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Soil organic carbon determination for Louisiana soils via portable x-ray fluorescence spectroscopy

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SOIL ORGANIC CARBON DETERMINATION FOR LOUISIANA SOILS VIA PORTABLE X-RAY FLUORESCENCE SPECTROSCOPY

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ABSTRACT

As scientists work to investigate the mechanisms underlying the depletion of carbon from terrestrial ecosystems, there has been an urgent call for the development of test methods that offer reduced analysis times for soil organic carbon (SOC) determinations. Traditional laboratory techniques can be time-consuming and costly, making high-volume sample analyses problematic. Portable x-ray fluorescence spectroscopy (PXRF) provides quantitative, multi-elemental data for soil samples in as little as 60 seconds; and, unlike other spectroscopic methods, differences in elemental concentrations between field-moist and oven-dry samples are considered to be negligible when soil moisture contents are less than 20%, by weight. This study aims to evaluate the performance of various SOC prediction models, constructed from PXRF elemental data from 300 soil samples collected from alluvium and loess parent materials found in Louisiana, USA. Elemental data, in addition to pH and depth measurements, were used in the construction of prediction models using multiple linear regression (MLR) analysis and principal components analysis (PCA) statistical techniques. Previous research indicates that the use of a stability index may enhance SOC prediction modeling capabilities. Therefore, models utilized relative elemental abundances on the basis on Zr and Ti concentrations, and performances were compared to those resulting from models developed from 'Raw' PXRF data. Results show that models constructed using field-moist PXRF elemental data provide excellent SOC prediction capabilities ($R > 0.90$) for both alluvium and loess datasets. Optimal performances resulted from the use of Ti as a stability index for field-moist datasets, producing accurate SOC predictions for both wet and dry validation sub-datasets. Findings indicate that PXRF elemental analysis, conducted under field conditions, provide for accurate SOC content determinations via MLR modeling of Louisiana alluvium and loess soil types examined in this study.

CHAPTER 1: INTRODUCTION

1.1 Soil organic carbon

Soils constitute the largest terrestrial reservoir of carbon on Earth (Goto et al., 1994). Carbon is a primary component of the organic fraction of soils, usually concentrated in the uppermost portion of soil profiles, due to the slow accumulation of dead and decaying plant and animal organic materials on the soil's surface. Carbon stored in soils and sediments is prevented from contributing to the absorption and radiation of thermal infrared energy, or heat energy, within Earth's atmosphere. This atmospheric process increases the insulative heating of the Earth, as the absorbed energy fails to escape into space. Carbon dioxide is one such 'greenhouse gas', whose levels have been on the rise since the dawn of the Industrial Revolution, due to natural and anthropogenic mechanisms (Vavrus et al., 2008).

Carbon species contributing to concentrations of greenhouse gases in the atmosphere are released from aquatic and terrestrial reservoirs as components of a complex carbon cycle (Galvez and Gaillardet, 2012). A number of factors are known to influence soil's ability to capture and retain these carbon stocks. These factors include temperature, soil acidity, exposure to oxidizing conditions, and other environmental conditions. Many studies are conducted to monitor soil carbon levels to examine how changing environmental conditions are affecting the quality of these carbon reserves. Areas having a high potential for rapid degradation of existing carbon reserves, causing large transfers of carbon from 'locked' lithospheric and hydrospheric carbon species to atmospheric species, are the subject of many environmental studies aimed at investigating the mechanisms controlling these processes. Such studies often require frequent monitoring of organic carbon reserves in soils, a process that may involve the collection of numerous soil samples, to be analyzed several times a year (Wang et al., 2012).

In the last decade, there has been an urgent call for the development of rapid methods for soil organic carbon (SOC) analysis (Bell and Worrall, 2009; Braakhekke et al., 2011; Yadav et al., 2009). The assessment and monitoring of soil carbon stocks has been a matter of primary importance to researchers in understanding the global carbon cycle and in determining those areas subject to deterioration, and release of carbon reserves to the atmosphere. With the evolution of 'carbon credit' programs, requiring mandatory reporting of carbon emissions, there has been an even greater demand for the development of more efficient carbon assessment techniques (Updegraff et al., 2005). Such techniques, applied to the analysis of soils, strive to provide a rapid method for high-volume sample processing, while minimizing time spent in the collection, preparation, and analysis of soil samples.

1.2 SOC determination methods

Traditional laboratory methods for SOC determination require the use of costly chemical reagents and large time allocations for laboratory analysis. When high-volume carbon assessments are desired, hundreds of soil samples are subject to procedures such as Walkley-Black or loss-on-ignition for the determination of organic carbon. Allocation of adequate laboratory time for these techniques can be problematic for high-volume sample analysis, especially for studies which require several sampling events over time in order to monitor carbon reserves.

Traditional laboratory techniques for soil organic carbon determination described in Methods of Soil Analysis Part III: Chemical Methods (Nelson and Sommers, 1996) can be time-consuming and costly. The Walkley-Black method, long considered the standard for SOC determination, involves the use of strong chemicals (i.e. chromic acid) and hazardous reagents (i.e. ferrous ammonium sulfate) to calculate SOC contents gravimetrically (Nelson and

Sommers, 1996). Other methods, such as loss-on-ignition (LOI) analysis, take up to 36 hours or more for organic matter determination (Nelson and Sommers, 1996). This method also involves the use of a standard conversion factor of 1.724, which assumes that organic carbon constitutes 58% of soil organic matter, by weight (Waxman and Stevens, 1930). The weight contribution of organic carbon has been found to vary greatly from this level, with possible variations in organic carbon contributions to soil organic matter likely requiring conversion factors ranging from 1.4 - 2.5, rather than the standard factor typically used (Pribyl, 2010). Additional testing is required to calculate exact SOC contents for soil samples, as a weight percentage of total soil organic matter.

Instrumental techniques for the determination of soil organic carbon contents have been developed for use under both laboratory and field settings. The Dumas method employs combustion to quantify total carbon contents by measuring carbon dioxide levels evolved from samples under high temperatures (~900^0C; Nelson and Sommers, 1996; Tiessen and Moir, 1993). This technique uses spectrophotometric detection to quantify the evolved CO_2, using thermal conductivity (TCD) or infrared (IR) detectors. A TCD measures differences in thermal conductivity between the evolved gas and a reference gas, converting the difference in temperature to the percentage of carbon present in the sample, while IR detectors quantify the infrared energy absorbed by carbon dioxide in the sample, then convert the decrease in detected IR energy to % carbon. This technique offers a high degree of accuracy for total carbon determinations. However, its use requires a laboratory setting and thorough drying and grinding of samples prior to analysis, making this method unsuitable for on-site soils analysis.

A technique that would allow for the collection of data from soil samples *in situ* would be ideal to for rapid SOC assessments. Data obtained from samples, with minimal pre-treatment, could then be subject to statistical analysis to determine SOC contents. Spectroscopic methods are commonly employed to identify and quantify specific elemental or molecular species, based on the intensity of the electromagnetic signals they detect. Additionally, portable spectroscopic instruments are available, that would allow for on-site data collection.

Visible near-infrared (VisNIR) spectroscopy is one such technique that allows for sample analysis to be conducted using a field-portable instrument. This instrumental method assesses the visible and near-infrared ranges of the electromagnetic spectrum for identification and quantification of functional groups or compounds present in soil samples. These species, when exposed to light, absorb energy at characteristic wavelengths. The application of electromagnetic radiation to samples produces electronic transitions within a molecule, causing electrons to occupy higher, less stable antibonding orbitals spectrum (Workmand and Springsteen, 1998). As the molecule loses this excess energy, through rotational and vibrational relaxation, the resultant electromagnetic spectral data can be evaluated to determine amounts of various species and organic functional groups within the analyzed sample.

1.3 X-ray fluorescence spectroscopy for soils analysis

X-ray fluorescence (XRF) spectroscopy uses x-rays to excite an element's inner orbital electron. As this electron is ejected by incident x-radiation, other electrons are forced to assume the excited electron's former position, causing a cascade effect that is detectable by the emission of secondary fluorescence particular to elements, with wavelength intensities corresponding quantitatively to abundances of individual elements (Jenkins and Winefordner, 1999). While XRF instruments are limited by their ability to accurately detect only those elements having an atomic number greater than or equal to 19, its broad suite of detectable species allows for multi-elemental data collection in ~60 seconds of analysis time.

By using the relative depletion/enrichment of certain elements throughout the soil profile, calculated from portable XRF (PXRF) elemental data, this study aims to assess the distribution of weatherable elements as they relate to SOC contents. By using an element that is known to remain relatively stable throughout a soil profile, being largely unaffected by the processes of chemical and physical weathering, the translocation of weatherable elemental components of soil mineralogical materials can be observed as their abundance increases or decreases with depth. Elemental data, normalized to stable element concentrations, may be useful in assessing these elemental relationships to soil organic carbon.

1.4 Statistical approaches to prediction modeling

Several statistical methods can be applied to develop prediction models, utilizing multiple categorical and continuous predictor variables to calculate dependent variable values (Johnson, 1998). The previous study by Weindorf et al. (2012) employed multiple regression analysis of Zr-normalized PXRF elemental data to predict SOC contents in soils developed in glacial outwash and volcanic materials. Such soils can be considered to demonstrate a relative uniformity within the soil profile, with the gradual breakdown of glacial materials into soil particles occurring mostly in place. Consequently, depth distributions of inorganic mineralogical materials within a soil profile may exhibit little relative heterogeneity, with significantly different elemental compositions being attributable to added materials, such as volcanic ash depositions, when not confined exclusively to the inorganic materials present in the sample.

Multiple linear regression (MLR) analysis is a statistical technique used to describe the manner in which a set of uncorrelated, or independent, variables relate to a dependent variable. Each predictor variable is designated a coefficient, and the summation of all independent variables, in addition to a set intercept value, provide a calculated estimation of the dependent variable. In this study, laboratory-measured soil organic carbon contents supply the dependent variable for which a highly variable set of elemental predictors, in addition to depth and pH measurement variables, are analyzed to provide a linear model to predict SOC contents. Multiple regression analysis describes how SOC levels in a soil sample increase or decrease based on how predictor variable values rise and fall, with SOC contents being calculated as a function of the independent predictor variables.

Another statistical technique, termed principal components analysis, provides a set of factors that can be used to calculate a dependent, predicted value. Principal components analysis (PCA) uses orthogonal transformation to identify sets of possibly-correlated values in order to generate a set of linearly-uncorrelated variables, called principal components. This allows for different levels of correlated elements to be grouped for use as components. Components subject to regression analysis describe how they contribute to the variability occurring in the dependent variable.

Application of the PCA method to PXRF elemental data, generated from soils that have experienced a layered, depositional genesis and development, may provide an enhanced view of elemental interactions of different fractions of soil with SOC. These alluvial and loess soils have undergone a slow pedogenesis in place, upon layered mineralogical materials. Elemental datasets arising from such soil profiles may be well-characterized by principal components analysis. If depositional events cause layers of soil to demonstrate relative uniformity between and within horizons, the principal components identified by the model may be able to describe these layers, and within them, distinguish the translocation of mineralogical (and organic matter-associated) materials throughout the soil profile.

An accurate account of the elemental composition of soil samples would allow for an increased potential to identify and characterize how such species are associated with organic materials, as they relate to the various inorganic materials present in the soil. This may allow for the construction of enhanced prediction modeling capabilities for inferring soil organic carbon concentrations.

The objectives of this study were to: 1) develop prediction models, based on PXRF elemental data, for soil organic carbon content determination in Louisiana soils originating from alluvium and loess parent material types, 2) evaluate the efficacy of two statistical modeling approaches, multiple linear regression and principal components analysis, for SOC prediction modeling, 3) examine how SOC prediction models constructed from oven-dry PXRF elemental data differ from those constructed through the use of field-moist PXRF data, 4) determine the usefulness of employing a stable-element index to represent the effects of chemical weathering on elemental translocations within the soil profile, by comparing SOC prediction model performances with those provided by un-treated elemental dataset models, and 5) describe the effects of moisture on prediction model performance by comparing both the observed differences in individual elemental PXRF concentrations obtained from field-moist and oven-dried preparations, and by identifying elemental variables that influence model prediction capabilities when applied to field-moist or oven-dry elemental datasets.

CHAPTER 2: REVIEW OF LITERATURE

2.1 Louisiana soils: general occurrence and features

Soil samples collected for this study were obtained from alluvial and loess sampling sites in the state of Louisiana. While precipitation, climate, and land use conditions can be very similar for these two soil types, their development or pedogenesis involves different processes, affecting the elemental, physical, and chemical interactions at work within these entities. The climate of Louisiana is moist and subtropical, with average annual temperatures from 17 °C in the northern part of the state to 22 °C in coastal areas. Average annual rainfall ranges from 119 cm in the northwestern part of the state to 180 cm in isolated southeastern areas (Soil Survey Staff, 2012). Soils in Louisiana have been grouped into six major soil areas, based on landscape setting and parent material; i.e., coastal plain, flatwoods, coastal prairie, loess hills, recent alluvium, and coastal marsh (Amacher et al., 1989). Soils experience thermic and hyperthermic temperature regimes in Louisiana, with udic or aquic moisture regimes (Weindorf, 2008). Smectite, illite, and kaolinite dominate clay mineralogies in the state, with variable relative abundances (Roberts, 1985). Taxonomic classifications and other information regarding the soils series used in this study can be seen in Table 2.1 (Soil Survey Staff, 2012).

Louisiana loess soils consist of Tertiary materials, deposited during periods ranging from the Paleocene to the Pliocene eras in geologic time (Weindorf, 2008). Louisiana alluvial soils are all Quaternary-age materials, being deposited during the Holocene period (12,000 – 11,150 million years ago). The historical weathering of Tertiary loess soils by alluvial bodies can clearly be seen in Figure 2.1, which shows the underlying geologies of Louisiana soils. This process can especially be seen in the Northeastern region of the state, where the Red, Ouachita, and Mississippi Rivers deposited alluvial sediments, carving out reliefs in Tertiary-age loess soils.

Table 2.1 Soil series, texture, and taxonomic classification for sampling sites in Louisiana.

Parent material	Site	Soil series	Soil texture	Taxonomic classification
Alluvium	1	Commerce	Silt loam	Fine-silty, mixed, superactive, nonacid, thermic Fluvaquentic Endoaquepts
		Schriever	Clay	Very-fine, smectitic, hyperthermic Chromic Epiaquerts
		Gramercy	Silty clay loam	Fine, smectitic, hyperthermic Chromic Epiaquerts
	2	Norwood	Silt loam	Fine-silty, mixed, superactive, hyperthermic Fluventic Eutrudepts
		Latanier	Silty clay loam	Clayey over loamy, smectitic over mixed, superactive, thermic Oxyaquic Hapluderts
		Moreland	Silty clay loam	Very-fine, smectitic, thermic Oxyaquic Hapluderts
	3	Tunica	Silty clay	Clayey over loamy, smectitic over mixed, superactive, nonacid, thermic Vertic Epiaquepts
		Sharkey	Clay	Very-fine, smectitic, thermic Chromic Epiaquerts
Loess	1	Tangi	Silt loam	Fine-silty, mixed, semiactive, thermic Typic Fragiudults
		Lytle	Silt loam	Fine-loamy, siliceous, semiactive, thermic Typic Paleudults
		Fluker	Silt loam	Fine-silty, siliceous, active, thermic Aquic Fraglossudalfs
	2	Oprairie	Silt	Fine-silty, mixed, semiactive, thermic Fragiaquic Glossudalfs
		Jeanerette	Silt loam	Fine-silty, mixed, superactive, thermic Typic Argiaquolls
	3	Gigger	Silt loam	Fine-silty, mixed, active, thermic Typic Fragiudalfs
		Calhoun	Silt loam	Fine-silty, mixed, active, thermic Typic Glossaqualfs
		Foley	Silt loam	Fine-silty, mixed, active, thermic Albic Glossic Natraqualfs

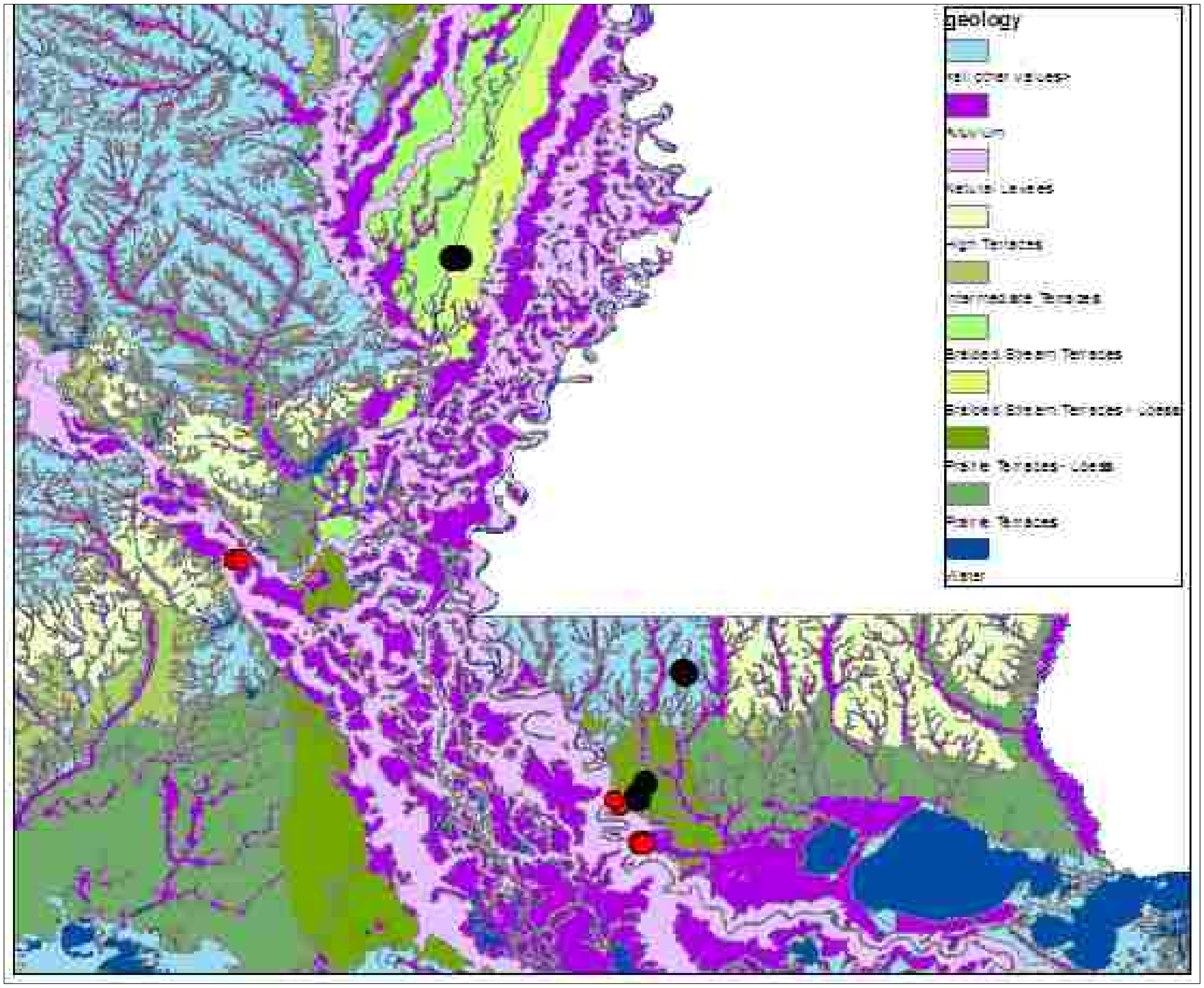

Figure 2.1 Map of underlying geologic materials found in Louisiana. Locations for soil core collection are indicated by red and black circles, for alluvium and loess, respectively.

2.2 Methods for SOC determination

Spectroscopic techniques, such as visible near-infrared (VisNIR) spectroscopy have been used to quantify organic carbon levels in soils, based on functional groups of carbon's characteristic absorption wavelengths in the electromagnetic Prediction models generated by

VisNIR data are positively correlated to laboratory-determined SOC levels, with R^2 values as high as 0.84 (RMSE=0.92%), 0.90 (RMSE=0.6%), and 0.85 (Viscarra-Rossel and Behrens, 2010; Cozzolino and Moron, 2006; Vohland et al., 2011), for models constructed using dried soil samples.

The use of localized samples for prediction model calibration has been shown to improve prediction results (Sankey et al., 2008). While portable VisNIR units are available, a technique that experiences minimal distortion from the influence of soil moisture on spectroscopic data would constitute a more robust method for estimating SOC contents in field-moist soil samples.

2.3 Soils characterization using PXRF spectroscopy

Applied to soils, PXRF spectroscopy has provided elemental information used to characterize a number of soil chemical and physical features (Clark et al., 1999; Gunicheva et al., 1995; Kalnichy and Singhvi, 2001). PXRF data and relative elemental abundances have been used to determine boundaries for soil horizon delineation, estimate gypsum content, and determine soil textural fractions, in addition to other soil physicochemical features (Weindorf et al., 2012; Zhu et al., 2011; Weindorf et al., 2009).

Weindorf et al. (2009) found that horizons can be differentiated by analyzing relative elemental abundances observed within a soil profile, calculated on the basis of PXRF elemental concentrations. This provides an especially useful technique when profiles lack distinct differences in color, texture, or structural features, often making field characterizations difficult. Louisiana soils can be problematic for field characterization, due to the limited presence of recognizable indicators of horizonation. Even so, a principal components analysis (PCA) method was successful in differentiating Louisiana alluvial soil horizons using PXRF elemental data. Horizonation was approached via application of the PCA technique to data describing samples' clay content, laboratory analysis data (including pH, organic carbon, and electrical conductivity measurements), and PXRF elemental data, producing results that consistently agreed with official soil series descriptions, as provided by the Natural Resources Conservation Service (NRCS).

Previous research by Weindorf et al. (2012) found that PXRF elemental data, collected from soil profiles in northern Idaho and southern Alaska, correlated very strongly with organic carbon contents (determined by traditional lab analysis) after normalization of data to PXRF concentrations of Zr. Normalization was conducted in order to observe the re/distribution of elements detected by PXRF spectroscopy, relative to an element considered to remain stable throughout soil profiles. Zirconium is known to demonstrate minimal translocation under the influence of chemical weathering, thus providing an index of stability upon which to assess the relative enrichment and depletion of additional elements throughout a soil profile (Smeck and Wilding, 1980). As such, Zr concentrations have been used to assess parent material uniformity (Marsan et al., 1988). Results from multiple regression analysis models used in the previous study showed excellent predictive performances (R^2 = 0.93-0.99, RMSE = 1.3-2.7%), with relative amounts of Mn, Zn, and Sr constituting significant predictor variables in SOC determination models developed on Alaskan, Idahoan, and combined soil sample datasets.

Soils originating from the different parent material types (in the case of the previous study: volcanic ash and glacial outwash) produced slightly different prediction modeling parameters and validation performances. These models were generated from elemental data collected from soils formed mostly in place, from the gradual breakdown of underlying geologic parent materials, with upper horizons receiving additional inputs of volcanic ash and/or loess depositions. Prediction model performance may suffer dramatically upon application to soil samples originating from highly heterogeneous soil mineralogical materials, such as those produced by depositional events. Such soils commonly experience differences in elemental abundances, particle size, and organic matter levels, compounded by the effects of physical and chemical weathering, temperature, and precipitation inputs on their elemental constituents seen throughout soil profiles (Van Den Broek et al., 1968; Smalley et al., 2009; Xu et al., 2012). Loessal and alluvial soils found in Louisiana represent depositional soils, formed in sediments transported by the forces of wind and water, respectively..

2.4 Use of stable element indices to evaluate chemical weathering extent in soils

The variations in relative elemental abundances observed in the previous study correlated closely with variations in SOC distributions. The soils from Idaho and Alaska exhibit a high incidence of larger soil particles (according to soil series textural classifications) in contrast to the high percentages of silt and clay-sized particles found in the Louisiana soils. Coarse soil particles are apt to result in a more variable PXRF spectral detection of elemental data, due to the small size of the PXRF scanning window through which fluorescent radiation is detected and analyzed for elemental quantification (Glanzman and Closs, 2007). Finer soil particles provide a greater overall surface area for x-ray interaction, and the greater number of soil particles found in the scanning window allow for a higher variability of the soil matrix to be captured by individual PXRF scans, so long as the soil is suitably homogenized prior to analysis. These fine, particulate soils may decrease the potential for bias that larger particles would invoke, providing a more representative sample for PXRF scanning analysis.

The initial research using PXRF elemental data for SOC prediction was conducted on soils generated by a slow pedogenesis of mineralogical materials *in situ*. Climatic, mineralogical, and other conditions in these areas commonly led to physically and morphologically distinct zones of enrichment and depletion, especially in the case of spodosols (Lundstrom et al., 2000). The differences in Zr-normalized elemental distributions, resulting from the processes of podsolization, exhibit relatively clear patterns of translocation and accumulation of elements within the profile. The alluvial and loess soils found in Louisiana rarely exhibit such clear, visible boundaries of elemental enrichment/depletion and horizonation, compared to those seen in spodosols. While loess soils experience upbuilding pedogenesis, similarly to the Spodosols examined in the previous study, the elevated deposition rates are higher than the leaching rate of these materials into the subsoil, causing them to be classified as Inceptisols. Such soils have relatively high surface Fe oxides which act to accumulate and protect organic matter near the soil surface, before these materials are leached downwards in the profile (Eger et al., 2012). Pedogenic similarities between the Louisiana loess soils and those of the earlier study will be evaluated in their prediction model performances using PXRF elemental data.

The elemental data collected from alluvial and loess soils in the current study may demonstrate different correlations of translocated elemental constituents with soil organic carbon contents, compared to prediction models constructed using the Alaska and Idaho PXRF data (Weindorf et al., 2012; Paul et al., 2008). The different physicochemical conditions acting upon a soil, such as variable water table heights, land use history, soil acidity, and organic matter fractional components, may be related to the relative amounts of weatherable elemental materials as they are translocated downwards within the soil profile (Whitfield et al., 2006; White et al., 1995a; White et al., 1995b). Additionally, soil organic matter may experience dissolution of acid- or temperature-sensitive fractions in alluvial and loess soils experiencing variable physicochemical conditions. Elemental constituents associated with these labile organic matter fractions are released into the soil water solution, with certain elements having been identified as being more closely associated with these labile and recalcitrant fractions (Wagai et al., 2008; Donisa et al., 2003; Nael et al, 2009). The current study aims to account for the influence of such factors by including variables for depth, moisture content, and soil reaction (pH level) in modeling datasets, in addition to employing stable element indices for the construction of SOC prediction models.

In a 2003 study, Stiles et al., found that Zr and Ti elements, considered to maintain relatively stable concentrations throughout a soil profile, are influenced differently by the effects of weathering, and when these species are used as a stable element index, they can demonstrate very different distribution patters. As long as Zr compounds are not subjected to prolonged alkaline leaching, Zr compounds remain intact within soil profiles (Carroll, 1953). Because Zr is primarily affected by processes of physical weathering, its mineralogical origin (i.e. zircon grains) and consequential recalcitrance in soils, causes Zr to commonly be employed as a stable element index, in order to observe the relative translocation of additional elements. Zirconium's resistance to chemical weathering effects makes this element a prime stability index choice for soils with high amounts of sand and coarse-sized silt particles (Milnes and Fitzpatrick, 1989; Hodson, 2002). Titanium, on the other hand, found mainly in rutile grains, is more vulnerable to the effects of chemical weathering processes (Cornu et al., 1999), but is found to remain more stable than Zr in finer-textured soil profiles that have undergone prolonged physical weathering (Dixon et al., 1989; Stiles et al., 2003; Taboadah et al., 2006).

Additionally, profile contamination by loess depositions of coarser-textured materials at the soil surface, can make Zr concentrations higher in these upper layers (Marx and McGowan, 2005). As soils in the current study are differentiated by their parent material type, alluvial soils (with samples collected for this study demonstrating higher levels of fine-textured particles) and loess soils (with greater amounts of sand and coarse silt in the upper portions of the profile) may illustrate the effects of using different elements (Zr and Ti) for normalization of elemental data, in order to observe the translocations taking place in the soil profile due to the processes of weathering. This study will evaluate the use of both Zr and Ti as stability indices, to correlate the relative enrichment/depletion patterns of additional elements in multiple regression models with soil organic carbon contents.

2.5 Effects of soil moisture on PXRF elemental readings

Previous research has indicated that dissimilarities do exist between field-portable XRF (PXRF) scanning results from *in situ*, compared to dry, soil sample analysis (Bernick et al., 1999). Different methods have been proposed for the correction of PXRF data to soil moisture effects on spectral data, for samples exhibiting moisture contents of less than 20% (Ge et al., 2005; Bastos et al., 2012). Portable XRF instruments use specialized programming to correct for variations in soil chemistry from site-to-site. Additionally, EPA method 6200 states that moisture contents >20% may negatively affect PXRF readings; however, variations in soil chemistry (including water content) are already automatically calibrated for by the instrument (USEPA, 2007). The Compton normalization is one such calibration technique employed by spectroscopic detection methods to correct for soil moisture and other differences related to soil geochemistry (Innov-X Systems, 2010; Potts and West, 2008).

For soils experiencing moisture contents greater than 20%, a method of correction has been determined to account for the scattering of radiation that takes place when moisture is present during PXRF analysis of soil samples. Detected concentrations of certain elements (Cu, Zn, and Sr) can be corrected for in samples exhibiting moisture contents of less than 20% (Weindorf et al., 2011; Ge et al., 2005; USEPA, 2007). This correction can be applied to field-moist data prior to construction of 'Raw' prediction models. However, as overall elemental concentrations are normalized to same sample stable-element indices (in the Zr-stable and Ti-stable treatment models), this moisture correction is rendered ineffective, as the correction factor (determined by gravimetric moisture content analysis) undergoes a uniform application to PXRF elemental data, irrespective of the possible differential moisture effects of individual elements in resultant field-moist elemental readings. For example,: a field-moist PXRF concentration of 1200ppm is recorded for Ti, along with a concentration of 250 for Ba, in a soil found to have a moisture content of 12%. The correction of these elements, based on moisture content, is as follows:

$$[Ti] \times [1 + (12\%/100\%)] \rightarrow 1200ppm \times 1.12 = 1344ppm\ Ti$$

$$[Ba] \times [1 + (12\%/100\%)] \rightarrow 250ppm \times 1.12 = 280ppm\ Ba$$

When Ba undergoes normalization to Ti concentrations, the elemental ratios are calculated as follows:

Corrected PXRF elemental ratio:	Uncorrected PXRF elemental ratio:
[Ba]/[[Ti] → 250ppm /1200ppm	[correctedBa]/[correctedTi] → 280ppm/1344ppm
= 0.2083	= 0.2083

CHAPTER 3: MATERIALS AND METHODS

3.1 Site selection and soil core sampling

A total of 30 soil cores, 15 each from alluvium and loess soils in Louisiana, were collected in 2012. Figure 3.1 shows the locations of the six sampling sites. At each site, five cores (0-60+ cm) were collected using a hydraulic Giddings Probe. Sampling locations were geo-located using an eTrex model (Garmin, Olathe, KS, USA) global positioning system (GPS) receiver. Intact soil cores were placed in sample trays and bound with plastic wrap for transport to the laboratory for further analysis.

3.2 Soil sample analysis

3.2.1 PXRF analysis

Field-moist soil cores were scanned in duplicate, in 5cm increments, with clear plastic film separating the moist soil from the PXRF scanning window, to prevent contamination of scans from smeared soil obscuring the scanning window. A Delta Premium portable x-ray fluorescence spectrometer (PXRF; Olympus Innov-X, Woburn, MA, USA) was used in this study. This device employs a Ta/Au x-ray tube operated at ~15–40 KeV, for x-ray generation. Scanning consisted of 30 seconds per beam, with the light element analysis program (LEAP) engaged in a software configuration termed ‘soil mode’ (Innov-X Systems, 2010). This proprietary program corrects for soil chemistry variability, as part of the soil matrix, for optimized elemental quantification. The Delta PXRF was calibrated using a stainless steel ‘316’ alloy clip (containing 16.130% Cr, 1.780% Mn, 68.760% Fe, 10.420% Ni, 0.200% Cu, and 2.100% Mo) tightly fitted over the 2 cm aperture. Two National Institute of Standards and Technology (NIST) standard reference soils (NIST 2702 and 2781) were used to validate the accuracy of the PXRF prior to sample scanning, with recalibration and validation additionally being conducted after every 20 scans.

After initial scanning of field-moist core samples, cores were divided into ten segments, at 5cm depth increments, and subjected to gravimetric moisture content analysis, per traditional laboratory methods (Black, 1965). Samples were then dried at 105°C for 24 hours, and ground to pass through a 2mm sieve, before being subjected to further analyses. A second set of PXRF scans were collected in duplicate from oven-dry samples, to provide additional elemental datasets for prediction modeling.

3.2.2 Laboratory determination of soil carbon contents

3.2.2.1 Identification and removal of inorganic carbon. To test for the presence of inorganic carbon, soil samples were subject to HCl effervescence testing. Sampled depths from 5 of 30 total cores, collected from alluvial Site 2 (see Figure 2.1), tested positive for carbonates. The 39 samples from these five cores were treated by HCl applications to facilitate carbonate destruction, per traditional analysis methods (Nelson and Sommers, 1996).

3.2.2.2 Instrumental analysis for total carbon determination. Samples were analyzed for total carbon content via the Dumas high-temperature combustion method, using an Elementar Vario El Cube CN Analyzer (Hanau, Germany) (Soil Survey Staff, 1993; Pansu et al, 2001). As removal of inorganic carbon ensures that all remaining carbon found is in organic form, total carbon concentrations provided the laboratory-measured organic carbon used in this study.

3.2.3 pH determination

Soil reaction (pH) measurements were made using the saturated paste method, with a four-hour equilibration time following additions of deionized water (Sparks e al., 1996). Sample pH readings were taken using a Control Company Treaceable bench/portable pH meter (Friendswood, TX, USA).

3.3 Statistical techniques

3.3.1 Characterization of multivariate data

Multivariate analysis of variance (MANOVA) techniques were used to evaluate significant elemental differences between the parent material types. An autoregressive covariance structural analysis was employed in the MANOVA analyses to determine significant elemental differences between alluvial and loessal PXRF datasets. Additional differences in elemental soil constituents were evaluated by application of the MANOVA technique, to compare PXRF readings at various depth intervals, sampling sites, and between individual soil cores within alluvial and loess elemental datasets. All statistical procedures were performed using SAS version 9.3 (Cary, North Carolina).

3.3.2 SOC prediction modeling

3.3.2.1 Data preparation. Elemental data from 300 total soil samples were collected from the upper 5-50cm of 30 soil cores taken from alluvial and loess soils in Louisiana. Data resulting from PXRF scanning and traditional laboratory methods were analyzed for normal distribution, using the Shapiro-Wilk test of normality, with log transformations applied to correct elemental datasets failing to exhibit normal distribution of the means. The modeling dataset was comprised of the fourteen elements (consistently demonstrating PXRF elemental concentrations within the instrument's limits of detection), in addition to variables representing depth and soil reaction (pH level). Separate datasets were created using stable-element treatments, which involved normalization of elemental data to Zr and Ti concentrations observed for each sample. This produced 'Zr-stable' and 'Ti-stable' datasets containing each of the 150 samples collected from each parent material. These three treatments, termed 'Raw', Zr-stable, and Ti-stable datasets (for the purposes of this study) were used in constructing separate SOC prediction models for alluvial and loess soil datasets.

Calculations for means and standard deviations of elemental data were conducted on whole datasets. Modeling datasets were divided into generation and validation sub-datasets, with 20% of the total parent material dataset randomly selected and removed from the generation dataset, to be used for validation of prediction models. This produces datasets comprised of 120 samples for model generation and 30 samples for validation, for each parent material soil type.

3.3.2.2 Multiple linear regression analysis. A stepwise, multiple linear regression (MLR) analysis was applied to each generation dataset to determine the statistical modeling parameters producing the optimal predictive performance for each model's generation. The MLR technique selects predictor variables that are independently correlated to the independent variable (i.e. SOC content). The model selectively includes the predictor variable contributing the greatest correlated relationship to laboratory-measured SOC contents, by 'kicking-out' variables that demonstrate multiple-collinearity; collinear variables are unable to provide an independent predictor for SOC modeling when used in combination. Therefore, only inclusion of the variable demonstrating the strongest correlation with the dependent variable is used in the MLR model, with less significant collinear variables being excluded. In addition to the 14 elemental variables (K, Ca, Ti, Cr, Mn, Fe, Co, Zn, Rb, Sr, Ba, Pb, Cu, and Zr) included in the multiple regression procedures, variables for pH, and depth (in cm) were also included in all prediction modeling datasets.

All prediction models were alternately subjected to log-normalization of: 1) no variables, 2) the independent variable (laboratory-measured SOC percentage), 3) dependent variables

(PXRF elemental variables, in addition to depth and pH measurements), and 4) both independent and dependent variables. Prediction models were then assessed for statistical validity by testing prediction value residuals for normality, with models achieving a Shapiro-Wilk value (Pr < W) greater than 0.05 being considered statistically valid.

Prediction models were applied to both oven-dry validation sub-datasets, as well as validation datasets resulting from field-moist core scanning. Field-moist datasets (N=150 for loess soils, N=111 for alluvial soils, excluding data from samples containing carbonates) were also used for the construction of additional MLR prediction models, with separate models generated from Raw, Ti-stable, and Zr-stable datasets. Sub-datasets were assembled using the same observations for generation and validations datasets that were used in the oven-dry prediction modeling, with samples exhibiting a presence of carbonates removed from inclusion in field-moist model generation and validation datasets (generation datasets: N= 120 and 88; and validation datasets: N= 30 and 23, for loess and alluvial wet datasets, respectively).

3.3.2.3 Principal components analysis. The same datasets used for multiple linear regression SOC prediction modeling (described in the previous section; comprised of 'Raw', Ti-stable, and Zr-stable datasets for alluvial and loess parent material types) were used for prediction model construction using the principal components analysis (PCA) technique for data characterization. Using this method, principal components (or factors) are determined that are assumed to represent a process or feature which describes a specific source of variation observed in the dataset. Varimax rotation was used to maximize the variance in the loadings (or weights) of each factor, to provide for the generation of a more robust prediction model (Davis, 2002). This was accomplished by use of the varimax option in the factor procedure, available in SAS version 9.3 (Cary, North Carolina, USA). Components derived from the covariance matrix having eigenvalues greater than one were considered to be significant for inclusion in prediction models. This method for component selection, termed the Kaiser/Guttman criterion, is commonly used in the analysis of geochemical data, oftentimes providing superior results over other methods (Reimann et al., 2002).

To determine the relationship between selected components and SOC content, factors were subject to multiple linear regression analysis. This allowed for coefficients to be assigned to factors, in to calculate appropriate prediction modeling parameters. Prediction models were then assessed for statistical validity by testing resultant model residual values for normality, with models achieving a Shapiro-Wilk value $(Pr < W) > 0.05$ being considered statistically valid. Validations of model performances on oven-dry and field-moist datasets were conducted using the same observations used in the multiple linear regression (MLR) approach, described in section 3.3.2.1.

3.3.3 Elemental differences between wet and dry samples and modeling effects

Parent material oven-dry and field-moist datasets were examined to determine whether increasing moisture contents for individual soil samples were significantly correlated to differences in elemental concentrations detected between PXRF datasets. Elements were separately analyzed to calculate the extent to which field-moist data was correlated to oven-dry PXRF elemental concentrations for each sample. To test whether moisture exhibited a significant effect on prediction model accuracy, the absolute value of residuals (resulting from differences between model-predicted and laboratory-measured SOC values) were compared to sample moisture contents, to determine whether increasing moisture elicits larger discrepancies between predicted and actual SOC values.

CHAPTER 4: RESULTS AND DISCUSSION

4.1 Comparison of PXRF elemental data for alluvial and loessal datasets

4.1.1 General statistical analyses

Alluvial and loessal datasets were subject to statistical analyses to determine mean concentrations of elements, as detected by PXRF analysis, in addition to mean values for soil organic carbon (SOC) and pH, as determined by traditional laboratory methods. Table 4.1.1 provides descriptive statistics for SOC and pH values for alluvial and loessal datasets. Alluvial soil samples showed higher mean concentrations of organic carbon overall (0.96 vs. 0.64 percent, for alluvium and loess, respectively), along with neutral pH values. Determination of the mean pH value for the loessal dataset classifies these soils as very strongly acidic, according to NRCS Soil Survey Manual specifications (e.g. 4.93 vs. 6.79, for loessal and alluvial datasets, respectively; Soil Survey Division Staff, 1993).

Table 4.1.1 Descriptive statistics are provided for laboratory-measured soil organic carbon percentages (SOC) and pH measurements for Louisiana soil core samples collected in this study, with means calculated for each core (N=15, for each parent material). Data were collected from each of ten 5cm sampling depths (0-50cm). Data include mean, standard deviation (SD), and Shapiro-Wilk (Pr < W) test of normality results.

alluvial dataset			
variable	mean	SD	Pr < W
pH	6.79	0.90	<0.0001
SOC	0.96	0.80	<0.0001
loessal dataset			
variable	mean	SD	Pr < W
pH	4.93	0.68	0.0047
SOC	0.64	0.59	<0.0001

Loessal soils, commonly exhibiting lower pH values (compared to those observed in alluvial soils), experience increased leaching of elements found in the humic acid organic matter fraction, which is more vulnerable to degradation under low pH conditions. This breakdown of organic matter allows for water-soluble elemental macronutrient constituents, such as calcium, to be translocated down and away from the soil surface (Schroth et al.,2007). Donisa et al. (2003) found that, although Pb and Zn are subject to leaching in the soluble organic matter fraction upon exposure to low pH conditions, they can be detected at more stable levels in the courser-textured soil particle size fraction of soils. So while Ca concentrations in an acidic soil profile may experience significant translocation, being strongly associate with dissolved organic matter (DOC), other elements that associate with DOC (such as Pb or Zn) should provide a more consistent variable for prediction modeling, being more easily detectable by spectroscopic methods. Indeed, Zn is thought to facilitate multiple interactions with SOC-associated elements in organic-rich surface soils (Martinez et al., 2006).

Loessal soils typically demonstrate a decrease in sand percentages with depth. These particles remain in place, while smaller-sized particles are subject to downward translocations in response to the actions of physical weathering. Due to the upper portions of loess soil profiles experiencing higher sand concentrations, compared to lower depths, these soils would be expected to exhibit greater variabilities in Pb, Zn, and Ca stable-element ratios throughout, when compared to these ratios in alluvial datasets, due to the higher weathering rates causing depletion of these elements in from upper portions of loess soils. Soil organic matter fractions in hydromorphic alluvial soils undergo a more gradual deterioration under reducing conditions, causing a more uniform translocation of constituent elements downward through the profile (Oliva et al., 1999),.

In addition to SOC content and pH, a number of elements were found to exhibit differing concentrations in the different soil parent material types. Descriptive statistics for parent material elemental concentrations, as detected by PXRF elemental analysis on dry soil samples, can be found in Table 4.1.2, along with statistics for wet PXRF elemental datasets. Alluvial and loess parent materials demonstrated differing concentrations of elements detected by PXRF analysis, with alluvial soil samples exhibiting higher mean values, compared to loess sample datasets, for all elements.

Two elements of interest to this study, Ti and Zr, were found to experience largely different mean concentrations between the two parent material datasets. These elements are used as indices of stability, to observe the relative translocation of elemental ratios downwards through the soil profile, in response to the effects of weathering. The scale of Ti and Zr concentrations are quite different (~2600 vs. ~300 mg kg^{-1}, for Ti and Zr, respectively), and so will allow for different levels of resolution to observe the enrichment/depletion of mobile elemental species within SOC modeling datasets, with the larger values of Ti providing an index with a broad range upon which to monitor subtle difference in elemental ratio values. The narrower scale provided by Zr-normalization will offer a more general view of elemental ratio differences within datasets.

4.1.2 MANOVA results

Results from multivariate analysis of variance (MANOVA) for wet and dry datasets for alluvium and loess can be seen in Table 4.1.3. Comparisons between the alluvium and loess datasets indicate that the differences observed in elemental values between 1) parent material types, and 2) sampling depths, can be attributed to particular variables. Characteristic root vector

Table 4.1.2 Descriptive statistics are provided for PXRF elemental datasets for Louisiana alluvium and loess, with concentrations given in mg/kg. Wet and dry analysis results include mean elemental values and standard deviations (SD) for each dataset. Each dry dataset, along with the loess wet dataset, is comprised of N=150 samples. Due to the removal of scans resulting from carbonate-containing core samples, the alluvial wet dataset includes N=111 observations.

Oven-dry datasets									
	Alluvium					Loess			
Element	Mean	SD	SW	Pr < W	Element	Mean	SD	SW	Pr < W
K	12826	2078	0.91	<0.0001	K	8057	1709	0.98	0.0247
Ca	5330	2128	0.81	<0.0001	Ca	1122	551	0.97	0.0019
Ti	2998	520	0.94	<0.0001	Ti	3752	325	0.99	0.4518
Cr	56	15	0.97	0.0041	Cr	48	7	0.99	0.3747
Mn	337	152	0.89	<0.0001	Mn	478	440	0.79	<0.0001
Fe	20579	8903	0.93	<0.0001	Fe	16597	7103	0.90	<0.0001
Co	413	169	0.94	<0.0001	Co	339	139	0.93	<0.0001
Zn	73	57	0.66	<0.0001	Zn	37	11	0.98	0.0857
Rb	95	22	0.96	0.0002	Rb	63	12	0.97	0.0027
Sr	134	36	0.92	<0.0001	Sr	80	20	0.92	<0.0001
Ba	303	73	0.98	0.0193	Ba	259	35	1.00	0.0313
Pb	19	7	0.83	<0.0001	Pb	19	5	0.79	<0.0001
Cu	28	11	0.75	<0.0001	Cu	22	6	0.98	0.0439
Zr	386	122	0.95	<0.0001	Zr	692	105	0.98	0.0162

Field-moist datasets									
	Alluvium					Loess			
element	mean	SD	SW	Pr < W	element	mean	SD	SW	Pr < W
K	11921	1435	0.91	<0.0001	K	8451	1994	0.98	0.077
Ca	4171	1139	0.86	<0.0001	Ca	966	649	0.92	<0.0001
Ti	2556	397	0.96	0.0013	Ti	3606	451	0.99	0.4558
Cr	45	10	0.96	0.0014	Cr	42	8	0.99	0.5107
Mn	238	163	0.77	<0.0001	Mn	380	386	0.75	<0.0001
Fe	14638	5099	0.97	0.0085	Fe	13635	6070	0.94	<0.0001
Co	270	100	0.96	0.002	Co	253	112	0.95	<0.0001
Zn	57	40	0.61	<0.0001	Zn	30	10	0.98	0.1024
Rb	70	11	9805.00	0.1035	Rb	50	11	0.99	0.4044
Sr	105	27	0.96	0.0015	Sr	62	17	0.96	0.0007
Ba	273	46	0.97	0.0316	Ba	232	42	0.95	<0.0001
Pb	12	5	0.92	<0.0001	Pb	13	4	0.95	<0.0001
Cu	17	9	0.55	<0.0001	Cu	15	5	0.98	0.0437
Zr	269	90	0.95	0.0006	Zr	531	88	0.99	0.2895

values provide the degree (given as a percentage) to which the variability between the datasets can be explained by certain variables. Significant differences in elemental values between parent material types were confined to Cu concentrations, in both wet and dry datasets. Results from MANOVA analysis of elemental distributions by depth, between parent material types, show that the concentrations of Rb, Sr, and Pb observed in the dry datasets are significantly different in their distributions between 0-50cm. While these same three elements showed similar trends in wet datasets, the overall variance of these elements was not found to be significant, as indicated by its associated Wilks' Lambda value (Pr < F) being > 0.05.

Table 4.1.3 Characteristic root vector values are provided as a result of MANOVA analysis of Louisiana alluvium and loess PXRF elemental data. Analyses were conducted upon dry and wet datasets, separately. Values shown in bold indicate relatively significant contributors to MANOVA root vector characterizations.

	alluvial data		loessal data	
Element	overall	by depth	overall	by depth
K	<0.0001	<0.0001	<0.0001	<0.0001
Ca	<0.0001	0.0002	<0.0001	-0.0001
Ti	<0.0001	0.0002	0.0004	0.0003
Cr	0.0021	0.0012	-0.0025	0.0014
Mn	-0.0003	0.0006	0.0005	<0.0001
Fe	<0.0001	<0.0001	<0.0001	<0.0001
Co	-0.0004	-0.0024	0.0007	<0.0001
Zn	0.0028	-0.0058	-0.0020	0.0042
Rb	<0.0001	**0.0307**	0.0080	**0.0232**
Sr	-0.0002	**-0.0227**	-0.0027	**0.0214**
Ba	0.0064	0.0061	-0.0078	-0.0036
Pb	-0.0052	**0.0142**	0.0036	**-0.0128**
Cu	**-0.0162**	**0.0132**	**0.0158**	0.0096
Zr	0.0003	0.0007	0.0000	-0.0004
Characteristic root	59.20	11.83	39.03	6.00
Percent	100.00	78.84	74.82	63.22
Wilks' Lambda	<.0001	0.0227	<.0001	0.1074

4.1.3 Multicollinearity testing results

Multicollinearity occurs when interdependencies are observed within a set of variables. Such intercorrelations would jeopardize the integrity of multiple linear regression models, as variables are assumed to demonstrate an independent relationship to the dependent variable. Although the MLR technique used in this study excludes variables demonstrating intercorrelations, determination of such relationships within datasets will assist in the interpretation of MLR and PCA prediction model performances.

Results from multicollinearity testing of the datasets are given in Tables 4.1.4.1 and 4.1.4.2, for alluvial and loessal datasets, respectively. Analysis results show that elements in the dry alluvial dataset, in addition to the dry loess dataset, had statistically significant degrees of multicollinearity (indicated by p values > 0.90). Analysis of wet datasets highlighted the occurrence of multicollinearities between alluvial variables and loess variables. These observations will be used to discern possible explanations for prediction model underperformances.

4.2 Prediction modeling for SOC content using multiple regression analysis

Models were constructed using Raw, Ti-stable, and Zr-stable datasets, comprised of 80% of observations for alluvial and loess sampling sets. Tables 4.2.1.1 and 4.2.1.2 show the models generated by stepwise selection using MLR analysis of raw elemental variables, depth, and pH to predict SOC contents in separate alluvial and loess prediction models. Model validity was assessed by confirmation of a normal distribution of residual values between predicted and observed SOC contents, with models demonstrating Shapiro-Wilk test (Pr < W) values of < 0.05 considered to be invalid and unsuitable for SOC modeling. Hereafter, references to model oven-dry soil samples will be referred to as “dry”. Datasets utilizing field-moist PXRF data will

Table 4.1.4.1 Results from multicollinearity analysis of PXRF elemental data are provided. Results from analyses conducted on Raw alluvial datasets are shown for Louisiana soil samples.

Pearson Correlation Coefficients, N = 150

Prob > |r| under H0: Rho=0

dry	Depth	K	Ca	Ti	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	Zr	pH
Depth	1.000	0.117	0.257	0.111	0.187	0.160	0.207	0.228	-0.132	0.054	-0.054	0.150	-0.284	0.049	-0.155	0.381
		0.152	0.002	0.178	0.022	0.050	0.011	0.005	0.107	0.515	0.515	0.067	0.000	0.549	0.059	<.0001
K	0.117	1.000	0.077	0.822	0.677	0.663	0.808	0.790	0.165	0.798	-0.199	0.592	0.268	0.440	-0.635	0.110
	0.152		0.350	<.0001	<.0001	<.0001	<.0001	<.0001	0.044	<.0001	0.015	<.0001	0.001	<.0001	<.0001	0.182
Ca	0.257	0.077	1.000	0.241	-0.167	0.172	-0.103	-0.078	-0.250	-0.281	-0.400	-0.374	-0.281	-0.069	0.094	0.550
	0.002	0.350		0.003	0.041	0.036	0.211	0.342	0.002	0.001	<.0001	<.0001	0.001	0.404	0.252	<.0001
Ti	0.111	0.822	0.241	1.000	0.570	0.664	0.727	0.711	0.044	0.631	-0.572	0.380	0.088	0.393	-0.502	0.259
	0.178	<.0001	0.003		<.0001	<.0001	<.0001	<.0001	0.590	<.0001	<.0001	<.0001	0.282	<.0001	<.0001	0.001
Cr	0.187	0.677	-0.167	0.570	1.000	0.513	0.896	0.896	0.392	0.887	-0.154	0.885	0.473	0.627	-0.782	-0.251
	0.022	<.0001	0.041	<.0001		<.0001	<.0001	<.0001	<.0001	<.0001	0.059	<.0001	<.0001	<.0001	<.0001	0.002
Mn	0.160	0.663	0.172	0.664	0.513	1.000	0.635	0.623	0.081	0.516	-0.307	0.467	0.158	0.297	-0.541	0.221
	0.050	<.0001	0.036	<.0001	<.0001		<.0001	<.0001	0.325	<.0001	0.000	<.0001	0.054	0.000	<.0001	0.007
Fe	0.207	0.808	-0.103	0.727	0.896	0.635	1.000	0.987	0.343	0.942	-0.330	0.841	0.391	0.618	-0.880	-0.088
	0.011	<.0001	0.211	<.0001	<.0001	<.0001		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.287
Co	0.228	0.790	-0.078	0.711	0.896	0.623	0.987	1.000	0.309	0.924	-0.313	0.848	0.389	0.593	-0.868	-0.069
	0.005	<.0001	0.342	<.0001	<.0001	<.0001	<.0001		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.402
Zn	-0.132	0.165	-0.250	0.044	0.392	0.081	0.343	0.309	1.000	0.444	0.056	0.389	0.612	0.751	-0.356	-0.621
	0.107	0.044	0.002	0.590	<.0001	0.325	<.0001	<.0001		<.0001	0.497	<.0001	<.0001	<.0001	<.0001	<.0001
Rb	0.054	0.798	-0.281	0.631	0.887	0.516	0.942	0.924	0.444	1.000	-0.173	0.873	0.529	0.609	-0.855	-0.311
	0.515	<.0001	0.001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001		0.034	<.0001	<.0001	<.0001	<.0001	0.000
Sr	-0.054	-0.199	-0.400	-0.572	-0.154	-0.307	-0.330	-0.313	0.056	-0.173	1.000	0.103	0.108	-0.157	0.368	-0.305
	0.515	0.015	<.0001	<.0001	0.059	0.000	<.0001	<.0001	0.497	0.034		0.210	0.189	0.055	<.0001	0.000
Ba	0.150	0.592	-0.374	0.380	0.885	0.467	0.841	0.848	0.389	0.873	0.103	1.000	0.509	0.542	-0.761	-0.382
	0.067	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.210		<.0001	<.0001	<.0001	<.0001
Pb	-0.284	0.268	-0.281	0.088	0.473	0.158	0.391	0.389	0.612	0.529	0.108	0.509	1.000	0.466	-0.399	-0.561
	<.0001	0.001	0.001	0.282	<.0001	0.054	<.0001	<.0001	<.0001	<.0001	0.189	<.0001		<.0001	<.0001	<.0001
Cu	0.049	0.440	-0.069	0.393	0.627	0.297	0.618	0.593	0.751	0.609	-0.157	0.542	0.466	1.000	-0.550	-0.322
	0.549	<.0001	0.404	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.055	<.0001	<.0001		<.0001	<.0001
Zr	-0.155	-0.635	0.094	-0.502	-0.782	-0.541	-0.880	-0.868	-0.356	-0.855	0.368	-0.761	-0.399	-0.550	1.000	0.156
	0.059	<.0001	0.252	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001		0.057
pH	0.381	0.110	0.550	0.259	-0.251	0.221	-0.088	-0.069	-0.621	-0.311	-0.305	-0.382	-0.561	-0.322	0.156	1.000
	<.0001	0.182	<.0001	0.001	0.002	0.007	0.287	0.402	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.057	

(Table 4.1.4.1 continued)

Pearson Correlation Coefficients, N = 150

Prob > |r| under H0: Rho=0

wet	Depth	K	Ca	Ti	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	Zr	pH
Depth	1.000	0.123	-0.077	0.155	0.267	-0.095	0.301	0.302	-0.136	0.162	-0.074	0.398	-0.281	-0.057	-0.276	0.348
		0.198	0.425	0.105	0.005	0.319	0.001	0.001	0.155	0.089	0.443	<.0001	0.003	0.554	0.003	0.000
K	0.123	1.000	0.524	0.818	0.357	0.373	0.651	0.606	-0.003	0.583	-0.300	0.494	0.045	0.161	-0.262	0.383
	0.198		<.0001	<.0001	0.000	<.0001	<.0001	<.0001	0.973	<.0001	0.001	<.0001	0.641	0.091	0.006	<.0001
Ca	-0.077	0.524	1.000	0.421	0.001	0.299	0.118	0.074	-0.054	-0.065	0.026	-0.038	-0.011	0.116	0.115	0.411
	0.425	<.0001		<.0001	0.994	0.001	0.218	0.437	0.571	0.501	0.789	0.695	0.911	0.225	0.231	<.0001
Ti	0.155	0.818	0.421	1.000	0.516	0.374	0.754	0.740	0.050	0.708	-0.615	0.543	0.065	0.293	-0.426	0.345
	0.105	<.0001	<.0001		<.0001	<.0001	<.0001	<.0001	0.604	<.0001	<.0001	<.0001	0.497	0.002	<.0001	0.000
Cr	0.267	0.357	0.001	0.516	1.000	0.091	0.759	0.721	0.496	0.700	-0.625	0.738	0.217	0.647	-0.690	-0.014
	0.005	0.000	0.994	<.0001		0.340	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.022	<.0001	<.0001	0.884
Mn	-0.095	0.373	0.299	0.374	0.091	1.000	0.307	0.300	-0.112	0.170	-0.105	0.207	-0.051	0.040	-0.148	0.146
	0.319	<.0001	0.001	<.0001	0.340		0.001	0.001	0.242	0.075	0.273	0.029	0.596	0.674	0.122	0.125
Fe	0.301	0.651	0.118	0.754	0.759	0.307	1.000	0.944	0.227	0.873	-0.765	0.834	0.167	0.405	-0.804	0.168
	0.001	<.0001	0.218	<.0001	<.0001	0.001		<.0001	0.017	<.0001	<.0001	<.0001	0.079	<.0001	<.0001	0.079
Co	0.302	0.606	0.074	0.740	0.721	0.300	0.944	1.000	0.191	0.854	-0.745	0.783	0.217	0.407	-0.763	0.199
	0.001	<.0001	0.437	<.0001	<.0001	0.001	<.0001		0.045	<.0001	<.0001	<.0001	0.022	<.0001	<.0001	0.037
Zn	-0.136	-0.003	-0.054	0.050	0.496	-0.112	0.227	0.191	1.000	0.328	-0.234	0.277	0.601	0.755	-0.238	-0.494
	0.155	0.973	0.571	0.604	<.0001	0.242	0.017	0.045		0.001	0.013	0.003	<.0001	<.0001	0.012	<.0001
Rb	0.162	0.583	-0.065	0.708	0.700	0.170	0.873	0.854	0.328	1.000	-0.777	0.759	0.348	0.414	-0.775	-0.052
	0.089	<.0001	0.501	<.0001	<.0001	0.075	<.0001	<.0001	0.001		<.0001	<.0001	0.000	<.0001	<.0001	0.591
Sr	-0.074	-0.300	0.026	-0.615	-0.625	-0.105	-0.765	-0.745	-0.234	-0.777	1.000	-0.562	-0.254	-0.333	0.825	0.022
	0.443	0.001	0.789	<.0001	<.0001	0.273	<.0001	<.0001	0.013	<.0001		<.0001	0.007	0.000	<.0001	0.820
Ba	0.398	0.494	-0.038	0.543	0.738	0.207	0.834	0.783	0.277	0.759	-0.562	1.000	0.136	0.374	-0.742	0.005
	<.0001	<.0001	0.695	<.0001	<.0001	0.029	<.0001	<.0001	0.003	<.0001	<.0001		0.154	<.0001	<.0001	0.955
Pb	-0.281	0.045	-0.011	0.065	0.217	-0.051	0.167	0.217	0.601	0.348	-0.254	0.136	1.000	0.447	-0.232	-0.360
	0.003	0.641	0.911	0.497	0.022	0.596	0.079	0.022	<.0001	0.000	0.007	0.154		<.0001	0.014	0.000
Cu	-0.057	0.161	0.116	0.293	0.647	0.040	0.405	0.407	0.755	0.414	-0.333	0.374	0.447	1.000	-0.310	-0.138
	0.554	0.091	0.225	0.002	<.0001	0.674	<.0001	<.0001	<.0001	<.0001	0.000	<.0001	<.0001		0.001	0.149
Zr	-0.276	-0.262	0.115	-0.426	-0.690	-0.148	-0.804	-0.763	-0.238	-0.775	0.825	-0.742	-0.232	-0.310	1.000	0.069
	0.003	0.006	0.231	<.0001	<.0001	0.122	<.0001	<.0001	0.012	<.0001	<.0001	<.0001	0.014	0.001		0.475
pH	0.348	0.383	0.411	0.345	-0.014	0.146	0.168	0.199	-0.494	-0.052	0.022	0.005	-0.360	-0.138	0.069	1.000
	0.000	<.0001	<.0001	0.000	0.884	0.125	0.079	0.037	<.0001	0.591	0.820	0.955	0.000	0.149	0.475	

Table 4.1.4.2 Results from multicollinearity analysis of PXRF elemental data are provided. Results from analyses conducted on Raw loessal datasets are shown for Louisiana soil samples.

Pearson Correlation Coefficients, N = 150
Prob > |r| under H0: Rho=0

dry	Depth	K	Ca	Ti	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	Zr	pH
Depth	1.000	0.212	-0.147	0.253	0.283	-0.335	0.238	0.293	0.100	0.272	0.086	0.172	-0.406	0.158	-0.444	-0.214
		0.009	0.073	0.002	0.001	<.0001	0.003	0.000	0.223	0.001	0.294	0.035	<.0001	0.053	<.0001	0.009
K	0.212	1.000	-0.211	0.523	0.552	0.119	0.457	0.496	0.491	0.849	0.107	0.712	-0.155	0.411	-0.443	-0.116
	0.009		0.009	<.0001	<.0001	0.148	<.0001	<.0001	<.0001	<.0001	0.192	<.0001	0.058	<.0001	<.0001	0.156
Ca	-0.147	-0.211	1.000	-0.251	-0.018	0.056	-0.266	-0.192	0.060	-0.006	0.664	-0.008	0.439	-0.171	0.018	0.346
	0.073	0.009		0.002	0.827	0.499	0.001	0.019	0.467	0.940	<.0001	0.918	<.0001	0.037	0.826	<.0001
Ti	0.253	0.523	-0.251	1.000	0.568	-0.034	0.483	0.509	0.291	0.434	-0.154	0.560	-0.109	0.404	-0.128	-0.132
	0.002	<.0001	0.002		<.0001	0.679	<.0001	<.0001	0.000	<.0001	0.061	<.0001	0.183	<.0001	0.119	0.107
Cr	0.283	0.552	-0.018	0.568	1.000	-0.198	0.591	0.622	0.556	0.649	0.045	0.678	-0.140	0.482	-0.323	-0.162
	0.001	<.0001	0.827	<.0001		0.015	<.0001	<.0001	<.0001	<.0001	0.587	<.0001	0.087	<.0001	<.0001	0.048
Mn	-0.335	0.119	0.056	-0.034	-0.198	1.000	-0.415	-0.423	-0.219	-0.055	0.248	-0.002	0.207	-0.315	0.249	0.397
	<.0001	0.148	0.499	0.679	0.015		<.0001	<.0001	0.007	0.504	0.002	0.983	0.011	<.0001	0.002	<.0001
Fe	0.238	0.457	-0.266	0.483	0.591	-0.415	1.000	0.967	0.656	0.460	-0.429	0.644	-0.247	0.705	-0.452	-0.287
	0.003	<.0001	0.001	<.0001	<.0001	<.0001		<.0001	<.0001	<.0001	<.0001	<.0001	0.002	<.0001	<.0001	0.000
Co	0.293	0.496	-0.192	0.509	0.622	-0.423	0.967	1.000	0.633	0.514	-0.314	0.657	-0.239	0.711	-0.437	-0.312
	<.0001	<.0001	0.019	<.0001	<.0001	<.0001	<.0001		<.0001	<.0001	<.0001	<.0001	0.003	<.0001	<.0001	<.0001
Zn	0.100	0.491	0.060	0.291	0.556	-0.219	0.656	0.633	1.000	0.703	0.055	0.721	0.051	0.643	-0.533	-0.312
	0.223	<.0001	0.467	0.000	<.0001	0.007	<.0001	<.0001		<.0001	0.504	<.0001	0.532	<.0001	<.0001	0.000
Rb	0.272	0.849	-0.006	0.434	0.649	-0.055	0.460	0.514	0.703	1.000	0.309	0.780	-0.086	0.492	-0.537	-0.194
	0.001	<.0001	0.940	<.0001	<.0001	0.504	<.0001	<.0001	<.0001		0.000	<.0001	0.297	<.0001	<.0001	0.018
Sr	0.086	0.107	0.664	-0.154	0.045	0.248	-0.429	-0.314	0.055	0.309	1.000	0.128	0.368	-0.210	-0.127	0.150
	0.294	0.192	<.0001	0.061	0.587	0.002	<.0001	<.0001	0.504	0.000		0.118	<.0001	0.010	0.120	0.068
Ba	0.172	0.712	-0.008	0.560	0.678	-0.002	0.644	0.657	0.721	0.780	0.128	1.000	0.004	0.556	-0.407	-0.210
	0.035	<.0001	0.918	<.0001	<.0001	0.983	<.0001	<.0001	<.0001	<.0001	0.118		0.964	<.0001	<.0001	0.010
Pb	-0.406	-0.155	0.439	-0.109	-0.140	0.207	-0.247	-0.239	0.051	-0.086	0.368	0.004	1.000	-0.106	0.095	0.109
	<.0001	0.058	<.0001	0.183	0.087	0.011	0.002	0.003	0.532	0.297	<.0001	0.964		0.197	0.246	0.183
Cu	0.158	0.411	-0.171	0.404	0.482	-0.315	0.705	0.711	0.643	0.492	-0.210	0.556	-0.106	1.000	-0.215	-0.323
	0.053	<.0001	0.037	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.010	<.0001	0.197		0.008	<.0001
Zr	-0.444	-0.443	0.018	-0.128	-0.323	0.249	-0.452	-0.437	-0.533	-0.537	-0.127	-0.407	0.095	-0.215	1.000	0.120
	<.0001	<.0001	0.826	0.119	<.0001	0.002	<.0001	<.0001	<.0001	<.0001	0.120	<.0001	0.246	0.008		0.144
pH	-0.214	-0.116	0.346	-0.132	-0.162	0.397	-0.287	-0.312	-0.312	-0.194	0.150	-0.210	0.109	-0.323	0.120	1.000
	0.009	0.156	<.0001	0.107	0.048	<.0001	<.0001	<.0001	<.0001	0.018	0.068	0.010	0.183	<.0001	0.144	

(Table 4.1.4.2 continued)

Pearson Correlation Coefficients, N = 150

Prob > |r| under H0: Rho=0

wet	Depth	K	Ca	Ti	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	Zr	pH
Depth	1.000	0.291	0.018	0.306	0.259	-0.323	0.249	0.258	0.191	0.318	0.198	0.260	-0.288	0.297	-0.337	-0.214
		0.000	0.826	0.000	0.001	<.0001	0.002	0.001	0.019	<.0001	0.015	0.001	0.000	0.000	<.0001	0.009
K	0.291	1.000	-0.149	0.571	0.378	0.177	0.416	0.389	0.658	0.865	0.314	0.725	-0.054	0.458	-0.245	-0.020
	0.000		0.069	<.0001	<.0001	0.031	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.513	<.0001	0.003	0.809
Ca	0.018	-0.149	1.000	-0.278	-0.064	0.159	-0.142	-0.028	0.162	0.085	0.627	0.077	0.180	-0.092	-0.150	0.244
	0.826	0.069		0.001	0.439	0.052	0.083	0.735	0.047	0.301	<.0001	0.352	0.027	0.262	0.067	0.003
Ti	0.306	0.571	-0.278	1.000	0.568	0.012	0.467	0.446	0.293	0.459	-0.055	0.560	0.000	0.411	0.055	0.076
	0.000	<.0001	0.001		<.0001	0.886	<.0001	<.0001	0.000	<.0001	0.503	<.0001	0.999	<.0001	0.502	0.353
Cr	0.259	0.378	-0.064	0.568	1.000	-0.060	0.569	0.546	0.403	0.443	-0.088	0.581	-0.095	0.520	-0.116	-0.056
	0.001	<.0001	0.439	<.0001		0.469	<.0001	<.0001	<.0001	<.0001	0.282	<.0001	0.249	<.0001	0.156	0.497
Mn	-0.323	0.177	0.159	0.012	-0.060	1.000	-0.159	-0.189	0.052	0.064	0.284	0.149	0.279	-0.231	0.296	0.319
	<.0001	0.031	0.052	0.886	0.469		0.053	0.021	0.526	0.433	0.000	0.068	0.001	0.004	0.000	<.0001
Fe	0.249	0.416	-0.142	0.467	0.569	-0.159	1.000	0.948	0.590	0.456	-0.276	0.725	-0.016	0.747	-0.351	-0.175
	0.002	<.0001	0.083	<.0001	<.0001	0.053		<.0001	<.0001	<.0001	0.001	<.0001	0.843	<.0001	<.0001	0.032
Co	0.258	0.389	-0.028	0.446	0.546	-0.189	0.948	1.000	0.579	0.487	-0.160	0.723	0.052	0.774	-0.305	-0.211
	0.001	<.0001	0.735	<.0001	<.0001	0.021	<.0001		<.0001	<.0001	0.050	<.0001	0.525	<.0001	0.000	0.010
Zn	0.191	0.658	0.162	0.293	0.403	0.052	0.590	0.579	1.000	0.820	0.244	0.696	0.053	0.625	-0.509	-0.168
	0.019	<.0001	0.047	0.000	<.0001	0.526	<.0001	<.0001		<.0001	0.003	<.0001	0.521	<.0001	<.0001	0.040
Rb	0.318	0.865	0.085	0.459	0.443	0.064	0.456	0.487	0.820	1.000	0.439	0.732	-0.026	0.542	-0.358	-0.097
	<.0001	<.0001	0.301	<.0001	<.0001	0.433	<.0001	<.0001	<.0001		<.0001	<.0001	0.756	<.0001	<.0001	0.238
Sr	0.198	0.314	0.627	-0.055	-0.088	0.284	-0.276	-0.160	0.244	0.439	1.000	0.204	0.167	-0.133	-0.098	0.139
	0.015	<.0001	<.0001	0.503	0.282	0.000	0.001	0.050	0.003	<.0001		0.012	0.042	0.105	0.231	0.090
Ba	0.260	0.725	0.077	0.560	0.581	0.149	0.725	0.723	0.696	0.732	0.204	1.000	0.049	0.653	-0.298	-0.061
	0.001	<.0001	0.352	<.0001	<.0001	0.068	<.0001	<.0001	<.0001	<.0001	0.012		0.555	<.0001	0.000	0.461
Pb	-0.288	-0.054	0.180	0.000	-0.095	0.279	-0.016	0.052	0.053	-0.026	0.167	0.049	1.000	0.002	0.161	0.050
	0.000	0.513	0.027	0.999	0.249	0.001	0.843	0.525	0.521	0.756	0.042	0.555		0.983	0.049	0.546
Cu	0.297	0.458	-0.092	0.411	0.520	-0.231	0.747	0.774	0.625	0.542	-0.133	0.653	0.002	1.000	-0.280	-0.308
	0.000	<.0001	0.262	<.0001	<.0001	0.004	<.0001	<.0001	<.0001	<.0001	0.105	<.0001	0.983		0.001	0.000
Zr	-0.337	-0.245	-0.150	0.055	-0.116	0.296	-0.351	-0.305	-0.509	-0.358	-0.098	-0.298	0.161	-0.280	1.000	0.289
	<.0001	0.003	0.067	0.502	0.156	0.000	<.0001	0.000	<.0001	<.0001	0.231	0.000	0.049	0.001		0.000
pH	-0.214	-0.020	0.244	0.076	-0.056	0.319	-0.175	-0.211	-0.168	-0.097	0.139	-0.061	0.050	-0.308	0.289	1.000
	0.009	0.809	0.003	0.353	0.497	<.0001	0.032	0.010	0.040	0.238	0.090	0.461	0.546	0.000	0.000	

Table 4.2.1.1 A summary of alluvial model generation and validation results are provided, for wet and dry multiple linear regression prediction models. Mean square error (MSE) and coefficient of determination (R^2) values are provided for model generation datasets. For models proven to exhibit normally distributed residuals (Shapiro-Wilk test of normality; p > 0.05), performance correlation statistics (R values) of predicted versus laboratory-measured soil organic carbon values are listed. (Due to the removal of wet PXRF data from carbonate-containing core sample datasets, alluvial wet validation sub-datasets contain only N=23 observations, compared to dry validation sub-datasets comprised of N=30 observations.)

	modeling variables		normality	model generation		model validations			
model	dependent	independent	Pr < W	R^2	MSE	R (dry)	P > |r|	R (wet)	P > |r|
					dry				
Raw	log	log	0.2141	0.789	0.072	0.914	<0.0001	0.895	<0.0001
Ti-stable	log	log	0.0884	0.783	0.074	0.891	<0.0001	0.878	<0.0001
Zr-stable	log	log	0.0303	0.795	0.071	0.872	<0.0001	0.783	<0.0001
					wet				
Raw	log	log	0.2415	0.877	0.043	0.798	<0.0001	0.839	<0.0001
Ti-stable	log	log	0.9339	0.872	0.045	0.763	<0.0001	0.822	<0.0001
Zr-stable	log	log	0.2391	0.876	0.043	0.814	<0.0001	0.828	<0.0001

Table 4.2.1.2 A summary of loessal model generation and validation results are provided, for wet and dry multiple linear regression prediction models. Mean square error (MSE) and coefficient of determination (R^2) values are provided for model generation datasets. For models proven to exhibit normally distributed residuals (Shapiro-Wilk test of normality; p > 0.05), performance correlation statistics (R values) of predicted versus laboratory-measured soil organic carbon values are listed.

	modeling variables		normality	model generation		model validations			
model	dependent	independent	Pr < W	R^2	MSE	R (dry)	P > |r|	R (wet)	P > |r|
					dry				
Raw	log	log	0.7256	0.796	0.107	0.768	<0.0001	0.902	<0.0001
Ti-stable	log	log	0.6753	0.795	0.107	0.763	<0.0001	0.904	<0.0001
Zr-stable	log	log	0.7311	0.796	0.106	0.767	<0.0001	0.906	<0.0001
					wet				
Raw	log	log	0.318	0.75	0.127	0.819	<0.0001	0.906	<0.0001
Ti-stable	log	log	0.5707	0.774	0.116	0.803	<0.0001	0.892	<0.0001
Zr-stable	log	log	0.6943	0.779	0.114	0.801	<0.0001	0.888	<0.0001

construction or validation datasets generated from PXRF data obtained from the scanning of be described as “moist”. Models demonstrating the greatest SOC prediction capabilities upon application to both wet and dry validation sub-datasets were the dry Zr-stable and wet Ti-stable models for alluvial and loess datasets, respectively, with correlation coefficients (R) > 0.92.

Table 4.2.1.3 provides a qualitative assessment of elements selected for inclusion in various prediction models. All models included depth as a significant predictor variable for SOC. No loess models utilized pH for SOC prediction, while this variable was utilized by all but two (Raw and Zr-stable alluvial models) models generated for alluvial datasets.

Loess models relied heavily upon K and Ca as predictor variables, in addition to depth, judged by their inclusion in all six prediction models. While only one alluvial model utilized K, all wet models included Ca in their modeling. Mn was only found in dry alluvial model.

Table 4.2.1.3 A qualitative summary of predictor variables selected for inclusion in Raw, Ti-stable, and Zr-stable multiple linear regression models are given for Louisiana alluvium and loess models. Variables for wet and dry models are included.

parent		predictor variables															
material	model	depth	K	Ca	Ti	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	Zr	pH
alluvial	Raw	X					X			X		X	X	X			
	Raw, wet	X		X	X				X	X	X		X	X		X	X
	Ti-stable	X	X				X	X	X				X	X			X
	Ti-stable, wet	X		X					X		X	X	X	X			X
	Zr-stable	X					X			X		X		X			
	Zr-stable, wet	X		X	X				X	X	X		X	X			X
loessal	Raw	X	X	X						X	X			X			
	Raw, wet	X	X	X	X							X				X	
	Ti-stable	X	X	X								X	X	X			
	Ti-stable, wet	X	X	X				X	X	X		X					
	Zr-stable	X	X	X								X	X	X			
	Zr-stable, wet	X	X	X	X			X	X	X					X		

Rb was another variable included in wet alluvial models, and this element was only seen in one loess model. Pb is a significant predictor variable for all alluvial models and dry loess models. Only raw, wet models made use of Zr, and Cu was only found to constitute a significant predictor variable for the wet, Zr-stable loessal model.

4.2.1 Differences between alluvial and loessal prediction models.

Results of model generation by stepwise multiple linear regression (MLR) analysis for Raw alluvial and loess prediction models are given in Table 4.2.1.4, along with predictor variables and their associated regression coefficients, as utilized by each model. Wet, Raw alluvial models exhibited the superior coefficient of determination (R^2) value for model generations, with other alluvial and loess models showing similar values, and all exhibiting Pearson product-moment correlation coefficient (R) values > 0.75. Mean square error (MSE) values calculated for each model demonstrate consistently lower values in alluvial models, compared to loessal models, indicating that alluvial predictions exhibit less deviation from observed SOC values, overall.

Upon examination of Raw SOC prediction model performances, the alluvial model demonstrating the greatest predictive capabilities upon application to dry validation datasets proved to be the wet model, with an R value of 0.95. Wet validation datasets experienced optimal SOC predictions by use of the dry Raw model, with an R of 0.93. For Raw loess datasets, a maximum R value for dry validation datasets was achieved by wet and dry models. The wet loess model demonstrated slightly better prediction capabilities in wet validation datasets (with an R of 0.95 vs. the dry R value of 0.93). All raw models showed successful SOC prediction abilities under both wet and dry conditions. Scatterplots of predicted vs. laboratory-measured SOC values for each prediction model are presented in Figures 4.2.1.1 and 4.2.1.2.

Table 4.2.1.4 Multiple linear regression analysis parameters are provided for Raw SOC prediction models; modeling statistics describe Louisiana alluvial and loessal soils' dry and wet generation sub-datasets. Model generation descriptive statistics also include sample number (N), regression coefficient (R^2), intercept (INT), and mean square error (MSE) values for each model. Variable weights are calculated by multiplying predictor coefficients by variable averages for the dataset, and then calculating the percent contribution of each predictor compared to the sum total of predictor variable products of dataset averages and model coefficients.

Raw MLR model parameters

alluvium						loess					
dry			wet			dry			wet		
variable	coefficient	weight	variable	coefficient	weight	variable	coefficient	weight	variable	coefficient	weight
D	-0.380	72	D	-0.321	40	D	-0.627	75	D	-0.698	62
Mn	-0.297	5	Ca	0.403	7	K	-0.796	13	K	-1.049	13
Zn	0.365	4	Ti	-1.034	16	Ca	0.239	3	Ca	0.364	3
Sr	-0.600	9	Co	0.398	4	Zn	0.522	2	Ti	1.191	14
Ba	0.317	5	Zn	0.169	1	Rb	-0.658	5	Sr	-0.420	2
Pb	0.548	5	Rb	1.911	16	Pb	0.324	2	Zr	-0.602	5
			Ba	-1.850	21						
			Pb	0.126	1						
			Zr	-0.438	5						
			pH	-0.166	5						
INT	0.665			8.219			6.663			4.24	
N	120			88			120			120	
R^2	0.789			0.877			0.796			0.749	
MSE	0.072			0.043			0.106			0.127	

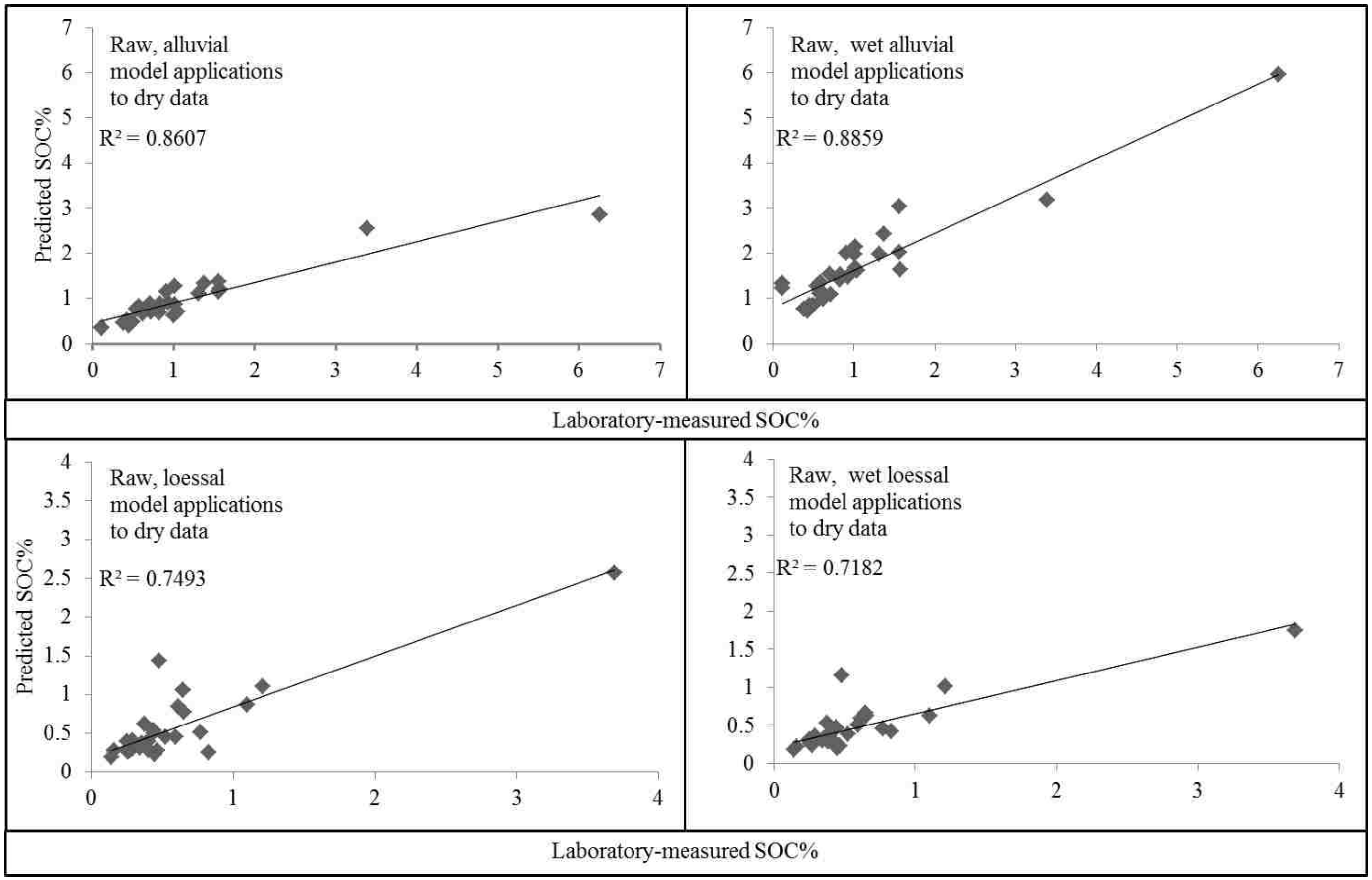

Figure 4.2.1.1 Scatterplots show predicted SOC contents vs. laboratory-measured SOC values for Raw model applications to dry validation sub-datasets, for Louisiana alluvial and loessal soils. Predicted soil organic carbon values were obtained by back-transformation of predictions generated by model applications, due to the use of log-transformed SOC contents for model construction.

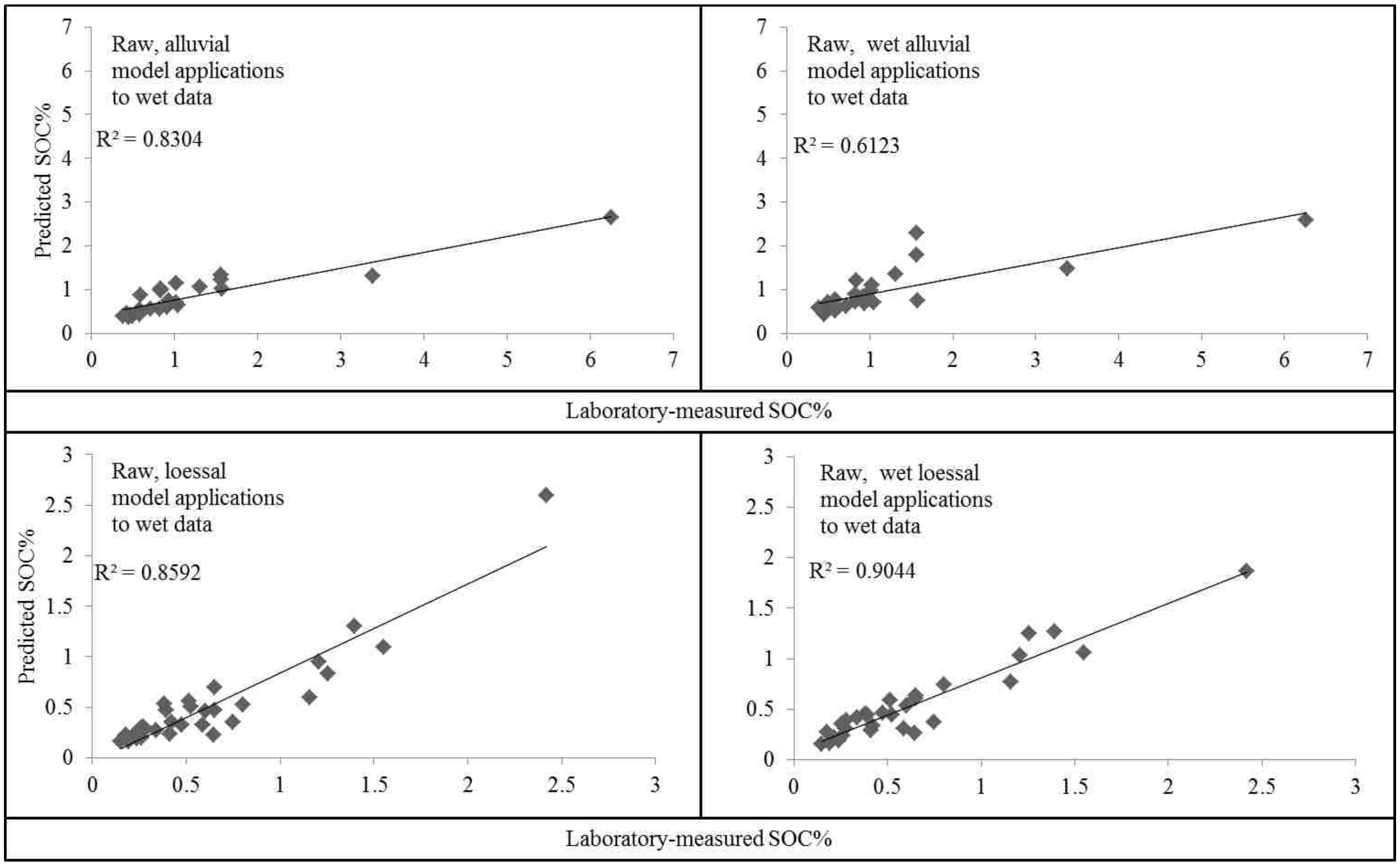

Figure 4.2.1.2 Scatterplots show predicted SOC contents vs. laboratory-measured SOC values for Raw model applications to wet validation sub-datasets, for Louisiana alluvial and loessal soils. Predicted SOC values were obtained by back-transformation of predictions generated by model applications, due to the use of log-transformed SOC contents for model construction.

Table 4.2.2.1 Multiple linear regression analysis parameters are provided for Raw SOC prediction models; modeling statistics describe Louisiana alluvial and loessal soils' dry and wet generation sub-datasets. Model generation descriptive statistics also include sample number (N), regression coefficient (R2), intercept (INT), and mean square error (MSE) values for each model. Variable weights are calculated by multiplying predictor coefficients by variable averages for the dataset, and then calculating the percent contribution of each predictor compared to the sum total of predictor variable products of dataset averages and model coefficients.

Ti-stable MLR model parameters

alluvium						loess					
dry			wet			dry			wet		
variable	coefficient	weight	variable	coefficient	weight	variable	coefficient	weight	variable	coefficient	weight
D	-0.411	66	D	-0.293	51	D	-0.629	81	D	-0.626	75
K	-0.774	3	Ca	0.593	1	K	-1.164	2	K	-1.449	4
Mn	-0.220	1	Co	0.409	3	Ca	0.272	1	Ca	0.334	2
Fe	1.958	9	Rb	2.292	23	Sr	-0.293	2	Fe	0.631	2
Co	-1.027	5	Sr	-0.487	4	Ba	0.852	5	Co	-0.789	7
Ba	-0.687	4	Ba	-1.356	8	Pb	0.485	5	Zn	0.499	7
Pb	0.693	9	Pb	0.159	2				Sr	-0.345	4
pH	-0.069	3	pH	-0.200	9						
INT	-1.632			7.256			6.204			0.999	
N	120			88			120			120	
R^2	0.794			0.872			0.795			0.774	
MSE	0.071			0.044			0.107			0.115	

Table 4.2.2.2 Multiple linear regression analysis parameters are provided for Zr-stable SOC prediction models; modeling statistics describe Louisiana alluvial and loessal soils' wet and dry generation sub-datasets. Model generation descriptive statistics also include sample number (N), regression coefficient (R^2), intercept (INT), and mean square error (MSE) values for each model. Variable weights are calculated by multiplying predictor coefficients by variable averages for the dataset, and then calculating the percent contribution of each predictor compared to the sum total of predictor variable products of dataset averages and model coefficients.

Zr-stable MLR model parameters

alluvium						loess					
dry			wet			dry			wet		
variable	coefficient	weight	variable	coefficient	weight	variable	coefficient	weight	variable	coefficient	weight
D	-0.373	89	D	-0.320	67	D	-0.641	87	D	-0.694	78
Mn	-0.291	0	Ca	0.447	4	K	-1.199	6	K	-1.581	8
Zn	0.404	3	Ti	-1.095	8	Ca	0.275	0	Ca	0.284	0
Sr	-0.504	2	Co	0.387	0	Sr	-0.275	1	Ti	1.384	5
Pb	0.550	6	Zn	0.151	1	Ba	0.849	2	Fe	0.772	4
			Rb	2.124	9	Pb	0.494	4	Co	-0.976	1
			Ba	-1.768	0				Zn	0.293	2
			Pb	0.114	1				Cu	0.278	2
			pH	-0.17	9						
INT	2.724			6.72			6.14			1.643	
N	120			88			120			120	
R^2	0.782			0.861			0.7962			0.779	
MSE	0.073			0.043			0.1063			0.114	

4.2.2 Effects of stable-element normalization on modeling datasets.

Results of model generation by stepwise MLR analysis for stable-element alluvial and loessal prediction models are provided in Tables 4.2.2.1 and 4.2.2.2, along with predictor variables and their associated regression coefficients, as utilized by each model. Use of stable-element indices resulted in alluvial SOC prediction model capabilities with high R values (0.91 and 0.93 for Ti- and Zr-stable model performances, respectively).

Field models omitted both Pb and Ba as significant predictors, possibly indicating these variables as false predictors, in that their stable-element ratios fail to account for a different relationship to SOC contents under different states of preparation (oven-dried or field-moist). As these elements experience significant differences between their wet and dry mean concentrations (as seen in Table 4.1.1), it is likely that their differential detection by PXRF analysis makes these variables less favorable for inclusion in SOC prediction models where determination of SOC contents from PXRF data collected *in situ* is desired.

Scatterplots showing predicted vs. laboratory-measured SOC values generated by each Ti-stable prediction model, for dry and wet datasets are given in Figures 4.2.2.1 and 4.2.2.2, respectively. Results of Zr-stable prediction model applications are presented in Figures 4.2.2.3 – 4.2.2.4 for wet and dry sub-datasets.

4.2.3 Comparison of field-moist and oven-dry prediction models.

Wet alluvial models experienced greatly reduced prediction capabilities upon application to wet validation sub-datasets ($R < 0.78$, vs. $R > 0.91$ for dry models). These models differ from the dry Ti- and Zr-stable models in that they both employed Ca and Rb as predictors. Conversely, field models constructed from loess datasets demonstrated excellent performance capabilities upon application to wet datasets, with R values > 0.92 (as seen in Table 4.2.1.1).

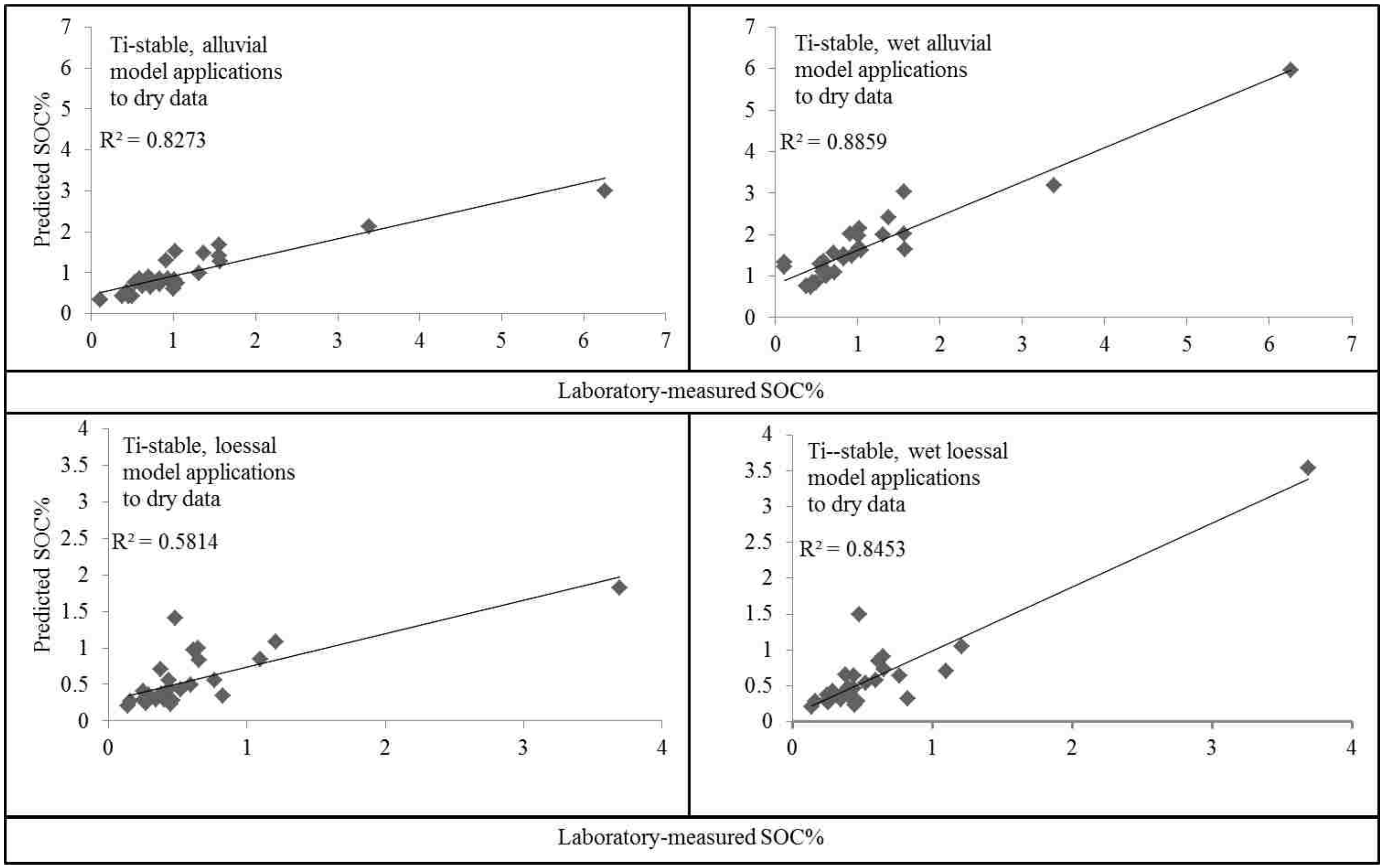

Figure 4.2.2.1 Scatterplots show predicted SOC contents vs. laboratory-measured SOC values for Ti-stable model applications to dry validation sub-datasets, for Louisiana alluvial and loessal soils. Predicted SOC values were obtained by back-transformation of predictions generated by model applications, due to the use of log-transformed SOC contents for model construction.

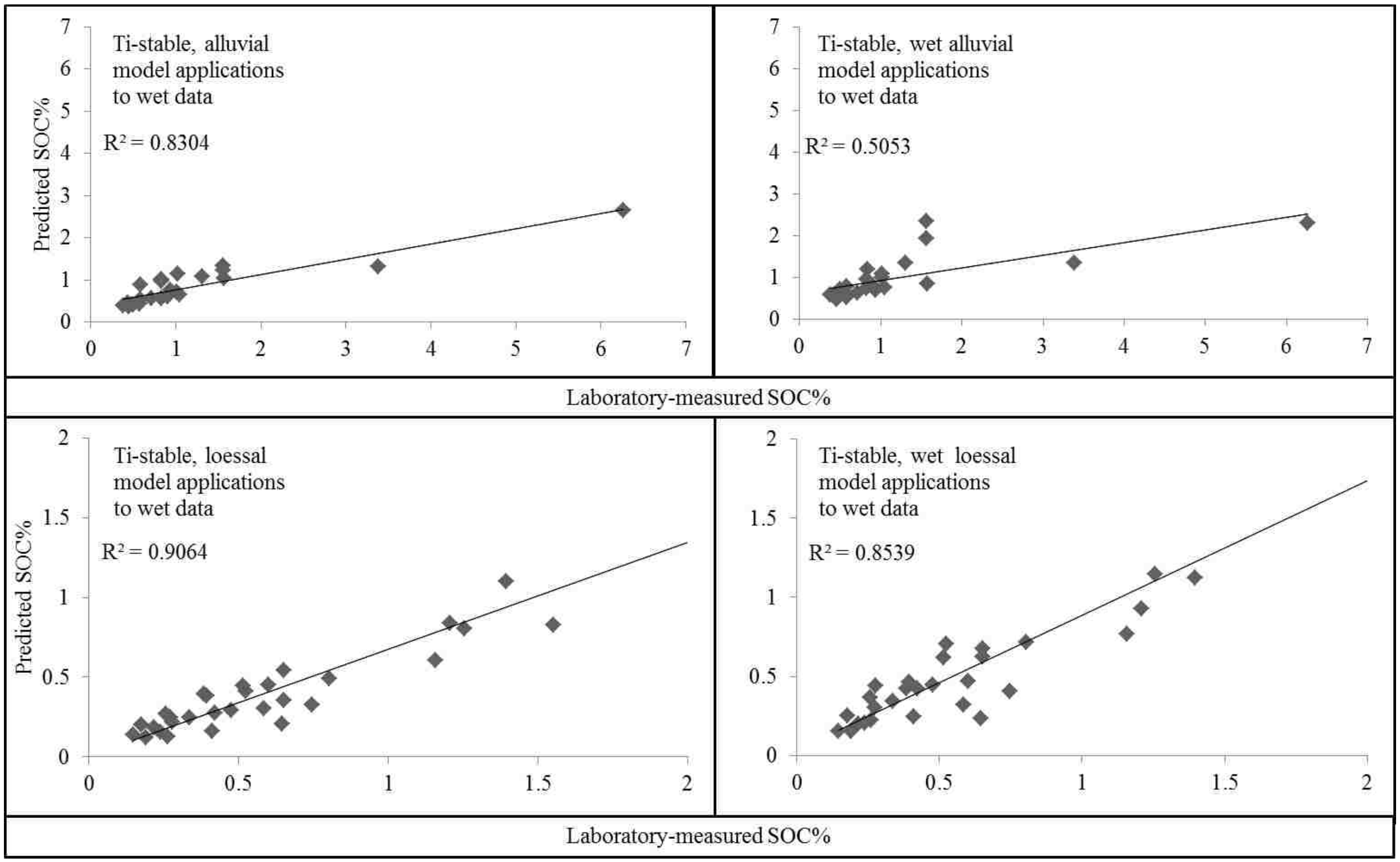

Figure 4.2.2.2 Scatterplots show predicted SOC contents vs. laboratory-measured SOC values for Ti-stable model applications to wet validation sub-datasets, for Louisiana alluvial and loessal soils. Predicted SOC values were obtained by back-transformation of predictions generated by model applications, due to the use of log-transformed SOC contents for model construction.

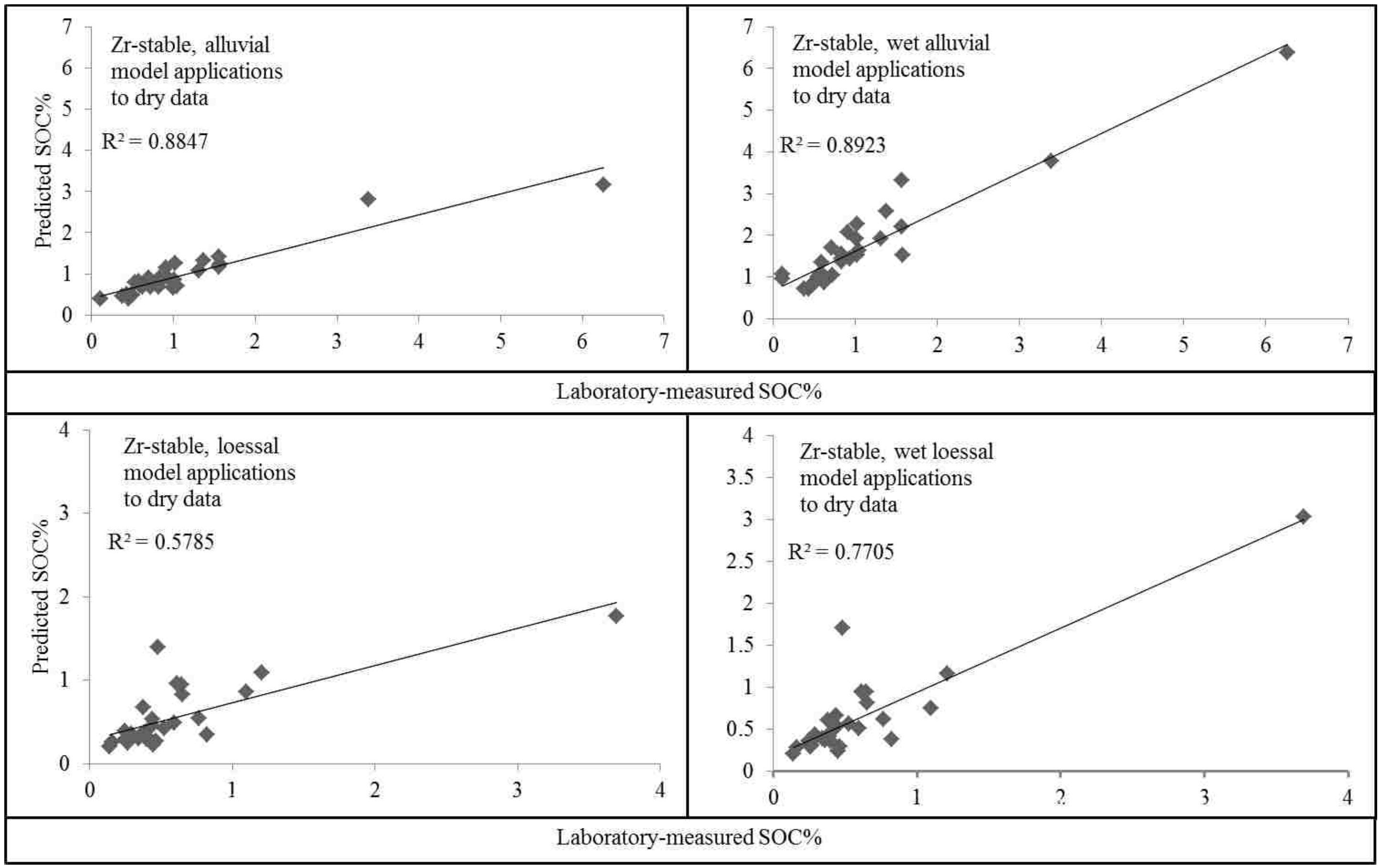

Figure 4.2.2.3 Scatterplots show predicted SOC contents vs. laboratory-measured SOC values for Zr-stable model applications to dry validation sub-datasets, for Louisiana alluvial and loessal soils. Predicted SOC values were obtained by back-transformation of predictions generated by model applications, due to the use of log-transformed SOC contents for model construction.

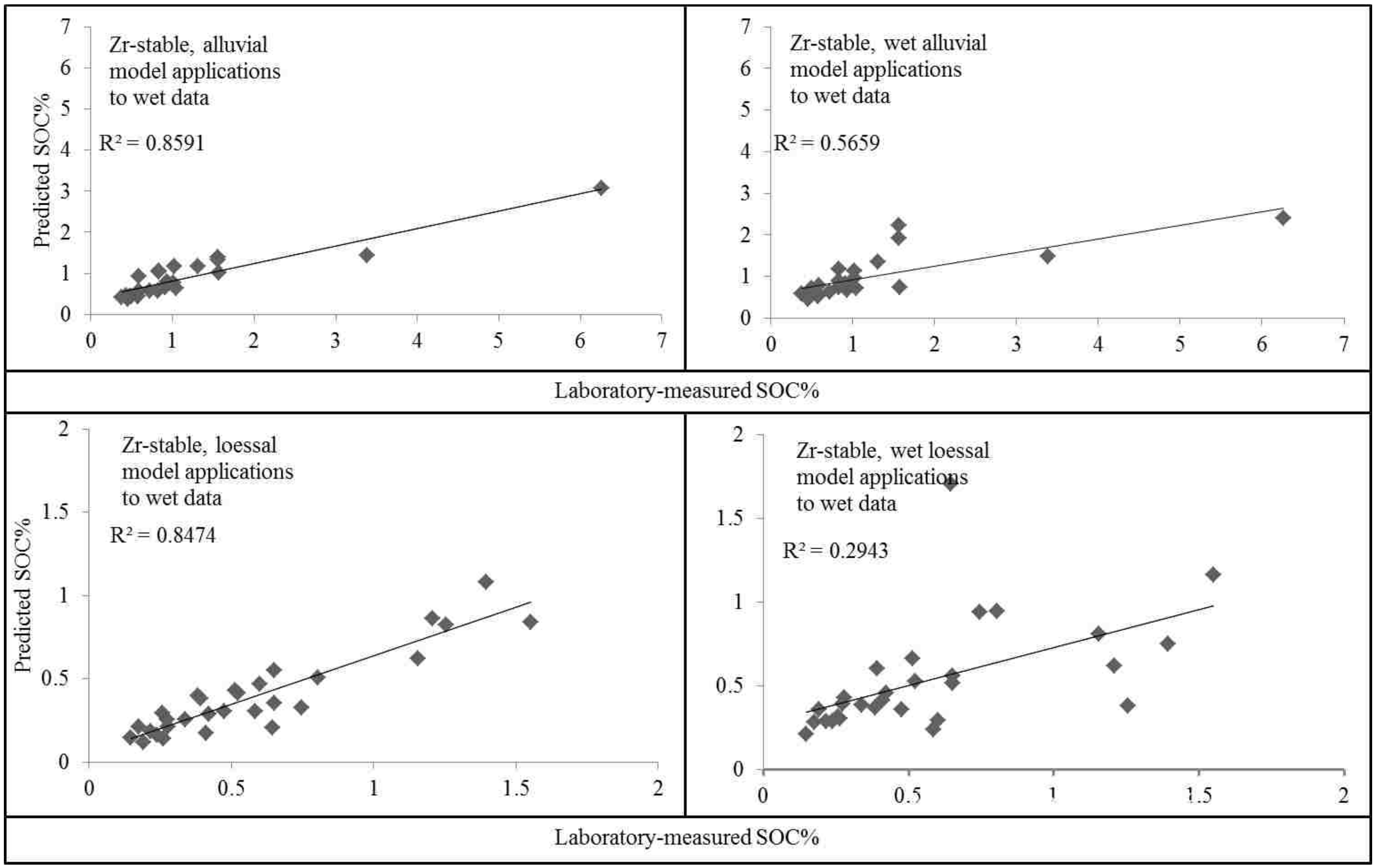

Figure 4.2.2.4 Scatterplots show predicted SOC contents vs. laboratory-measured SOC values for Zr-stable model applications to wet validation sub-datasets, for Louisiana alluvial and loessal soils. Predicted SOC values were obtained by back-transformation of predictions generated by model applications, due to the use of log-transformed SOC contents for model construction.

Loess models experienced greatly reduced model performances upon application of Ti- and Zr-stable models to dry validation sub-datasets. Both stable-element models used the same six predictor variables in SOC modeling. These included: depth, K, Ca, Pb (included in ALL loess models), Sr, and Ba.

As Ca is an element that experienced significant decreases in mean PXRF elemental readings between wet and dry datasets, it seems that this element, in combination with Sr, experienced highly variable PXRF readings (depending on moisture content), causing significant over-predictions of SOC contents by these models. Application of these models to dry validation sub-datasets exhibited enhanced SOC prediction capabilities over results from application of dry models. It is possible that the inclusion of Ba and Pb as predictor variables in the dry models detracted from their prediction capabilities upon dry validation sub-datasets, as these variables were omitted from the wet stable-element models.

Figure 4.2.3.1 shows the performance of all wet and dry SOC prediction models on validation sub-datasets. Soil organic carbon contents are also shown to depict how models deviated in their predictions from laboratory-measured SOC contents. Equations for multiple linear regression models are provided in Figure 4.2.3.2

4.3 Prediction modeling for SOC contents using principal components analysis

Results for SOC prediction models, as generated by principal components analysis (PCA), are given in Tables 4.3.1.1. and 4.3.1.2 for alluvium and loess, respectively. Three out of six alluvial models were determined to be statistically valid, and all demonstrated excellent prediction capabilities (with R values 0.90 – 0.94, for both wet and dry modeling datasets). Loess models achieved the best SOC prediction performances of 0.70 and 0.81, for dry and wet datasets, respectively; however, certain models experienced markedly reduced SOC prediction

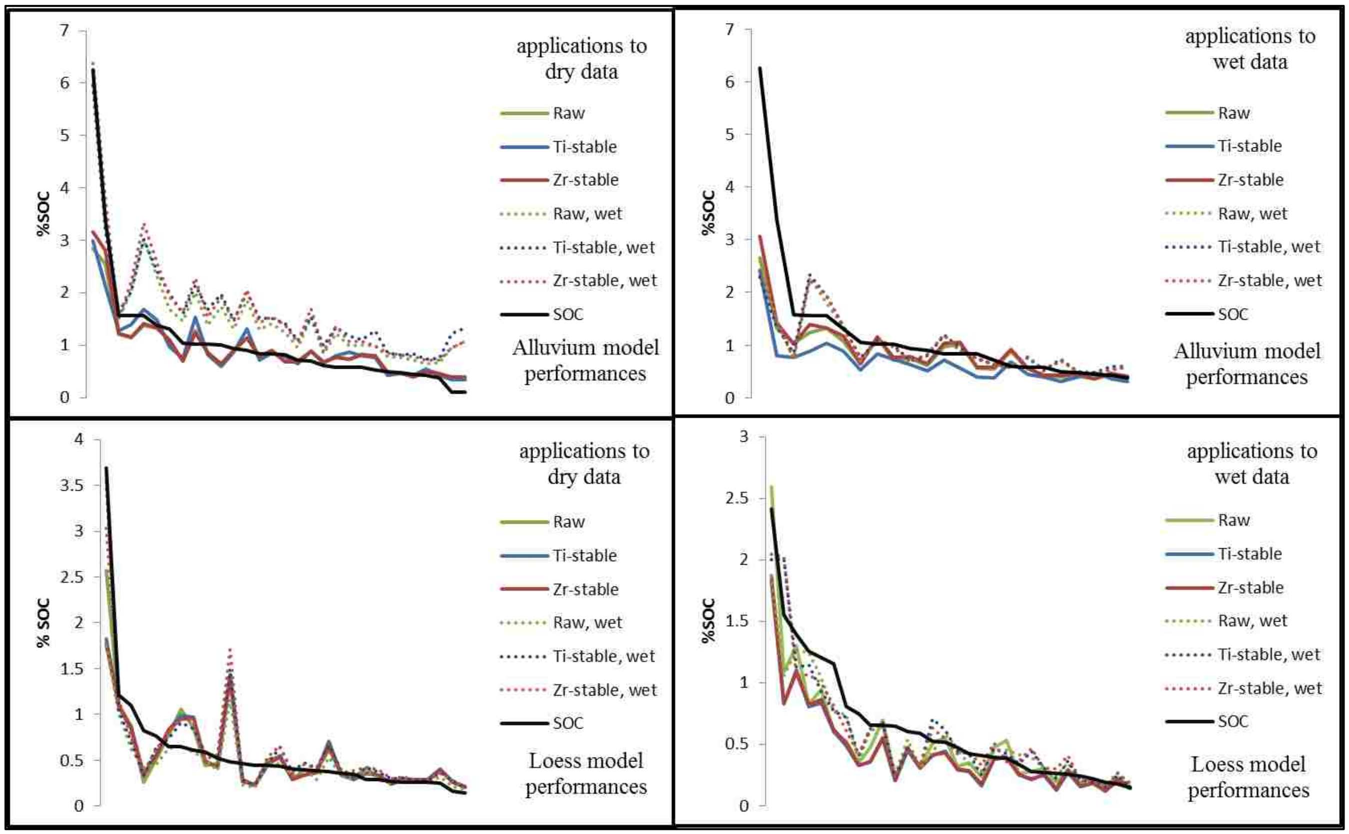

Figure 4.2.3.1 Line graphs show SOC prediction model performances on validation sub-datasets for Louisiana alluvial and loessal soil samples. Black lines indicate laboratory-measured SOC percentages, with green, blue, and red lines corresponding to Raw, Ti-stable, and Zr-stable SOC predictions, respectively. (Wet and dry dataset applications are denoted above legends.)

Alluvium

Dry

log(PSOC) = 0.665 + log(Depth)*-0.38 + log(Mn)*-0.297 + log(Zn)*0.365 + log(Sr)*-0.6 + log(Ba)*0.317 + log(Pb)*0.548

Wet

log(PSOC) = 8.219 + log(Depth)*-0.321 + log(Ca)*0.403 + log(Ti)*-1.034 + log(Co)*0.398 + log(Zn)*0.169 + log(Rb)*1.911 + log(Ba)*-1.85 + log(Pb)*0.126 + log(Zr)*-0.439 + pH*-0.166

Ti-stable

Dry

log(PSOC) = -1.632 + log(Depth)*-0.411 + log(K)*-0.774 + log(Mn)*-0.22 + log(Fe)*1.958 + log(Co)*-1.027 + log(Ba)*-0.687 + log(Pb)*0.693 + pH*-0.069

Wet

log(PSOC) = 7.256 + log(Depth)*-0.293 + log(Ca)*0.593 + log(Co)*0.409 + log(Rb)*2.292 + log(Sr)*-0.487 + log(Ba)*-1.356 + log(Pb)*0.159 + pH*-0.2

Zr-stable

Dry

log(PSOC) = 2.724 + log(Depth)*-0.373 + log(Mn)*-0.291 + log(Zn)*0.404 + log(Sr)*-0.504 + log(Pb)*0.55

Wet

log(PSOC) = 6.72 + log(Depth)*-0.32 + log(Ca)*0.447 + log(Ti)*-1.095 + log(Co)*0.387 + log(Zn)*0.151 + log(Rb)*2.124 + log(Ba)*-1.768 + log(Pb)*0.114 + pH*-0.17

Loess

Dry

log(PSOC) = 6.663 + log(Depth)*-0.627 + log(K)*-0.796 + log(Ca)*0.239 + log(Zn)*0.522 + log(Rb)*-0.658 + log(Pb)*0.324

Wet

log(PSOC) = 4.24 + log(Depth)*-0.698 + log(K)*-1.049 + log(Ca)*0.364 + log(Ti)*1.191 + log(Sr)*-0.42 + log(Zr)*-0.602

Ti-stable

Dry

log(PSOC) = 6.204 + log(Depth)*-0.629 + log(K)*-1.164 + log(Ca)*0.272 + log(Sr)*-0.293 + log(Ba)*0.852 + log(Pb)*0.485

Wet

log(PSOC) = 0.999 + log(Depth)*-0.626 + log(K)*-1.449 + log(Ca)*0.334 + log(Fe)*0.631 + log(Co)*-0.789 + log(Zn)*0.499 + log(Sr)*-0.345

Zr-stable

Dry

log(PSOC) = 6.14 + log(Depth)*-0.641 + log(K)*-1.199 + log(Ca)*0.275 + log(Sr)*-0.275 + log(Ba)*0.849 + log(Pb)*0.494

Wet

log(PSOC) = 1.643 + log(Depth)*-0.694 + log(K)*-1.581 + log(Ca)*0.284 + log(Ti)*1.384 + log(Fe)*0.772 + log(Co)*-0.976 + log(Zn)*0.293 + log(Cu)*0.278

Figure 4.2.3.2 MLR equations are provided for SOC prediction models for alluvium and loess soils in Louisiana, USA. Model-predicted SOC is denoted as PSOC

Table 4.3.1.1 A summary of model generation and validation results are provided, for Louisiana alluvial wet and dry principal components analysis prediction models. Mean square error (MSE) and coefficient of determination (R^2) values are provided for model generation datasets. For models proven to exhibit normally distributed residuals (Shapiro-Wilk test of normality; $p > 0.05$), performance correlation statistics (R values) of predicted versus laboratory-measured SOC values are provided. (Due to the removal of wet PXRF data from carbonate-containing core samples, alluvial wet validation sub-datasets contain only N=23 observations, compared to dry validation sub-datasets comprised of N=30 observations.)

	modeling variables		normality	model generation		model validations			
model	dependent	independent	Pr < W	R^2	MSE	R (dry)	P > |r|	R (wet)	P > |r|
					oven-dry				
Raw	log	log	0.4146	0.754	0.082	0.927	<0.0001	0.933	<0.0001
					field-moist				
Raw	log	log	0.4752	0.695	0.098	0.8963	<0.0001	0.8994	<0.0001
Ti-stable	log	log	0.37	0.7394	0.085	0.9184	<0.0001	0.9372	<0.0001

Table 4.3.1.2 A summary of model generation and validation results are provided, for Louisiana loessal wet and dry principal components analysis SOC prediction models. Mean square error (MSE) and coefficient of determination (R^2) values are provided for model generation datasets. For models proven to exhibit normally distributed residuals (Shapiro-Wilk test of normality; $p > 0.05$), performance correlation statistics (R values) of predicted versus laboratory-measured SOC values are provided.

	modeling variables		normality	model generation		model validations			
models	dependent	independent	Pr < W	R^2	MSE	R (dry)	P > |r|	R (wet)	P > |r|
					oven-dry				
Raw	log	log	0.254	0.6972	0.155	0.6756	<0.0001	0.77	<0.0001
Ti-stable	log		0.9641	0.709	0.1492	0.6868	<0.0001	0.8077	<0.0001
Zr-stable	log	log	0.7175	0.7422	0.1321	0.7015	<0.0001	0.7663	<0.0001
					field-moist				
Raw	log	log	0.1566	0.4615	0.2687	0.6573	<0.0001	0.7703	<0.0001
Ti-stable	log		0.5791	0.4637	0.268	0.6241	0.0002	0.7249	<0.0001
Zr-stable	log	log	0.1172	0.436	0.2814	0.5998	0.0005	0.739	<0.0001

accuracies, compared to results seen for alluvial PCA model applications. PCA methods have been applied to loess soils previously, in order to characterize different particle size fractions (Scull and Schaetzl, 2011). It is therefore surprising that organic carbon-associated fractions are not very well characterized by the PCA identification method utilized in this study.

4.3.1 Differences between alluvial and loessal prediction models.

The factors utilized by various PCA prediction models, along with coefficients supplied by regression analysis, are presented in Tables 4.3.1.3 and 4.3.1.4, respectively. Full model descriptions can be seen in Tables 4.3.1.5 and 4.3.1.6, for Raw and stable-element models, respectively. All utilized at least three PCA factors for SOC modeling. Similarities between elemental weights, determined within factors, allowed for the designation of characteristic soil features identified by PCA analysis.

Factors demonstrating coefficient weights greater than 0.9 for the elements Fe, Co, Rb, and Ba will be termed the 'fine-fraction' (FC) component, due to these elements being associated with the clay and silt-sized fractions, especially in loess soils (LeRiche et al., 1973). Factors utilizing pH variables (with weights greater than 0.40) constitute the 'pH-dependent component' (PC), while factors utilizing depth predictor variables at a significance level greater than 0.40 are associated with the 'depth component' (DC). An additional factor, comprised of various macro- and micronutrient elemental predictors, weighted at more than 0.40, will be referred to as the 'nutrient component' (NC).

The fine-fraction (FC) regression coefficients were typically within the range of |0.20 – 0.25|, with the exception of the loess Ti-stable models, which applied a value of 0.03 for the component's use in regression for SOC predictions. Raw prediction models typically utilized pH by applying low regression coefficients (|0.02 – 0.05|), with the wet, loessal model alone

Table 4.3.1.3 Factors utilized in various principal components analysis are provided, for wet and dry SOC prediction models determined by principal components analysis, with numbers used to identify factors corresponding to designated: fine-fraction (FC), pH-dependent (PC), depth-dependent (DC), nutrient-associated (NC), or stability (SC) components, determined for Louisiana soil samples. (Spaces left blank indicate the absence of components from associated prediction models.)

		Component				
Parent Material	Model	FC	PC	DC	NC	SC
Alluvium	Raw	1	2	3		
	Raw, wet	1	2	3		
	Ti-stable, wet	1	2	3	4	
Loess	Raw	1	5	3	2	4
	Raw, wet	1	3	4	2	
	Ti-stable, wet	1	4	3	2	
	Ti-stable, wet	1	4	3	2	
	Zr-stable	1		3	2	
	Zr-stable, wet	1		3	2	

Table 4.3.1.4 Component coefficients for principal components analysis prediction models are provided, determined by multiple regression analysis of PCA factor relationships to SOC contents in Louisiana soils. Coefficient weights are provided for designated components' usage by various models, with abbreviations listed corresponding to: fine-fraction (FC), pH-dependent (PC), depth-dependent (DC), nutrient-associated (NC), or stability (SC) components. (Spaces left blank indicate the absence of components from associated prediction models.)

		Component				
Parent Material	Model	FC	PC	DC	NC	SC
Alluvium	Raw	0.22	-0.04	-0.44		
	Raw, wet	0.16	-0.05	-0.43		
	Ti-stable, wet	-0.18	0.02	0.44	0.05	
Loess	Raw	-0.22	0.02	0.16	0.02	-0.52
	Raw, wet	-0.25	0.37	-0.09	0.05	
	Ti-stable, wet	0.03	0.17	0.54	-0.17	
	Ti-stable, wet	0.03	0.11	0.42	-0.19	
	Zr-stable	-0.25		-0.47	0.04	
	Zr-stable, wet	-0.24		0.35	0.04	

Table 4.3.1.5 Principal components analysis parameters for Raw SOC prediction models are provided; modeling statistics for Louisiana soils describe wet and dry generation sub-datasets. PCA significance factors, variance explained by each factor (VEF), and regression estimates (REG) are provided for valid Louisiana alluvial and loess soil generation sub-datasets. Sample number (N), regression coefficient (R^2), intercept (INT), and mean square error (MSE) values are also provided for each model's generation.

Raw PCA modeling parameters															
	alluvium						loess								
	oven-dry			field-moist			oven-dry					field-moist			
variable	factor1	factor2	factor3	factor1	factor2	factor3	factor1	factor2	factor3	factor4	factor5	factor1	factor2	factor3	factor4
D	0.14	0.46	0.77	0.25	0.37	-0.68	0.37	-0.31	-0.69	0.21	0.10	0.47	0.00	-0.04	-0.68
K	0.82	0.26	0.03	0.58	0.58	0.30	0.74	0.26	-0.14	0.22	-0.34	0.78	0.30	0.24	-0.05
Ca	-0.19	0.80	-0.08	0.06	0.61	0.51	-0.28	0.65	-0.14	-0.05	0.54	-0.08	0.76	-0.27	-0.07
Ti	0.65	0.62	-0.24	0.80	0.42	0.16	0.59	0.02	0.24	0.61	0.02	0.62	-0.08	0.63	-0.20
Cr	0.92	-0.04	0.12	0.85	-0.11	-0.15	0.77	0.17	0.02	0.30	0.18	0.74	-0.12	0.27	-0.12
Mn	0.60	0.49	-0.07	0.27	0.47	0.42	-0.51	0.44	0.14	0.26	-0.44	-0.29	0.64	0.17	0.26
Fe	0.98	0.11	0.06	0.97	0.08	-0.07	0.89	-0.24	0.20	-0.13	0.19	0.86	-0.27	-0.07	0.20
Co	0.96	0.14	0.07	0.96	0.06	-0.08	0.90	-0.16	0.13	-0.07	0.21	0.86	-0.17	-0.07	0.23
Zn	0.80	-0.45	-0.06	0.67	-0.58	0.19	0.82	0.30	0.13	-0.33	0.02	0.81	0.28	-0.28	0.19
Rb	0.97	-0.16	0.02	0.93	-0.17	-0.02	0.80	0.42	-0.22	0.01	-0.17	0.82	0.42	-0.06	-0.03
Sr	-0.15	-0.69	0.54	-0.84	0.05	0.09	-0.15	0.77	-0.43	-0.03	-0.04	0.05	0.86	-0.12	-0.18
Ba	0.89	-0.28	0.25	0.85	0.00	-0.19	0.83	0.34	0.10	0.09	-0.11	0.88	0.22	0.14	0.07
Pb	0.64	-0.53	-0.20	0.46	-0.47	0.41	-0.26	0.63	0.41	-0.28	0.02	-0.15	0.31	0.18	0.68
Cu	0.87	0.10	-0.09	0.76	-0.23	0.24	0.79	0.08	0.24	-0.11	0.14	0.80	-0.20	-0.04	0.30
Zr	-0.91	-0.12	0.03	-0.84	0.06	0.27	-0.51	0.03	0.52	0.42	0.12	-0.41	-0.03	0.73	0.17
pH	-0.25	0.84	0.25	0.06	0.84	-0.20	-0.39	0.23	-0.12	0.33	0.49	-0.18	0.42	0.49	-0.20
VEF	8.61	2.67	1.95	7.52	2.46	2.06	5.05	2.56	1.77	1.77	1.46	5.94	2.48	1.71	1.69
REG	0.22	-0.04	-0.44	0.16	-0.05	-0.43	-0.22	0.02	0.16	-0.52	0.10	-0.25	0.01	0.37	-0.09
R^2		0.754			0.695				0.729				0.431		
N		120			88				120				120		
INT		-0.254			-0.254				-0.725				-0.716		
MSE		0.082			0.098				0.14				0.234		

Table 4.3.2.1 Principal components analysis parameters for Ti-stable and Zr-stable SOC prediction models are provided; modeling statistics for Louisiana soils describe wet and dry generation sub-datasets; PCA significance factors, variance explained by each factor (VEF), and regression estimates (REG) are provided for valid Louisiana alluvial and loess soil generation sub-datasets. Sample number (N), regression coefficient (R^2), intercept (INT), and mean square error (MSE) values are also provided for each model's generation.

	Ti-stable PCA modeling parameters											
	field-moist alluvial				oven-dry loessel				field-moist loessel			
variable	factor1	factor2	factor3	factor4	factor1	factor2	factor3	factor4	factor1	factor2	factor3	factor4
D	0.15	-0.42	0.69	-0.28	0.35	-0.36	0.68	0.20	0.28	-0.32	-0.68	0.12
K	-0.46	0.59	0.41	0.26	0.63	0.34	0.31	-0.41	0.67	0.31	-0.30	-0.45
Ca	-0.52	0.23	0.19	0.50	-0.27	0.67	0.07	0.54	0.08	0.75	-0.15	0.49
Ti												
Cr	0.69	0.30	0.33	0.01	0.61	0.28	0.11	0.30	0.56	-0.06	0.15	0.47
Mn	-0.13	-0.27	-0.16	0.81	-0.55	0.46	0.00	-0.42	-0.20	0.74	0.07	-0.20
Fe	0.89	-0.25	0.17	0.22	0.88	-0.23	-0.28	0.15	0.83	-0.33	0.23	0.14
Co	0.89	-0.29	0.09	0.14	0.89	-0.17	-0.19	0.18	0.84	-0.23	0.25	0.19
Zn	0.74	0.50	-0.15	0.03	0.80	0.39	-0.24	0.01	0.85	0.29	0.00	-0.13
Rb	0.69	0.52	0.08	-0.11	0.71	0.54	0.27	-0.17	0.77	0.46	-0.21	-0.20
Sr	-0.64	0.67	0.27	-0.02	-0.21	0.78	0.36	0.08	0.08	0.84	-0.24	0.09
Ba	0.50	0.48	0.57	0.15	0.68	0.53	-0.07	-0.13	0.81	0.34	0.07	0.07
Pb	0.41	0.53	-0.35	-0.01	-0.36	0.64	-0.41	0.02	-0.14	0.55	0.55	-0.08
Cu	0.68	0.21	-0.20	0.14	0.75	0.11	-0.31	0.12	0.77	-0.14	0.37	0.00
Zr	-0.76	0.56	-0.03	-0.14	-0.66	0.21	-0.33	0.08	-0.53	0.40	0.48	0.07
pH	-0.30	-0.69	0.35	0.06	-0.42	0.17	0.20	0.43	-0.30	0.29	-0.31	0.44
VEF	4.25	3.21	2.78	1.29	3.59	3.38	2.18	1.99	3.54	3.24	2.26	2.01
REG	-0.18	0.02	0.44	0.05	0.03	-0.17	0.54	0.17	0.03	-0.19	0.42	0.11
R^2	0.739				0.719				0.468			
N	88				120				120			
INT	-0.254				-0.725				-0.716			
MSE	0.085				0.144				0.428			

	Zr-stable PCA modeling parameters					
	LZ			FLZ		
variable	factor1	factor2	factor3	factor1	factor2	factor3
D	0.42	-0.24	0.76	0.47	-0.13	0.66
K	0.88	0.11	0.01	0.89	0.11	0.08
Ca	-0.02	0.71	0.25	0.23	0.78	0.13
Ti	0.90	0.04	0.08	0.88	-0.07	0.16
Cr	0.92	0.04	0.11	0.87	-0.13	0.11
Mn	-0.32	0.58	-0.22	-0.12	0.72	-0.18
Fe	0.88	-0.33	-0.11	0.87	-0.31	-0.12
Co	0.89	-0.31	-0.03	0.87	-0.26	-0.14
Zn	0.92	0.11	-0.22	0.91	0.14	-0.14
Rb	0.93	0.20	0.04	0.93	0.19	0.04
Sr	0.40	0.73	0.27	0.50	0.73	0.15
Ba	0.95	0.13	-0.04	0.96	0.08	0.00
Pb	0.35	0.65	-0.40	0.24	0.41	-0.64
Cu	0.86	-0.12	-0.13	0.85	-0.25	-0.20
Zr						
pH	-0.31	0.41	0.33	-0.25	0.40	0.44
VEF	7.90	2.07	1.50	7.72	2.35	1.31
REG	-0.25	0.04	-0.47	-0.26	0.04	0.35
R^2	0.572			0.391		
N	120			120		
INT	-0.725			-0.716		
MSE	0.271			0.301		

applying this component at a 0.37 significance level. The loess Ti-stable models did apply higher coefficients (ranging from |0.11 – 0.17|), which are slightly greater than Raw model values. Depth components were heavily weighted by all models, typically explaining between 35 – 44% of SOC prediction values. Raw loess models displayed markedly reduced usage of this component (0.16 and 0.09 for dry and wet Raw loessal models, respectively), while the Ti-stable model used this component to account for 54% of predicted SOC values. The NC acted as a low-level (|0.02 – 0.05|) calibrator for adjusting SOC predictions to all models, with the exception of the loessal Ti-stable models, which weighted this component at |0.17 – 0.19| significance levels. The Raw loess model employed a fifth component, whose largest contributors, Ti and Zr, suggest the designation of this factor as the 'stability component' (SC).

All PCA prediction models utilized at least three factors for SOC prediction. Raw alluvial models employed FC, PC, and DC factors to produce excellent SOC prediction values, with R values ranging from 0.90 – 0.93. While all PCA models contained Fe, Co, Rb, and Ba as significant predictors in the FC factor, models also showed variables Cr and Zr, in alluvium, and Zn, in loess, to be included as significant predictors within this factor (with coefficients > 0.90). The depth component was more heavily weighted in alluvial, compared to loess models (regression coefficients of -0.44 and -0.45, and 0.16 and 0.09 for dry and wet models, for alluvium and loess, respectively). Alluvial and loess pH-dependent components did not share any significant predictor variables universally; however both Raw alluvial PCA models identified Mn, Ti, Ca, and K as significant predictor variable components (having coefficients > 0.40) within this factor. The dry loessal Raw model did include Ca and Mn with coefficients greater than |0.4|, and the wet, Raw model identified Zr and Ti elements as functioning in a similar capacity within the depth component. The regression coefficients for PC components were quite similar between alluvial and loessal models (ranging from |0.02 – 0.05|), with loessal Ti-stable and wet Raw models giving more weight to this component (with coefficients of 0.11, 0.17, and 0.37 for moist alluvial T-stable model, and loessal dry and wet models, respectively). The wet Raw loess model weighted the PC component at a much higher significance level (of 0.37), and was able to generate SOC predictions having R values of 0.69 and 0.78 (for dry and wet validation sub-dataset applications, respectively).

4.3.2 Effects of stable-element normalization on modeling datasets .

The inclusion of a fourth PCA factor, the NC, contributes to the slightly superior SOC prediction ability observed in applications of the alluvial wet Ti-stable to wet validation sub-datasets. Perhaps the association of significant NC predictor elements, which include K, Ca, Mn, and Fe, experience a different mechanism for interactions with SOC, which the model is able to utilize in its predictions. While the wet Ti-stable model demonstrated the best overall wet SOC predictions (R = 0.94), Raw alluvial models also resulted in excellent prediction capabilities for this dataset (R > 0.90).

In contrast to results seen in alluvial PCA prediction modeling, the use of stable-element models dramatically enhanced PCA prediction capabilities in loessal datasets, compared to results produced from Raw loess model applications. Overall however, loess model performances were greatly reduced, compared to the excellent predictions generated by alluvial PCA models (R = 0.93 vs. 0.70 and R = 0.94 vs. 0.81, for dry and wet applications for alluvial and loess models, respectively).

Factors utilized by loess stable-element models can be seen in Table 4.3.1.3. The Zr-stable model demonstrated the greatest capability for predicting SOC contents in dry validation sub-datasets (R = 0.70). This model, along with the wet, Zr-stable model, employed FC, DC, and

NC factors for prediction modeling; however, a pH-dependent component is absent, a feature that distinguishes the Zr-stable from other loess prediction models. The Zr-stable model, while lacking a component that other loess models use to characterize pH-dependent associations occurring between SOC and Ca, Mn, K, and Cr predictor variables, finds two of these elements (K and Cr) instead incorporated into its FC. Perhaps the incorporation of these elements (in addition to Ti and Cu) in the FC factor of loess Zr-stable models, being absent from Raw and Ti-stable loess models, accounts for this model's enhanced SOC prediction capabilities. A similar occurrence is also observed in the wet Zr-stable model. However, dry applications experienced diminished prediction results (R = 0.70 and 0.63, for Zr-stable dry and wet model applications to dry sub-datasets), explaining the discrepancy in wet and dry Zr-stable prediction model performances.

4.3.3 Comparison of field-moist and oven-dry prediction models.

The use of FC, DC, and PC factors in Raw alluvial models provides excellent SOC prediction capabilities on both wet and dry validation sub-datasets, with dry models only demonstrating slight improvement upon applications to dry datasets. The wet, Ti-stable model exhibited the best overall SOC predictions upon application to wet validation sub-datasets, with an R value of 0.94, although the Raw alluvial model achieved similar performance results (R = 0.93; Table 4.3.1.1). Overall, Raw, dry model afforded optimal SOC prediction accuracies, in both wet and dry model validations; however, the other two valid PCA prediction models demonstrated highly significant (R > 0.90) SOC prediction capabilities as well.

Loess models exhibited very different SOC prediction abilities using the PCA method. The oven-dry Zr- and Ti-stable models provided the most accurate SOC predictions upon application to wet and dry validation sub-datasets, respectively. Wet stable-element models experienced reduced predictive performances, with Ti-stable models producing R values of 0.62 and 0.72 (for dry and wet validations, respectively).The Zr-stable model, while predicting SOC contents in wet validations reasonably well (R = 0.78), failed produce an R value > 0.63 when applied to dry validation datasets. The Ti-stable models, having undergone normalization to relatively high Ti concentrations (compared to Zr concentrations; see Table 4.1.1.1), experience a reduction in the ability of subsequent elemental ratios to reflect subtle changes in less-abundant elemental species. As microelement concentrations gradually change, certain species have a high degree of correlation with SOC levels, individually. However, the use of this element as a weathering ratio elicits a reduced overall resolution of data for prediction modeling.

Scatterplots showing predicted vs. laboratory-measured SOC values generated by each Raw prediction model are given in Figures 4.3.1.1. Results of Ti-stable and Zr-stable prediction model applications are presented in Figures 4.3.2.1 – 4.3.2.2, respectively.

The wet, Zr-stable loessal model, with predictor elements normalized to the lower Zr concentrations, experiences a less pronounced loss of significant predictor variable correlations to SOC contents. Applications of this model to dry validations would experience minimized reductions in prediction accuracy, as the dry dataset is better able to reflect subtle elemental ratios within the loess soil samples. The decreased variability of PXRF elemental readings found in dry validation sub-datasets, due to the weaker normalizing action of low Zr values, accounts for the slight improvement in Zr-stable prediction model performance, compared to that of the Ti-stable wet loessal model. Figure 4.3.3.1 shows the performance of all wet and dry SOC prediction models on validation datasets. Regression model equations of PCA identified components are provided in Figure 4.3.3.2.

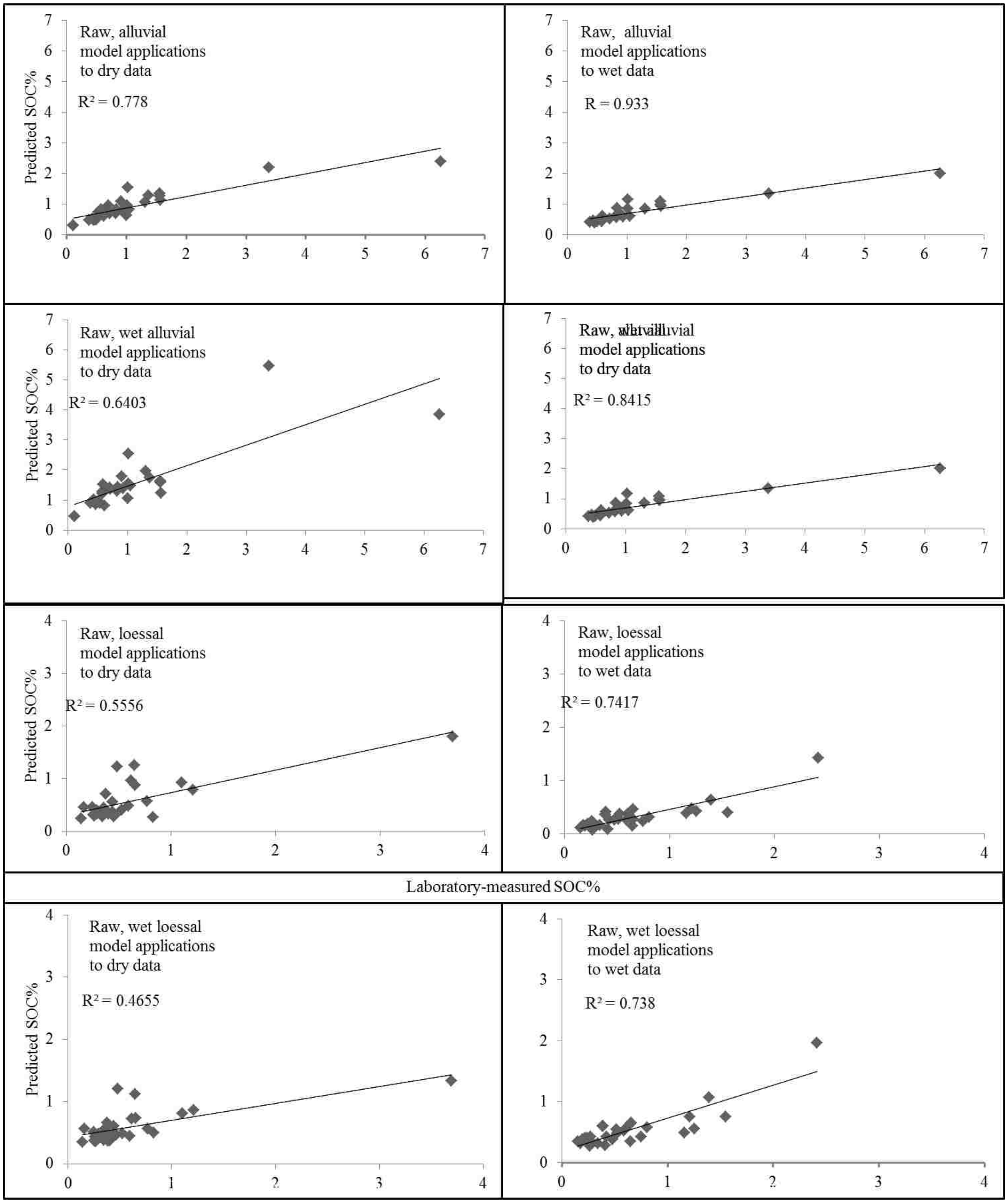

Figure 4.3.1.1 Scatterplots show predicted SOC contents vs. laboratory-measured SOC for Raw PCA model applications to wet and dry validation sub-datasets from Louisiana alluvial and loessal soils. Predicted SOC values were obtained by back-transformation of predictions generated by model applications, due to the use of log-transformed SOC contents for model construction.

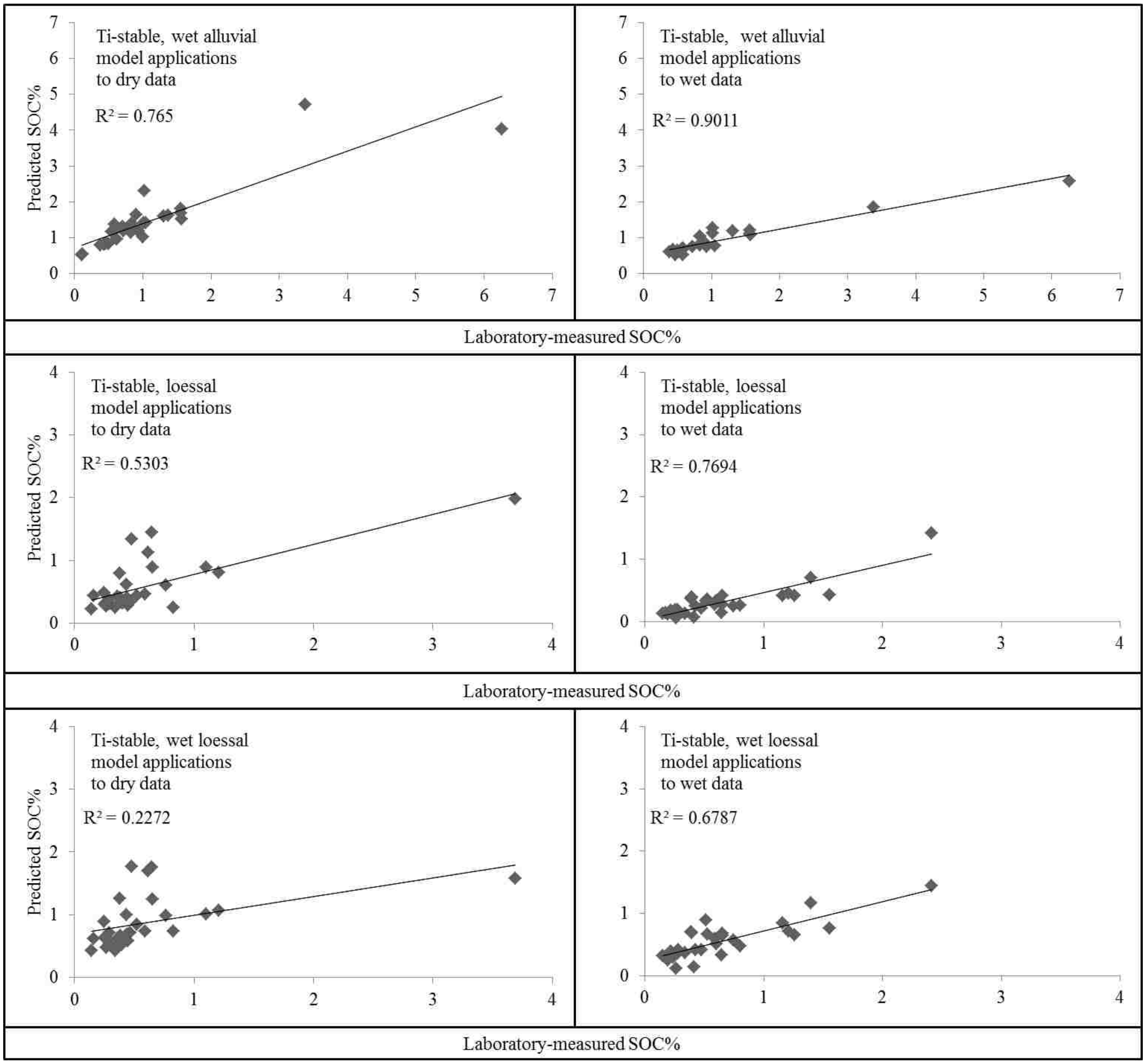

Figure 4.3.2.1 Scatterplots show predicted SOC contents vs. laboratory-measured SOC for PCA Ti-stable model applications to wet and dry validation sub-datasets from Louisiana alluvial and loessal soils. Predicted SOC values were obtained by back-transformation of predictions generated by model applications, due to the use of log-transformed SOC contents for model construction.

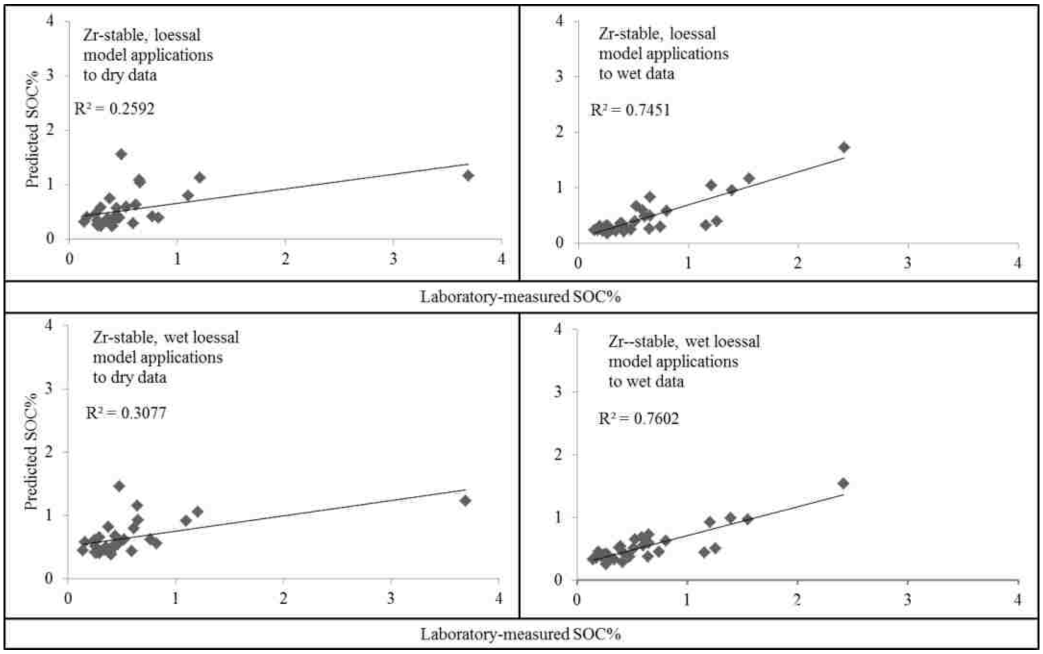

Figure 4.3.2 2 Scatterplots show predicted SOC contents vs. laboratory-measured SOC for PCA Zr-stable model applications to wet and dry validation sub-datasets from Louisiana alluvial and loessal soils. Predicted SOC values were obtained by back-transformation of predictions generated by model applications, due to the use of log-transformed SOC contents for model construction.

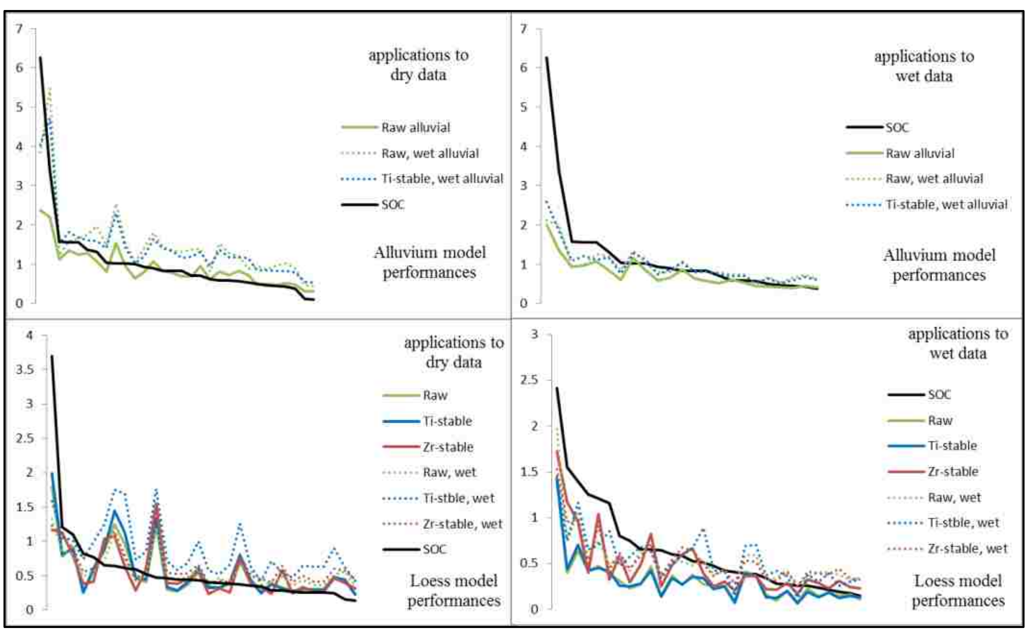

Figure 4.3.3.1 Line graphs show SOC prediction model performances on validation sub-datasets for Louisiana alluvial and loessal soil samples. Black lines indicate laboratory-measured SOC ercentages, with green, blue, and red lines corresponding to Raw, Ti-stable, and Zr-stable SOC predictions, respectively. (Wet and dry dataset applications are denoted above legends.)

<u>Alluvium</u>
<u>Raw</u>

Dry
log(PSOC) = -0.254 + factor1*0.22 + factor2*-0.04 + factor3*-0.44

Wet
log(PSOC) = -0.254 + factor1*0.16 + factor2*-0.05 + factor3*-0.43

<u>Ti-stable</u>

Wet
log(PSOC) = -0.254 + factor1*-0.18 + factor2*0.02 + factor3*0.44 + factor4*-0.04

<u>Loess</u>
<u>Raw</u>

Dry
log(PSOC) = -0.725 + factor1*-0.22 + factor2*0.02 + factor3*0.16 + factor4*-0.52 + factor5*0.10

Wet
log(PSOC) = -0.716 + factor1*-0.25 + factor2*0.01 + factor3*0.37 + factor4*-0.09

<u>Ti-stable</u>
Dry
log(PSOC) = -0.725 + factor1*0.03 + factor2*-0.17 + factor3*0.54 + factor4*0.17

Wet
log(PSOC) = --0.716 + factor1*0.03 + factor2*-0.19 + factor3*0.42 + factor4*0.11

<u>Zr-stable</u>
Dry
log(PSOC) = -0.725 + factor1*-0.25 + factor2*0.04 + factor3*-0.47

Wet
log(PSOC) = -0.716 + factor1*-0.26 + factor2*0.04 + factor3*0.35

Figure 4.3.3.2 MLR equations are provided for SOC prediction models for alluvium and loess soils in Louisiana, USA. Model-predicted SOC is denoted as PSOC.

4.4 The influence of moisture on PXRF elemental readings and prediction model performance

4.4.1 PXRF detection capabilities based on soil preparation state. Figure 4.4.4.1 shows PXRF mean elemental differences between wet and dry datasets for Louisiana alluvium and loess soils. Differences between parent materials PXRF detections of specific elements can be seen in Figure 4.4.4.2.

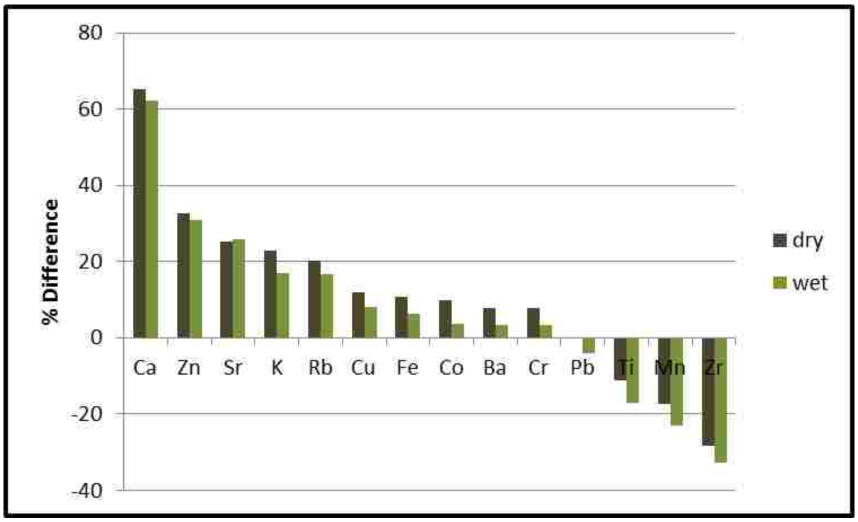

Figure 4.4.1.1 Percent (%) difference in mean elemental values between parent materials' wet & dry datasets are shown. Positive values indicate higher means for alluvial datasets.

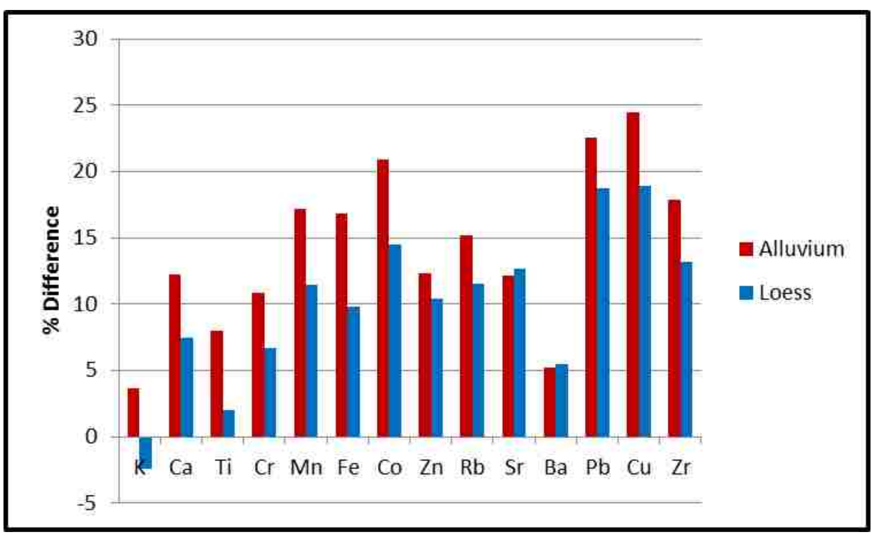

Figure 4.4.1.2 Percent (%) difference in mean elemental values between wet and dry datasets are shown. Positive values indicate higher elemental means for dry datasets.

Evaluating differences in PXRF elemental detections for soil samples scanned under field-moist and oven-dry conditions was approached by determining the extent of correlation occurring between wet and dry datasets, for each element used in prediction modeling. Correlation results provide an Pearson product-moment correlation coefficient (R) value, indicating the degree of correlation between two sets of variables, in addition to a p value, which determines whether the incidence of correlation is observed consistently throughout the dataset.

A p value of less than 0.05 indicates that the correlation (to the extent determined by R) is significant throughout the dataset. Results from correlation testing showed that the majority of elemental concentrations obtained by PXRF analysis exhibited no significant differences in elemental readings between wet and dry datasets analyzed in this study. Results are presented in Table 4.4.4.1.

Datasets were divided into high and low-moisture subsets, separating sample observations with moisture contents greater than 20%, by weight. Moisture levels above this threshold value are commonly reported in the literature to produce significant decreases in elemental detections, compared to concentrations from dry soil analysis (Weindorf et al., 2011; Ge et al., 2005; EPA, 2007). Alluvial samples experiencing high moisture contents (>20%) demonstrated significantly different PXRF readings for K, Ca, Ti, Mn, and Ba; however, these effects were not detected in low-moisture (<20%) alluvial samples. No significant differences were detected in high-moisture loess samples.

Loess low-moisture samples did however show variable PXRF concentrations for Pb between wet and dry samples. This finding is surprising, considering that by comparing wet and dry dataset mean elemental values, Pb experiences minimal reductions in PXRF detection in wet samples for both parent material datasets. Because significant differences in Pb concentrations

Table 4.4.4.1 Results are provided from correlation testing of dry PXRF elemental data against wet data, collected from alluvium and loess soils in Louisiana, USA. Datasets were separated into observations demonstrating moisture contents >20% ('High-moisture' group) and those with moisture contents of <20% ('Low-moisture' group). Correlation coefficients (R) and p values (P > |r|) are provided from datasets analyzed.

alluvium				
	High-moisture		Low-moisture	
Element	R	P > |r|	R	P > |r|
K	-0.151	0.442	0.49	0.021
Ca	0.092	0.643	0.734	0.0001
Ti	0.183	0.351	0.645	0.0012
Cr	0.675	<0.0001	0.674	0.001
Mn	0.362	0.059	0.845	<0.0001
Fe	0.615	0.001	0.937	<0.0001
Co	0.539	0.003	0.87	<0.0001
Zn	0.772	<0.0001	0.974	<0.0001
Rb	0.592	0.001	0.904	<0.0001
Sr	0.727	<0.0001	0.921	<0.0001
Ba	0.329	0.087	0.862	<0.0001
Pb	0.439	0.019	0.737	<0.0001
Cu	0.628	0.0003	0.648	<0.0001
Zr	0.837	<0.0001	0.942	<0.0001
loess				
	High-moisture		Low-moisture	
Element	R	P > |r|	R	P > |r|
K	0.835	<0.0001	0.766	<0.0001
Ca	0.834	<0.0001	0.784	0.0004
Ti	0.71	<0.0001	0.377	0.01
Cr	0.461	<0.0001	0.28	<0.0001
Mn	0.474	0.0009	0.706	<0.0001
Fe	0.807	<0.0001	0.773	<0.0001
Co	0.739	<0.0001	0.702	<0.0001
Zn	0.685	<0.0001	0.803	<0.0001
Rb	0.816	<0.0001	0.875	<0.0001
Sr	0.868	<0.0001	0.9	<0.0001
Ba	0.629	<0.0001	0.574	<0.0001
Pb	0.611	<0.0001	0.087	0.432
Cu	0.521	0.0002	0.513	<0.0001
Zr	0.564	<0.0001	0.698	<0.0001

were seen in the low-moisture, rather than the high-moisture, loess data, differences are not likely to be linearly correlated with moisture contents.

Previous studies have observed that high concentrations of Pb in soil samples lead to PXRF analysis results that show elevated concentrations of Pb and Cr (Hettipathurana et al., 2004). As differences in Cr levels in the present study between wet and dry PXRF detections were not found to be significant, this effect may not entirely explain the discrepancy seen here for Pb concentrations in the low-moisture loessal dataset.

4.4.2 Moisture content and SOC prediction accuracy.

To determine whether the presence of soil moisture is associated with a linear reduction in prediction model accuracy in field-moist model, residual values calculated from model predictions in wet datasets were analyzed to assess their correlation extent with soil moisture concentrations. A total of 50 alluvial and 130 loess samples were successfully analyzed for soil moisture content at the time of wet PXRF analysis. Unfortunately, data for the remaining 100 alluvial and 20 loess samples were lost over the course of the project, and it should be noted that the analysis for correlation between prediction residuals and wet moisture content has been conducted on a significantly reduced dataset. Results from this test are unable to fully explain the relationship between moisture content and prediction model accuracy, as it can be assumed that additional variability exists within the prediction model results that cannot be examined to determine the influences of soil moisture, as these data are lacking.

To determine whether increasing soil moisture content is associated with differences between sample PXRF elemental readings, correlation testing was conducted using elemental differences between wet and dry datasets and soil moisture contents. Results from this analysis are presented in Table 4.4.1.2.

Table 4.4.1.2 Results are provided from correlation testing of differences between dry and wet PXRF elemental data against moisture contents for individual soil samples collected from alluvium and loess soils in Louisiana, USA. Datasets were separated into observations having moisture contents >20% ('High-moisture' group) and those with moisture contents of <20% ('Low moisture' group). Correlation coefficients (R) and p values (P > |r|) are provided from datasets analyzed.

alluvium				
	High-moisture		Low-moisture	
Element	R	P > |r|	R	P > |r|
K	0.074	0.707	0.225	0.313
Ca	0.164	0.405	0.232	0.298
Ti	0.156	0.428	0.068	0.696
Cr	0.341	0.076	-0.093	-0.679
Mn	-0.174	0.377	0.103	0.647
Fe	0.469	0.012	0.05	0.825
Co	0.378	0.048	0.029	0.89
Zn	0.318	0.099	0.068	0.765
Rb	0.305	0.115	0.107	0.636
Sr	-0.122	0.537	0.185	0.41
Ba	0.126	0.522	0.038	0.866
Pb	-0.036	0.856	0.099	0.662
Cu	0.235	0.228	0.266	0.232
Zr	-0.288	0.137	-0.134	0.554

loess				
	High-moisture		Low-moisture	
Element	R	P > |r|	R	P > |r|
K	0.14	0.352	0.106	0.337
Ca	0.362	0.014	-0.012	0.913
Ti	0.245	0.101	-0.155	0.158
Cr	0.331	0.025	0.052	0.641
Mn	0.133	0.379	0.164	0.136
Fe	0.159	0.292	-0.197	0.072
Co	0.138	0.362	-0.229	0.036
Zn	0.243	0.104	-0.119	0.281
Rb	0.006	0.967	0.019	0.863
Sr	0.134	0.373	0.32	0.003
Ba	0.103	0.497	-0.0003	0.999
Pb	0.01	0.946	-0.076	0.492
Cu	-0.118	0.435	-0.291	0.007
Zr	-0.046	0.76	-0.071	0.521

Table 4.4.2.1 shows the results of testing for correlation between absolute residual values (generated by calculating the difference between laboratory-measured SOC contents and model predicted SOC values) and soil moisture content, provided as a percentage, at the time that field-moist PXRF scanning analysis was conducted. Regression coefficients (R values) provided in the table address the degree to which soil moisture contents are found to increase, as the absolute value of calculated residuals also become larger. The R values > 0.7 are considered to be highly correlated, while values between 0.5 and 0.7 are said to indicate the detection of a moderate correlation between variables.

Table 4.4.2 1 Results are provided from correlation testing of residual values from SOC prediction model applications to wet validation sub-datasets against moisture contents for individual soil samples. Datasets were separated into observations having moisture contents >20% ('High-moisture' group) and those with moisture contents of <20% ('Low moisture' group). Correlation coefficients (R) and p values (P > |r|) are provided from datasets analyzed.

		Alluvium			
		High-moisture		Low-moisture	
Method	Model	R	P > |r|	R	P > |r|
MLR	Raw	-0.07	0.722	0.034	0.88
	Ti-stable	-0.005	0.98	0.142	0.529
	Zr-stable	-0.09	0.648	0.31	0.16
PCA	Raw	-0.332	0.085	-0.117	0.604
	Ti-stable	-0.256	0.188	-0.355	0.105
		Loess			
		High-moisture		Low-moisture	
Method	Model	R	P > |r|	R	P > |r|
MLR	Raw	-0.311	0.035	0.024	0.829
	Ti-stable	0.117	0.44	0.013	0.908
	Zr-stable	0.057	0.709	0.173	0.116
PCA	Raw	0.282	0.057	-0.09	0.418
	Ti-stable	0.153	0.309	-0.106	0.336
	Zr-stable	0.087	0.566	-0.117	0.29

Moisture content was only found to be significantly correlated with reductions in model accuracy for the wet loessal Raw model. The negative correlation between residual values and moisture content exhibited a correlation coefficient of -0.311. When the magnitude of a correlation coefficient falls between 0.3 and 0.5, the relationship is said to exhibit a low level of correlation. Coefficients less than 0.30 demonstrate little, if any, linear correlation.

4.4.3 Variable effects of moisture for elemental predictor variables.

Elements found to exhibit significant differences between wet and dry readings would be expected to cause reductions in prediction model accuracy upon application of dry models to wet datasets, and vice versa. As predictor variable weights are calculated by accounting for variabilities observed over the entire generation dataset, elements found to be significantly higher or lower in validation sub-datasets would act to over-or under-represent the relationship of that particular predictor variable in the calculation of SOC prediction values.

As MLR models place more weight on a reduced number of predictor variables for SOC determinations, it would be expected that elements experiencing significant differences between wet and dry datasets would fail to provide a reliable variable upon which accurate SOC predictions would result from model applications to both wet and dry data. Therefore, the use of Fe and Co in alluvial models, and Ca and Cr in loess models, prevent optimal model performances for both wet and dry applications, especially when soil moisture contents are > 20% (see Table 4.4.1.2). Use of Co, Sr, and Cu as predictors in loessal models, along with K, Ca, Ti, Mn, and Ba in alluvial models, also constitute unreliable modeling variables, due to the significant differences detected between wet and dry datasets for these elements (see Table 4.4.4.1).

The principal components analysis modeling strategy experiences less pronounced negative effects from variable ‘moisture-sensitive’ elemental detections between wet and dry datasets, due to the sharing of prediction model weights amongst all predictor variables supplied for modeling. As cumulative elemental information is utilized for calculation of SOC predicted values, discrepancies in the detection of one or more variables would exert a less pronounced effect on overall model performance.

Although significant variabilities have been observed between wet and dry PXRF elemental datasets for alluvial and loess soil samples examined in this study, excellent prediction model performances are possible if models allocate relatively low weight to moisture-sensitive elemental predictor variables. Such models were shown to provide satisfactory SOC predictions when applied to both oven-dry and field-moist PXRF elemental datasets for Louisiana alluvial and loess soils.

4.5 Discussion of SOC prediction model performance and significant variables

Predictor variables for depth and soil reaction (pH) were included in modeling datasets as an attempt to account, for modeling purposes, for site-specific variabilities that exist within soil sample datasets. While depth was selected as a highly significant predictor variable for all MLR models, also playing an influential role in PCA models' "Depth component", the pH variable was only found to be significant in certain alluvial MLR models. Although models supplied by the PCA technique all (except loess Zr-normalized models) utilized a "pH-dependent component for SOC predictions, the lack of this predictor in Louisiana loess soils' MLR models is surprising, due to the greater extent of chemical weathering that has occurred in these soils (Almond and Tonkin, 1999), compared to weathering trends in Louisiana alluvial soils.

The use of Ti and Zr concentrations for stable element stabilization were employed to account for elemental translocations resulting from chemical and physical weathering. In the more highly weathered loess soils, MLR prediction models fail to select pH as a significant predictor variable, however the satisfactory performance of the stable-element models suggest that certain elemental predictor ratios are indicative of the processes of weathering, and so remove the need for a separate predictor variable accounting for soil acidity. The predictor variables selected for by Ti- and Zr-stable models would logically provide correlations associated with the translocation of organic carbon-associated elements in response to weathering.

Several significant factors explaining models' satisfactory or diminished performances between wet and dry applications can be identified upon close examination of the effects of moisture on PXRF elemental readings. Comparison of average elemental values for wet and dry datasets show that PXRF detections of Pb and Cu, for loess samples, and Mn, Fe, Co, Rb, Pb, Cu, and Zr, for alluvial samples, all demonstrate reductions in mean PXRF readings > 15% (of dry values) in wet PXRF datasets. Differences in PXRF elemental readings (between wet and dry datasets) were correlated with moisture contents to determine whether increases in soil moisture are related to larger discrepancies between wet and dry PXRF elemental detections. Results showed that in alluvial soil samples having moisture contents > 20%, PXRF readings for K, Ca, Ti, Mn, and Ba demonstrated significant differences when compared to dry PXRF soil sample readings. Soil samples having < 20% moisture showed greatly reduced effects on PXRF elemental readings, with only loess readings for Pb experiencing significant decreases, compared to dry PXRF concentrations.

Previous research has shown that Pb and Cu are found in both stable and acid-soluble fractions of organic matter (Egli et al., 2009). This would suggest that the PXRF-detectable concentrations of these elements reflect differences between dry and moist datasets, with their inclusion in field-moist prediction models being reflective of the soluble, rather than total, organic fraction. The significant differences between PXRF detections of Pb in wet and dry datasets exhibiting moisture contents of < 20% can be explained by a reduced ability of this instrument to detect Pb signatures emanating from the soluble organic matter fraction.

Alluvial soil samples were found to experience differences in PXRF elemental detections of Fe and Co (between wet and dry datasets) that increase as moisture content (> 20%) increases. This corresponds to previous findings that acknowledge that high Fe concentrations (such as the concentrations observed in alluvial datasets) can produce elevated PXRF readings for Co, due to the effects of k orbital spectral interferences associated with alterations in secondary fluorescence detections when moisture is present in scanned samples (Hettipathirana 2004; Innov-X Systems, 2003). This effect is not seen in Fe and Co readings obtained from PXRF analysis of loess soil samples; however, the PXRF detections of Ca and Cr concentrations demonstrate a similar trend in this parent material dataset. As these elements do not exhibit the same electron orbital configurations assumed by Fe and Co, a different mechanism is responsible for the field-moist PXRF concentrations of Ca and Cr observed in loess datasets.

Previous research has identified Ca as a major component of the humic acid fraction of soil organic matter, which is less vulnerable to solubilization in the dissolved organic matter fraction under acidic soil conditions (Nael et al., 2009; Donisa et al., 2002). Field-moist PXRF readings in loess soils having a low pH would be more subject to variability in the detection of fulvic acid-associated elements (Zn, Pb, and Cu) in the soil moisture component of samples, due to its greater potential for solubilization under low pH conditions. While Ca constitutes a significant predictor variable in all loessal MLR prediction models, insoluble and soluble fractions both experience a high degree of correlation between Ca and organic carbon. Additionally, Ca concentrations have been shown to be strongly linked with pH in acting as a control over dissolved organic carbon contents. As Ca concentrations increase, dissolved organic carbon becomes more incorporated in the Ca-associated insoluble organic fraction (Romkens et al., 1996), with this relationship being stronger as soil acidity approaches neutrality. With many of the loessal soil samples exhibiting low pH values, it would appear that the PXRF readings of Ca in the soluble organic fraction would add a level of uncertainty to models utilizing this element as an independent predictor in MLR modeling.

Another way of looking at differences between predictor variable usage in the MLR models is to evaluate their relative weights, and observe how depth differences may influence the way in which additional variables contribute to predicted SOC values. Weights are calculated by determining average predictor variable values for each dataset, which are multiplied by model regression coefficients. The product of each predictor variable is divided by the total of all average values multiplied by their respective coefficients. This provides the percent contribution of individual predictor variables to predicted SOC values.

Depth constitutes the largest percent contributor in all wet MLR models. Other variables used for SOC prediction modeling can be seen in Figures 4.5.1.1 and 4.5.1.2. These figures provide relative model weights at 5 and 50cm depths, illustrating how predictor variable weights change as depth increases through the profile.

For application of dry models to wet validation sub-datasets, certain elements experience a decrease in average concentration in wet PXRF datasets, compared to concentrations obtained from dry soil PXRF analysis. Those elements acting as positive predictor variables cause underestimation of SOC when dry modeling parameters are applied to wet validation sub-datasets. The reduced detection of predictor elements in the wet dataset causes wet MLR models to apply a greater coefficient to predictor variables than those use dry MLR models. Application of the wet models to dry datasets therefore results in an overestimate of predicted SOC values.

Table 4.5.1 Relative predictor variable weights are provided for 5 and 50cm depths of Raw MLR prediction models as applied to validation sub-datasets.

Raw MLR model parameters

alluvium							
dry				wet			
	weight				weight		
variable	average	5cm	50cm	variable	average	5cm	50cm
Depth	72	32	82	Depth	40	11	55
Mn	5	12	3	Ca	7	10	5
Zn	4	11	3	Ti	16	24	12
Sr	9	21	5	Co	4	7	3
Ba	5	13	3	Zn	1	2	1
Pb	5	11	3	Rb	16	24	12
				Ba	21	31	15
				Pb	1	1	0
				Zr	5	7	4
				pH	5	8	4

loess							
dry				wet			
	weight				weight		
variable	average	5cm	50cm	variable	average	5cm	50cm
Depth	75	16	84	Depth	62	23	75
K	13	16	8	K	13	27	9
Ca	3	4	2	Ca	3	7	2
Zn	2	2	1	Ti	14	28	9
Rb	5	6	3	Sr	2	5	2
Pb	2	2	1	Zr	5	11	4

Table 4.5.2 Relative predictor variable weights are provided for 5 and 50cm depths of stable-element MLR prediction models, as applied to validation sub-datasets.

Ti-stable MLR model parameters

alluvium — dry

variable	weight: average	weight: 5cm	weight: 50cm
Depth	66	26	78
K	3	6	2
Mn	1	3	1
Fe	9	20	6
Co	5	12	3
Ba	4	9	3
Pb	9	19	6
pH	3	6	2

alluvium — wet

variable	weight: average	weight: 5cm	weight: 50cm
Depth	51	16	65
Ca	1	1	1
Co	3	4	2
Rb	23	39	16
Sr	4	7	3
Ba	8	14	6
Pb	2	4	2
pH	9	15	6

loess — dry

variable	weight: average	weight: 5cm	weight: 50cm
Depth	81	50	91
K	2	6	1
Ca	1	3	0
Sr	2	8	1
Ba	5	16	3
Pb	5	18	3

loess — wet

variable	weight: average	weight: 5cm	weight: 50cm
Depth	75	35	84
K	4	9	2
Ca	2	4	1
Fe	2	6	1
Co	7	17	4
Zn	7	19	5
Sr	4	11	3

Zr-stable MLR model parameters

alluvium — dry

variable	weight: average	weight: 5cm	weight: 50cm
Depth	89	59	94
Mn	0	1	0
Zn	3	10	2
Sr	2	7	1
Pb	6	23	4

alluvium — wet

variable	weight: average	weight: 5cm	weight: 50cm
Depth	67	27	79
Ca	4	9	3
Ti	8	19	5
Co	0	0	0
Zn	1	2	1
Rb	9	21	6
Ba	0	1	0
Pb	1	3	1
pH	9	20	6

loess — dry

variable	weight: average	weight: 5cm	weight: 50cm
Depth	87	54	92
K	6	22	4
Ca	0	1	0
Sr	1	4	1
Ba	2	6	1
Pb	4	13	2

loess — wet

variable	weight: average	weight: 5cm	weight: 50cm
Depth	78	40	87
K	8	21	5
Ca	0	0	0
Ti	5	13	3
Fe	4	12	3
Co	1	4	1
Zn	2	4	1
Cu	2	5	1

Predictor variables experiencing a significant decrease in wet, as compared to dry, PXRF datasets, average values include K, Ca, Ti, Mn, and Ba in alluvial samples, and Pb is the loessal dataset. These elements are associated with very low (less than or equal to 5% weights) influence, by weight, on dry alluvial models (especially the Zr-stable model) and loessal (especially the Raw) prediction models. Models experiencing a greater degree of dependence (<5% weight) upon these variables include all wet alluvial models. No wet loessal models contain Pb, preventing diminished model performances upon their application to dry validation data.

While successful prediction models exert a lesser dependence upon predictors whose concentrations are significantly reduced under wet conditions, several models' predicted SOC contents exhibit non-linear relationships tp laboratory-measured SOC values. Models that produce predicted SOC values that correlate to measured SOC for both wet and dry applications include the Zr-stable, wet model for alluvium and the Ti-stable, wet model for loess.

The non-linear prediction results seen in other models is likely due to the way that predictor variable weights change as depth increases through the profile. As models rely heavily upon depth for generating SOC predictions (especially those constructed from wet datasets), the influence of other predictor variables may be more pronounced in surface depths, compared to their relative weights at lower depths, where depth is typically the dominant predictor.

Tables 4.5.1.1 and 4.5.1.2 list the relative weights of model predictor variables at 5 and 50cm depths. Average weight values were provided earlier, and can be seen in Tables 4.2.1.4, 4.2.2.1, and 4.2.2.2. Both alluvial and loessal prediction models weigh Ca, Rb, and Sr more heavily at surface depths (5cm), while Pb is more influential at lower depths (50cm).

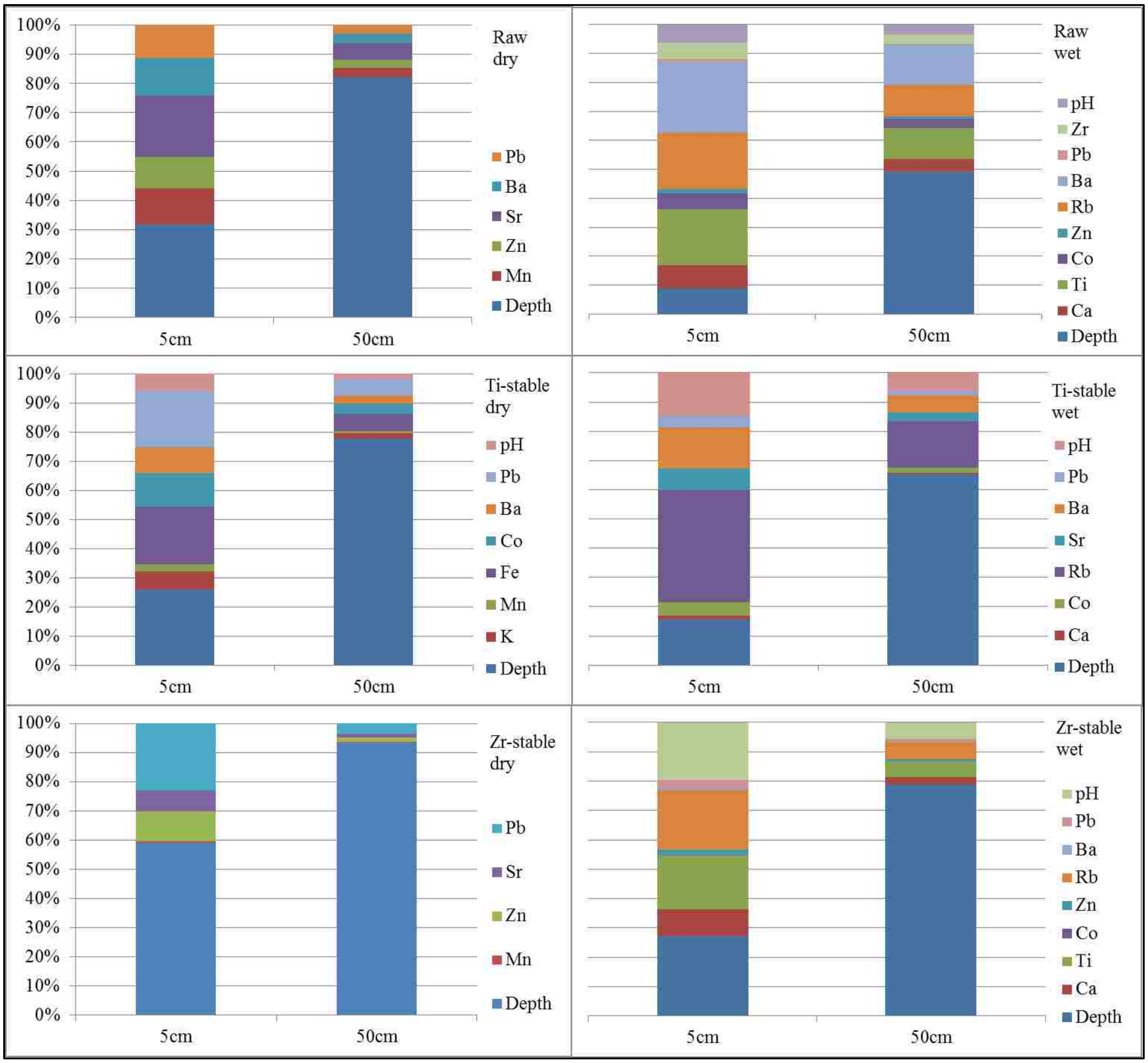

Figure 4.5.1 Relative predictor variable weights are provided for 5 and 50cm depths of MLR prediction model applications to alluvial validation sub-datasets.

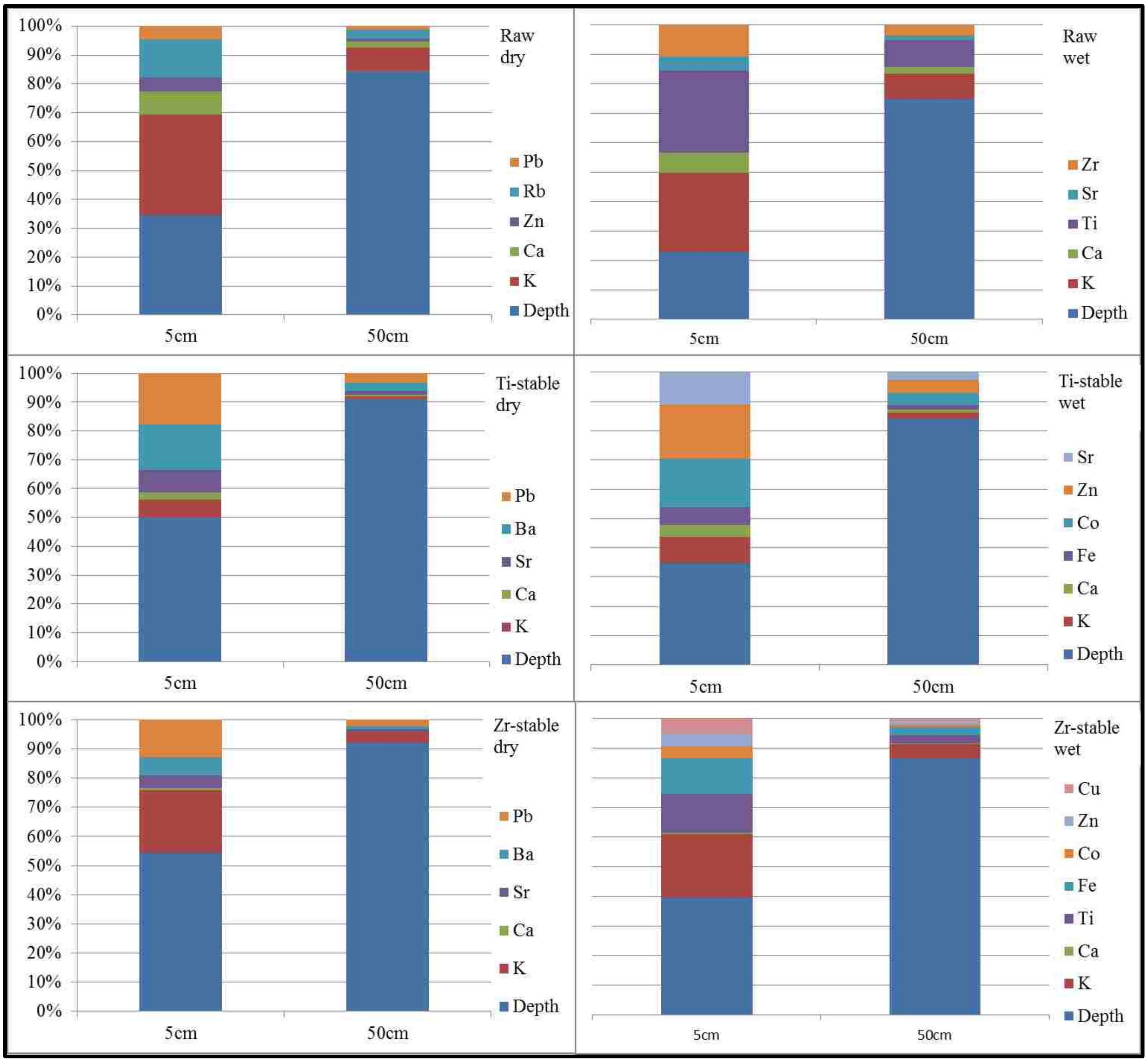

Figure 4.5.2 Relative predictor variable weights are provided for 5 and 50cm depths of MLR prediction model applications to loessal validation sub-datasets.

Loess models also exhibit greater influence of Fe, Ti, and Zn at the surface, while increasing depths cause alluvial models to utilize Ti more heavily for SOC predictions.

The non-linearity of predicted vs. laboratory-measured SOC contents of dry models applied to dry validation datasets, and vice versa, is thus far unexplained by the effects of moisture. Field-mist loessal models experience nearly linear relationships to laboratory SOC data when applied to wet validation sub-datasets, whereas alluvial models demonstrate consistent under-predictions of SOC. The complexity of alluvial PXRF datasets collected from wet soil samples prevents a consistently accurate MLR prediction from being generated, as several elemental species experience significant reductions in PXRF elemental concentrations. Because wet alluvial models place significant influence on several elements that experience these reductions, SOC predictions are subject to underestimate SOC contents, as positive predictors (such as K, Ca, and Mn) are represented imprecisely, especially in samples having moisture contents greater than 20%. As MLR models are unable to account for differential elemental detections that occur at different depths, pH, and SOC levels, PCA models instead provide a modeling strategy that is able to account for differently weighted factors (i.e. depth, pH, and nutrient components, respectively.) This allows for a sort of calibration of models to the local physicochemical conditions that may influence PXRF elemental detections under field settings. Further research into PXRF detection of elements found in the soluble organic matter fraction would be beneficial in understanding how models can be calibrated further to mitigate the effects of differential elemental solubility on modeling.

The PCA method provided the best overall alluvial model for wet SOC determinations. Alluvial PCA models utilized four components for the prediction of SOC contents. These four components were designated: fine-fraction, pH-dependent, depth-dependent, and nutrient-components. Applications of PCA factors in multiple linear regression analysis showed that for the Ti-stable, wet alluvial model, depth was the most influential factor for SOC predictions, followed by fine-fraction, pH-dependent, and nutrient-associated components. It seems that the Ti-stable model's improved performance can be attributed to the minimal use of certain elements within its four PCA components. The elements K, Ca, Ti, Mn, and Cu showed significant differences between wet and dry alluvial datasets, when moisture contents were > 20%. The minimal influence of these elements as significant factors make SOC predictions from this model more robust for both dry and wet dataset applications.

The best SOC prediction model examined in this study for Louisiana loess soils proved to be the field-moist, Ti-stable model determined through the use of multiple linear regression analysis. All wet models, lacking Pb as significant predictor variable, demonstrated enhanced SOC determination capabilities, compared to results from dry MLR model applications. Oven-dry loess models selected Pb as a significant predictor variable; however, due to the significant differences observed between wet and dry PXRF readings for this element, application of dry models to wet datasets experienced significant reductions in SOC prediction accuracy.

The Ti-stable model exhibited improved performances over other wet MLR models, due to its selection of certain predictor variables. This model benefited from its use of Sr, rather than Ti and Cu, which were included in the wet Zr-stable model. The interrelations observed by multicollinearity testing of wet and dry datasets indicate the presence of significant correlations existing between Ti and Pb, and between Cu and Pb, not observed in dry loess datasets. This observation suggests a higher potential for variability between loessal wet and dry modeling datasets, which resulted in the reduced SOC prediction performance of the moist Zr-stable model, when compared to applications of the Ti-stable model, lacking Ti and Cu, to dry datasets.

Previous research has suggested that Zr may provide a better stable-element index for soils experiencing high chemical weathering rates, as Ti shows greater susceptibility to the effects of physical weathering (Smeck and Wilding, 1980). However, Zr-stable Cu ratios, selected for via MLR modeling, fail to provide a consistent predictor variable for SOC determination of both field-moist and oven-dry datasets. Additionally, research by Hodson (2001) shows that Ti/Zr ratios can experience a high degree of variability (up to 57%), suggesting that these elements reflect very different modes of translocation and stability within soil profiles. Ti-normalization, reported to provide a more accurate stable-element index in soils having high silt and clay-sized fractions (Stiles et al., 2003), produces a dataset whose predictor variables are more able to accurately reflect their association with organic carbon, in both wet and dry states.

4.6 Comparison of PXRF elemental models with other SOC determination methods

Previous work by Weindorf et al. (2012) demonstrated the successful use of Zr-normalized PXRF data for SOC determination in soil samples collected from Idaho and Alaska, USA. Multiple linear regression analysis generated models using PXRF elemental data and laboratory-measured SOC contents, with results achieving R^2 values of 0.93, 0.95, and 0.99, for combined ID & AK, AK, and ID model applications respectively. Predictor variables for Mn, Zn, and Sr were shown to be significant in all three models, with K, Ca, Fe, Co, Rb, Ba, Pb, and Cu also chosen for selection by various models. Idaho models, with samples exhibiting lesser amounts of volcanic ash in predominantly loamy/sandy upper profile materials, utilized K, Ca, Co, and Pb, in addition to Mn, Zn, and Sr. Alaska pedons demonstrated greater overall variability with volcanic ash contents of <15 – 85%, by volume. The use of Ca, Cr, Fe, and Rb (in addition to Mn, Zn, and Sr), explained 95% of the variability observed in SOC contents. Combined AK &

ID models made use of Fe, Cu, Ba, and Pb to model SOC contents over a variable range of volcanic and glacial outwash soils. Similar elemental predictor variables were identified by MLR analysis of Louisiana alluvial and loess soils, however comparisons between model elemental selections are difficult due to the heavy weight allocated to depth variables in models generated for this study. The influence of moisture on the predictive performance of previous models is unknown; however, the results of this study suggest that the Idaho model, having several loamy soils within its dataset, would experience somewhat reduced performance levels upon application to field-moist datasets, due to its use of 4/7 predictor variables (Ca, Co, Pb, and Sr) which exhibit low-to-moderate PXRF moisture-sensitivities in Louisiana silt loam loess soils. Alaska and combined models both utilized 3/7 moisture-sensitive elements in MLR modeling, possibly allowing for improved prediction capabilities upon application to field-moist datasets.

Visible near-infrared diffuse reflectance spectroscopy (VisNIR-DRS) is another spectroscopic method that has been evaluated for its ability to accurately determine soil organic carbon contents from *in situ* data analysis. Results from various studies provide prediction values that satisfactorily agree with laboratory-measured SOC contents, with R^2 values ranging from 0.84 – 0.90 from model applications to dry soil samples. Results from the current study suggest that the use of PXRF elemental data allows for enhanced SOC prediction capabilities for localized soil samples, with moisture effects shown to minimally affect prediction accuracies when field-moist data is used for model construction.

Root mean square error (RMSE) values were calculated for PXRF models exhibiting best overall performances for dry and wet applications. For alluvium, the Ti-stable, wet MLR model exhibited RMSE values of 3.37 and 1.03 for model performances upon dry and wet validation datasets, respectively. The PCA model for wet, Ti-stable alluvial SOC predictions resulted in

RMSEs of 1.16 and 2.06, and the loessal MLR model using Ti-stable, wet PXRF demonstrated RMSE values of 0.19 and 0.34, for dry and wet applications, respectively.

For dry soil SOC determination using VisNIR data, Viscarra-Rossell and Behrens (2010) report RMSE values ranging from 0.75 – 1.49, using a variety of modeling strategies. Vohland et al. (2011) calculated values of 0.15 – 0.28. Cozzolino and Moron (2006) examined soil organic carbon in different particle size fractions, with silt+clay combined fraction predictions demonstrating RMSE values ranging from 0.4 – 2.1. These results describe applications of VisNIR prediction models to dry soil sample data.

Studies examining the performance of models upon application to data obtained from analysis of wet soil samples show that increases in RMSE values are associated with VisNIR determinations of SOC contents. Reported results include RMSE values of 5.4 g kg^{-1} (Morgan et al., 2009) and 7.2 – 29.4 (Sankey et al., 2001). The results reported here for PXRF analysis are for models constructed from field-moist PXRF elemental data, as applied to both wet and dry validation sub-datasets. Model performances on wet datasets, with RMSE values ranging from 0.34 – 2.06 are lower than those reported for VisNIR model performances on wet data. This indicates that PXRF elemental data provides modeling datasets that are better able to determine SOC contents under field condition, when compared to results obtained through the use of VisNIR spectroscopy for SOC determination.

The VisNIR technique relies on a direct spectral signature of organic carbon, identified by the identification of specific wavelengths in the detection spectrum, to predict SOC contents. The PXRF method presented here relies instead upon indirect measurements of soil elements to infer SOC contents on the basis of organic matter complexation with PXRF-detectable elements.

While characterization of soil features is typically approached via direct quantification, there have been instances where quantities of soil constituents have been determined through the analysis of indirect data, or proxy predictor variables. One such occurrence was reported by Samal et al. (2007), whose study utilized known concentrations of Ag, As, Sb, and Hg in geologic core samples to determine gold. Another study used Ca and Mg concentrations to calculate soil acidity (Begum et al., 2010). Both studies showed that models utilizing indirect data provided predicted values that correlated excellently to laboratory-measured values (having R^2 values > 0.90). While researchers typically seek out direct methods for characterization of soil elemental and constituent fractions, multivariate analysis of indirect features offers a strategy for expanding the applications of data obtained from current technologies for instrumental analysis.

CHAPTER 5: CONCLUSIONS

The current study was undertaken in order to evaluate the use of PXRF elemental data for predictive modeling of soil organic carbon contents in alluvial and loessal soils of Louisiana. One hundred and fifty soil samples were collected for both soil parent material types, and PXRF elemental data was collected from both field-moist and dried soil core samples. Measurements for depth and pH were also collected, to calibrate models to local environmental conditions. Soil samples' organic carbon was determined by traditional laboratory methods, to compare with results obtained by prediction modeling.

Modeling datasets included Raw, Ti-stable, and Zr-stable elemental data, along with depth and pH readings for individual soil samples. Datasets were analyzed by multiple linear regression analysis and principal components analysis for the development of SOC prediction models. The results of this study demonstrate the successful use of PXRF elemental data, along with soil depth and reaction measurements, to provide excellent soil organic carbon (SOC) content determinations ($R > 0.90$) using multivariate prediction modeling techniques. The use of oven-dried PXRF data for model generation resulted in performances as high as $R=0.95$ for both alluvial and loess model applications to dry validation sub-datasets. Upon application of dry models to wet validation sub-datasets, prediction models produced correlation R values of 0.94 and 0.87 between predicted and laboratory-measured SOC contents, for alluvial and loess datasets, respectively.

Multiple linear regression (MLR) and principal components analysis (PCA) statistical techniques were used to characterize alluvial and loess soil sample datasets. The MLR technique provided the best prediction abilities for model applications to dry validation sub-datasets for both parent material soil types, in addition to providing the superior modeling strategy for all loess prediction model applications to wet datasets. The PCA technique greatly enhanced alluvial model SOC prediction capabilities for wet applications, while results from loess PCA models demonstrated severely diminished prediction abilities, compared to results obtained through MLR modeling.

Models demonstrating highest overall prediction capabilities for both wet and dry applications for both alluvial and loess datasets were the field-moist, Ti-stable SOC prediction models, with R values > 0.92 for all applications' correlations between predicted and laboratory-measured SOC contents. Benefits from using the stable-element approach can most clearly be seen in model performances on wet validation sub-datasets. The wet Ti-stable alluvial PCA model achieved R values of 0.92 and 0.94 for dry and wet applications, respectively. The loess field-moist Ti-stable model was able to predict SOC contents with R values of 0.92 for predictions of both wet and dry validation sub-datasets, through use of the multiple linear regression approach to modeling.

As the overall goal of this research was to evaluate the potential use of PXRF elemental data for SOC determination under field-moist conditions, models developed from field-moist data and applied to wet validation sub-datasets are examined, as they show the greatest potential for all data collection to take place *in situ*, using a field-portable PXRF instrument. Of various prediction models, wet Ti-stable alluvial PCA and loessal MLR models demonstrated excellent SOC prediction capabilities upon application to wet, as well as dry, validation sub-datasets.

The Ti-stable, wet alluvial model employed four principle components to be weighted through multiple regression analysis for SOC predictions. Predictor variables that showed significant differences between wet and dry PXRF readings included K, Ca, Ti, Mn, and Ba for alluvial datasets, and were found to exert minimal influence in components employed by the wet, Ti-stable model. Raw alluvial models placed more weight on some of these ‘moisture-sensitive’ predictor variables, contributing to their reduced universal performance between wet and dry applications. The PCA approach outperformed the alluvial MLR models, through its utilization of all 14 elemental variables in four separate components. The lesser number of elemental predictor variables employed in the MLR model elicited diminished SOC predicted values over a highly variable dataset, such as that provided by the Louisiana alluvial dataset examined in this study.

Use of MLR provided the best SOC prediction model for Louisiana loess soils. The wet. Ti-stable model demonstrated the best overall prediction capabilities for both wet and dry applications, with both datasets having correlation R values of 0.92. This model utilized certain elements that showed high degrees of conservation in PXRF elemental readings between wet and dry PXRF datasets.

Overall, PXRF analyses provided field-moist datasets that closely resembled those obtained from oven-dry loess and alluvial soil samples. The use of stable-element normalization, providing a stability index for evaluating weathering extent in soil profiles, allowed for resolution of significant elemental variables that provided for excellent SOC content determinations to be made through the use of principle components and multiple linear regression analysis techniques, for alluvial and loess datasets, respectively.

As the application of these models have been limited to alluvial and loess samples collected from soils in Louisiana, USA, evaluation of PXRF model applications to alluvial and loess soils in other geographical areas would greatly enhance universal SOC prediction capabilities in soils developed from these parent materials. Broader applications of PXRF elemental analysis may reveal additional avenues for the characterization of soil samples. With minimal reductions observed in PXRF elemental analyses from field-moist soil samples, the portability, speed, and accuracy facilitating the modeling strategies presented here could allow for greatly increased sampling densities for SOC monitoring, and other soils characterization studies.

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APPENDIX A: SOIL ORGANIC CARBON ANALYSIS RESULTS - ALLUVIUM

Site	Core	cm Depth	% C	Site	Core	cm Depth	% C	Site	Core	cm Depth	% C	Site	Core	cm Depth	% C
1	1	5	0.626	1	4	40	0.658	2	3	30	0.680	3	2	15	1.034
			0.564				0.668				0.626				1.094
1	1	10	0.517	1	4	45	0.630	2	3	35	0.657	3	2	20	0.868
			0.589				0.622				0.657				0.886
1	1	15	0.541	1	4	50	0.763	2	3	40	0.722	3	2	25	0.945
			0.565				0.757				0.647				0.890
1	1	20	0.477	1	5	5	1.752	2	3	45	0.756	3	2	30	0.858
			0.465				1.991				0.830				0.785
1	1	25	0.493	1	5	10	1.096	2	3	50	0.744	3	2	35	0.831
			0.531				1.067				0.760				0.818
1	1	30	0.468	1	5	15	1.044	2	4	5	3.426	3	2	40	0.805
			0.527				0.992				3.454				0.774
1	1	35	0.464	1	5	20	1.012	2	4	10	1.732	3	2	45	0.759
			0.436				0.990				1.384				0.787
1	1	40	0.464	1	5	25	0.924	2	4	15	1.384	3	2	50	0.725
			0.494				0.889				0.859				0.707
1	1	45	0.551	1	5	30	0.893	2	4	20	0.963	3	3	5	3.198
			0.572				0.882				0.746				3.215
1	1	50	0.494	1	5	35	0.912	2	4	25	0.710	3	3	10	1.835
			0.477				0.860				1.155				1.746
1	2	5	0.632	1	5	40	0.793	2	4	30	1.274	3	3	15	1.282
			0.519				0.781				1.357				1.217
1	2	10	0.524	1	5	45	0.667	2	4	35	1.209	3	3	20	1.087
			0.507				0.662				1.044				0.943
1	2	15	0.439	1	5	50	0.583	2	4	40	0.961	3	3	25	0.938
			0.409				0.593				1.501				0.916
1	2	20	0.426	2	1	5	1.542	2	4	45	0.984	3	3	30	0.897
			0.377				1.596				0.984				0.832
1	2	25	0.335	2	1	10	1.203	2	4	50	0.969	3	3	35	0.863
			0.359				1.270				0.953				0.840
1	2	30	0.372	2	1	15	0.996	2	5	5	1.479	3	3	40	0.930
			0.386				1.055				1.551				0.860
1	2	35	0.445	2	1	20	0.933	2	5	10	2.053	3	3	45	0.769
			0.457				0.906				2.164				0.741
1	2	40	0.432	2	1	25	0.858	2	5	15	1.471	3	3	50	0.752
			0.427				0.889				1.446				0.784
1	2	45	0.402	2	1	30	0.788	2	5	20	0.989	3	4	5	6.199
			0.422				0.836				1.016				6.318
1	2	50	0.348	2	1	35	0.805	2	5	25	0.780	3	4	10	3.512
			0.362				0.723				0.794				3.437
1	3	5	0.485	2	1	40	0.669	2	5	30	0.662	3	4	15	2.514
			0.557				0.646				0.667				2.308
1	3	10	0.801	2	1	45	0.601	2	5	35	0.731	3	4	20	1.313
			0.449				0.607				0.745				1.301
1	3	15	0.494	2	1	50	0.562	2	5	40	0.956	3	4	25	1.060
			0.508				0.575				0.880				1.030
1	3	20	0.431	2	2	5	1.668	2	5	45	0.739	3	4	30	1.112
			0.398				1.941				0.716				1.074
1	3	25	0.318	2	2	10	1.331	2	5	50	1.213	3	4	35	0.904
			0.373				1.232				1.186				0.932
1	3	30	0.493	2	2	15	1.142	3	1	5	2.495	3	4	40	0.851
			0.500				1.173				1.218				0.841
1	3	35	0.512	2	2	20	1.041	3	1	10	1.229	3	4	45	0.764
			0.496				1.097				1.262				0.768
1	3	40	0.604	2	2	25	1.713	3	1	15	1.605	3	4	50	0.719
			0.555				1.054				1.559				0.720
1	3	45	0.462	2	2	30	0.958	3	1	20	3.358	3	5	5	3.917
			0.471				0.970				3.408				3.915
1	3	50	0.351	2	2	35	1.338	3	1	25	1.122	3	5	10	2.045
			0.695				0.895				1.028				2.034
1	4	5	1.494	2	2	40	0.675	3	1	30	1.094	3	5	15	1.340
			1.475				0.687				1.033				1.360
1	4	10	1.409	2	2	45	0.654	3	1	35	0.824	3	5	20	1.226
			1.408				0.566				0.883				1.333
1	4	15	1.110	2	2	50	0.625	3	1	40	0.785	3	5	25	1.227
			1.980				0.608				0.771				1.182
1	4	20	0.882	2	3	5	1.428	3	1	45	0.552	3	5	30	1.185
			0.842				1.444				0.603				1.191
1	4	25	0.768	2	3	10	1.112	3	1	50	0.554	3	5	35	1.078
			0.759				1.045				0.609				0.995
1	4	30	2.951	2	3	15	0.990	3	2	5	3.510	3	5	40	0.846
			0.833				0.932				3.582				0.811
1	4	35	0.847	2	3	20	0.777	3	2	10	1.629	3	5	45	0.838
			0.818				0.787				1.599				0.764
				2	3	25	0.764					3	5	50	0.739
							0.710								0.677

APPENDIX B: SOIL ORGANIC CARBON ANALYSIS RESULTS – LOESS

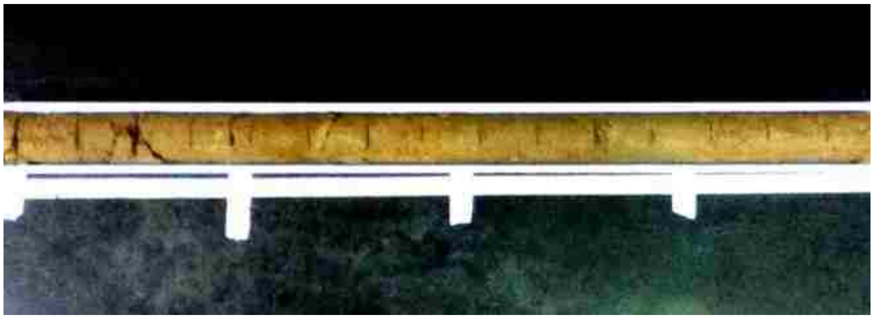
Site	Core	cm Depth	% C	Site	Core	cm Depth	% C	Site	Core	cm Depth	% C	Site	Core	cm Depth	% C
1	1	5	1.615	1	4	40	0.246	2	3	30	1.610	3	2	10	0.675
			1.597				0.250				1.083				0.628
1	1	10	1.098	1	4	45	0.195	2	3	35	1.023	3	2	15	0.597
			1.165				0.209				0.470				0.570
1	1	15	0.615	1	4	50	0.162	2	3	40	0.331	3	2	20	0.471
			0.668				0.166				0.393				0.563
1	1	20	0.402	1	5	5	1.668	2	3	45	0.443	3	2	25	0.287
			0.409				1.566				0.400				0.293
1	1	25	0.372	1	5	10	0.775	2	3	50	0.390	3	2	30	0.276
			0.386				0.727				0.377				0.265
1	1	30	0.329	1	5	15	0.648	2	4	5	1.532	3	2	35	0.212
			0.303				0.581				1.258				0.208
1	1	35	0.252	1	5	20	0.481	2	4	10	0.642	3	2	40	0.169
			0.237				0.599				0.647				0.174
1	1	40	0.249	1	5	25	0.533	2	4	15	0.494	3	2	45	0.166
			0.228				0.766				0.535				0.218
1	1	45	0.200	1	5	30	1.139	2	4	20	0.427	3	2	50	0.149
			0.177				1.083				0.447				0.146
1	1	50	0.200	1	5	35	0.679	2	4	25	0.270	3	3	5	0.706
			0.160				0.637				0.286				0.710
1	2	5	3.380	1	5	40	0.623	2	4	30	0.258	3	3	10	0.400
			4.004				0.767				0.238				0.353
1	2	10	1.186	1	5	45	0.891	2	4	35	0.250	3	3	15	0.329
			1.326				0.760				0.244				0.331
1	2	15	0.757	1	5	50	0.357	2	4	40	0.229	3	3	20	0.263
			0.732				0.427				0.285				0.262
1	2	20	0.649	2	1	5	2.433	2	4	45	0.282	3	3	25	0.240
			0.621				2.399				0.252				0.237
1	2	25	0.593	2	1	10	1.442	2	4	50	0.220	3	3	30	0.323
			0.590				1.463				0.203				0.275
1	2	30	0.476	2	1	15	0.825	2	5	5	2.210	3	3	35	0.169
1	2	35	0.554				0.837				1.992				0.183
			0.517	2	1	20	0.596	2	5	10	1.506	3	3	40	0.150
1	2	40	0.540				0.630				1.537				0.144
			0.410	2	1	25	0.479	2	5	15	1.134	3	3	45	0.130
1	2	45	0.417				0.490				1.061				0.137
			0.384	2	1	30	0.401	2	5	20	1.179	3	3	50	0.141
1	2	50	0.313				0.347				1.174				0.138
			0.293	2	1	35	0.404	2	5	25	1.178	3	4	5	1.161
1	3	5	1.460				0.382				1.137				1.254
			1.538	2	1	40	0.361	2	5	30	0.824	3	4	10	0.847
1	3	10	0.893				0.407				0.807				0.848
			0.862	2	1	45	0.316	2	5	35	0.761	3	4	15	0.556
1	3	15	0.802				0.339				0.755				0.705
			0.703	2	1	50	0.285	2	5	40	0.760	3	4	20	0.428
1	3	20	0.661				0.296				0.775				0.452
			0.687	2	2	5	0.481	2	5	45	0.706	3	4	25	0.585
1	3	25	0.618				0.477				0.712				2.235
			0.674	2	2	10	0.327	2	5	50	0.654	3	4	30	0.642
1	3	30	0.573	2	2	15	0.313				0.666				0.642
			0.553	2	2	20	0.251	3	1	5	1.652	3	4	35	0.611
1	3	35	0.389				0.244				1.450				0.681
			0.434	2	2	25	0.239	3	1	10	0.891	3	4	40	0.478
1	3	40	0.286				0.227				0.904	3	4	45	0.449
			0.246	2	2	30	0.258	3	1	15	0.547	3	4	50	0.459
1	3	45	0.184				0.288				0.649				0.482
			0.197	2	2	35	0.283	3	1	20	0.569	3	5	5	1.531
1	3	50	0.168				0.279				0.479				1.494
			0.153	2	2	40	0.307	3	1	25	0.365	3	5	10	1.386
1	4	5	2.906				0.315				0.366	3	5	15	0.486
			2.952	2	2	45	0.263	3	1	30	0.295	3	5	20	0.470
1	4	10	1.088				0.272				0.023				0.405
			1.199	2	2	50	0.206	3	1	35	0.489	3	5	25	0.403
1	4	15	0.801				0.228				0.199				0.368
			0.806	2	3	5	4.000	3	1	40	0.272	3	5	30	0.320
1	4	20	0.594				4.027				0.239				0.306
			0.605	2	3	10	3.621	3	1	45	0.266	3	5	35	0.286
1	4	25	0.478				1.328				0.257				0.349
			0.450	2	3	15	1.110	3	1	50	0.271	3	5	40	0.307
1	4	30	0.434				1.088				0.301				0.271
			0.361	2	3	20	1.052	3	2	5	0.962	3	5	45	0.276
1	4	35	0.350				1.175				0.852				0.238
			0.364	2	3	25	1.035					3	5	50	0.205
							1.089								0.512

APPENDIX C: PICTURES OF SAMPLING SITES AND CORES

ALLUVIUM SITE 1: SUGAR RESEARCH STATION

GONZALES, LA – IBERVILLE PARISH

CORE 1



CORE 2

CORE 3

CORE 5

ALLUVIUM SITE 2: DEAN LEE RESEARCH STATION
ALEXANDRIA, LA – RAPIDES PARISH
CORE 1

CORE 2

CORE 3

CORE 4

CORE 5

ALLUVIUM SITE 3: BEN HUR RESEARCH STATION AND LSU DAIRY
BATON ROUGE, LA – EAST BATON ROUGE PARISH
CORE 1

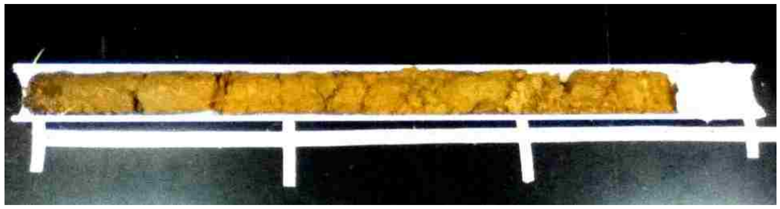
CORE 2

CORE 3

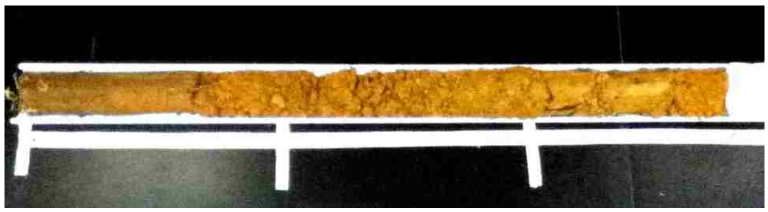
CORE 4

CORE 5

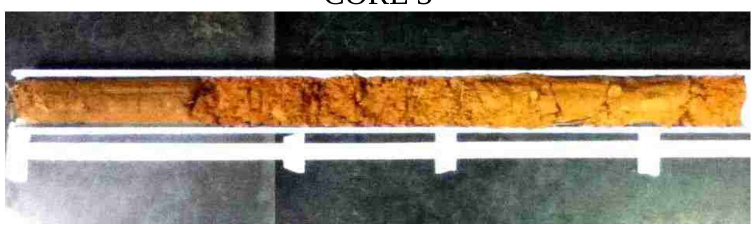
LOESS SITE 1: IDLEWILD RESEARCH STATION
CLINTON, LA – EAST FELICIANA PARISH
CORE 1



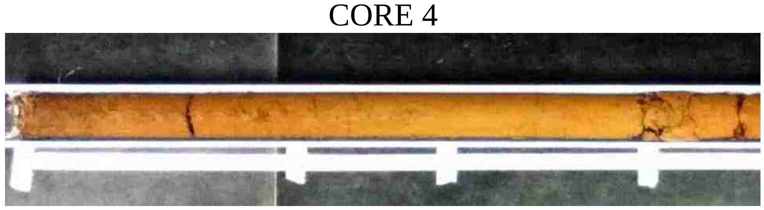
CORE 2



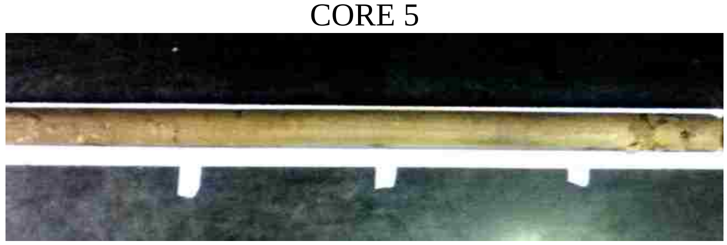
CORE 3



CORE 4



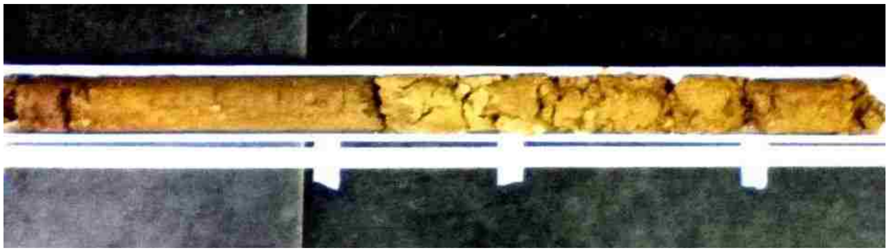
CORE 5



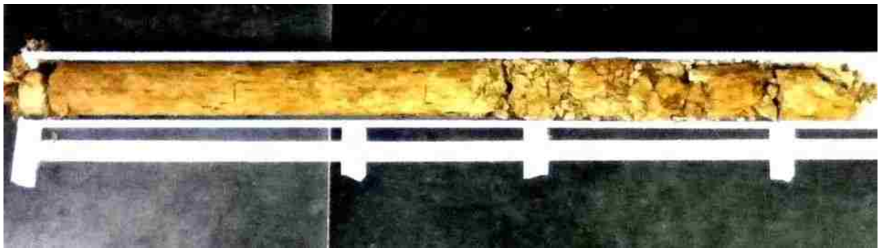
LOESS SITE 2: BURDEN RESEARCH STATION
BATON ROUGE, LA – EAST BATON ROUGE PARISH
CORE 1

CORE 2

CORE 3



CORE 4



CORE 5

APPENDIX D: MODELING DATASETS

OVEN-DRY ALLUVIUM – RAW

----Location information----				----PXRF Elemental data----															
				----mg/kg----															%
ID	Site	Core	Depth	K	Ca	Ti	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	Zr	pH	SOC
1	1	1	5	10957.5	3720	2565	45.5	242.5	9803.5	193.5	32.5	71.5	192.5	247.5	12.3	19.5	576.5	6.62	0.595
2	1	1	10	11215	4000	2414.5	40.5	232.5	9552.5	177	32	69.8	194	255	15.8	13.5	558	7.08	0.553
3	1	1	15	11498	4618.5	2426.5	41.5	255	10330.5	197.5	36	72.4	198.5	261	14.75	17.5	539.5	6.85	0.553
4	1	1	20	10988	4217.5	2202.5	33.5	243.5	8989.5	192.5	32	69.5	196.5	242.5	15.5	18	492.5	7.13	0.471
5	1	1	25	11647.5	4610	2576	45	298	12641.5	257.5	40.5	75.85	188.5	295	17.15	19	464.5	7.01	0.512
6	1	1	30	12491.5	6517	2358	46	408	14577	337	47	79.35	189	298	16.9	23.5	482	6.85	0.497
7	1	1	35	12602.5	6446	2712	47	352.5	14168	305	43.5	76.75	195	288	15.65	24	519.5	6.7	0.450
8	1	1	40	12639.5	5749	2687	42	335.5	15957	333.5	46.5	84.45	188	311.5	18.45	26	455	6.96	0.479
9	1	1	45	12621	6097.5	2699.5	44.5	344	15062.5	319.25	45	80.6	191.5	299.75	17.05	30.5	487.25	6.98	0.561
10	1	1	50	13224.5	4995.5	2824.5	47.5	439.5	18429.5	380.5	58.5	85.25	173	309	14.55	22.5	415	9.97	0.486
11	1	2	5	11722.5	4463.5	2400.5	40.5	204.5	9352	209.5	30.9	68.3	195	244.5	15.65	22.5	597	7.11	0.576
12	1	2	10	11645	4217.5	2398.5	32.5	197	9025.5	221.5	31.55	68.95	196	243	15.45	14	659.5	7.14	0.515
13	1	2	15	11375	4176.5	2321.5	35	200	8876	199.5	32.35	68.8	204	238	14.4	14.5	648.5	7.3	0.424
14	1	2	20	11380	4129	2567.5	43	221	9980.5	255.5	31.35	67.4	194.5	249	16.15	15.5	632.5	7.28	0.402
15	1	2	25	11598.5	4148.5	2553	38.5	219	11005.5	218	33.5	72.8	195	254.5	15.2	14.5	587.5	7.13	0.347
16	1	2	30	11937.5	4273	2341	44	228.5	11221	255	38	72.6	194	266.5	16.35	21.5	517	7.01	0.379
17	1	2	35	12595.5	4456	2654.5	46	271	14579	355.5	46	79.15	191.5	291	19.4	23	524.5	7.09	0.451
18	1	2	40	13884.5	5029	3028.5	54.5	274.5	18754.5	381.5	57.5	88.7	191.5	329.5	18.15	25	488.5	6.99	0.430
19	1	2	45	12486.5	4423	2816.5	55.5	308.5	16666.5	361.5	50.5	81.6	185	308.5	15.75	22.5	463	7.09	0.412
20	1	2	50	13030.5	4397	2949	50.5	280	15660.5	365	51	80.95	183.5	305	17.5	26.5	470	7.2	0.355
21	1	3	5	11324.5	4033.5	2404.5	38.5	217	8895	191	30.9	68.2	198.5	247.5	14.4	24.5	601.5	6.62	0.521
22	1	3	10	11286	5125.5	2554.5	51	220.5	8933	187.5	31	68.95	200.5	244	15.45	19	611	7.08	0.449
23	1	3	15	11038	3848.5	2296.5	38	216	8762.5	167	30	68.7	201	240.5	11.25	17	540.5	6.85	0.501
24	1	3	20	11394.5	4352.5	2339.5	36	214	8495	152	30	69.35	201	254	15.6	22	498	7.41	0.415
25	1	3	25	11671.5	4733	2404	46.5	234	9661.5	213.5	33	70.2	203	272.5	12	15.5	519.5	7.19	0.345
26	1	3	30	11915	6486	2740.5	57	344.5	13640.5	334	45	77.85	189	292	17.65	22.5	440	7.23	0.496
27	1	3	35	12972.5	6287	2917	56.5	744	18235.5	367.5	50.5	82.8	176	341	15.15	26.5	394	7.24	0.504
28	1	3	40	11669.5	4985	2775	52.5	601.5	20350.5	343.5	58	82.35	137.5	315	12.15	21.5	289.5	7	0.579
29	1	3	45	12843	6816.5	2793	42	385.5	16027	354.5	51	81.85	184	293	15.05	20	402	7.24	0.466
30	1	3	50	11998.5	6444.5	2160.5	35.5	164	12684	269	38.5	76	191.5	269.5	16.1	12	439	7.12	0.523
31	1	4	5	13846.5	4147	3247	67	421.5	28740.5	624	95	120.55	124	450	26.5	31	254.5	4.95	1.484
32	1	4	10	11143.5	3251.5	2781	59	376	25884.5	537.5	84.5	111.3	110.2	403	24.05	30	230.5	4.82	1.409
33	1	4	15	12738	4011	3108	72	487	30754	661.5	88.5	112.55	113.2	428	18.95	35	224	5.77	1.110
34	1	4	20	13689.5	4632	3198.5	79	513	34326	686.5	98.5	117.7	118.65	470.5	21.2	41	222	6.41	0.862
35	1	4	25	12806	4168.5	3065.5	67	560	33393	653.5	90	110.8	111.2	404.5	17.9	29.5	208.5	6.52	0.764
36	1	4	30	11907.5	4069	2728.5	63.5	383	25297	528.5	86	104.2	123	383.5	16.75	33	260.5	6.44	0.833
37	1	4	35	10686	3913	2650	60.5	235.5	22645	458.5	81	96.8	124.5	357	16.3	39.5	277.5	6.74	0.832
38	1	4	40	11604	4137.5	2827	60.5	202.5	24480.5	490	80	104	142	328.5	17.15	34.5	343	6.8	0.663
39	1	4	45	10869.5	3732.5	2555.5	68.5	202.5	21041.5	424.5	68	96.8	124	333	13.4	24	287.5	6.87	0.626
40	1	4	50	11772.5	4494	2966	58.5	213	25407	539.5	87.5	104.75	135	357.5	18.8	29	301	6.88	0.760
41	1	5	5	13196.5	4121	3247	76	407	25747	572	90.5	117.5	126.5	390	27.15	29.5	277.5	5.05	1.871
42	1	5	10	13276.5	3999	3363.5	69	435.5	24709	503.5	87.5	117.35	128	381.5	24.7	37	271	5.61	1.082
43	1	5	15	14162.5	4316.5	3511.5	87.5	554	28710	506	108	125.95	138	397	27.9	47.5	279	5.86	1.018
44	1	5	20	10665	3289.5	2780	65.5	401	23375	478.5	79	108.45	119	367	17.9	29	234.5	6.3	1.001
45	1	5	25	13599.5	4838	3265.5	71	328.5	35289.5	648.5	107.5	121.9	121.1	403.5	21.3	41	226	6.47	0.906
46	1	5	30	14120.5	5079.5	3550	78	437	34510	701.5	108.5	123.75	121.2	433.5	24.65	34.5	225	6.73	0.887
47	1	5	35	14453	5237.5	3489.5	81	382	36162	676	108	125.2	122.1	435	30.5	37	223.5	6.51	0.886
48	1	5	40	14520.5	5011	3453	92.5	608.5	34343.5	697	106	121.9	133.5	449	43.5	36	243.5	6.57	0.787
49	1	5	45	14520.5	5169.5	3446	89.5	952.5	37659.5	742	112.5	118.1	129	439	26.5	38.5	234	6.75	0.665
50	1	5	50	13878	5052	3340.5	77.5	555	36277	721	108.5	118.1	126	434	22.85	41.5	229.5	6.72	0.588
51	2	1	5	11575.5	4949	3223.5	38.5	279.5	11551	232	36.5	71	91.6	186.5	16.65	18.5	530	7.45	1.569
52	2	1	10	11774.5	5786.5	3179	33	309	11772.5	231.5	36	72.5	93.75	198	16.15	22	546.5	7.54	1.237
53	2	1	15	12149.5	6900.5	3316.5	33.5	303.5	12265	244	35	72.15	97.3	214	16.65	20.5	524	7.61	1.025
54	2	1	20	11716	5897	3166	41	291	12530	235	36	69.8	87.1	201	13.9	21	472	7.89	0.618
55	2	1	25	11067	5686	2824	34	308	12591	255	38	70.1	90	190	16.3	20	461	7.87	0.533
56	2	1	30	11472	5882	3353	43	355	14362	279	40	76	89.6	201	15	28	473	7.59	0.505
57	2	1	35	12568	6151	3338	44	357	15784	333	43	79.7	96.2	218	16.6	31	493	7.44	0.497
58	2	1	40	12674	5377	3301	52	359	16499	303	39	82.2	96.5	246	14.6	24	482	7.59	0.455
59	2	1	45	12121	4973	3489	44	369	17404	363	41	82.7	95.4	249	13.8	24	488	7.7	0.415
60	2	1	50	13258	4187	3597	63	365	19741	398	48	88.6	92.4	270	14.6	24	481	7.6	0.391
61	2	2	5	11066	6408	2882	34	254	11033	244	32	66.3	90	202	14.6	18	445	7.47	1.191
62	2	2	10	11061	9381	2683	45	278	10666	237	30	64.7	95.4	195	14.5	23	426	7.5	0.928
63	2	2	15	10227	8242	2719	34	263	10278	225	28.8	62.4	94.4	173	15.9	23	415	7.67	0.658
64	2	2	20	10614	8143	2718	38	246	10110	228	26.5	63.3	94.8	186	15.1	20	428	7.78	0.558
65	2	2	25	12485	11135	2937	42	305	12300	266	31	64.4	89.4	192	10.3	22	351	7.74	0.420
66	2	2	30	13906	14540	3488	50	331	17792	413	41	81.3	107.1	229	12.3	23	364	7.75	0.351
67	2	2	35	11248	8400	2856	37	253	14127	316	33	74.9	97.6	207	10.6	21	424	7.91	0.277
68	2	2	40	9664	7571	2250	34	195	10160	232	23.6	60.1	94.8	161	11.8	18	492	8.02	0.157
69	2	2	45	10465	7957	2147	30	209	8886	183	21.2	58	90.7	160	10.8	14	391	8.27	0.112
70	2	2	50	10305	7479	1974	33	209	8581	168	19.6	57.8	87.4	160	10.8	13	299	8.08	0.107
71	2	3	5	10415	5877	2746	34	250	9816	216	28.2	61.2	82.2	191	13.5	19	458	6.84	1.145
72	2	3	10	10387	6467	2685	37	253	10144	211	23.9	61	89.4	176	11.2	19	479	7.19	0.739
73	2	3	15	9282	5920	2625	35	234	8881	206	22	58.6	86.8	177	19.2	19	477	7.41	0.537
74	2	3	20	9486	6761	2546	33	242	9155	209	26.2	59.3	87.4	165	11.9	19	463	7.58	0.333
75	2	3	25	10100	7895	3050	42	260	10027	213	25	59.9	90.5	180	9.9	18	646	7.48	0.298

OVEN-DRY ALLUVIUM – RAW (cont.)

Location information				PXRF Elemental data															
				mg/kg															%
ID	Site	Core	Depth	K	Ca	Ti	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	Zr	pH	SOC
76	2	3	30	10111	8292	3032	32	245	9361	190	24	55.3	85.8	158	11.5	21	587	7.39	0.353
77	2	3	35	8833	8833	3504	35	252	8841	184	22	51.1	87	177	10.6	19	706	7.5	0.564
78	2	3	40	9813	9716	3458	39	245	10028	234	23	54.1	89	179	11.1	20	654	7.63	0.594
79	2	3	45	10826	11199	2897	45	233	11756	259	29	65.1	96.4	195	13.8	23	563	7.61	0.652
80	2	3	50	10315	11353	2925	52	236	10405	224	22.1	57	92.7	197	9.4	25	672	7.62	0.748
81	2	4	5	14968.5	3383	3722.5	55.5	443	28114	521.5	76.5	115.05	86.7	305	19.95	31	282.5	7.06	3.440
82	2	4	10	16182	3482.5	4024	62	611	30734.5	553	69	119.75	90.95	294	18.6	35	283.5	7.34	1.558
83	2	4	15	17014.5	3622	4042	65	942	31760	581.5	69	123.35	91.55	339	18.2	28.5	282	7.06	1.121
84	2	4	20	17589.5	3742	4068	60.5	452.5	34979.5	664	72	130.9	94.1	368.5	18.1	33.5	266	7.34	0.854
85	2	4	25	14534	4240.5	3647	49.5	579	27371.5	467	57.5	105.7	92.3	303	13	33	274.5	7.58	0.932
86	2	4	30	14622	7235.5	3631	53	313	26736	477	65.5	111.35	96.75	279.5	15.55	30	301.5	7.49	1.315
87	2	4	35	15614	8410	3738	65	549	27092	564	65	110.7	99.2	291	16.1	31	271	7.7	1.002
88	2	4	40	16433	9396	3966	59	523	29457	561	64	115.9	99.3	320	14.2	31	257	7.83	0.586
89	2	4	45	17602	9143	3870	69	703	32249	660	65	118.3	105	334	17.5	34	262	7.78	0.763
90	2	4	50	15192	7119	3928	55	651	25904	573	59	104.8	101.1	303	14.8	30	299	7.8	0.610
91	2	5	5	17667	5398.5	4095.5	82	471.5	37344.5	744	82.5	133.3	105.65	376	20.5	37	256.5	7.35	1.490
92	2	5	10	15417	4717.5	3706.5	65.5	293	34150.5	670.5	77.5	126.35	105.65	305	18.6	33.5	260.5	7.26	1.558
93	2	5	15	17583	4967	4080	70	348	36121	661	85	129.7	100.6	340	21.3	40	253	6.93	1.371
94	2	5	20	17538	5675	4054	67	393	34620	654	70	127.9	102.2	347	19.3	42	258	7.24	0.974
95	2	5	25	18572	4948	4488	76	418	36985	726	76	136	102.1	361	23	42	251	7.05	0.812
96	2	5	30	18196	4196	4355	76	511	36698	748	80	132.5	106.1	349	22.4	39	263	7.37	0.703
97	2	5	35	19065	7153	4447	85	655	37851	727	76	130.6	102.5	370	21	38	240	7.64	0.584
98	2	5	40	17819	11937	4040	76	621	33216	633	74	122.7	107.9	390	18.5	40	239	7.73	0.544
99	2	5	45	18640	6407	4206	73	654	37278	721	76	132.7	100.1	370	17.9	42	235	7.63	0.538
100	2	5	50	18578	14416	4031	73	702	33200	633	69	116.7	104.1	339	15.8	35	208	7.83	0.499
101	3	1	5	12098.5	3374.5	2693	50	308.5	17240	323	269	100.45	143.5	277	24.95	22.5	408.5	4.95	2.495
102	3	1	10	12893.5	3229	2790	52.5	408	17578.5	323.5	286.5	99.4	151	296.5	24.85	30.5	427.5	4.75	1.245
103	3	1	15	11628.5	2796	2658	49	128	16890.5	306.5	259	98.8	146	278	31.2	43.5	425	4.08	1.582
104	3	1	20	10869.5	5297	2522.5	61.5	148	19169	344.5	501	93.25	160.5	295	30.1	116.5	385.5	4.19	3.383
105	3	1	25	12306.5	3540.5	2772	49	317	19447	346.5	216.5	104.45	148.5	293.5	24.1	25.5	407.5	5.21	1.075
106	3	1	30	12253.5	3661	2763.5	64.5	219.5	18314.5	379	143	98.65	151	312.5	17.4	31.5	413.5	5.47	1.064
107	3	1	35	12195.5	3742.5	2660	55	358.5	21248.5	374.5	94.5	97.9	136	337	15.65	25.5	359.5	5.75	0.853
108	3	1	40	12193.5	3658	2851	65	211	22418.5	436	79	101.65	131.5	326	14.5	31	355.5	5.97	0.778
109	3	1	45	12426.5	3550	2819	60.5	322	23997.5	502.5	75.5	100	134	334.5	12.5	33.5	369.5	6.18	0.577
110	3	1	50	12058.5	3346.5	2658.5	55.5	218	24592.5	452.5	76.5	97.15	130.5	345.5	18.65	28.5	324	6.14	0.582
111	3	2	5	12007.5	3834.5	2695.5	51	139.5	16864	317	89.5	101.8	146.5	310.5	24.6	21	385.5	4.67	3.546
112	3	2	10	12335	3520.5	2724.5	55.5	155	17851.5	334.5	78.5	98.65	153.5	320	26.6	29.5	404	4.9	1.614
113	3	2	15	12551.5	3779	2828	54.5	224.5	17969	374.5	71.5	97.55	164	322	22.65	25.5	413	5.45	1.064
114	3	2	20	12323	3745	2822	59	143.5	17504.5	329	68	96.85	158	312	18.75	26	408.5	5.71	0.877
115	3	2	25	12454.5	3911	2661	53.5	137	18570	356.5	70.5	94.55	160	323.5	18.7	28	407.5	5.87	0.874
116	3	2	30	12369.5	3972.5	2731.5	61.5	117	20161.5	434.5	71.5	97.65	154	317.5	17.6	30.5	376.5	6.1	0.932
117	3	2	35	12075	4065	2631	71.5	197	21561	394.5	79	96.3	145	315.5	13.6	30.5	360	6.08	0.825
118	3	2	40	12391.5	4086.5	2768.5	58.5	261	22450	424.5	85	100.95	146.5	337.5	17.2	31.5	376	5.92	0.789
119	3	2	45	12763.5	4339	2991	69	327.5	23548.5	468.5	90.5	102.05	148	357	22.5	32.5	356	6.26	0.773
120	3	2	50	12896.5	4002	2885.5	66	269	23764.5	484.5	94.5	101.25	147.5	356	18.2	38	372.5	6.46	0.716
121	3	3	5	11216.5	3584.5	2365	45	185	13964	272	76.5	96.45	148.5	249.5	23.9	20.5	403	5.64	3.206
122	3	3	10	11715.5	3144	2539.5	47	221.5	14157	295.5	66	96.55	153	299	24.6	17.5	424.5	5.41	1.791
123	3	3	15	11622	3038.5	2532	50.5	270	14296.5	271	57.5	94.45	157	292	22.55	19.5	422	5.5	1.250
124	3	3	20	11680.5	3222	2488	54	231	14360.5	310.5	58.5	94.75	157.5	300	21.6	20.5	436.5	5.65	1.015
125	3	3	25	11763.5	3235	2733.5	50	229	15230.5	286.5	57.5	93.8	157	287.5	19.2	21	439.5	5.81	0.927
126	3	3	30	11757	3378	2649	48	279	17394	364	60	94.5	158	317.5	19.95	22	399.5	6.02	0.865
127	3	3	35	11998.5	3360.5	2494	51.5	158	16797.5	357	58	96.2	160.5	292	18.55	25	419.5	6.12	0.852
128	3	3	40	12492.5	3567	2789.5	55.5	150	18392	373.5	65	100.35	160	306	16.95	24.5	407	6.35	0.895
129	3	3	45	12184.5	3854	2701.5	52	187	18027.5	367	61.5	98.15	165.5	289	19.3	23	399.5	6.11	0.755
130	3	3	50	11934.5	3754	2589	57.5	151	18866.5	381	64.5	99.7	161	325.5	19.45	21.5	388	6.45	0.768
131	3	4	5	11355	5795.5	2335.5	48.5	391.5	18781	382.5	178.5	95.25	132.3	263	40.8	39.5	306	5.92	6.258
132	3	4	10	12798.5	5826	2734	53	405.5	21244	409.5	178	103.3	153	312	54.5	35	343	5.89	3.474
133	3	4	15	14203	7422.5	2807	61	346	22047	459.5	181.5	106.65	167.5	329	45	38.5	375	6.05	2.411
134	3	4	20	14889.5	5231	2951	60.5	327	21616.5	457	93.5	109.25	163	355.5	28.35	37.5	381	6.29	1.307
135	3	4	25	13734.5	4523.5	2938.5	52	467	23388.5	463	83.5	105.5	149.5	330.5	17.5	34.5	348	6.57	1.045
136	3	4	30	15435	4656	3353	77.5	435.5	32186	624	94	121.35	118.6	414	25.45	38.5	243.5	6.61	1.093
137	3	4	35	14320.5	4298	3178	74	367.5	31118.5	638.5	95	119.4	119.3	384	23.45	35	243.5	6.85	0.918
138	3	4	40	14739	4380.5	3224	74	291	29857	603	93	119.05	124	378	20.75	33	252.5	6.87	0.846
139	3	4	45	14869.5	4353	3275.5	73.5	346	29953	609	86.5	120.05	128	370	21.45	29	271.5	7	0.766
140	3	4	50	14327.5	4306.5	3087.5	68	531	31352.5	542	89	114.5	126	364.5	22.05	34.5	257	7.13	0.719
141	3	5	5	13430	4145.5	2867.5	75.5	280.5	22989.5	474	128.5	111.9	127.45	360	39.5	35.5	315	5.29	3.916
142	3	5	10	13150	3924.5	2922.5	63.5	315	23520	478.5	103	112.15	136	357.5	36.55	29	339	5.8	2.040
143	3	5	15	13634.5	4210.5	3112.5	66	276	23330.5	442	88.5	111	144	378.5	25.45	36	337.5	6.25	1.350
144	3	5	20	13481.5	4266.5	3189.5	72	304	25109.5	534	92.5	113.2	139	376	24.95	28	326	6.6	1.280
145	3	5	25	13791	4358	3151	80	408.5	28282	542	96.5	116.4	125	380.5	22.4	35.5	281	6.92	1.205
146	3	5	30	13385	4330.5	3017.5	76	204.5	29227.5	574.5	96	116.95	120.3	378.5	21.5	39.5	258.5	7.22	1.188
147	3	5	35	12883	8163.5	2988.5	75.5	198	32529	638.5	96	113.85	116.45	355	19.85	33.5	239	7	1.036
148	3	5	40	12849	4560.5	3137.5	67.5	377	31433.5	670.5	95	115.25	117.3	376	22.1	36.5	233.5	7.34	0.829
149	3	5	45	13490	5000	3127.5	74.5	493	34564	677	94.5	115.05	115.45	390	20.6	39.5	226	7.54	0.801
150	3	5	50	12734	4678	3044	70	407	33911.5	715	93.5	115.7	115.55	402.5	18.15	34.5	217	7.32	0.708

OVEN-DRY ALLUVIUM – Ti-STABLE

Location information				PXRF Elemental data (mg/kg)														%
ID	Site	Core	Depth	K	Ca	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	Zr	pH	SOC
1	1	1	5	4.272	1.450	0.018	0.095	3.822	0.075	0.013	0.028	0.075	0.096	0.005	0.008	0.225	6.62	0.595
2	1	1	10	4.645	1.657	0.017	0.096	3.956	0.073	0.013	0.029	0.080	0.106	0.007	0.006	0.231	7.08	0.553
3	1	1	15	4.739	1.903	0.017	0.105	4.257	0.081	0.015	0.030	0.082	0.108	0.006	0.007	0.222	6.85	0.553
4	1	1	20	4.989	1.915	0.015	0.111	4.081	0.087	0.015	0.032	0.089	0.110	0.007	0.008	0.224	7.13	0.471
5	1	1	25	4.522	1.790	0.017	0.116	4.907	0.100	0.016	0.029	0.073	0.115	0.007	0.007	0.180	7.01	0.512
6	1	1	30	5.297	2.764	0.020	0.173	6.182	0.143	0.020	0.034	0.080	0.126	0.007	0.010	0.204	6.85	0.497
7	1	1	35	4.647	2.377	0.017	0.130	5.224	0.112	0.016	0.028	0.072	0.106	0.006	0.009	0.192	6.7	0.450
8	1	1	40	4.704	2.140	0.016	0.125	5.939	0.124	0.017	0.031	0.070	0.116	0.007	0.010	0.169	6.96	0.479
9	1	1	45	4.675	2.259	0.016	0.127	5.580	0.118	0.017	0.030	0.071	0.111	0.006	0.011	0.180	6.98	0.561
10	1	1	50	4.682	1.769	0.017	0.156	6.525	0.135	0.021	0.030	0.061	0.109	0.005	0.008	0.147	9.97	0.486
11	1	2	5	4.883	1.859	0.017	0.085	3.896	0.087	0.013	0.028	0.081	0.102	0.007	0.009	0.249	7.11	0.576
12	1	2	10	4.855	1.758	0.014	0.082	3.763	0.092	0.013	0.029	0.082	0.101	0.006	0.006	0.275	7.14	0.515
13	1	2	15	4.900	1.799	0.015	0.086	3.823	0.086	0.014	0.030	0.088	0.103	0.006	0.006	0.279	7.3	0.424
14	1	2	20	4.432	1.608	0.017	0.086	3.887	0.100	0.012	0.026	0.076	0.097	0.006	0.006	0.246	7.28	0.402
15	1	2	25	4.543	1.625	0.015	0.086	4.311	0.085	0.013	0.029	0.076	0.100	0.006	0.006	0.230	7.13	0.347
16	1	2	30	5.099	1.825	0.019	0.098	4.793	0.109	0.016	0.031	0.083	0.114	0.007	0.009	0.221	7.01	0.379
17	1	2	35	4.745	1.679	0.017	0.102	5.492	0.134	0.017	0.030	0.072	0.110	0.007	0.009	0.198	7.09	0.451
18	1	2	40	4.585	1.661	0.018	0.091	6.193	0.126	0.019	0.029	0.063	0.109	0.006	0.008	0.161	6.99	0.430
19	1	2	45	4.433	1.570	0.020	0.110	5.917	0.128	0.018	0.029	0.066	0.110	0.006	0.008	0.164	7.09	0.412
20	1	2	50	4.419	1.491	0.017	0.095	5.310	0.124	0.017	0.027	0.062	0.103	0.006	0.009	0.159	7.2	0.355
21	1	3	5	4.710	1.677	0.016	0.090	3.699	0.079	0.013	0.028	0.083	0.103	0.006	0.010	0.250	6.62	0.521
22	1	3	10	4.418	2.006	0.020	0.086	3.497	0.073	0.012	0.027	0.078	0.096	0.006	0.007	0.239	7.08	0.449
23	1	3	15	4.806	1.676	0.017	0.094	3.816	0.073	0.013	0.030	0.088	0.105	0.005	0.007	0.235	6.85	0.501
24	1	3	20	4.870	1.860	0.015	0.091	3.631	0.065	0.013	0.030	0.086	0.109	0.007	0.009	0.213	7.41	0.415
25	1	3	25	4.855	1.969	0.019	0.097	4.019	0.089	0.014	0.029	0.084	0.113	0.005	0.006	0.216	7.19	0.345
26	1	3	30	4.348	2.367	0.021	0.126	4.977	0.122	0.016	0.028	0.069	0.107	0.006	0.008	0.161	7.23	0.496
27	1	3	35	4.447	2.155	0.019	0.255	6.251	0.126	0.017	0.028	0.060	0.117	0.005	0.009	0.135	7.24	0.504
28	1	3	40	4.205	1.796	0.019	0.217	7.334	0.124	0.021	0.030	0.050	0.114	0.004	0.008	0.104	7	0.579
29	1	3	45	4.598	2.441	0.015	0.138	5.738	0.127	0.018	0.029	0.066	0.105	0.005	0.007	0.144	7.24	0.466
30	1	3	50	5.554	2.983	0.016	0.076	5.871	0.125	0.018	0.035	0.089	0.125	0.007	0.006	0.203	7.12	0.523
31	1	4	5	4.264	1.277	0.021	0.130	8.851	0.192	0.029	0.037	0.038	0.139	0.008	0.010	0.078	4.95	1.484
32	1	4	10	4.007	1.169	0.021	0.135	9.308	0.193	0.030	0.040	0.040	0.145	0.009	0.011	0.083	4.82	1.409
33	1	4	15	4.098	1.291	0.023	0.157	9.895	0.213	0.028	0.036	0.036	0.138	0.006	0.011	0.072	5.77	1.110
34	1	4	20	4.280	1.448	0.025	0.160	10.732	0.215	0.031	0.037	0.037	0.147	0.007	0.013	0.069	6.41	0.862
35	1	4	25	4.177	1.360	0.022	0.183	10.893	0.213	0.029	0.036	0.036	0.132	0.006	0.010	0.068	6.52	0.764
36	1	4	30	4.364	1.491	0.023	0.140	9.271	0.194	0.032	0.038	0.045	0.141	0.006	0.012	0.095	6.44	0.833
37	1	4	35	4.032	1.477	0.023	0.089	8.545	0.173	0.031	0.037	0.047	0.135	0.006	0.015	0.105	6.74	0.832
38	1	4	40	4.105	1.464	0.021	0.072	8.660	0.173	0.028	0.037	0.050	0.116	0.006	0.012	0.121	6.8	0.663
39	1	4	45	4.253	1.461	0.027	0.079	8.234	0.166	0.027	0.038	0.049	0.130	0.005	0.009	0.113	6.87	0.626
40	1	4	50	3.969	1.515	0.020	0.072	8.566	0.182	0.030	0.035	0.046	0.121	0.006	0.010	0.101	6.88	0.760
41	1	5	5	4.064	1.269	0.023	0.125	7.929	0.176	0.028	0.036	0.039	0.120	0.008	0.009	0.085	5.05	1.871
42	1	5	10	3.947	1.189	0.021	0.129	7.346	0.150	0.026	0.035	0.038	0.113	0.007	0.011	0.081	5.61	1.082
43	1	5	15	4.033	1.229	0.025	0.158	8.176	0.144	0.031	0.036	0.039	0.113	0.008	0.014	0.079	5.86	1.018
44	1	5	20	3.836	1.183	0.024	0.144	8.408	0.172	0.028	0.039	0.043	0.132	0.006	0.010	0.084	6.3	1.001
45	1	5	25	4.165	1.482	0.022	0.101	10.807	0.199	0.033	0.037	0.037	0.124	0.007	0.013	0.069	6.47	0.906
46	1	5	30	3.978	1.431	0.022	0.123	9.721	0.198	0.031	0.035	0.034	0.122	0.007	0.010	0.063	6.73	0.887
47	1	5	35	4.142	1.501	0.023	0.109	10.363	0.194	0.031	0.036	0.035	0.125	0.009	0.011	0.064	6.51	0.886
48	1	5	40	4.205	1.451	0.027	0.176	9.946	0.202	0.031	0.035	0.039	0.130	0.013	0.010	0.071	6.57	0.787
49	1	5	45	4.214	1.500	0.026	0.276	10.928	0.215	0.033	0.034	0.037	0.127	0.008	0.011	0.068	6.75	0.665
50	1	5	50	4.154	1.512	0.023	0.166	10.860	0.216	0.032	0.035	0.038	0.130	0.007	0.012	0.069	6.72	0.588
51	2	1	5	3.591	1.535	0.012	0.087	3.583	0.072	0.011	0.022	0.028	0.058	0.005	0.006	0.164	7.45	1.569
52	2	1	10	3.704	1.820	0.010	0.097	3.703	0.073	0.011	0.023	0.029	0.062	0.005	0.007	0.172	7.54	1.237
53	2	1	15	3.663	2.081	0.010	0.092	3.698	0.074	0.011	0.022	0.029	0.065	0.005	0.006	0.158	7.61	1.025
54	2	1	20	3.701	1.863	0.013	0.092	3.958	0.074	0.011	0.022	0.028	0.063	0.004	0.007	0.149	7.89	0.618
55	2	1	25	3.919	2.013	0.012	0.109	4.459	0.090	0.013	0.025	0.032	0.067	0.006	0.007	0.163	7.87	0.533
56	2	1	30	3.421	1.754	0.013	0.106	4.283	0.083	0.012	0.023	0.027	0.060	0.004	0.008	0.141	7.59	0.505
57	2	1	35	3.765	1.843	0.013	0.107	4.729	0.100	0.013	0.024	0.029	0.065	0.005	0.009	0.148	7.44	0.497
58	2	1	40	3.839	1.629	0.016	0.109	4.998	0.092	0.012	0.025	0.029	0.075	0.004	0.007	0.146	7.59	0.455
59	2	1	45	3.474	1.425	0.013	0.106	4.988	0.104	0.012	0.024	0.027	0.071	0.004	0.007	0.140	7.7	0.415
60	2	1	50	3.686	1.164	0.018	0.101	5.488	0.111	0.013	0.025	0.026	0.075	0.004	0.007	0.134	7.6	0.391
61	2	2	5	3.840	2.223	0.012	0.088	3.828	0.085	0.011	0.023	0.031	0.070	0.005	0.006	0.154	7.47	1.191
62	2	2	10	4.123	3.496	0.017	0.104	3.975	0.088	0.011	0.024	0.036	0.073	0.005	0.009	0.159	7.5	0.928
63	2	2	15	3.761	3.031	0.013	0.097	3.780	0.083	0.011	0.023	0.035	0.064	0.006	0.008	0.153	7.67	0.658
64	2	2	20	3.905	2.996	0.014	0.091	3.720	0.084	0.010	0.023	0.035	0.068	0.006	0.007	0.157	7.78	0.558
65	2	2	25	4.251	3.791	0.014	0.104	4.188	0.091	0.011	0.022	0.030	0.065	0.004	0.007	0.120	7.74	0.420
66	2	2	30	3.987	4.169	0.014	0.095	5.101	0.118	0.012	0.023	0.031	0.066	0.004	0.007	0.104	7.75	0.351
67	2	2	35	3.938	2.941	0.013	0.089	4.946	0.111	0.012	0.026	0.034	0.072	0.004	0.007	0.148	7.91	0.277
68	2	2	40	4.295	3.365	0.015	0.087	4.516	0.103	0.010	0.027	0.042	0.072	0.005	0.008	0.219	8.02	0.157
69	2	2	45	4.874	3.706	0.014	0.097	4.139	0.085	0.010	0.027	0.042	0.075	0.005	0.007	0.182	8.27	0.112
70	2	2	50	5.220	3.789	0.017	0.106	4.347	0.085	0.010	0.029	0.044	0.081	0.005	0.007	0.151	8.08	0.107
71	2	3	5	3.793	2.140	0.012	0.091	3.575	0.079	0.010	0.022	0.030	0.070	0.005	0.007	0.167	6.84	1.145
72	2	3	10	3.869	2.409	0.014	0.094	3.778	0.079	0.009	0.023	0.033	0.066	0.004	0.007	0.178	7.19	0.739
73	2	3	15	3.536	2.255	0.013	0.089	3.383	0.078	0.008	0.022	0.033	0.067	0.007	0.007	0.182	7.41	0.537
74	2	3	20	3.726	2.656	0.013	0.095	3.596	0.082	0.010	0.023	0.034	0.065	0.005	0.007	0.182	7.58	0.333
75	2	3	25	3.311	2.589	0.014	0.085	3.288	0.070	0.008	0.020	0.030	0.059	0.003	0.006	0.212	7.48	0.298

OVEN-DRY ALLUVIUM – Ti-STABLE (cont.)

Location information				PXRF Elemental data (mg/kg)														%
ID	Site	Core	Depth	K	Ca	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	Zr	pH	SOC
76	2	3	30	3.335	2.735	0.011	0.081	3.087	0.063	0.008	0.018	0.028	0.052	0.004	0.007	0.194	7.39	0.353
77	2	3	35	2.521	2.521	0.010	0.072	2.523	0.053	0.006	0.015	0.025	0.051	0.003	0.005	0.201	7.5	0.564
78	2	3	40	2.838	2.810	0.011	0.071	2.900	0.068	0.007	0.016	0.026	0.052	0.003	0.006	0.189	7.63	0.594
79	2	3	45	3.737	3.866	0.016	0.080	4.058	0.089	0.010	0.022	0.033	0.067	0.005	0.008	0.194	7.61	0.652
80	2	3	50	3.526	3.881	0.018	0.081	3.557	0.077	0.008	0.019	0.032	0.067	0.003	0.009	0.230	7.62	0.748
81	2	4	5	4.021	0.909	0.015	0.119	7.552	0.140	0.021	0.031	0.023	0.082	0.005	0.008	0.076	7.06	3.440
82	2	4	10	4.021	0.865	0.015	0.152	7.638	0.137	0.017	0.030	0.023	0.073	0.005	0.009	0.070	7.34	1.558
83	2	4	15	4.209	0.896	0.016	0.233	7.857	0.144	0.017	0.031	0.023	0.084	0.005	0.007	0.070	7.06	1.121
84	2	4	20	4.324	0.920	0.015	0.111	8.599	0.163	0.018	0.032	0.023	0.091	0.004	0.008	0.065	7.34	0.854
85	2	4	25	3.985	1.163	0.014	0.159	7.505	0.128	0.016	0.029	0.025	0.083	0.004	0.009	0.075	7.58	0.932
86	2	4	30	4.027	1.993	0.015	0.086	7.363	0.131	0.018	0.031	0.027	0.077	0.004	0.008	0.083	7.49	1.315
87	2	4	35	4.177	2.250	0.017	0.147	7.248	0.151	0.017	0.030	0.027	0.078	0.004	0.008	0.072	7.7	1.002
88	2	4	40	4.143	2.369	0.015	0.132	7.427	0.141	0.016	0.029	0.025	0.081	0.004	0.008	0.065	7.83	0.586
89	2	4	45	4.548	2.363	0.018	0.182	8.333	0.171	0.017	0.031	0.027	0.086	0.005	0.009	0.068	7.78	0.763
90	2	4	50	3.868	1.812	0.014	0.166	6.595	0.146	0.015	0.027	0.026	0.077	0.004	0.008	0.076	7.8	0.610
91	2	5	5	4.314	1.318	0.020	0.115	9.118	0.182	0.020	0.033	0.026	0.092	0.005	0.009	0.063	7.35	1.490
92	2	5	10	4.159	1.273	0.018	0.079	9.214	0.181	0.021	0.034	0.029	0.082	0.005	0.009	0.070	7.26	1.558
93	2	5	15	4.310	1.217	0.017	0.085	8.853	0.162	0.021	0.032	0.025	0.083	0.005	0.010	0.062	6.93	1.371
94	2	5	20	4.326	1.400	0.017	0.097	8.540	0.161	0.017	0.032	0.025	0.086	0.005	0.010	0.064	7.24	0.974
95	2	5	25	4.138	1.102	0.017	0.093	8.241	0.162	0.017	0.030	0.023	0.080	0.005	0.009	0.056	7.05	0.812
96	2	5	30	4.178	0.963	0.017	0.117	8.427	0.172	0.018	0.030	0.024	0.080	0.005	0.009	0.060	7.37	0.703
97	2	5	35	4.287	1.609	0.019	0.147	8.512	0.163	0.017	0.029	0.023	0.083	0.005	0.009	0.054	7.64	0.584
98	2	5	40	4.411	2.955	0.019	0.154	8.222	0.157	0.018	0.030	0.027	0.097	0.005	0.010	0.059	7.73	0.544
99	2	5	45	4.432	1.523	0.017	0.155	8.863	0.171	0.018	0.032	0.024	0.088	0.004	0.010	0.056	7.63	0.538
100	2	5	50	4.609	3.576	0.018	0.174	8.236	0.157	0.017	0.029	0.026	0.084	0.004	0.009	0.052	7.83	0.499
101	3	1	5	4.493	1.253	0.019	0.115	6.402	0.120	0.100	0.037	0.053	0.103	0.009	0.008	0.152	4.95	2.495
102	3	1	10	4.621	1.157	0.019	0.146	6.301	0.116	0.103	0.036	0.054	0.106	0.009	0.011	0.153	4.75	1.245
103	3	1	15	4.375	1.052	0.018	0.048	6.355	0.115	0.097	0.037	0.055	0.105	0.012	0.016	0.160	4.08	1.582
104	3	1	20	4.309	2.100	0.024	0.059	7.599	0.137	0.199	0.037	0.064	0.117	0.012	0.046	0.153	4.19	3.383
105	3	1	25	4.440	1.277	0.018	0.114	7.016	0.125	0.078	0.038	0.054	0.106	0.009	0.009	0.147	5.21	1.075
106	3	1	30	4.434	1.325	0.023	0.079	6.627	0.137	0.052	0.036	0.055	0.113	0.006	0.011	0.150	5.47	1.064
107	3	1	35	4.585	1.407	0.021	0.135	7.988	0.141	0.036	0.037	0.051	0.127	0.006	0.010	0.135	5.75	0.853
108	3	1	40	4.277	1.283	0.023	0.074	7.863	0.153	0.028	0.036	0.046	0.114	0.005	0.011	0.125	5.97	0.778
109	3	1	45	4.408	1.259	0.021	0.114	8.513	0.178	0.027	0.035	0.048	0.119	0.004	0.012	0.131	6.18	0.577
110	3	1	50	4.536	1.259	0.021	0.082	9.251	0.170	0.029	0.037	0.049	0.130	0.007	0.011	0.122	6.14	0.582
111	3	2	5	4.455	1.423	0.019	0.052	6.256	0.118	0.033	0.038	0.054	0.115	0.009	0.008	0.143	4.67	3.546
112	3	2	10	4.527	1.292	0.020	0.057	6.552	0.123	0.029	0.036	0.056	0.117	0.010	0.011	0.148	4.9	1.614
113	3	2	15	4.438	1.336	0.019	0.079	6.354	0.132	0.025	0.034	0.058	0.114	0.008	0.009	0.146	5.45	1.064
114	3	2	20	4.367	1.327	0.021	0.051	6.203	0.117	0.024	0.034	0.056	0.111	0.007	0.009	0.145	5.71	0.877
115	3	2	25	4.680	1.470	0.020	0.051	6.979	0.134	0.026	0.036	0.060	0.122	0.007	0.011	0.153	5.87	0.874
116	3	2	30	4.528	1.454	0.023	0.043	7.381	0.159	0.026	0.036	0.056	0.116	0.006	0.011	0.138	6.1	0.932
117	3	2	35	4.590	1.545	0.027	0.075	8.195	0.150	0.030	0.037	0.055	0.120	0.005	0.012	0.137	6.08	0.825
118	3	2	40	4.476	1.476	0.021	0.094	8.109	0.153	0.031	0.036	0.053	0.122	0.006	0.011	0.136	5.92	0.789
119	3	2	45	4.267	1.451	0.023	0.109	7.873	0.157	0.030	0.034	0.049	0.119	0.008	0.011	0.119	6.26	0.773
120	3	2	50	4.469	1.387	0.023	0.093	8.236	0.168	0.033	0.035	0.051	0.123	0.006	0.013	0.129	6.46	0.716
121	3	3	5	4.743	1.516	0.019	0.078	5.904	0.115	0.032	0.041	0.063	0.105	0.010	0.009	0.170	5.64	3.206
122	3	3	10	4.613	1.238	0.019	0.087	5.575	0.116	0.026	0.038	0.060	0.118	0.010	0.007	0.167	5.41	1.791
123	3	3	15	4.590	1.200	0.020	0.107	5.646	0.107	0.023	0.037	0.062	0.115	0.009	0.008	0.167	5.5	1.250
124	3	3	20	4.695	1.295	0.022	0.093	5.772	0.125	0.024	0.038	0.063	0.121	0.009	0.008	0.175	5.65	1.015
125	3	3	25	4.303	1.183	0.018	0.084	5.572	0.105	0.021	0.034	0.057	0.105	0.007	0.008	0.161	5.81	0.927
126	3	3	30	4.438	1.275	0.018	0.105	6.566	0.137	0.023	0.036	0.060	0.120	0.008	0.008	0.151	6.02	0.865
127	3	3	35	4.811	1.347	0.021	0.063	6.735	0.143	0.023	0.039	0.064	0.117	0.007	0.010	0.168	6.12	0.852
128	3	3	40	4.478	1.279	0.020	0.054	6.593	0.134	0.023	0.036	0.057	0.110	0.006	0.009	0.146	6.35	0.895
129	3	3	45	4.510	1.427	0.019	0.069	6.673	0.136	0.023	0.036	0.061	0.107	0.007	0.009	0.148	6.11	0.755
130	3	3	50	4.610	1.450	0.022	0.058	7.287	0.147	0.025	0.039	0.062	0.126	0.008	0.008	0.150	6.45	0.768
131	3	4	5	4.862	2.481	0.021	0.168	8.042	0.164	0.076	0.041	0.057	0.113	0.017	0.017	0.131	5.92	6.258
132	3	4	10	4.681	2.131	0.019	0.148	7.770	0.150	0.065	0.038	0.056	0.114	0.020	0.013	0.125	5.89	3.474
133	3	4	15	5.060	2.644	0.022	0.123	7.854	0.164	0.065	0.038	0.060	0.117	0.016	0.014	0.134	6.05	2.411
134	3	4	20	5.046	1.773	0.021	0.111	7.325	0.155	0.032	0.037	0.055	0.120	0.010	0.013	0.129	6.29	1.307
135	3	4	25	4.674	1.539	0.018	0.159	7.959	0.158	0.028	0.036	0.051	0.112	0.006	0.012	0.118	6.57	1.045
136	3	4	30	4.603	1.389	0.023	0.130	9.599	0.186	0.028	0.036	0.035	0.123	0.008	0.011	0.073	6.61	1.093
137	3	4	35	4.506	1.352	0.023	0.116	9.792	0.201	0.030	0.038	0.038	0.121	0.007	0.011	0.077	6.85	0.918
138	3	4	40	4.572	1.359	0.023	0.090	9.261	0.187	0.029	0.037	0.038	0.117	0.006	0.010	0.078	6.87	0.846
139	3	4	45	4.540	1.329	0.022	0.106	9.145	0.186	0.026	0.037	0.039	0.113	0.007	0.009	0.083	7	0.766
140	3	4	50	4.640	1.395	0.022	0.172	10.155	0.176	0.029	0.037	0.041	0.118	0.007	0.011	0.083	7.13	0.719
141	3	5	5	4.684	1.446	0.026	0.098	8.017	0.165	0.045	0.039	0.044	0.126	0.014	0.012	0.110	5.29	3.916
142	3	5	10	4.500	1.343	0.022	0.108	8.048	0.164	0.035	0.038	0.047	0.122	0.013	0.010	0.116	5.8	2.040
143	3	5	15	4.381	1.353	0.021	0.089	7.496	0.142	0.028	0.036	0.046	0.122	0.008	0.012	0.108	6.25	1.350
144	3	5	20	4.227	1.338	0.023	0.095	7.873	0.167	0.029	0.035	0.044	0.118	0.008	0.009	0.102	6.6	1.280
145	3	5	25	4.377	1.383	0.025	0.130	8.976	0.172	0.031	0.037	0.040	0.121	0.007	0.011	0.089	6.92	1.205
146	3	5	30	4.436	1.435	0.025	0.068	9.686	0.190	0.032	0.039	0.040	0.125	0.007	0.013	0.086	7.22	1.188
147	3	5	35	4.311	2.732	0.025	0.066	10.885	0.214	0.032	0.038	0.039	0.119	0.007	0.011	0.080	7	1.036
148	3	5	40	4.095	1.454	0.022	0.120	10.019	0.214	0.030	0.037	0.037	0.120	0.007	0.012	0.074	7.34	0.829
149	3	5	45	4.313	1.599	0.024	0.158	11.052	0.216	0.030	0.037	0.037	0.125	0.007	0.013	0.072	7.54	0.801
150	3	5	50	4.183	1.537	0.023	0.134	11.140	0.235	0.031	0.038	0.038	0.132	0.006	0.011	0.071	7.32	0.708

OVEN-DRY ALLUVIUM – Zr-STABLE

Location information				PXRF Elemental data														%
				mg/kg														
ID	Site	Core	Depth	K	Ca	Ti	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	pH	SOC
1	1	1	5	19.007	6.453	4.449	0.079	0.421	17.005	0.336	0.056	0.124	0.334	0.429	0.021	0.034	6.62	0.595
2	1	1	10	20.099	7.168	4.327	0.073	0.417	17.119	0.317	0.057	0.125	0.348	0.457	0.028	0.024	7.08	0.553
3	1	1	15	21.312	8.561	4.498	0.077	0.473	19.148	0.366	0.067	0.134	0.368	0.484	0.027	0.032	6.85	0.553
4	1	1	20	22.311	8.563	4.472	0.068	0.494	18.253	0.391	0.065	0.141	0.399	0.492	0.031	0.037	7.13	0.471
5	1	1	25	25.075	9.925	5.546	0.097	0.642	27.215	0.554	0.087	0.163	0.406	0.635	0.037	0.041	7.01	0.512
6	1	1	30	25.916	13.521	4.892	0.095	0.846	30.243	0.699	0.098	0.165	0.392	0.618	0.035	0.049	6.85	0.497
7	1	1	35	24.259	12.408	5.220	0.090	0.679	27.272	0.587	0.084	0.148	0.375	0.554	0.030	0.046	6.7	0.450
8	1	1	40	27.779	12.635	5.905	0.092	0.737	35.070	0.733	0.102	0.186	0.413	0.685	0.041	0.057	6.96	0.479
9	1	1	45	25.903	12.514	5.540	0.091	0.706	30.913	0.655	0.092	0.165	0.393	0.615	0.035	0.063	6.98	0.561
10	1	1	50	31.866	12.037	6.806	0.114	1.059	44.408	0.917	0.141	0.205	0.417	0.745	0.035	0.054	9.97	0.486
11	1	2	5	19.636	7.477	4.021	0.068	0.343	15.665	0.351	0.052	0.114	0.327	0.410	0.026	0.038	7.11	0.576
12	1	2	10	17.657	6.395	3.637	0.049	0.299	13.685	0.336	0.048	0.105	0.297	0.368	0.023	0.021	7.14	0.515
13	1	2	15	17.540	6.440	3.580	0.054	0.308	13.687	0.308	0.050	0.106	0.315	0.367	0.022	0.022	7.3	0.424
14	1	2	20	17.992	6.528	4.059	0.068	0.349	15.779	0.404	0.050	0.107	0.308	0.394	0.026	0.025	7.28	0.402
15	1	2	25	19.742	7.061	4.346	0.066	0.373	18.733	0.371	0.057	0.124	0.332	0.433	0.026	0.025	7.13	0.347
16	1	2	30	23.090	8.265	4.528	0.085	0.442	21.704	0.493	0.074	0.140	0.375	0.515	0.032	0.042	7.01	0.379
17	1	2	35	24.014	8.496	5.061	0.088	0.517	27.796	0.678	0.088	0.151	0.365	0.555	0.037	0.044	7.09	0.451
18	1	2	40	28.423	10.295	6.200	0.112	0.562	38.392	0.781	0.118	0.182	0.392	0.675	0.037	0.051	6.99	0.430
19	1	2	45	26.969	9.553	6.083	0.120	0.666	35.997	0.781	0.109	0.176	0.400	0.666	0.034	0.049	7.09	0.412
20	1	2	50	27.724	9.355	6.274	0.107	0.596	33.320	0.777	0.109	0.172	0.390	0.649	0.037	0.056	7.2	0.355
21	1	3	5	18.827	6.706	3.998	0.064	0.361	14.788	0.318	0.051	0.113	0.330	0.411	0.024	0.041	6.62	0.521
22	1	3	10	18.471	8.389	4.181	0.083	0.361	14.620	0.307	0.051	0.113	0.328	0.399	0.025	0.031	7.08	0.449
23	1	3	15	20.422	7.120	4.249	0.070	0.400	16.212	0.309	0.056	0.127	0.372	0.445	0.021	0.031	6.85	0.501
24	1	3	20	22.881	8.740	4.698	0.072	0.430	17.058	0.305	0.060	0.139	0.404	0.510	0.031	0.044	7.41	0.415
25	1	3	25	22.467	9.111	4.628	0.090	0.450	18.598	0.411	0.064	0.135	0.391	0.525	0.023	0.030	7.19	0.345
26	1	3	30	27.080	14.741	6.228	0.130	0.783	31.001	0.759	0.102	0.177	0.430	0.664	0.040	0.051	7.23	0.496
27	1	3	35	32.925	15.957	7.404	0.143	1.888	46.283	0.933	0.128	0.210	0.447	0.865	0.038	0.067	7.24	0.504
28	1	3	40	40.309	17.219	9.585	0.181	2.078	70.295	1.187	0.200	0.284	0.475	1.088	0.042	0.074	7	0.579
29	1	3	45	31.948	16.956	6.948	0.104	0.959	39.868	0.882	0.127	0.204	0.458	0.729	0.037	0.050	7.24	0.466
30	1	3	50	27.331	14.680	4.921	0.081	0.374	28.893	0.613	0.088	0.173	0.436	0.614	0.037	0.027	7.12	0.523
31	1	4	5	54.407	16.295	12.758	0.263	1.656	112.929	2.452	0.373	0.474	0.487	1.768	0.104	0.122	4.95	1.484
32	1	4	10	48.345	14.106	12.065	0.256	1.631	112.297	2.332	0.367	0.483	0.478	1.748	0.104	0.130	4.82	1.409
33	1	4	15	56.866	17.906	13.875	0.321	2.174	137.295	2.953	0.395	0.502	0.505	1.911	0.085	0.156	5.77	1.110
34	1	4	20	61.664	20.865	14.408	0.356	2.311	154.622	3.092	0.444	0.530	0.534	2.119	0.095	0.185	6.41	0.862
35	1	4	25	61.420	19.993	14.703	0.321	2.686	160.158	3.134	0.432	0.531	0.533	1.940	0.086	0.141	6.52	0.764
36	1	4	30	45.710	15.620	10.474	0.244	1.470	97.109	2.029	0.330	0.400	0.472	1.472	0.064	0.127	6.44	0.833
37	1	4	35	38.508	14.101	9.550	0.218	0.849	81.604	1.652	0.292	0.349	0.449	1.286	0.059	0.142	6.74	0.832
38	1	4	40	33.831	12.063	8.242	0.176	0.590	71.372	1.429	0.233	0.303	0.414	0.958	0.050	0.101	6.8	0.663
39	1	4	45	37.807	12.983	8.889	0.238	0.704	73.188	1.477	0.237	0.337	0.431	1.158	0.047	0.083	6.87	0.626
40	1	4	50	39.111	14.930	9.854	0.194	0.708	84.409	1.792	0.291	0.348	0.449	1.188	0.062	0.096	6.88	0.760
41	1	5	5	47.555	14.850	11.701	0.274	1.467	92.782	2.061	0.326	0.423	0.456	1.405	0.098	0.106	5.05	1.871
42	1	5	10	48.991	14.756	12.411	0.255	1.607	91.177	1.858	0.323	0.433	0.472	1.408	0.091	0.137	5.61	1.082
43	1	5	15	50.762	15.471	12.586	0.314	1.986	102.903	1.814	0.387	0.451	0.495	1.423	0.100	0.170	5.86	1.018
44	1	5	20	45.480	14.028	11.855	0.279	1.710	99.680	2.041	0.337	0.462	0.507	1.565	0.076	0.124	6.3	1.001
45	1	5	25	60.175	21.407	14.449	0.314	1.454	156.148	2.869	0.476	0.539	0.536	1.785	0.094	0.181	6.47	0.906
46	1	5	30	62.758	22.576	15.778	0.347	1.942	153.378	3.118	0.482	0.550	0.539	1.927	0.110	0.153	6.73	0.887
47	1	5	35	64.667	23.434	15.613	0.362	1.709	161.799	3.025	0.483	0.560	0.546	1.946	0.136	0.166	6.51	0.886
48	1	5	40	59.632	20.579	14.181	0.380	2.499	141.041	2.862	0.435	0.501	0.548	1.844	0.179	0.148	6.57	0.787
49	1	5	45	62.053	22.092	14.726	0.382	4.071	160.938	3.171	0.481	0.505	0.551	1.876	0.113	0.165	6.75	0.665
50	1	5	50	60.471	22.013	14.556	0.338	2.418	158.070	3.142	0.473	0.515	0.549	1.891	0.100	0.181	6.72	0.588
51	2	1	5	21.841	9.338	6.082	0.073	0.527	21.794	0.438	0.069	0.134	0.173	0.352	0.031	0.035	7.45	1.569
52	2	1	10	21.545	10.588	5.817	0.060	0.565	21.542	0.424	0.066	0.133	0.172	0.362	0.030	0.040	7.54	1.237
53	2	1	15	23.186	13.169	6.329	0.064	0.579	23.406	0.466	0.067	0.138	0.186	0.408	0.032	0.039	7.61	1.025
54	2	1	20	24.822	12.494	6.708	0.087	0.617	26.547	0.498	0.076	0.148	0.185	0.426	0.029	0.044	7.89	0.618
55	2	1	25	24.007	12.334	6.126	0.074	0.668	27.312	0.553	0.082	0.152	0.195	0.412	0.035	0.043	7.87	0.533
56	2	1	30	24.254	12.436	7.089	0.091	0.751	30.364	0.590	0.085	0.161	0.189	0.425	0.032	0.059	7.59	0.505
57	2	1	35	25.493	12.477	6.771	0.089	0.724	32.016	0.675	0.087	0.162	0.195	0.442	0.034	0.063	7.44	0.497
58	2	1	40	26.295	11.156	6.849	0.108	0.745	34.230	0.629	0.081	0.171	0.200	0.510	0.030	0.050	7.59	0.455
59	2	1	45	24.838	10.191	7.150	0.090	0.756	35.664	0.744	0.084	0.169	0.195	0.510	0.028	0.049	7.7	0.415
60	2	1	50	27.563	8.705	7.478	0.131	0.759	41.042	0.827	0.100	0.184	0.192	0.561	0.030	0.050	7.6	0.391
61	2	2	5	24.867	14.400	6.476	0.076	0.571	24.793	0.548	0.072	0.149	0.202	0.454	0.033	0.040	7.47	1.191
62	2	2	10	25.965	22.021	6.298	0.106	0.653	25.038	0.556	0.070	0.152	0.224	0.458	0.034	0.054	7.5	0.928
63	2	2	15	24.643	19.860	6.552	0.082	0.634	24.766	0.542	0.069	0.150	0.227	0.417	0.038	0.055	7.67	0.658
64	2	2	20	24.799	19.026	6.350	0.089	0.575	23.621	0.533	0.062	0.148	0.221	0.435	0.035	0.047	7.78	0.558
65	2	2	25	35.570	31.724	8.368	0.120	0.869	35.043	0.758	0.088	0.183	0.255	0.547	0.029	0.063	7.74	0.420
66	2	2	30	38.203	39.945	9.582	0.137	0.909	48.879	1.135	0.113	0.223	0.294	0.629	0.034	0.063	7.75	0.351
67	2	2	35	26.528	19.811	6.736	0.087	0.597	33.318	0.745	0.078	0.177	0.230	0.488	0.025	0.050	7.91	0.277
68	2	2	40	19.642	15.388	4.573	0.069	0.396	20.650	0.472	0.048	0.122	0.193	0.327	0.024	0.037	8.02	0.157
69	2	2	45	26.765	20.350	5.491	0.077	0.535	22.726	0.468	0.054	0.148	0.232	0.409	0.028	0.036	8.27	0.112
70	2	2	50	34.465	25.013	6.602	0.110	0.699	28.699	0.562	0.066	0.193	0.292	0.535	0.036	0.043	8.08	0.107
71	2	3	5	22.740	12.832	5.996	0.074	0.546	21.432	0.472	0.062	0.134	0.179	0.417	0.029	0.041	6.84	1.145
72	2	3	10	21.685	13.501	5.605	0.077	0.528	21.177	0.441	0.050	0.127	0.187	0.367	0.023	0.040	7.19	0.739
73	2	3	15	19.459	12.411	5.503	0.073	0.491	18.618	0.432	0.046	0.123	0.182	0.371	0.040	0.040	7.41	0.537
74	2	3	20	20.488	14.603	5.499	0.071	0.523	19.773	0.451	0.057	0.128	0.189	0.356	0.026	0.041	7.58	0.333
75	2	3	25	15.635	12.221	4.721	0.065	0.402	15.522	0.330	0.039	0.093	0.140	0.279	0.015	0.028	7.48	0.298

OVEN-DRY ALLUVIUM – Zr-STABLE (cont.)

Location information				PXRF Elemental data														
				mg/kg														%
ID	Site	Core	Depth	K	Ca	Ti	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	pH	SOC
76	2	3	30	17.225	14.126	5.165	0.055	0.417	15.947	0.324	0.041	0.094	0.146	0.269	0.020	0.036	7.39	0.353
77	2	3	35	12.511	12.511	4.963	0.050	0.357	12.523	0.261	0.031	0.072	0.123	0.251	0.015	0.027	7.5	0.564
78	2	3	40	15.005	14.856	5.287	0.060	0.375	15.333	0.358	0.035	0.083	0.136	0.274	0.017	0.031	7.63	0.594
79	2	3	45	19.229	19.892	5.146	0.080	0.414	20.881	0.460	0.052	0.116	0.171	0.346	0.025	0.041	7.61	0.652
80	2	3	50	15.350	16.894	4.353	0.077	0.351	15.484	0.333	0.033	0.085	0.138	0.293	0.014	0.037	7.62	0.748
81	2	4	5	52.986	11.975	13.177	0.196	1.568	99.519	1.846	0.271	0.407	0.307	1.080	0.071	0.110	7.06	3.440
82	2	4	10	57.079	12.284	14.194	0.219	2.155	108.411	1.951	0.243	0.422	0.321	1.037	0.066	0.123	7.34	1.558
83	2	4	15	60.335	12.844	14.333	0.230	3.340	112.624	2.062	0.245	0.437	0.325	1.202	0.065	0.101	7.06	1.121
84	2	4	20	66.126	14.068	15.293	0.227	1.701	131.502	2.496	0.271	0.492	0.354	1.385	0.068	0.126	7.34	0.854
85	2	4	25	52.947	15.448	13.286	0.180	2.109	99.714	1.701	0.209	0.385	0.336	1.104	0.047	0.120	7.58	0.932
86	2	4	30	48.498	23.998	12.043	0.176	1.038	88.677	1.582	0.217	0.369	0.321	0.927	0.052	0.100	7.49	1.315
87	2	4	35	57.616	31.033	13.793	0.240	2.026	99.970	2.081	0.240	0.408	0.366	1.074	0.059	0.114	7.7	1.002
88	2	4	40	63.942	36.560	15.432	0.230	2.035	114.619	2.183	0.249	0.451	0.386	1.245	0.055	0.121	7.83	0.586
89	2	4	45	67.183	34.897	14.771	0.263	2.683	123.088	2.519	0.248	0.452	0.401	1.275	0.067	0.130	7.78	0.763
90	2	4	50	50.809	23.809	13.137	0.184	2.177	86.635	1.916	0.197	0.351	0.338	1.013	0.049	0.100	7.8	0.610
91	2	5	5	68.877	21.047	15.967	0.320	1.838	145.593	2.901	0.322	0.520	0.412	1.466	0.080	0.144	7.35	1.490
92	2	5	10	59.182	18.109	14.228	0.251	1.125	131.096	2.574	0.298	0.485	0.406	1.171	0.071	0.129	7.26	1.558
93	2	5	15	69.498	19.632	16.126	0.277	1.375	142.771	2.613	0.336	0.513	0.398	1.344	0.084	0.158	6.93	1.371
94	2	5	20	67.977	21.996	15.713	0.260	1.523	134.186	2.535	0.271	0.496	0.396	1.345	0.075	0.163	7.24	0.974
95	2	5	25	73.992	19.713	17.880	0.303	1.665	147.351	2.892	0.303	0.542	0.407	1.438	0.092	0.167	7.05	0.812
96	2	5	30	69.186	15.954	16.559	0.289	1.943	139.536	2.844	0.304	0.504	0.403	1.327	0.085	0.148	7.37	0.703
97	2	5	35	79.438	29.804	18.529	0.354	2.729	157.713	3.029	0.317	0.544	0.427	1.542	0.088	0.158	7.64	0.584
98	2	5	40	74.556	49.946	16.904	0.318	2.598	138.979	2.649	0.310	0.513	0.451	1.632	0.077	0.167	7.73	0.544
99	2	5	45	79.319	27.264	17.898	0.311	2.783	158.630	3.068	0.323	0.565	0.426	1.574	0.076	0.179	7.63	0.538
100	2	5	50	89.317	69.308	19.380	0.351	3.375	159.615	3.043	0.332	0.561	0.500	1.630	0.076	0.168	7.83	0.499
101	3	1	5	29.617	8.261	6.592	0.122	0.755	42.203	0.791	0.659	0.246	0.351	0.678	0.061	0.055	4.95	2.495
102	3	1	10	30.160	7.553	6.526	0.123	0.954	41.119	0.757	0.670	0.233	0.353	0.694	0.058	0.071	4.75	1.245
103	3	1	15	27.361	6.579	6.254	0.115	0.301	39.742	0.721	0.609	0.232	0.344	0.654	0.073	0.102	4.08	1.582
104	3	1	20	28.196	13.741	6.543	0.160	0.384	49.725	0.894	1.300	0.242	0.416	0.765	0.078	0.302	4.19	3.383
105	3	1	25	30.200	8.688	6.802	0.120	0.778	47.723	0.850	0.531	0.256	0.364	0.720	0.059	0.063	5.21	1.075
106	3	1	30	29.634	8.854	6.683	0.156	0.531	44.291	0.917	0.346	0.239	0.365	0.756	0.042	0.076	5.47	1.064
107	3	1	35	33.924	10.410	7.399	0.153	0.997	59.106	1.042	0.263	0.272	0.378	0.937	0.044	0.071	5.75	0.853
108	3	1	40	34.300	10.290	8.020	0.183	0.594	63.062	1.226	0.222	0.286	0.370	0.917	0.041	0.087	5.97	0.778
109	3	1	45	33.631	9.608	7.629	0.164	0.871	64.946	1.360	0.204	0.271	0.363	0.905	0.034	0.091	6.18	0.577
110	3	1	50	37.218	10.329	8.205	0.171	0.673	75.903	1.397	0.236	0.300	0.403	1.066	0.058	0.088	6.14	0.582
111	3	2	5	31.148	9.947	6.992	0.132	0.362	43.746	0.822	0.232	0.264	0.380	0.805	0.064	0.054	4.67	3.546
112	3	2	10	30.532	8.714	6.744	0.137	0.384	44.187	0.828	0.194	0.244	0.380	0.792	0.066	0.073	4.9	1.614
113	3	2	15	30.391	9.150	6.847	0.132	0.544	43.508	0.907	0.173	0.236	0.397	0.780	0.055	0.062	5.45	1.064
114	3	2	20	30.166	9.168	6.908	0.144	0.351	42.851	0.805	0.166	0.237	0.387	0.764	0.046	0.064	5.71	0.877
115	3	2	25	30.563	9.598	6.530	0.131	0.336	45.571	0.875	0.173	0.232	0.393	0.794	0.046	0.069	5.87	0.874
116	3	2	30	32.854	10.551	7.255	0.163	0.311	53.550	1.154	0.190	0.259	0.409	0.843	0.047	0.081	6.1	0.932
117	3	2	35	33.542	11.292	7.308	0.199	0.547	59.892	1.096	0.219	0.268	0.403	0.876	0.038	0.085	6.08	0.825
118	3	2	40	32.956	10.868	7.363	0.156	0.694	59.707	1.129	0.226	0.268	0.390	0.898	0.046	0.084	5.92	0.789
119	3	2	45	35.853	12.188	8.402	0.194	0.920	66.147	1.316	0.254	0.287	0.416	1.003	0.063	0.091	6.26	0.773
120	3	2	50	34.621	10.744	7.746	0.177	0.722	63.797	1.301	0.254	0.272	0.396	0.956	0.049	0.102	6.46	0.716
121	3	3	5	27.833	8.895	5.868	0.112	0.459	34.650	0.675	0.190	0.239	0.368	0.619	0.059	0.051	5.64	3.206
122	3	3	10	27.598	7.406	5.982	0.111	0.522	33.350	0.696	0.155	0.227	0.360	0.704	0.058	0.041	5.41	1.791
123	3	3	15	27.540	7.200	6.000	0.120	0.640	33.878	0.642	0.136	0.224	0.372	0.692	0.053	0.046	5.5	1.250
124	3	3	20	26.759	7.381	5.700	0.124	0.529	32.899	0.711	0.134	0.217	0.361	0.687	0.049	0.047	5.65	1.015
125	3	3	25	26.766	7.361	6.220	0.114	0.521	34.654	0.652	0.131	0.213	0.357	0.654	0.044	0.048	5.81	0.927
126	3	3	30	29.429	8.456	6.631	0.120	0.698	43.539	0.911	0.150	0.237	0.395	0.795	0.050	0.055	6.02	0.865
127	3	3	35	28.602	8.011	5.945	0.123	0.377	40.042	0.851	0.138	0.229	0.383	0.696	0.044	0.060	6.12	0.852
128	3	3	40	30.694	8.764	6.854	0.136	0.369	45.189	0.918	0.160	0.247	0.393	0.752	0.042	0.060	6.35	0.895
129	3	3	45	30.499	9.647	6.762	0.130	0.468	45.125	0.919	0.154	0.246	0.414	0.723	0.048	0.058	6.11	0.755
130	3	3	50	30.759	9.675	6.673	0.148	0.389	48.625	0.982	0.166	0.257	0.415	0.839	0.050	0.055	6.45	0.768
131	3	4	5	37.108	18.940	7.632	0.158	1.279	61.376	1.250	0.583	0.311	0.432	0.859	0.133	0.129	5.92	6.258
132	3	4	10	37.313	16.985	7.971	0.155	1.182	61.936	1.194	0.519	0.301	0.446	0.910	0.159	0.102	5.89	3.474
133	3	4	15	37.875	19.793	7.485	0.163	0.923	58.792	1.225	0.484	0.284	0.447	0.877	0.120	0.103	6.05	2.411
134	3	4	20	39.080	13.730	7.745	0.159	0.858	56.736	1.199	0.245	0.287	0.428	0.933	0.074	0.098	6.29	1.307
135	3	4	25	39.467	12.999	8.444	0.149	1.342	67.208	1.330	0.240	0.303	0.430	0.950	0.050	0.099	6.57	1.045
136	3	4	30	63.388	19.121	13.770	0.318	1.789	132.181	2.563	0.386	0.498	0.487	1.700	0.105	0.158	6.61	1.093
137	3	4	35	58.811	17.651	13.051	0.304	1.509	127.797	2.622	0.390	0.490	0.490	1.577	0.096	0.144	6.85	0.918
138	3	4	40	58.372	17.349	12.768	0.293	1.152	118.246	2.388	0.368	0.471	0.491	1.497	0.082	0.131	6.87	0.846
139	3	4	45	54.768	16.033	12.064	0.271	1.274	110.324	2.243	0.319	0.442	0.471	1.363	0.079	0.107	7	0.766
140	3	4	50	55.749	16.757	12.014	0.265	2.066	121.994	2.109	0.346	0.446	0.490	1.418	0.086	0.134	7.13	0.719
141	3	5	5	42.635	13.160	9.103	0.240	0.890	72.983	1.505	0.408	0.355	0.405	1.143	0.125	0.113	5.29	3.916
142	3	5	10	38.791	11.577	8.621	0.187	0.929	69.381	1.412	0.304	0.331	0.401	1.055	0.108	0.086	5.8	2.040
143	3	5	15	40.399	12.476	9.222	0.196	0.818	69.127	1.310	0.262	0.329	0.427	1.121	0.075	0.107	6.25	1.350
144	3	5	20	41.354	13.087	9.784	0.221	0.933	77.023	1.638	0.284	0.347	0.426	1.153	0.077	0.086	6.6	1.280
145	3	5	25	49.078	15.509	11.214	0.285	1.454	100.648	1.929	0.343	0.414	0.445	1.354	0.080	0.126	6.92	1.205
146	3	5	30	51.779	16.752	11.673	0.294	0.791	113.066	2.222	0.371	0.452	0.465	1.464	0.083	0.153	7.22	1.188
147	3	5	35	53.904	34.157	12.504	0.316	0.828	136.105	2.672	0.402	0.476	0.487	1.485	0.083	0.140	7	1.036
148	3	5	40	55.028	19.531	13.437	0.289	1.615	134.619	2.872	0.407	0.494	0.502	1.610	0.095	0.156	7.34	0.829
149	3	5	45	59.690	22.124	13.838	0.330	2.181	152.938	2.996	0.418	0.509	0.511	1.726	0.091	0.175	7.54	0.801
150	3	5	50	58.682	21.558	14.028	0.323	1.876	156.274	3.295	0.431	0.533	0.532	1.855	0.084	0.159	7.32	0.708

OVEN-DRY LOESS – RAW

	Location information			PXRF Elemental data															
					mg/kg														%
ID	S	C	D	K	Ca	Ti	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	Zr	pH	SOC
1	1	1	20	8343.5	251.0	4102.5	47.0	120.5	26769.5	504.0	34.0	63.1	54.5	288.0	19.1	27.5	698.0	4.29	0.405
2	1	1	25	8064.0	150.5	4024.0	55.0	109.0	26845.5	529.5	37.5	64.1	55.0	297.0	18.7	23.0	676.5	4.31	0.379
3	1	1	30	8188.0	34.5	4065.0	47.0	133.5	26516.0	541.0	39.0	64.6	56.0	284.0	17.4	25.5	660.0	4.34	0.316
4	1	1	35	8966.5	50.5	4082.5	50.5	108.5	27253.5	556.5	41.0	67.2	58.9	287.5	17.7	24.5	628.5	4.26	0.245
5	1	1	40	9350.0	112.0	4062.5	53.0	189.0	26248.5	531.0	40.0	65.8	63.6	280.5	15.0	22.5	619.0	4.15	0.238
6	1	1	45	9314.5	176.5	3917.5	49.5	166.0	23296.5	427.5	41.0	63.8	70.6	289.5	18.2	24.5	582.0	4.05	0.188
7	1	1	50	9227.5	239.5	3923.5	44.5	171.0	24211.5	462.5	38.0	62.2	72.7	281.0	16.3	24.0	611.0	4.07	0.180
8	1	2	5	5887.0	1415.0	3204.0	36.0	345.0	15812.0	287.0	70.0	53.7	52.0	223.0	15.0	29.0	820.0	4.1	3.692
9	1	2	10	7414.0	1431.0	3663.0	56.0	207.0	20464.0	391.0	55.0	63.7	56.2	286.0	16.0	30.0	877.0	4.96	1.256
10	1	2	15	8569.0	1436.0	3880.0	63.0	116.0	29312.0	570.0	43.0	69.0	54.2	321.0	16.0	25.0	670.0	5.33	0.744
11	1	2	20	8343.0	1224.0	4043.0	59.0	112.0	27097.0	546.0	42.0	67.3	54.5	281.0	17.0	29.0	674.0	5.29	0.635
12	1	2	25	7828.0	1085.0	3766.0	50.0	83.0	29753.0	600.0	40.0	70.1	55.7	256.0	16.0	24.0	671.0	5.35	0.592
13	1	2	30	8944.0	1118.0	4039.0	59.0	119.0	29532.0	567.0	43.0	70.8	58.0	288.0	16.0	32.0	702.0	5.24	0.476
14	1	2	35	8198.0	1029.0	3918.0	59.0	121.0	26829.0	541.0	41.0	67.4	55.7	286.0	16.0	26.0	657.0	5.34	0.536
15	1	2	40	8502.0	1234.0	4115.0	57.0	178.0	25916.0	519.0	36.0	62.6	55.7	224.0	13.0	24.0	696.0	5.44	0.475
16	1	2	45	9000.0	1111.0	4151.0	52.0	114.0	27341.0	521.0	37.0	62.9	55.3	264.0	16.0	32.0	677.0	4.93	0.401
17	1	2	50	9000.0	1106.0	4148.0	56.0	206.0	24298.0	481.0	37.0	62.7	56.1	258.0	16.0	32.0	715.0	4.97	0.303
18	1	3	5	6448.0	780.0	3782.0	43.0	182.0	12062.0	239.0	23.0	49.6	48.5	205.0	16.0	19.0	885.0	4.78	1.499
19	1	3	10	7103.0	928.0	3837.0	42.0	134.0	20562.0	413.0	37.0	57.5	51.5	258.0	16.0	21.0	743.0	4.95	0.877
20	1	3	15	8004.0	1063.0	4003.0	49.0	114.0	26887.0	491.0	45.0	64.6	55.2	293.0	18.0	29.0	676.0	5.11	0.753
21	1	3	20	7640.0	1089.0	3924.0	58.0	304.0	30305.0	628.0	46.0	65.4	55.2	276.0	18.0	33.0	633.0	5.19	0.674
22	1	3	25	8144.0	1024.0	4128.0	49.0	119.0	29131.0	573.0	50.0	66.0	56.2	309.0	16.0	35.0	649.0	5.2	0.646
23	1	3	30	8222.0	938.0	4114.0	48.0	129.0	27318.0	578.0	45.0	65.0	58.1	294.0	19.0	39.0	665.0	5.02	0.563
24	1	3	35	8597.0	776.0	4255.0	57.0	152.0	26559.0	453.0	49.0	65.4	61.4	279.0	18.0	26.0	747.0	4.52	0.411
25	1	3	40	9018.0	713.0	4369.0	56.0	272.0	22882.0	454.0	42.0	62.8	60.8	265.0	21.0	35.0	742.0	4.49	0.266
26	1	3	45	8676.0	671.0	4138.0	55.0	434.0	21817.0	434.0	37.0	63.4	62.4	259.0	20.0	27.0	700.0	4.57	0.191
27	1	3	50	8155.0	532.0	3776.0	38.0	292.0	20973.0	397.0	37.0	59.4	63.8	251.0	20.0	30.0	709.0	4.57	0.161
28	1	4	5	7848.0	1222.0	3524.0	47.0	318.0	16901.0	313.0	50.0	58.8	48.9	257.0	20.0	23.0	712.0	4.42	2.929
29	1	4	10	7519.0	993.0	3200.0	50.0	250.0	17905.0	323.0	35.0	57.2	47.8	238.0	16.0	23.0	627.0	4.99	1.143
30	1	4	15	7772.0	923.0	3452.0	42.0	283.0	21491.0	417.0	36.0	60.4	46.4	262.0	17.0	24.0	622.0	4.78	0.804
31	1	4	20	7971.0	762.0	3310.0	51.0	264.0	24579.0	418.0	45.0	64.0	50.3	256.0	17.0	17.0	544.0	5.04	0.600
32	1	4	25	8486.0	789.0	3352.0	52.0	239.0	25901.0	442.0	46.0	64.7	54.5	259.0	16.0	30.0	564.0	5.22	0.464
33	1	4	30	8113.0	786.0	3481.0	41.0	262.0	23233.0	425.0	43.0	59.2	54.3	240.0	13.0	23.0	531.0	5.64	0.397
34	1	4	35	7863.0	695.0	3240.0	41.0	232.0	22030.0	393.0	40.0	61.1	56.5	221.0	18.0	21.0	532.0	5.75	0.357
35	1	4	40	7748.0	566.0	3195.0	37.0	206.0	19381.0	324.0	37.0	53.9	48.6	216.0	13.5	25.0	466.0	5.45	0.248
36	1	4	45	7979.0	446.0	3106.0	35.0	193.0	19086.0	330.0	34.0	54.5	45.5	222.0	14.1	21.0	495.0	5.06	0.202
37	1	4	50	6840.0	257.0	2840.0	35.0	183.0	15482.0	269.0	27.0	45.5	39.1	160.0	11.6	12.0	469.0	4.92	0.164
38	1	5	5	5279.0	581.0	3541.0	39.0	491.0	9975.0	181.0	25.0	41.7	58.1	203.0	20.0	17.0	796.0	4.44	1.617
39	1	5	10	5156.0	659.0	3501.0	42.0	804.0	9719.0	182.0	23.0	38.9	59.3	216.0	20.0	11.0	811.0	4.53	0.751
40	1	5	15	5458.0	865.0	3764.0	40.0	865.0	9333.0	160.0	22.0	40.9	59.0	203.0	17.0	19.0	853.0	5.41	0.615
41	1	5	20	5374.0	1002.0	3752.0	38.0	1344.0	9875.0	190.0	18.0	35.7	56.7	212.0	21.0	12.0	809.0	5.73	0.540
42	1	5	25	5075.0	1036.0	3561.0	38.0	1237.0	8169.0	130.0	20.0	34.3	57.6	221.0	16.0	6.0	792.0	5.6	0.649
43	1	5	30	4452.0	824.0	3645.0	28.0	741.0	6766.0	111.0	18.0	32.5	59.2	189.0	17.0	11.0	770.0	5.43	0.652
44	1	5	35	4998.0	663.0	3834.0	47.0	882.0	7648.0	162.0	17.0	35.2	60.2	186.0	17.0	14.0	790.0	5.11	0.658
45	1	5	40	5309.0	713.0	3990.0	42.0	871.0	7601.0	154.0	14.0	34.2	61.3	217.0	15.0	11.0	785.0	5.04	0.695
46	1	5	45	5180.0	604.0	4205.0	36.0	499.0	6154.0	154.0	8.7	35.1	64.7	203.0	14.5	14.0	740.0	4.99	0.826
47	1	5	50	5099.0	608.0	4062.0	45.0	633.0	9129.0	157.0	23.0	40.3	63.2	239.0	16.0	20.0	689.0	4.74	0.392
48	2	1	5	5598.0	1694.0	3315.0	44.0	329.0	8564.0	170.0	39.0	48.4	99.0	195.0	26.0	15.0	724.0	4.55	2.416
49	2	1	10	6109.0	1769.0	3488.0	44.0	415.0	10563.0	240.0	31.0	46.7	100.0	237.0	31.0	19.0	726.0	4.58	1.452
50	2	1	15	5925.0	1803.0	3321.0	35.0	419.0	9826.0	228.0	27.0	49.6	99.0	213.0	27.0	18.0	755.0	4.98	0.831
51	2	1	20	5959.0	1850.0	3304.0	50.0	436.0	13099.0	234.0	26.0	46.2	99.0	279.0	22.0	20.0	768.0	5.47	0.613
52	2	1	25	6067.0	1850.0	3473.0	47.0	554.0	11089.0	229.0	27.0	47.5	104.0	227.0	21.0	17.0	796.0	5.45	0.485
53	2	1	30	6013.0	1743.0	3552.0	42.0	288.0	11045.0	234.0	25.0	49.8	102.0	231.0	19.0	21.0	766.0	5.09	0.374
54	2	1	35	6317.0	1819.0	3340.0	39.0	188.0	11546.0	218.0	25.0	52.2	105.0	212.0	18.0	16.0	755.0	5.03	0.393
55	2	1	40	6212.0	2039.0	3457.0	52.0	120.0	17129.0	427.0	32.0	57.2	98.0	252.0	17.0	24.0	677.0	5.09	0.384
56	2	1	45	6110.0	1963.0	3312.0	50.0	162.0	13489.0	340.0	27.0	50.1	102.0	224.0	17.0	15.0	714.0	5.02	0.328
57	2	1	50	6586.0	2058.0	3598.0	51.0	104.0	15800.0	387.0	38.0	61.4	103.0	228.0	16.0	20.0	618.0	5.08	0.290
58	2	2	5	6586.0	767.0	3541.0	46.0	1310.0	10584.0	209.0	28.0	51.8	80.0	228.0	21.0	21.0	827.0	4.43	0.479
59	2	2	10	6533.0	594.0	3336.0	36.0	922.0	10795.0	182.0	34.0	58.2	78.0	236.0	19.0	19.0	830.0	3.65	0.327
60	2	2	15	6844.0	490.0	3541.0	42.0	438.0	12022.0	274.0	30.0	59.7	76.8	241.0	15.0	17.0	810.0	3.76	0.313
61	2	2	20	7475.0	631.0	3591.0	50.0	174.0	14856.0	330.0	33.0	64.7	76.8	233.0	16.0	21.0	759.0	3.74	0.248
62	2	2	25	7899.0	632.0	3862.0	50.0	156.0	18275.0	407.0	41.0	69.0	74.7	239.0	16.0	26.0	683.0	3.81	0.233
63	2	2	30	8976.0	637.0	3760.0	55.0	103.0	25236.0	524.0	49.0	76.4	76.8	296.0	20.0	29.0	631.0	4	0.273
64	2	2	35	9171.0	765.0	4018.0	55.0	135.0	27897.0	588.0	50.0	79.6	79.6	285.0	17.0	36.0	630.0	4.08	0.281
65	2	2	40	9186.0	832.0	3903.0	53.0	122.0	26889.0	561.0	53.0	78.0	83.9	303.0	16.0	33.0	634.0	4.15	0.311
66	2	2	45	9701.0	868.0	4116.0	55.0	105.0	25791.0	519.0	52.0	77.1	85.1	280.0	17.0	27.0	646.0	4.1	0.267
67	2	2	50	9458.0	909.0	3913.0	47.0	96.0	19589.0	483.0	39.0	68.0	92.0	264.0	15.0	26.0	680.0	4.16	0.217
68	2	3	5	7332.0	1652.0	3440.0	41.0	881.0	13505.0	280.0	57.0	68.4	103.0	275.0	45.0	24.0	576.0	3.92	4.013
69	2	3	10	8513.0	2232.0	3708.0	47.0	616.0	15426.0	338.0	54.0	75.0	113.0	270.0	31.0	27.0	606.0	4.58	1.328
70	2	3	15	8278.0	2123.0	3434.0	44.0	460.0	14966.0	356.0	47.0	70.2	107.0	276.0	25.0	23.0	625.0	4.69	1.099
71	2	3	20	7748.0	1853.0	3320.0	37.0	419.0	11972.0	214.0	42.0	69.6	104.0	263.0	26.0	22.0	625.0	4.82	1.052
72	2	3	25	7384.0	1831.0	3341.0	52.0	367.0	11426.0	253.0	42.0	65.0	104.0	239.0	25.0	22.0	650.0	4.82	0.774
73	2	3	30	7301.0	1613.0	3508.0	48.0	246.0	12015.0	307.0	39.0	64.6	102.0	245.0	22.0	23.0	689.0	4.68	0.831
74	2	3	35	7156.0	1341.0	3634.0	52.0	211.0	12775.0	286.0	36.0	66.9	95.0	245.0	13.6	29.0	712.0	4.22	0.746
75	2	3	40	8075.0	1571.0	3674.0	52.0	97.0	20092.0	443.0	56.0	73.9	93.0	305.0	19.0	28.0	647.0	4.04	0.362

OVEN-DRY LOESS – RAW (cont.)

	Location information			PXRF Elemental data															%
				mg/kg															
	Site	Core	Depth	K	Ca	Ti	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	Zr	pH	SOC
76	2	3	45	7853.0	1402.0	3938.0	49.0	87.0	15921.0	370.0	48.0	71.7	92.3	243.0	15.0	22.0	686.0	4.05	0.422
77	2	3	50	8150.0	1565.0	3627.0	67.0	108.0	23900.0	490.0	64.0	79.0	92.0	316.0	18.0	29.0	594.0	4.09	0.384
78	2	4	5	7078.0	1347.0	3180.0	41.0	643.0	7986.0	173.0	26.0	50.8	88.5	236.0	20.0	18.0	867.0	4.87	1.395
79	2	4	10	6246.0	1217.0	3000.0	36.0	719.0	7427.0	164.0	27.0	50.9	92.6	212.0	20.0	20.0	887.0	5.5	0.645
80	2	4	15	6752.0	1401.0	3061.0	42.0	655.0	7862.0	174.0	29.0	52.0	92.1	217.0	18.0	18.0	897.0	5.79	0.515
81	2	4	20	7444.0	1484.0	3480.0	41.0	757.0	9766.0	188.0	29.0	60.2	92.7	247.0	16.0	20.0	811.0	6.06	0.437
82	2	4	25	7603.0	1342.0	3426.0	40.0	446.0	10638.0	281.0	27.0	62.5	92.6	232.0	17.0	19.0	767.0	5.58	0.278
83	2	4	30	8321.0	1367.0	3579.0	52.0	508.0	11415.0	263.0	31.0	65.0	95.0	252.0	19.0	19.0	769.0	5.33	0.248
84	2	4	35	8627.0	1250.0	3564.0	41.0	389.0	13045.0	285.0	34.0	68.9	93.4	263.0	17.0	24.0	738.0	5.66	0.247
85	2	4	40	8021.0	1111.0	3711.0	50.0	320.0	11399.0	282.0	33.0	70.3	91.5	250.0	15.0	23.0	720.0	4.38	0.257
86	2	4	45	8083.0	1090.0	3490.0	48.0	464.0	12876.0	373.0	35.0	67.6	95.0	254.0	21.0	27.0	727.0	4.43	0.267
87	2	4	50	8688.0	1135.0	3631.0	54.0	366.0	13198.0	309.0	34.0	68.5	97.0	255.0	17.0	24.0	697.0	4.49	0.211
88	2	5	5	6204.0	2330.0	3489.0	39.0	354.0	12193.0	233.0	37.0	56.1	100.1	238.0	25.0	21.0	703.0	5.06	2.101
89	2	5	10	6223.0	2549.0	3684.0	47.0	464.0	13280.0	256.0	36.0	55.4	102.5	253.0	28.0	19.0	707.0	5.46	1.522
90	2	5	15	6593.0	2882.0	3758.0	47.0	409.0	14188.0	296.0	37.0	55.2	102.9	274.0	24.8	11.0	693.0	5.77	1.098
91	2	5	20	6254.0	2670.0	3543.0	44.0	398.0	11485.0	226.0	33.0	53.7	106.5	263.0	29.0	18.0	765.0	5.97	1.177
92	2	5	25	6254.0	2517.0	3554.0	51.0	617.0	12429.0	245.0	30.0	53.3	100.1	253.0	40.0	14.0	753.0	6.19	1.157
93	2	5	30	5487.0	1997.0	3577.0	40.0	470.0	11947.0	284.0	23.9	50.3	101.7	227.0	21.2	23.0	767.0	5.82	0.815
94	2	5	35	6009.0	2011.0	3774.0	47.0	297.0	14825.0	366.0	30.0	54.6	92.2	256.0	20.2	24.0	733.0	5.13	0.758
95	2	5	40	5862.0	1933.0	3679.0	47.0	425.0	16136.0	352.0	36.0	62.5	92.0	254.0	18.4	20.0	741.0	4.59	0.768
96	2	5	45	6026.0	2009.0	3520.0	56.0	205.0	16551.0	316.0	45.0	67.8	90.3	271.0	15.9	22.0	675.0	4.55	0.709
97	2	5	50	6188.0	1817.0	3483.0	47.0	248.0	13823.0	339.0	34.0	61.2	95.5	272.0	15.0	20.0	734.0	4.74	0.660
98	3	1	5	8970.0	731.0	3880.0	49.0	1431.0	10961.0	195.0	44.0	67.0	82.6	252.0	21.3	22.0	758.0	4.69	1.551
99	3	1	10	8823.0	952.0	3750.0	44.0	1210.0	10857.0	211.0	34.0	64.6	85.9	233.0	22.2	19.0	761.0	5.98	0.898
100	3	1	15	8777.0	1066.0	3981.0	44.0	2007.0	11157.0	221.0	35.0	65.5	91.9	283.0	25.6	21.0	803.0	6.4	0.598
101	3	1	20	8932.0	937.0	3941.0	55.0	1930.0	10799.0	207.0	37.0	65.3	91.5	266.0	17.0	20.0	769.0	6.37	0.524
102	3	1	25	9833.0	1663.0	4055.0	65.0	381.0	15974.0	305.0	49.0	86.6	100.1	294.0	16.0	23.0	525.0	6.15	0.366
103	3	1	30	10291.0	1688.0	3994.0	47.0	170.0	17763.0	366.0	52.0	84.8	105.9	279.0	14.4	24.0	510.0	5.41	0.295
104	3	1	35	11218.0	1492.0	3950.0	54.0	250.0	18163.0	366.0	50.0	83.7	108.1	300.0	18.8	29.0	497.0	4.65	0.344
105	3	1	40	11202.0	1475.0	4033.0	53.0	254.0	17248.0	347.0	51.0	81.6	109.3	297.0	16.9	30.0	494.0	4.53	0.256
106	3	1	45	5332.0	613.0	3539.0	58.0	383.0	16079.0	177.0	72.0	82.9	112.3	330.0	19.1	27.0	459.0	4.86	0.262
107	3	1	50	11517.0	1364.0	3972.0	58.0	393.0	20285.0	510.0	63.0	88.4	115.2	320.0	20.6	33.0	467.0	4.71	0.286
108	3	2	5	9452.0	1150.0	3685.0	47.0	1131.0	10100.0	228.0	36.0	69.4	88.7	257.0	20.8	17.0	717.0	6.98	0.907
109	3	2	10	9411.0	1178.0	3749.0	52.0	2263.0	12458.0	246.0	34.0	66.2	88.9	274.0	25.2	23.0	740.0	6.77	0.652
110	3	2	15	9121.0	1064.0	3617.0	39.0	1651.0	10503.0	235.0	32.0	67.7	88.7	249.0	23.2	18.0	750.0	6.74	0.584
111	3	2	20	10211.0	1132.0	3858.0	46.0	1101.0	10082.0	200.0	37.0	79.0	95.8	271.0	15.9	18.0	636.0	5.82	0.517
112	3	2	25	11427.0	1224.0	4166.0	44.0	1829.0	13411.0	250.0	35.0	81.0	96.4	301.0	18.7	22.0	699.0	5.36	0.290
113	3	2	30	11374.0	1187.0	4057.0	43.0	1860.0	13872.0	359.0	33.0	79.2	95.6	323.0	16.9	19.0	698.0	4.85	0.271
114	3	2	35	10383.0	1004.0	3981.0	52.0	1138.0	10561.0	234.0	29.4	78.5	96.0	273.0	19.8	20.0	705.0	4.52	0.210
115	3	2	40	11253.0	1085.0	3996.0	51.0	658.0	9297.0	209.0	25.0	83.2	93.7	279.0	15.2	19.0	693.0	4.4	0.172
116	3	2	45	10914.0	993.0	3749.0	49.0	658.0	10265.0	257.0	32.0	79.4	93.0	272.0	15.4	15.0	648.0	4.29	0.192
117	3	2	50	9868.0	855.0	3492.0	49.0	596.0	7613.0	172.0	24.4	75.4	94.6	246.0	13.6	16.0	693.0	4.18	0.148
118	3	3	5	9246.0	960.0	3781.0	51.0	541.0	11691.0	261.0	30.0	61.8	67.6	268.0	20.7	20.0	982.0	5.66	0.708
119	3	3	10	9372.0	909.0	3708.0	50.0	586.0	11832.0	239.0	28.0	61.9	69.5	273.0	18.1	22.0	992.0	5.7	0.377
120	3	3	15	9296.0	768.0	3856.0	50.0	742.0	13720.0	288.0	32.0	67.3	69.2	269.0	18.5	26.0	851.0	5.01	0.330
121	3	3	20	10541.0	909.0	4280.0	60.0	413.0	22196.0	425.0	50.0	79.5	67.2	311.0	19.5	27.0	671.0	4.35	0.263
122	3	3	25	11004.0	777.0	4081.0	56.0	221.0	28300.0	565.0	53.0	83.6	65.9	308.0	18.5	28.0	597.0	4.56	0.238
123	3	3	30	11311.0	740.0	4210.0	65.0	282.0	30515.0	593.0	53.0	83.3	65.9	332.0	16.4	36.0	588.0	4.25	0.299
124	3	3	35	11215.0	711.0	4340.0	66.0	182.0	31692.0	617.0	58.0	83.3	67.3	316.0	17.7	33.0	574.0	4.23	0.176
125	3	3	40	12146.0	641.0	4403.0	55.0	251.0	32043.0	624.0	61.0	81.5	69.5	373.0	18.1	29.0	572.0	4.1	0.147
126	3	3	45	11734.0	528.0	4367.0	68.0	389.0	29658.0	590.0	55.0	80.0	69.6	325.0	20.2	32.0	582.0	4.19	0.133
127	3	3	50	11695.0	513.0	4344.0	63.0	379.0	29480.0	594.0	53.0	83.0	72.5	334.0	20.1	33.0	591.0	4.12	0.140
128	3	4	5	9637.0	1064.0	3624.0	49.0	928.0	13402.0	286.0	39.0	67.8	81.7	273.0	18.8	23.0	672.0	4.93	1.208
129	3	4	10	9313.0	908.0	3509.0	55.0	1175.0	13782.0	308.0	37.0	67.2	88.4	271.0	15.8	16.0	693.0	4.2	0.847
130	3	4	15	10257.0	1433.0	3692.0	55.0	1066.0	27739.0	569.0	45.0	70.3	102.3	324.0	13.0	26.0	624.0	5.13	0.631
131	3	4	20	10139.0	1870.0	3763.0	53.0	1518.0	28018.0	586.0	47.0	70.7	107.9	306.0	14.8	26.0	557.0	5.59	0.440
132	3	4	25	10155.0	1461.0	3714.0	53.0	1196.0	22222.0	431.0	44.0	69.1	98.5	301.0	16.1	22.0	588.0	4.52	0.585
133	3	4	30	8613.0	970.0	3469.0	46.0	706.0	9924.0	207.0	32.0	66.0	89.5	265.0	17.8	16.0	704.0	4.84	0.642
134	3	4	35	8549.0	839.0	3646.0	48.0	671.0	10611.0	243.0	35.0	66.9	89.1	261.0	17.6	17.0	706.0	4.87	0.646
135	3	4	40	8127.0	835.0	3493.0	53.0	490.0	10547.0	227.0	30.9	65.1	90.0	242.0	16.2	20.0	706.0	4.68	0.463
136	3	4	45	8725.0	907.0	3560.0	49.0	528.0	10920.0	269.0	31.0	67.1	94.3	253.0	17.0	23.0	694.0	4.82	0.470
137	3	4	50	8807.0	881.0	3607.0	46.0	608.0	11179.0	232.0	29.0	66.9	87.7	249.0	17.2	20.0	678.0	4.89	0.447
138	3	5	5	8792.0	1261.0	4508.0	49.0	326.0	9689.0	233.0	40.0	67.2	90.0	271.0	28.2	19.0	666.0	4.19	1.512
139	3	5	10	7423.0	948.0	2750.0	33.0	397.0	7799.0	146.0	22.9	53.3	84.0	225.0	23.1	9.0	529.0	4.23	1.386
140	3	5	15	8453.0	1296.0	3537.0	49.0	637.0	8511.0	165.0	23.5	57.4	94.7	220.0	22.6	14.0	640.0	6.06	0.478
141	3	5	20	7866.0	1217.0	3926.0	47.0	281.0	8646.0	179.0	23.6	58.6	90.8	208.0	20.6	19.0	663.0	6.22	0.404
142	3	5	25	7783.0	1147.0	3815.0	48.0	222.0	9444.0	206.0	25.3	60.4	90.4	220.0	15.6	14.0	669.0	5.99	0.370
143	3	5	30	7936.0	1031.0	3962.0	46.0	143.0	11344.0	274.0	27.9	63.7	89.9	229.0	21.4	17.0	662.0	5.62	0.337
144	3	5	35	7479.0	1076.0	3558.0	48.0	76.0	8434.0	183.0	16.0	62.0	93.0	213.0	15.0	15.0	673.0	5.32	0.317
145	3	5	40	8277.0	1110.0	4035.0	55.0	68.0	13966.0	323.0	34.0	69.1	89.0	239.0	16.0	11.0	659.0	5.16	0.289
146	3	5	45	7995.0	994.0	3751.0	54.0	105.0	14387.0	323.0	29.0	68.5	91.7	248.0	18.0	19.0	663.0	5.18	0.257
147	3	5	50	8535.0	953.0	3587.0	47.0	152.0	14341.0	326.0	36.0	73.0	92.7	267.0	16.0	18.0	491.0	5.55	0.205
148	3	5	40	8277.0	1110.0	4035.0	55.0	68.0	13966.0	323.0	34.0	69.1	89.0	239.0	16.0	11.0	659.0	5.16	0.289
149	3	5	45	7995.0	994.0	3751.0	54.0	105.0	14387.0	323.0	29.0	68.5	91.7	248.0	18.0	19.0	663.0	5.18	0.257
150	3	5	50	8535.0	953.0	3587.0	47.0	152.0	14341.0	326.0	36.0	73.0	92.7	267.0	16.0	18.0	491.0	5.55	0.205

OVEN-DRY LOESS – Ti-STABLE

	Location information			PXRF Elemental data														
					mg/kg													%
ID	S	C	D	K	Ca	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	Zr	pH	SOC
1	1	1	20	2.034	0.061	0.011	0.029	6.525	0.123	0.008	0.015	0.013	0.070	0.005	0.007	0.170	4.29	0.405
2	1	1	25	2.004	0.037	0.014	0.027	6.671	0.132	0.009	0.016	0.014	0.074	0.005	0.006	0.168	4.31	0.379
3	1	1	30	2.014	0.008	0.012	0.033	6.523	0.133	0.010	0.016	0.014	0.070	0.004	0.006	0.162	4.34	0.316
4	1	1	35	2.196	0.012	0.012	0.027	6.676	0.136	0.010	0.016	0.014	0.070	0.004	0.006	0.154	4.26	0.245
5	1	1	40	2.302	0.028	0.013	0.047	6.461	0.131	0.010	0.016	0.016	0.069	0.004	0.006	0.152	4.15	0.238
6	1	1	45	2.378	0.045	0.013	0.042	5.947	0.109	0.010	0.016	0.018	0.074	0.005	0.006	0.149	4.05	0.188
7	1	1	50	2.352	0.061	0.011	0.044	6.171	0.118	0.010	0.016	0.019	0.072	0.004	0.006	0.156	4.07	0.180
8	1	2	5	1.837	0.442	0.011	0.108	4.935	0.090	0.022	0.017	0.016	0.070	0.005	0.009	0.256	4.1	3.692
9	1	2	10	2.024	0.391	0.015	0.057	5.587	0.107	0.015	0.017	0.015	0.078	0.004	0.008	0.239	4.96	1.256
10	1	2	15	2.209	0.370	0.016	0.030	7.555	0.147	0.011	0.018	0.014	0.083	0.004	0.006	0.173	5.33	0.744
11	1	2	20	2.064	0.303	0.015	0.028	6.702	0.135	0.010	0.017	0.013	0.070	0.004	0.007	0.167	5.29	0.635
12	1	2	25	2.079	0.288	0.013	0.022	7.900	0.159	0.011	0.019	0.015	0.068	0.004	0.006	0.178	5.35	0.592
13	1	2	30	2.214	0.277	0.015	0.029	7.312	0.140	0.011	0.018	0.014	0.071	0.004	0.008	0.174	5.24	0.476
14	1	2	35	2.092	0.263	0.015	0.031	6.848	0.138	0.010	0.017	0.014	0.073	0.004	0.007	0.168	5.34	0.536
15	1	2	40	2.066	0.300	0.014	0.043	6.298	0.126	0.009	0.015	0.014	0.054	0.003	0.006	0.169	5.44	0.475
16	1	2	45	2.168	0.268	0.013	0.027	6.587	0.126	0.009	0.015	0.013	0.064	0.004	0.008	0.163	4.93	0.401
17	1	2	50	2.170	0.267	0.014	0.050	5.858	0.116	0.009	0.015	0.014	0.062	0.004	0.008	0.172	4.97	0.303
18	1	3	5	1.705	0.206	0.011	0.048	3.189	0.063	0.006	0.013	0.013	0.054	0.004	0.005	0.234	4.78	1.499
19	1	3	10	1.851	0.242	0.011	0.035	5.359	0.108	0.010	0.015	0.013	0.067	0.004	0.005	0.194	4.95	0.877
20	1	3	15	2.000	0.266	0.012	0.028	6.717	0.123	0.011	0.016	0.014	0.073	0.004	0.007	0.169	5.11	0.753
21	1	3	20	1.947	0.278	0.015	0.077	7.723	0.160	0.012	0.017	0.014	0.070	0.005	0.008	0.161	5.19	0.674
22	1	3	25	1.973	0.248	0.012	0.029	7.057	0.139	0.012	0.016	0.014	0.075	0.004	0.008	0.157	5.2	0.646
23	1	3	30	1.999	0.228	0.012	0.031	6.640	0.140	0.011	0.016	0.014	0.071	0.005	0.009	0.162	5.02	0.563
24	1	3	35	2.020	0.182	0.013	0.036	6.242	0.106	0.012	0.015	0.014	0.066	0.004	0.006	0.176	4.52	0.411
25	1	3	40	2.064	0.163	0.013	0.062	5.237	0.104	0.010	0.014	0.014	0.061	0.005	0.008	0.170	4.49	0.266
26	1	3	45	2.097	0.162	0.013	0.105	5.272	0.105	0.009	0.015	0.015	0.063	0.005	0.007	0.169	4.57	0.191
27	1	3	50	2.160	0.141	0.010	0.077	5.554	0.105	0.010	0.016	0.017	0.066	0.005	0.008	0.188	4.57	0.161
28	1	4	5	2.227	0.347	0.013	0.090	4.796	0.089	0.014	0.017	0.014	0.073	0.006	0.007	0.202	4.42	2.929
29	1	4	10	2.350	0.310	0.016	0.078	5.595	0.101	0.011	0.018	0.015	0.074	0.005	0.007	0.196	4.99	1.143
30	1	4	15	2.251	0.267	0.012	0.082	6.226	0.121	0.010	0.017	0.013	0.076	0.005	0.007	0.180	4.78	0.804
31	1	4	20	2.408	0.230	0.015	0.080	7.426	0.126	0.014	0.019	0.015	0.077	0.005	0.005	0.164	5.04	0.600
32	1	4	25	2.532	0.235	0.016	0.071	7.727	0.132	0.014	0.019	0.016	0.077	0.005	0.009	0.168	5.22	0.464
33	1	4	30	2.331	0.226	0.012	0.075	6.674	0.122	0.012	0.017	0.016	0.069	0.004	0.007	0.153	5.64	0.397
34	1	4	35	2.427	0.215	0.013	0.072	6.799	0.121	0.012	0.019	0.017	0.068	0.006	0.006	0.164	5.75	0.357
35	1	4	40	2.425	0.177	0.012	0.064	6.066	0.101	0.012	0.017	0.015	0.068	0.004	0.008	0.146	5.45	0.248
36	1	4	45	2.569	0.144	0.011	0.062	6.145	0.106	0.011	0.018	0.015	0.071	0.005	0.007	0.159	5.06	0.202
37	1	4	50	2.408	0.090	0.012	0.064	5.451	0.095	0.010	0.016	0.014	0.056	0.004	0.004	0.165	4.92	0.164
38	1	5	5	1.491	0.164	0.011	0.139	2.817	0.051	0.007	0.012	0.016	0.057	0.006	0.005	0.225	4.44	1.617
39	1	5	10	1.473	0.188	0.012	0.230	2.776	0.052	0.007	0.011	0.017	0.062	0.006	0.003	0.232	4.53	0.751
40	1	5	15	1.450	0.230	0.011	0.230	2.480	0.043	0.006	0.011	0.016	0.054	0.005	0.005	0.227	5.41	0.615
41	1	5	20	1.432	0.267	0.010	0.358	2.632	0.051	0.005	0.010	0.015	0.057	0.006	0.003	0.216	5.73	0.540
42	1	5	25	1.425	0.291	0.011	0.347	2.294	0.037	0.006	0.010	0.016	0.062	0.004	0.002	0.222	5.6	0.649
43	1	5	30	1.221	0.226	0.008	0.203	1.856	0.030	0.005	0.009	0.016	0.052	0.005	0.003	0.211	5.43	0.652
44	1	5	35	1.304	0.173	0.012	0.230	1.995	0.042	0.004	0.009	0.016	0.049	0.004	0.004	0.206	5.11	0.658
45	1	5	40	1.331	0.179	0.011	0.218	1.905	0.039	0.004	0.009	0.015	0.054	0.004	0.003	0.197	5.04	0.695
46	1	5	45	1.232	0.144	0.009	0.119	1.463	0.037	0.002	0.008	0.015	0.048	0.003	0.003	0.176	4.99	0.826
47	1	5	50	1.255	0.150	0.011	0.156	2.247	0.039	0.006	0.010	0.016	0.059	0.004	0.005	0.170	4.74	0.392
48	2	1	5	1.689	0.511	0.013	0.099	2.583	0.051	0.012	0.015	0.030	0.059	0.008	0.005	0.218	4.55	2.416
49	2	1	10	1.751	0.507	0.013	0.119	3.028	0.069	0.009	0.013	0.029	0.068	0.009	0.005	0.208	4.58	1.452
50	2	1	15	1.784	0.543	0.011	0.126	2.959	0.069	0.008	0.015	0.030	0.064	0.008	0.005	0.227	4.98	0.831
51	2	1	20	1.804	0.560	0.015	0.132	3.965	0.071	0.008	0.014	0.030	0.084	0.007	0.006	0.232	5.47	0.613
52	2	1	25	1.747	0.533	0.014	0.160	3.193	0.066	0.008	0.014	0.030	0.065	0.006	0.005	0.229	5.45	0.485
53	2	1	30	1.693	0.491	0.012	0.081	3.110	0.066	0.007	0.014	0.029	0.065	0.005	0.006	0.216	5.09	0.374
54	2	1	35	1.891	0.545	0.012	0.056	3.457	0.065	0.007	0.016	0.031	0.063	0.005	0.005	0.226	5.03	0.393
55	2	1	40	1.797	0.590	0.015	0.035	4.955	0.124	0.009	0.017	0.028	0.073	0.005	0.007	0.196	5.09	0.384
56	2	1	45	1.845	0.593	0.015	0.049	4.073	0.103	0.008	0.015	0.031	0.068	0.005	0.005	0.216	5.02	0.328
57	2	1	50	1.830	0.572	0.014	0.029	4.391	0.108	0.011	0.017	0.029	0.063	0.004	0.006	0.172	5.08	0.290
58	2	2	5	1.860	0.217	0.013	0.370	2.989	0.059	0.008	0.015	0.023	0.064	0.006	0.006	0.234	4.43	0.479
59	2	2	10	1.958	0.178	0.011	0.276	3.236	0.055	0.010	0.017	0.023	0.071	0.006	0.006	0.249	3.65	0.327
60	2	2	15	1.933	0.138	0.012	0.124	3.395	0.077	0.008	0.017	0.022	0.068	0.004	0.005	0.229	3.76	0.313
61	2	2	20	2.082	0.176	0.014	0.048	4.137	0.092	0.009	0.018	0.021	0.065	0.004	0.006	0.211	3.74	0.248
62	2	2	25	2.045	0.164	0.013	0.040	4.732	0.105	0.011	0.018	0.019	0.062	0.004	0.007	0.177	3.81	0.233
63	2	2	30	2.387	0.169	0.015	0.027	6.712	0.139	0.013	0.020	0.020	0.079	0.005	0.008	0.168	4	0.273
64	2	2	35	2.282	0.190	0.014	0.034	6.943	0.146	0.012	0.020	0.020	0.071	0.004	0.009	0.157	4.08	0.281
65	2	2	40	2.354	0.213	0.014	0.031	6.889	0.144	0.014	0.020	0.021	0.078	0.004	0.008	0.162	4.15	0.311
66	2	2	45	2.357	0.211	0.013	0.026	6.266	0.126	0.013	0.019	0.021	0.068	0.004	0.007	0.157	4.1	0.267
67	2	2	50	2.417	0.232	0.012	0.025	5.006	0.123	0.010	0.017	0.024	0.067	0.004	0.007	0.174	4.16	0.217
68	2	3	5	2.131	0.480	0.012	0.256	3.926	0.081	0.017	0.020	0.030	0.080	0.013	0.007	0.167	3.92	4.013
69	2	3	10	2.296	0.602	0.013	0.166	4.160	0.091	0.015	0.020	0.030	0.073	0.008	0.007	0.163	4.58	1.328
70	2	3	15	2.411	0.618	0.013	0.134	4.358	0.104	0.014	0.020	0.031	0.080	0.007	0.007	0.182	4.69	1.099
71	2	3	20	2.334	0.558	0.011	0.126	3.606	0.064	0.013	0.021	0.031	0.079	0.008	0.007	0.188	4.82	1.052
72	2	3	25	2.210	0.548	0.016	0.110	3.420	0.076	0.013	0.019	0.031	0.072	0.007	0.007	0.195	4.82	0.774
73	2	3	30	2.081	0.460	0.014	0.070	3.425	0.088	0.011	0.018	0.029	0.070	0.006	0.007	0.196	4.68	0.831
74	2	3	35	1.969	0.369	0.014	0.058	3.515	0.079	0.010	0.018	0.026	0.067	0.004	0.008	0.196	4.22	0.746
75	2	3	40	2.198	0.428	0.014	0.026	5.469	0.121	0.015	0.020	0.025	0.083	0.005	0.008	0.176	4.04	0.362

OVEN-DRY LOESS – Ti-STABLE (cont.)

	Location information			PXRF Elemental data														
					mg/kg													%
	Site	Core	Depth	K	Ca	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	Zr	pH	SOC
76	2	3	45	1.994	0.356	0.012	0.022	4.043	0.094	0.012	0.018	0.023	0.062	0.004	0.006	0.174	4.05	0.422
77	2	3	50	2.247	0.431	0.018	0.030	6.589	0.135	0.018	0.022	0.025	0.087	0.005	0.008	0.164	4.09	0.384
78	2	4	5	2.226	0.424	0.013	0.202	2.511	0.054	0.008	0.016	0.028	0.074	0.006	0.006	0.273	4.87	1.395
79	2	4	10	2.082	0.406	0.012	0.240	2.476	0.055	0.009	0.017	0.031	0.071	0.007	0.007	0.296	5.5	0.645
80	2	4	15	2.206	0.458	0.014	0.214	2.568	0.057	0.009	0.017	0.030	0.071	0.006	0.006	0.293	5.79	0.515
81	2	4	20	2.139	0.426	0.012	0.218	2.806	0.054	0.008	0.017	0.027	0.071	0.005	0.006	0.233	6.06	0.437
82	2	4	25	2.219	0.392	0.012	0.130	3.105	0.082	0.008	0.018	0.027	0.068	0.005	0.006	0.224	5.58	0.278
83	2	4	30	2.325	0.382	0.015	0.142	3.189	0.073	0.009	0.018	0.027	0.070	0.005	0.005	0.215	5.33	0.248
84	2	4	35	2.421	0.351	0.012	0.109	3.660	0.080	0.010	0.019	0.026	0.074	0.005	0.007	0.207	5.66	0.247
85	2	4	40	2.161	0.299	0.013	0.086	3.072	0.076	0.009	0.019	0.025	0.067	0.004	0.006	0.194	4.38	0.257
86	2	4	45	2.316	0.312	0.014	0.133	3.689	0.107	0.010	0.019	0.027	0.073	0.006	0.008	0.208	4.43	0.267
87	2	4	50	2.393	0.313	0.015	0.101	3.635	0.085	0.009	0.019	0.027	0.070	0.005	0.007	0.192	4.49	0.211
88	2	5	5	1.778	0.668	0.011	0.101	3.495	0.067	0.011	0.016	0.029	0.068	0.007	0.006	0.201	5.06	2.101
89	2	5	10	1.689	0.692	0.013	0.126	3.605	0.069	0.010	0.015	0.028	0.069	0.008	0.005	0.192	5.46	1.522
90	2	5	15	1.754	0.767	0.013	0.109	3.775	0.079	0.010	0.015	0.027	0.073	0.007	0.003	0.184	5.77	1.098
91	2	5	20	1.765	0.754	0.012	0.112	3.242	0.064	0.009	0.015	0.030	0.074	0.008	0.005	0.216	5.97	1.177
92	2	5	25	1.760	0.708	0.014	0.174	3.497	0.069	0.008	0.015	0.028	0.071	0.011	0.004	0.212	6.19	1.157
93	2	5	30	1.534	0.558	0.011	0.131	3.340	0.079	0.007	0.014	0.028	0.063	0.006	0.006	0.214	5.82	0.815
94	2	5	35	1.592	0.533	0.012	0.079	3.928	0.097	0.008	0.014	0.024	0.068	0.005	0.006	0.194	5.13	0.758
95	2	5	40	1.593	0.525	0.013	0.116	4.386	0.096	0.010	0.017	0.025	0.069	0.005	0.005	0.201	4.59	0.768
96	2	5	45	1.712	0.571	0.016	0.058	4.702	0.090	0.013	0.019	0.026	0.077	0.005	0.006	0.192	4.55	0.709
97	2	5	50	1.777	0.522	0.013	0.071	3.969	0.097	0.010	0.018	0.027	0.078	0.004	0.006	0.211	4.74	0.660
98	3	1	5	2.312	0.188	0.013	0.369	2.825	0.050	0.011	0.017	0.021	0.065	0.005	0.006	0.195	4.69	1.551
99	3	1	10	2.353	0.254	0.012	0.323	2.895	0.056	0.009	0.017	0.023	0.062	0.006	0.005	0.203	5.98	0.898
100	3	1	15	2.205	0.268	0.011	0.504	2.803	0.056	0.009	0.016	0.023	0.071	0.006	0.005	0.202	6.4	0.598
101	3	1	20	2.266	0.238	0.014	0.490	2.740	0.053	0.009	0.017	0.023	0.067	0.004	0.005	0.195	6.37	0.524
102	3	1	25	2.425	0.410	0.016	0.094	3.939	0.075	0.012	0.021	0.025	0.073	0.004	0.006	0.129	6.15	0.366
103	3	1	30	2.577	0.423	0.012	0.043	4.447	0.092	0.013	0.021	0.027	0.070	0.004	0.006	0.128	5.41	0.295
104	3	1	35	2.840	0.378	0.014	0.063	4.598	0.093	0.013	0.021	0.027	0.076	0.005	0.007	0.126	4.65	0.344
105	3	1	40	2.778	0.366	0.013	0.063	4.277	0.086	0.013	0.020	0.027	0.074	0.004	0.007	0.122	4.53	0.256
106	3	1	45	1.507	0.173	0.016	0.108	4.543	0.050	0.020	0.023	0.032	0.093	0.005	0.008	0.130	4.86	0.262
107	3	1	50	2.900	0.343	0.015	0.099	5.107	0.128	0.016	0.022	0.029	0.081	0.005	0.008	0.118	4.71	0.286
108	3	2	5	2.565	0.312	0.013	0.307	2.741	0.062	0.010	0.019	0.024	0.070	0.006	0.005	0.195	6.98	0.907
109	3	2	10	2.510	0.314	0.014	0.604	3.323	0.066	0.009	0.018	0.024	0.073	0.007	0.006	0.197	6.77	0.652
110	3	2	15	2.522	0.294	0.011	0.456	2.904	0.065	0.009	0.019	0.025	0.069	0.006	0.005	0.207	6.74	0.584
111	3	2	20	2.647	0.293	0.012	0.285	2.613	0.052	0.010	0.020	0.025	0.070	0.004	0.005	0.165	5.82	0.517
112	3	2	25	2.743	0.294	0.011	0.439	3.219	0.060	0.008	0.019	0.023	0.072	0.004	0.005	0.168	5.36	0.290
113	3	2	30	2.804	0.293	0.011	0.458	3.419	0.088	0.008	0.020	0.024	0.080	0.004	0.005	0.172	4.85	0.271
114	3	2	35	2.608	0.252	0.013	0.286	2.653	0.059	0.007	0.020	0.024	0.069	0.005	0.005	0.177	4.52	0.210
115	3	2	40	2.816	0.272	0.013	0.165	2.327	0.052	0.006	0.021	0.023	0.070	0.004	0.005	0.173	4.4	0.172
116	3	2	45	2.911	0.265	0.013	0.176	2.738	0.069	0.009	0.021	0.025	0.073	0.004	0.004	0.173	4.29	0.192
117	3	2	50	2.826	0.245	0.014	0.171	2.180	0.049	0.007	0.022	0.027	0.070	0.004	0.005	0.198	4.18	0.148
118	3	3	5	2.445	0.254	0.013	0.143	3.092	0.069	0.008	0.016	0.018	0.071	0.005	0.005	0.260	5.66	0.708
119	3	3	10	2.528	0.245	0.013	0.158	3.191	0.064	0.008	0.017	0.019	0.074	0.005	0.006	0.268	5.7	0.377
120	3	3	15	2.411	0.199	0.013	0.192	3.558	0.075	0.008	0.017	0.018	0.070	0.005	0.007	0.221	5.01	0.330
121	3	3	20	2.463	0.212	0.014	0.096	5.186	0.099	0.012	0.019	0.016	0.073	0.005	0.006	0.157	4.35	0.263
122	3	3	25	2.696	0.190	0.014	0.054	6.935	0.138	0.013	0.020	0.016	0.075	0.005	0.007	0.146	4.56	0.238
123	3	3	30	2.687	0.176	0.015	0.067	7.248	0.141	0.013	0.020	0.016	0.079	0.004	0.009	0.140	4.25	0.299
124	3	3	35	2.584	0.164	0.015	0.042	7.302	0.142	0.013	0.019	0.016	0.073	0.004	0.008	0.132	4.23	0.176
125	3	3	40	2.759	0.146	0.012	0.057	7.278	0.142	0.014	0.019	0.016	0.085	0.004	0.007	0.130	4.1	0.147
126	3	3	45	2.687	0.121	0.016	0.089	6.791	0.135	0.013	0.018	0.016	0.074	0.005	0.007	0.133	4.19	0.133
127	3	3	50	2.692	0.118	0.015	0.087	6.786	0.137	0.012	0.019	0.017	0.077	0.005	0.008	0.136	4.12	0.140
128	3	4	5	2.659	0.294	0.014	0.256	3.698	0.079	0.011	0.019	0.023	0.075	0.005	0.006	0.185	4.93	1.208
129	3	4	10	2.654	0.259	0.016	0.335	3.928	0.088	0.011	0.019	0.025	0.077	0.005	0.005	0.197	4.2	0.847
130	3	4	15	2.778	0.388	0.015	0.289	7.513	0.154	0.012	0.019	0.028	0.088	0.004	0.007	0.169	5.13	0.631
131	3	4	20	2.694	0.497	0.014	0.403	7.446	0.156	0.012	0.019	0.029	0.081	0.004	0.007	0.148	5.59	0.440
132	3	4	25	2.734	0.393	0.014	0.322	5.983	0.116	0.012	0.019	0.027	0.081	0.004	0.006	0.158	4.52	0.585
133	3	4	30	2.483	0.280	0.013	0.204	2.861	0.060	0.009	0.019	0.026	0.076	0.005	0.005	0.203	4.84	0.642
134	3	4	35	2.345	0.230	0.013	0.184	2.910	0.067	0.010	0.018	0.024	0.072	0.005	0.005	0.194	4.87	0.646
135	3	4	40	2.327	0.239	0.015	0.140	3.019	0.065	0.009	0.019	0.026	0.069	0.005	0.006	0.202	4.68	0.463
136	3	4	45	2.451	0.255	0.014	0.148	3.067	0.076	0.009	0.019	0.026	0.071	0.005	0.006	0.195	4.82	0.470
137	3	4	50	2.442	0.244	0.013	0.169	3.099	0.064	0.008	0.019	0.024	0.069	0.005	0.006	0.188	4.89	0.447
138	3	5	5	1.950	0.280	0.011	0.072	2.149	0.052	0.009	0.015	0.020	0.060	0.006	0.004	0.148	4.19	1.512
139	3	5	10	2.699	0.345	0.012	0.144	2.836	0.053	0.008	0.019	0.031	0.082	0.008	0.003	0.192	4.23	1.386
140	3	5	15	2.390	0.366	0.014	0.180	2.406	0.047	0.007	0.016	0.027	0.062	0.006	0.004	0.181	6.06	0.478
141	3	5	20	2.004	0.310	0.012	0.072	2.202	0.046	0.006	0.015	0.023	0.053	0.005	0.005	0.169	6.22	0.404
142	3	5	25	2.040	0.301	0.013	0.058	2.475	0.054	0.007	0.016	0.024	0.058	0.004	0.004	0.175	5.99	0.370
143	3	5	30	2.003	0.260	0.012	0.036	2.863	0.069	0.007	0.016	0.023	0.058	0.005	0.004	0.167	5.62	0.337
144	3	5	35	2.102	0.302	0.013	0.021	2.370	0.051	0.004	0.017	0.026	0.060	0.004	0.004	0.189	5.32	0.317
145	3	5	40	2.051	0.275	0.014	0.017	3.461	0.080	0.008	0.017	0.022	0.059	0.004	0.003	0.163	5.16	0.289
146	3	5	45	2.131	0.265	0.014	0.028	3.836	0.086	0.008	0.018	0.024	0.066	0.005	0.005	0.177	5.18	0.257
147	3	5	50	2.379	0.266	0.013	0.042	3.998	0.091	0.010	0.020	0.026	0.074	0.004	0.005	0.137	5.55	0.205
148	3	5	40	2.051	0.275	0.014	0.017	3.461	0.080	0.008	0.017	0.022	0.059	0.004	0.003	0.163	5.16	0.289
149	3	5	45	2.131	0.265	0.014	0.028	3.836	0.086	0.008	0.018	0.024	0.066	0.005	0.005	0.177	5.18	0.257
150	3	5	50	2.379	0.266	0.013	0.042	3.998	0.091	0.010	0.020	0.026	0.074	0.004	0.005	0.137	5.55	0.205

OVEN-DRY LOESS – Zr-STABLE

Location information				PXRF Elemental data														
				mg/kg														%
ID	S	C	D	K	Ca	Ti	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	pH	SOC
1	1	1	20	11.953	0.360	5.878	0.067	0.173	38.352	0.722	0.049	0.090	0.078	0.413	0.027	0.039	4.29	0.405
2	1	1	25	11.920	0.222	5.948	0.081	0.161	39.683	0.783	0.055	0.095	0.081	0.439	0.028	0.034	4.31	0.379
3	1	1	30	12.406	0.052	6.159	0.071	0.202	40.176	0.820	0.059	0.098	0.085	0.430	0.026	0.039	4.34	0.316
4	1	1	35	14.267	0.080	6.496	0.080	0.173	43.363	0.885	0.065	0.107	0.094	0.457	0.028	0.039	4.26	0.245
5	1	1	40	15.105	0.181	6.563	0.086	0.305	42.405	0.858	0.065	0.106	0.103	0.453	0.024	0.036	4.15	0.238
6	1	1	45	16.004	0.303	6.731	0.085	0.285	40.028	0.735	0.070	0.110	0.121	0.497	0.031	0.042	4.05	0.188
7	1	1	50	15.102	0.392	6.421	0.073	0.280	39.626	0.757	0.062	0.102	0.119	0.460	0.027	0.039	4.07	0.180
8	1	2	5	7.179	1.726	3.907	0.044	0.421	19.283	0.350	0.085	0.065	0.063	0.272	0.018	0.035	4.1	3.692
9	1	2	10	8.454	1.632	4.177	0.064	0.236	23.334	0.446	0.063	0.073	0.064	0.326	0.018	0.034	4.96	1.256
10	1	2	15	12.790	2.143	5.791	0.094	0.173	43.749	0.851	0.064	0.103	0.081	0.479	0.024	0.037	5.33	0.744
11	1	2	20	12.378	1.816	5.999	0.088	0.166	40.203	0.810	0.062	0.100	0.081	0.417	0.025	0.043	5.29	0.635
12	1	2	25	11.666	1.617	5.613	0.075	0.124	44.341	0.894	0.060	0.104	0.083	0.382	0.024	0.036	5.35	0.592
13	1	2	30	12.741	1.593	5.754	0.084	0.170	42.068	0.808	0.061	0.101	0.083	0.410	0.023	0.046	5.24	0.476
14	1	2	35	12.478	1.566	5.963	0.090	0.184	40.836	0.823	0.062	0.103	0.085	0.435	0.024	0.040	5.34	0.536
15	1	2	40	12.216	1.773	5.912	0.082	0.256	37.236	0.746	0.052	0.090	0.080	0.322	0.019	0.034	5.44	0.475
16	1	2	45	13.294	1.641	6.131	0.077	0.168	40.386	0.770	0.055	0.093	0.082	0.390	0.024	0.047	4.93	0.401
17	1	2	50	12.587	1.547	5.801	0.078	0.288	33.983	0.673	0.052	0.088	0.078	0.361	0.022	0.045	4.97	0.303
18	1	3	5	7.286	0.881	4.273	0.049	0.206	13.629	0.270	0.026	0.056	0.055	0.232	0.018	0.021	4.78	1.499
19	1	3	10	9.560	1.249	5.164	0.057	0.180	27.674	0.556	0.050	0.077	0.069	0.347	0.022	0.028	4.95	0.877
20	1	3	15	11.840	1.572	5.922	0.072	0.169	39.774	0.726	0.067	0.096	0.082	0.433	0.027	0.043	5.11	0.753
21	1	3	20	12.070	1.720	6.199	0.092	0.480	47.875	0.992	0.073	0.103	0.087	0.436	0.028	0.052	5.19	0.674
22	1	3	25	12.549	1.578	6.361	0.076	0.183	44.886	0.883	0.077	0.102	0.087	0.476	0.025	0.054	5.2	0.646
23	1	3	30	12.364	1.411	6.186	0.072	0.194	41.080	0.869	0.068	0.098	0.087	0.442	0.029	0.059	5.02	0.563
24	1	3	35	11.509	1.039	5.696	0.076	0.203	35.554	0.606	0.066	0.088	0.082	0.373	0.024	0.035	4.52	0.411
25	1	3	40	12.154	0.961	5.888	0.075	0.367	30.838	0.612	0.057	0.085	0.082	0.357	0.028	0.047	4.49	0.266
26	1	3	45	12.394	0.959	5.911	0.079	0.620	31.167	0.620	0.053	0.091	0.089	0.370	0.029	0.039	4.57	0.191
27	1	3	50	11.502	0.750	5.326	0.054	0.412	29.581	0.560	0.052	0.084	0.090	0.354	0.028	0.042	4.57	0.161
28	1	4	5	11.022	1.716	4.949	0.066	0.447	23.737	0.440	0.070	0.083	0.069	0.361	0.028	0.032	4.42	2.929
29	1	4	10	11.992	1.584	5.104	0.080	0.399	28.557	0.515	0.056	0.091	0.076	0.380	0.026	0.037	4.99	1.143
30	1	4	15	12.495	1.484	5.550	0.068	0.455	34.551	0.670	0.058	0.097	0.075	0.421	0.027	0.039	4.78	0.804
31	1	4	20	14.653	1.401	6.085	0.094	0.485	45.182	0.768	0.083	0.118	0.092	0.471	0.031	0.031	5.04	0.600
32	1	4	25	15.046	1.399	5.943	0.092	0.424	45.924	0.784	0.082	0.115	0.097	0.459	0.028	0.053	5.22	0.464
33	1	4	30	15.279	1.480	6.556	0.077	0.493	43.753	0.800	0.081	0.111	0.102	0.452	0.024	0.043	5.64	0.397
34	1	4	35	14.780	1.306	6.090	0.077	0.436	41.410	0.739	0.075	0.115	0.106	0.415	0.034	0.039	5.75	0.357
35	1	4	40	16.627	1.215	6.856	0.079	0.442	41.590	0.695	0.079	0.116	0.104	0.464	0.029	0.054	5.45	0.248
36	1	4	45	16.119	0.901	6.275	0.071	0.390	38.558	0.667	0.069	0.110	0.092	0.448	0.028	0.042	5.06	0.202
37	1	4	50	14.584	0.548	6.055	0.075	0.390	33.011	0.574	0.058	0.097	0.083	0.341	0.025	0.026	4.92	0.164
38	1	5	5	6.632	0.730	4.448	0.049	0.617	12.531	0.227	0.031	0.052	0.073	0.255	0.025	0.021	4.44	1.617
39	1	5	10	6.358	0.813	4.317	0.052	0.991	11.984	0.224	0.028	0.048	0.073	0.266	0.025	0.014	4.53	0.751
40	1	5	15	6.399	1.014	4.413	0.047	1.014	10.941	0.188	0.026	0.048	0.069	0.238	0.020	0.022	5.41	0.615
41	1	5	20	6.643	1.239	4.638	0.047	1.661	12.206	0.235	0.022	0.044	0.070	0.262	0.026	0.015	5.73	0.540
42	1	5	25	6.408	1.308	4.496	0.048	1.562	10.314	0.164	0.025	0.043	0.073	0.279	0.020	0.008	5.6	0.649
43	1	5	30	5.782	1.070	4.734	0.036	0.962	8.787	0.144	0.023	0.042	0.077	0.245	0.022	0.014	5.43	0.652
44	1	5	35	6.327	0.839	4.853	0.059	1.116	9.681	0.205	0.022	0.045	0.076	0.235	0.022	0.018	5.11	0.658
45	1	5	40	6.763	0.908	5.083	0.054	1.110	9.683	0.196	0.018	0.044	0.078	0.276	0.019	0.014	5.04	0.695
46	1	5	45	7.000	0.816	5.682	0.049	0.674	8.316	0.208	0.012	0.047	0.087	0.274	0.020	0.019	4.99	0.826
47	1	5	50	7.401	0.882	5.896	0.065	0.919	13.250	0.228	0.033	0.058	0.092	0.347	0.023	0.029	4.74	0.392
48	2	1	5	7.732	2.340	4.579	0.061	0.454	11.829	0.235	0.054	0.067	0.137	0.269	0.036	0.021	4.55	2.416
49	2	1	10	8.415	2.437	4.804	0.061	0.572	14.550	0.331	0.043	0.064	0.138	0.326	0.043	0.026	4.58	1.452
50	2	1	15	7.848	2.388	4.399	0.046	0.555	13.015	0.302	0.036	0.066	0.131	0.282	0.036	0.024	4.98	0.831
51	2	1	20	7.759	2.409	4.302	0.065	0.568	17.056	0.305	0.034	0.060	0.129	0.363	0.029	0.026	5.47	0.613
52	2	1	25	7.622	2.324	4.363	0.059	0.696	13.931	0.288	0.034	0.060	0.131	0.285	0.026	0.021	5.45	0.485
53	2	1	30	7.850	2.275	4.637	0.055	0.376	14.419	0.305	0.033	0.065	0.133	0.302	0.025	0.027	5.09	0.374
54	2	1	35	8.367	2.409	4.424	0.052	0.249	15.293	0.289	0.033	0.069	0.139	0.281	0.024	0.021	5.03	0.393
55	2	1	40	9.176	3.012	5.106	0.077	0.177	25.301	0.631	0.047	0.084	0.145	0.372	0.025	0.035	5.09	0.384
56	2	1	45	8.557	2.749	4.639	0.070	0.227	18.892	0.476	0.038	0.070	0.143	0.314	0.024	0.021	5.02	0.328
57	2	1	50	10.657	3.330	5.822	0.083	0.168	25.566	0.626	0.061	0.099	0.167	0.369	0.026	0.032	5.08	0.290
58	2	2	5	7.964	0.927	4.282	0.056	1.584	12.798	0.253	0.034	0.063	0.097	0.276	0.025	0.025	4.43	0.479
59	2	2	10	7.871	0.716	4.019	0.043	1.111	13.006	0.219	0.041	0.070	0.094	0.284	0.023	0.023	3.65	0.327
60	2	2	15	8.449	0.605	4.372	0.052	0.541	14.842	0.338	0.037	0.074	0.095	0.298	0.019	0.021	3.76	0.313
61	2	2	20	9.848	0.831	4.731	0.066	0.229	19.573	0.435	0.043	0.085	0.101	0.307	0.021	0.028	3.74	0.248
62	2	2	25	11.565	0.925	5.654	0.073	0.228	26.757	0.596	0.060	0.101	0.109	0.350	0.023	0.038	3.81	0.233
63	2	2	30	14.225	1.010	5.959	0.087	0.163	39.994	0.830	0.078	0.121	0.122	0.469	0.032	0.046	4	0.273
64	2	2	35	14.557	1.214	6.378	0.087	0.214	44.281	0.933	0.079	0.126	0.126	0.452	0.027	0.057	4.08	0.281
65	2	2	40	14.489	1.312	6.156	0.084	0.192	42.412	0.885	0.084	0.123	0.132	0.478	0.025	0.052	4.15	0.311
66	2	2	45	15.017	1.344	6.372	0.085	0.163	39.924	0.803	0.080	0.119	0.132	0.433	0.026	0.042	4.1	0.267
67	2	2	50	13.909	1.337	5.754	0.069	0.141	28.807	0.710	0.057	0.100	0.135	0.388	0.022	0.038	4.16	0.217
68	2	3	5	12.729	2.868	5.972	0.071	1.530	23.446	0.486	0.099	0.119	0.179	0.477	0.078	0.042	3.92	4.013
69	2	3	10	14.048	3.683	6.119	0.078	1.017	25.455	0.558	0.089	0.124	0.186	0.446	0.051	0.045	4.58	1.328
70	2	3	15	13.245	3.397	5.494	0.070	0.736	23.946	0.570	0.075	0.112	0.171	0.442	0.040	0.037	4.69	1.099
71	2	3	20	12.397	2.965	5.312	0.059	0.670	19.155	0.342	0.067	0.111	0.166	0.421	0.042	0.035	4.82	1.052
72	2	3	25	11.360	2.817	5.140	0.080	0.565	17.578	0.389	0.065	0.100	0.160	0.368	0.038	0.034	4.82	0.774
73	2	3	30	10.597	2.341	5.091	0.070	0.357	17.438	0.446	0.057	0.094	0.148	0.356	0.032	0.033	4.68	0.831
74	2	3	35	10.051	1.883	5.104	0.073	0.296	17.942	0.402	0.051	0.094	0.133	0.344	0.019	0.041	4.22	0.746
75	2	3	40	12.481	2.428	5.679	0.080	0.150	31.054	0.685	0.087	0.114	0.144	0.471	0.029	0.043	4.04	0.362

OVEN-DRY LOESS – Zr-STABLE (cont.)

	Location information			PXRF Elemental data														
				mg/kg														%
	Site	Core	Depth	K	Ca	Ti	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	pH	SOC
76	2	3	45	11.448	2.044	5.741	0.071	0.127	23.208	0.539	0.070	0.105	0.135	0.354	0.022	0.032	4.05	0.422
77	2	3	50	13.721	2.635	6.106	0.113	0.182	40.236	0.825	0.108	0.133	0.155	0.532	0.030	0.049	4.09	0.384
78	2	4	5	8.164	1.554	3.668	0.047	0.742	9.211	0.200	0.030	0.059	0.102	0.272	0.023	0.021	4.87	1.395
79	2	4	10	7.042	1.372	3.382	0.041	0.811	8.373	0.185	0.030	0.057	0.104	0.239	0.023	0.023	5.5	0.645
80	2	4	15	7.527	1.562	3.412	0.047	0.730	8.765	0.194	0.032	0.058	0.103	0.242	0.020	0.020	5.79	0.515
81	2	4	20	9.179	1.830	4.291	0.051	0.933	12.042	0.232	0.036	0.074	0.114	0.305	0.020	0.025	6.06	0.437
82	2	4	25	9.913	1.750	4.467	0.052	0.581	13.870	0.366	0.035	0.081	0.121	0.302	0.022	0.025	5.58	0.278
83	2	4	30	10.821	1.778	4.654	0.068	0.661	14.844	0.342	0.040	0.085	0.124	0.328	0.025	0.025	5.33	0.248
84	2	4	35	11.690	1.694	4.829	0.056	0.527	17.676	0.386	0.046	0.093	0.127	0.356	0.023	0.033	5.66	0.247
85	2	4	40	11.140	1.543	5.154	0.069	0.444	15.832	0.392	0.046	0.098	0.127	0.347	0.021	0.032	4.38	0.257
86	2	4	45	11.118	1.499	4.801	0.066	0.638	17.711	0.513	0.048	0.093	0.131	0.349	0.029	0.037	4.43	0.267
87	2	4	50	12.465	1.628	5.209	0.077	0.525	18.935	0.443	0.049	0.098	0.139	0.366	0.024	0.034	4.49	0.211
88	2	5	5	8.825	3.314	4.963	0.055	0.504	17.344	0.331	0.053	0.080	0.142	0.339	0.036	0.030	5.06	2.101
89	2	5	10	8.802	3.605	5.211	0.066	0.656	18.784	0.362	0.051	0.078	0.145	0.358	0.040	0.027	5.46	1.522
90	2	5	15	9.514	4.159	5.423	0.068	0.590	20.473	0.427	0.053	0.080	0.148	0.395	0.036	0.016	5.77	1.098
91	2	5	20	8.175	3.490	4.631	0.058	0.520	15.013	0.295	0.043	0.070	0.139	0.344	0.038	0.024	5.97	1.177
92	2	5	25	8.305	3.343	4.720	0.068	0.819	16.506	0.325	0.040	0.071	0.133	0.336	0.053	0.019	6.19	1.157
93	2	5	30	7.154	2.604	4.664	0.052	0.613	15.576	0.370	0.031	0.066	0.133	0.296	0.028	0.030	5.82	0.815
94	2	5	35	8.198	2.744	5.149	0.064	0.405	20.225	0.499	0.041	0.074	0.126	0.349	0.028	0.033	5.13	0.758
95	2	5	40	7.911	2.609	4.965	0.063	0.574	21.776	0.475	0.049	0.084	0.124	0.343	0.025	0.027	4.59	0.768
96	2	5	45	8.927	2.976	5.215	0.083	0.304	24.520	0.468	0.067	0.100	0.134	0.401	0.024	0.033	4.55	0.709
97	2	5	50	8.431	2.475	4.745	0.064	0.338	18.832	0.462	0.046	0.083	0.130	0.371	0.020	0.027	4.74	0.660
98	3	1	5	11.834	0.964	5.119	0.065	1.888	14.460	0.257	0.058	0.088	0.109	0.332	0.028	0.029	4.69	1.551
99	3	1	10	11.594	1.251	4.928	0.058	1.590	14.267	0.277	0.045	0.085	0.113	0.306	0.029	0.025	5.98	0.898
100	3	1	15	10.930	1.328	4.958	0.055	2.499	13.894	0.275	0.044	0.082	0.114	0.352	0.032	0.026	6.4	0.598
101	3	1	20	11.615	1.218	5.125	0.072	2.510	14.043	0.269	0.048	0.085	0.119	0.346	0.022	0.026	6.37	0.524
102	3	1	25	18.730	3.168	7.724	0.124	0.726	30.427	0.581	0.093	0.165	0.191	0.560	0.030	0.044	6.15	0.366
103	3	1	30	20.178	3.310	7.831	0.092	0.333	34.829	0.718	0.102	0.166	0.208	0.547	0.028	0.047	5.41	0.295
104	3	1	35	22.571	3.002	7.948	0.109	0.503	36.545	0.736	0.101	0.168	0.218	0.604	0.038	0.058	4.65	0.344
105	3	1	40	22.676	2.986	8.164	0.107	0.514	34.915	0.702	0.103	0.165	0.221	0.601	0.034	0.061	4.53	0.256
106	3	1	45	11.617	1.336	7.710	0.126	0.834	35.031	0.386	0.157	0.181	0.245	0.719	0.042	0.059	4.86	0.262
107	3	1	50	24.662	2.921	8.505	0.124	0.842	43.437	1.092	0.135	0.189	0.247	0.685	0.044	0.071	4.71	0.286
108	3	2	5	13.183	1.604	5.139	0.066	1.577	14.086	0.318	0.050	0.097	0.124	0.358	0.029	0.024	6.98	0.907
109	3	2	10	12.718	1.592	5.066	0.070	3.058	16.835	0.332	0.046	0.089	0.120	0.370	0.034	0.031	6.77	0.652
110	3	2	15	12.161	1.419	4.823	0.052	2.201	14.004	0.313	0.043	0.090	0.118	0.332	0.031	0.024	6.74	0.584
111	3	2	20	16.055	1.780	6.066	0.072	1.731	15.852	0.314	0.058	0.124	0.151	0.426	0.025	0.028	5.82	0.517
112	3	2	25	16.348	1.751	5.960	0.063	2.617	19.186	0.358	0.050	0.116	0.138	0.431	0.027	0.031	5.36	0.290
113	3	2	30	16.295	1.701	5.812	0.062	2.665	19.874	0.514	0.047	0.113	0.137	0.463	0.024	0.027	4.85	0.271
114	3	2	35	14.728	1.424	5.647	0.074	1.614	14.980	0.332	0.042	0.111	0.136	0.387	0.028	0.028	4.52	0.210
115	3	2	40	16.238	1.566	5.766	0.074	0.949	13.416	0.302	0.036	0.120	0.135	0.403	0.022	0.027	4.4	0.172
116	3	2	45	16.843	1.532	5.785	0.076	1.015	15.841	0.397	0.049	0.123	0.144	0.420	0.024	0.023	4.29	0.192
117	3	2	50	14.240	1.234	5.039	0.071	0.860	10.986	0.248	0.035	0.109	0.137	0.355	0.020	0.023	4.18	0.148
118	3	3	5	9.415	0.978	3.850	0.052	0.551	11.905	0.266	0.031	0.063	0.069	0.273	0.021	0.020	5.66	0.708
119	3	3	10	9.448	0.916	3.738	0.050	0.591	11.927	0.241	0.028	0.062	0.070	0.275	0.018	0.022	5.7	0.377
120	3	3	15	10.924	0.902	4.531	0.059	0.872	16.122	0.338	0.038	0.079	0.081	0.316	0.022	0.031	5.01	0.330
121	3	3	20	15.709	1.355	6.379	0.089	0.615	33.079	0.633	0.075	0.118	0.100	0.463	0.029	0.040	4.35	0.263
122	3	3	25	18.432	1.302	6.836	0.094	0.370	47.404	0.946	0.089	0.140	0.110	0.516	0.031	0.047	4.56	0.238
123	3	3	30	19.236	1.259	7.160	0.111	0.480	51.896	1.009	0.090	0.142	0.112	0.565	0.028	0.061	4.25	0.299
124	3	3	35	19.538	1.239	7.561	0.115	0.317	55.213	1.075	0.101	0.145	0.117	0.551	0.031	0.057	4.23	0.176
125	3	3	40	21.234	1.121	7.698	0.096	0.439	56.019	1.091	0.107	0.142	0.122	0.652	0.032	0.051	4.1	0.147
126	3	3	45	20.162	0.907	7.503	0.117	0.668	50.959	1.014	0.095	0.137	0.120	0.558	0.035	0.055	4.19	0.133
127	3	3	50	19.788	0.868	7.350	0.107	0.641	49.882	1.005	0.090	0.140	0.123	0.565	0.034	0.056	4.12	0.140
128	3	4	5	14.341	1.583	5.393	0.073	1.381	19.943	0.426	0.058	0.101	0.122	0.406	0.028	0.034	4.93	1.208
129	3	4	10	13.439	1.310	5.063	0.079	1.696	19.887	0.444	0.053	0.097	0.128	0.391	0.023	0.023	4.2	0.847
130	3	4	15	16.438	2.296	5.917	0.088	1.708	44.454	0.912	0.072	0.113	0.164	0.519	0.021	0.042	5.13	0.631
131	3	4	20	18.203	3.357	6.756	0.095	2.725	50.302	1.052	0.084	0.127	0.194	0.549	0.027	0.047	5.59	0.440
132	3	4	25	17.270	2.485	6.316	0.090	2.034	37.793	0.733	0.075	0.118	0.168	0.512	0.027	0.037	4.52	0.585
133	3	4	30	12.234	1.378	4.928	0.065	1.003	14.097	0.294	0.045	0.094	0.127	0.376	0.025	0.023	4.84	0.642
134	3	4	35	12.109	1.188	5.164	0.068	0.950	15.030	0.344	0.050	0.095	0.126	0.370	0.025	0.024	4.87	0.646
135	3	4	40	11.511	1.183	4.948	0.075	0.694	14.939	0.322	0.044	0.092	0.127	0.343	0.023	0.028	4.68	0.463
136	3	4	45	12.572	1.307	5.130	0.071	0.761	15.735	0.388	0.045	0.097	0.136	0.365	0.024	0.033	4.82	0.470
137	3	4	50	12.990	1.299	5.320	0.068	0.897	16.488	0.342	0.043	0.099	0.129	0.367	0.025	0.029	4.89	0.447
138	3	5	5	13.201	1.893	6.769	0.074	0.489	14.548	0.350	0.060	0.101	0.135	0.407	0.042	0.029	4.19	1.512
139	3	5	10	14.032	1.792	5.198	0.062	0.750	14.743	0.276	0.043	0.101	0.159	0.425	0.044	0.017	4.23	1.386
140	3	5	15	13.208	2.025	5.527	0.077	0.995	13.298	0.258	0.037	0.090	0.148	0.344	0.035	0.022	6.06	0.478
141	3	5	20	11.864	1.836	5.922	0.071	0.424	13.041	0.270	0.036	0.088	0.137	0.314	0.031	0.029	6.22	0.404
142	3	5	25	11.634	1.714	5.703	0.072	0.332	14.117	0.308	0.038	0.090	0.135	0.329	0.023	0.021	5.99	0.370
143	3	5	30	11.988	1.557	5.985	0.069	0.216	17.136	0.414	0.042	0.096	0.136	0.346	0.032	0.026	5.62	0.337
144	3	5	35	11.113	1.599	5.287	0.071	0.113	12.532	0.272	0.024	0.092	0.138	0.316	0.022	0.022	5.32	0.317
145	3	5	40	12.560	1.684	6.123	0.083	0.103	21.193	0.490	0.052	0.105	0.135	0.363	0.024	0.017	5.16	0.289
146	3	5	45	12.059	1.499	5.658	0.081	0.158	21.700	0.487	0.044	0.103	0.138	0.374	0.027	0.029	5.18	0.257
147	3	5	50	17.383	1.941	7.305	0.096	0.310	29.208	0.664	0.073	0.149	0.189	0.544	0.033	0.037	5.55	0.205
148	3	5	40	12.560	1.684	6.123	0.083	0.103	21.193	0.490	0.052	0.105	0.135	0.363	0.024	0.017	5.16	0.289
149	3	5	45	12.059	1.499	5.658	0.081	0.158	21.700	0.487	0.044	0.103	0.138	0.374	0.027	0.029	5.18	0.257
150	3	5	50	17.383	1.941	7.305	0.096	0.310	29.208	0.664	0.073	0.149	0.189	0.544	0.033	0.037	5.55	0.205

FIELD-MOIST ALLUVIUM – RAW,

INCL. MOISTURE CONTENT ANALYSIS RESULTS

·Location information·				PXRF Elemental data																
				mg/kg															%	%
ID	S	C	D	K	Ca	Ti	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	Zr	pH	SOC	Moisture
1	1	1	5	11875	3804	2245	33	221	8765	171	28.6	55	148	232	9.6	9	407	6.62	0.595	20.39
2	1	1	10	12186	4175	2504	34	239	7981	156	25.9	56.5	152	220	9.6	14	435	7.08	0.553	20.49
3	1	1	15	11310	5477	1990	26	219	7123	133	23.8	51.9	149	221	10.6	7	404	6.85	0.553	19.97
4	1	1	20	11388	3869	2132	29	172	7183	130	21.8	53.1	146	211	10.5	8	390	7.13	0.471	19.16
5	1	1	25	10726	3869	2120	36	259	12073	133	24.4	51.9	133	221	6.6	11	367	7.01	0.512	18.35
6	1	1	30	11161	4647	2578	36	245	10672	213	35	59.1	117.5	250	6.7	12	279	6.85	0.497	20.45
7	1	1	35	11768	5766	2528	35	320	13084	196	37	60.9	150	282	10.5	12	386	6.7	0.450	20.5
8	1	1	40	9918	4221	2172	30	254	10108	212	29.2	58.7	147	205	10.7	11	374	6.96	0.479	23.19
9	1	1	45	11936	4805	2506	39	316	15214	288	46	69.2	117.2	309	13.2	19	247	6.98	0.561	25.01
10	1	1	50	12742	4473	2750	42	231	14424	281	39	69.6	136.3	273	13.2	15	311	9.97	0.486	25.39
11	1	2	5	10732	3979	2012	31	156	6605	115	18.8	46.8	148	208	4.5	7	471	7.11	0.576	19.66
12	1	2	10	10237	3571	1969	36	160	6571	114	17.5	49.1	137	196	1.3	8	444	7.14	0.515	18.08
13	1	2	15	11410	4376	2398	36	173	8650	160	24.9	52.1	156	222	10.4	13	427	7.3	0.424	17.52
14	1	2	20	11537	4075	2193	27	179	9092	165	25.6	53.4	144	227	10.2	12	415	7.28	0.402	17.27
15	1	2	25	12388	4320	2464	32	204	8208	139	26.2	56.3	163	232	11.3	11	485	7.13	0.347	17.06
16	1	2	30	12254	4319	2387	32	233	10242	225	31	62.2	150	244	11.1	12	387	7.01	0.379	17.59
17	1	2	35	12156	3865	2447	38	204	11833	206	36	61	129.3	270	12.8	11	360	7.09	0.451	19.68
18	1	2	40	12692	4459	2559	35	246	13035	292	41	65.3	139	265	13.4	16	419	6.99	0.430	30.73
19	1	2	45	11794	4282	2434	40	232	12372	239	36	58.1	128	267	9.1	11	314	7.09	0.412	22.27
20	1	2	50	11435	3755	2474	38	110	11268	194	34	56.4	131	233	7	7	353	7.2	0.355	22.56
21	1	3	5	10347	3338	1907	27	156	7342	147	22	50.8	142	228	7.9	9	426	6.62	0.521	18.53
22	1	3	10	11044	3733	1954	29	173	6984	127	21.5	51.1	142	209	4.7	9	410	7.08	0.449	19.11
23	1	3	15	10529	3571	2228	36	158	7083	143	20.7	49.6	141	211	6.3	10	423	6.85	0.501	19.32
24	1	3	20	10942	3714	1786	34	162	6093	103	20.9	49.9	147	200	5.1	7	375	7.41	0.415	20.1
25	1	3	25	12597	5914	2247	34	172	8227	135	25.9	55.5	156	225	8.7	13	366	7.19	0.345	16.24
26	1	3	30	12365	6526	2514	41	354	11492	244	37	64.2	130	259	10.6	16	295	7.23	0.496	16.9
27	1	3	35	12359	6628	2819	47	691	14548	268	40	60.8	122.9	298	6.7	15	263	7.24	0.504	17.82
28	1	3	40	12567	5411	2860	43	328	14565	304	47	71.5	108	288	14.5	15	213	7	0.579	18.91
29	1	3	45	11802	4838	2477	46	171	12253	226	38	61.6	121.4	266	9.4	16	266	7.24	0.466	18.26
30	1	3	50	11366	5576	1980	41	113	8725	151	24.7	50.9	135	187	6.1	6	299	7.12	0.523	18.87
31	1	4	5	8882	3365	2151	48	547	12663	236	39	57.5	116.4	246	9	10	281	4.95	1.484	22.69
32	1	4	10	10944	5121	2072	29	296	9101	168	25.1	50	131	208	4.3	10	284	4.82	1.409	21.65
33	1	4	15	13226	6301	2255	34	1102	10914	173	36	58.1	161	259	11.2	12	289	5.77	1.110	28.4
34	1	4	20	11172	3094	2518	50	273	17273	324	56	78.7	77.1	310	13.1	19	156	6.41	0.862	23.25
35	1	4	25	9959	3268	2341	51	272	16691	243	53	73.3	72.8	288	12.4	19	155	6.52	0.764	23.44
36	1	4	30	12633	4242	2783	67	246	22317	472	63	80.5	79.7	331	15.7	20	148	6.44	0.833	24.93
37	1	4	35	12033	3872	2715	51	111	21772	365	59	76.3	81.7	314	8.9	20	172	6.74	0.832	20.64
38	1	4	40	13585	4381	2978	55	638	27082	544	70	79.3	80.1	380	15.7	20	144	6.8	0.663	21.58
39	1	4	45	13180	4757	2873	55	119	21006	361	66	85.5	94	349	13.2	20	195	6.87	0.626	20.85
40	1	4	50	11278	3839	2686	57	72	15673	315	54	73.2	87.2	314	7.3	16	197	6.88	0.760	20.34
41	1	5	5	13239	4072	2888	47	250	18922	355	66	86.7	89	349	17.9	19	198	5.05	1.871	
42	1	5	10	12615	3741	3004	51	421	17110	314	61	81.3	88.4	317	13.7	19	188	5.61	1.082	
43	1	5	15	13775	3921	3131	48	276	18621	350	63	85.7	95.4	357	16.2	20	195	5.86	1.018	
44	1	5	20	12209	3651	2742	48	530	17217	271	57	78.5	86.7	369	7.9	14	177	6.3	1.001	
45	1	5	25	11594	3752	2619	54	257	19296	275	58	76.9	71.7	340	5.6	23	130	6.47	0.906	
46	1	5	30	11787	4050	2708	61	214	19537	362	64	78.3	74.1	334	9.5	12	139	6.73	0.887	
47	1	5	35	11071	3832	2594	55	434	20130	360	57	75	69.2	318	5.8	19	129	6.51	0.886	
48	1	5	40	11057	3832	2482	52	135	17331	296	55	72.7	79	323	9.4	12	160	6.57	0.787	
49	1	5	45	11356	3997	2644	57	123	18986	298	61	72.4	73.1	323	8.8	13	140	6.75	0.665	
50	1	5	50	12173	3939	2830	52	103	21933	349	60	71.9	72	342	10.4	18	147	6.72	0.588	
51	2	1	5	12015	7328	3273	35	326	10263	197	29.6	54.6	74.7	221	11.3	18	397	7.45	1.569	
52	2	1	10	15375	8946	3746	39	356	14583	247	38	69.9	80.4	228	12.8	15	416	7.54	1.237	
53	2	1	15	13565	7535	3336	46	343	11957	247	32.5	62.8	77	203	13.1	16	413	7.61	1.025	
71	2	4	5	13622	6181	3119	37	327	20305	389	69	78.6	65.3	257	14.8	29	193	7.06	3.440	
72	2	4	10	12471	5776	2712	34	231	15165	301	50	73.3	58.7	211	11.7	17	188	7.34	1.558	

FIELD-MOIST ALLUVIUM – RAW (cont.) ,

INCL. MOISTURE CONTENT ANALYSIS RESULTS

	·Location information·				---PXRF Elemental data---															
					---mg/kg---														%	%
	S	C	D	K	Ca	Ti	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	Zr	pH	SOC	Moisture
73	2	4	15	10863	4108	3129	43	321	16128	364	48	78.5	62	211	14.2	21	232	7.06	1.121	
74	2	4	20	12871	3029	3321	52	480	20503	421	47	83.9	63.2	281	13.1	22	200	7.34	0.854	
75	2	4	25	13491	2862	3257	58	528	24440	536	51	93	63.9	305	12.7	27	177	7.58	0.932	
76	2	4	30	13559	2543	3318	53	833	23125	461	47	89.8	64.9	286	10.9	27	185	7.49	1.315	
81	2	5	5	17832	6911	3755	61	504	28704	369	56	94	74.7	305	7.9	19	179	7.35	1.490	
82	2	5	10	18191	7230	3854	59	318	30539	563	67	104.2	81.8	356	14	26	193	7.26	1.558	
91	3	1	5	10370	5490	2322	87	109	14912	262	350	68.9	122.6	308	29.1	96	309	4.95	2.495	
92	3	1	10	11746	2702	2358	43	131	12646	224	174	72.7	103.6	264	16.5	19	305	4.75	1.245	
93	3	1	15	11801	2763	2504	39	168	11122	197	173	72.5	107.5	245	20.7	16	315	4.08	1.582	
94	3	1	20	11701	3096	2537	37	175	11516	204	168	74.1	111.1	266	14.5	18	318	4.19	3.383	
95	3	1	25	11856	3625	2523	54	164	13215	250	143	76.1	113.4	289	12	15	323	5.21	1.075	
96	3	1	30	11871	3669	2423	45	219	18005	272	110	71.8	106.8	277	10.4	16	301	5.47	1.064	
97	3	1	35	9909	3135	2274	46	103	14046	267	73	76.3	99.7	267	9	23	278	5.75	0.853	
98	3	1	40	11851	3904	2567	56	215	17631	340	62	74.1	89.1	308	11.2	26	241	5.97	0.778	
99	3	1	45	12655	3680	2675	52	664	19131	350	59	73.3	95.1	323	13.8	19	267	6.18	0.577	
100	3	1	50	12571	3691	2744	46	162	17228	273	65	78.7	91.6	290	7.4	16	222	6.14	0.582	
101	3	2	5	9306	3274	1893	32	117	10039	193	55	65	93.6	220	16	12	236	4.67	3.546	
102	3	2	10	10275	3190	2209	35	103	11274	227	55	69.5	106.6	260	19.1	17	270	4.9	1.614	
103	3	2	15	11199	3151	2337	42	124	11028	228	48	63.8	110.9	270	11.4	18	296	5.45	1.064	
104	3	2	20	10718	3366	2388	48	87	11423	207	50	66.7	109.8	253	13.2	11	267	5.71	0.877	
105	3	2	25	10595	3190	2399	52	78	11620	227	46	65.8	107.1	249	10.1	16	273	5.87	0.874	
106	3	2	30	10690	3365	2320	48	57	14086	254	45	62.9	101.2	269	8.1	20	256	6.1	0.932	
107	3	2	35	11347	3768	2600	43	156	13755	269	54	71.4	107.5	282	8.2	18	271	6.08	0.825	
108	3	2	40	11591	3845	2689	48	98	17410	314	57	68.4	99.6	296	8.5	17	259	5.92	0.789	
109	3	2	45	11955	3792	2610	48	219	16268	326	62	72.4	100	273	8.7	23	261	6.26	0.773	
110	3	2	50	12176	3683	2689	51	161	15195	263	66	76.4	97.8	305	8	23	235	6.46	0.716	
111	3	3	5	8329	2484	1908	38	200	9340	167	44	68.2	99.2	214	15.2	7	283	5.64	3.206	
112	3	3	10	11010	2880	2338	43	152	10094	198	45	72.4	112.1	213	16.1	16	305	5.41	1.791	
113	3	3	15	11404	3016	2241	35	130	10023	171	47	73.5	115.1	244	14.7	12	326	5.5	1.250	
114	3	3	20	10514	2756	2229	39	242	9612	162	39	67.4	109.6	236	15.6	12	299	5.65	1.015	
115	3	3	25	11358	2980	2478	34	113	10393	180	39	66	109.3	245	11.5	11	294	5.81	0.927	
116	3	3	30	11439	3050	2332	43	111	12225	224	41	69	111	265	11.8	14	306	6.02	0.865	
117	3	3	35	11353	3218	2486	43	90	11333	224	42	70	116.4	246	15.1	14	307	6.12	0.852	
118	3	3	40	11083	3209	2323	34	100	11896	201	41	68.2	114.3	240	13.6	12	299	6.35	0.895	
119	3	3	45	11531	3450	2566	42	158	12945	229	41	67.5	120	264	11.4	11	284	6.11	0.755	
120	3	3	50	11193	3388	2325	34	91	11220	210	39	68.2	119.8	260	11	13	307	6.45	0.768	
121	3	4	5	9745	3744	1971	31	259	12457	205	102	60.1	78.6	233	25.3	17	186	5.92	6.258	
122	3	4	10	10563	4594	2300	43	161	13579	232	102	69.5	92.2	225	30.1	19	220	5.89	3.474	
123	3	4	15	11698	5660	2102	48	199	13446	229	131	64.6	110.3	247	25.8	18	237	6.05	2.411	
124	3	4	20	11241	4531	2257	37	161	13149	230	74	69.8	103.1	255	15.4	18	251	6.29	1.307	
125	3	4	25	12989	4260	2549	46	265	15302	241	55	73.8	106.3	313	10.3	15	265	6.57	1.045	
126	3	4	30	13998	4239	2928	55	364	21292	425	62	84.9	80.7	333	12.8	23	162	6.61	1.093	
127	3	4	35	14258	4123	2937	57	320	20424	407	59	83.8	77.8	340	14.9	20	162	6.85	0.918	
128	3	4	40	13616	4183	2945	60	230	19938	383	59	81.2	80.1	311	14.5	16	168	6.87	0.846	
129	3	4	45	14499	4302	2937	54	353	24480	488	61	82.9	90.4	369	16.5	16	187	7	0.766	
130	3	4	50	14325	4467	3092	58	147	21816	386	62	83.7	88.7	326	14.8	22	181	7.13	0.719	
131	3	5	5	11350	3745	2295	48	174	14747	290	90	78.7	88.9	271	22.4	20	218	5.29	3.916	21.69
132	3	5	10	12274	3650	2490	45	144	16042	303	73	79.9	90.6	299	25.1	17	228	5.8	2.040	17.88
133	3	5	15	12017	3329	2432	49	110	15063	292	62	78.4	95.7	310	16.1	18	234	6.25	1.350	16.19
134	3	5	20	12005	3710	2509	50	132	14782	267	58	74.7	96.9	273	12.1	19	240	6.6	1.280	19.31
135	3	5	25	11989	3707	2586	53	123	17205	325	59	75.8	79.5	277	11.3	20	182	6.92	1.205	25.76
136	3	5	30	12771	3884	2715	54	102	19166	409	66	80.2	83	286	15.4	22	175	7.22	1.188	30.39
137	3	5	35	11860	3640	2649	58	82	18300	383	57	75.1	77	310	10.7	18	158	7	1.036	33.22
138	3	5	40	12164	4573	2629	45	122	19881	426	64	77.9	76.3	326	13.3	21	168	7.34	0.829	34.36
139	3	5	45	12920	4550	2899	54	295	22421	440	67	82.6	77.8	333	12.1	18	154	7.54	0.801	34.96
140	3	5	50	12360	4473	2752	55	118	19590	332	56	78.5	76	310	9.3	21	149	7.32	0.708	36.74

FIELD-MOIST ALLUVIUM – Ti-STABLE,

INCL. MOISTURE CONTENT ANALYSIS RESULTS

Location information				PXRF Elemental data															
				mg/kg														%	%
ID	S	C	D	K	Ca	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	Zr	pH	SOC	Moisture
1	1	1	5	5.290	1.694	0.015	0.098	3.904	0.076	0.013	0.024	0.066	0.103	0.004	0.004	0.181	6.62	0.595	20.39
2	1	1	10	4.867	1.667	0.014	0.095	3.187	0.062	0.010	0.023	0.061	0.088	0.004	0.006	0.174	7.08	0.553	20.49
3	1	1	15	5.683	2.752	0.013	0.110	3.579	0.067	0.012	0.026	0.075	0.111	0.005	0.004	0.203	6.85	0.553	19.97
4	1	1	20	5.341	1.815	0.014	0.081	3.369	0.061	0.010	0.025	0.068	0.099	0.005	0.004	0.183	7.13	0.471	19.16
5	1	1	25	5.059	1.825	0.017	0.122	5.695	0.063	0.012	0.024	0.063	0.104	0.003	0.005	0.173	7.01	0.512	18.35
6	1	1	30	4.329	1.803	0.014	0.095	4.140	0.083	0.014	0.023	0.046	0.097	0.003	0.005	0.108	6.85	0.497	20.45
7	1	1	35	4.655	2.281	0.014	0.127	5.176	0.078	0.015	0.024	0.059	0.112	0.004	0.005	0.153	6.7	0.450	20.5
8	1	1	40	4.566	1.943	0.014	0.117	4.654	0.098	0.013	0.027	0.068	0.094	0.005	0.005	0.172	6.96	0.479	23.19
9	1	1	45	4.763	1.917	0.016	0.126	6.071	0.115	0.018	0.028	0.047	0.123	0.005	0.008	0.099	6.98	0.561	25.01
10	1	1	50	4.633	1.627	0.015	0.084	5.245	0.102	0.014	0.025	0.050	0.099	0.005	0.005	0.113	9.97	0.486	25.39
11	1	2	5	5.334	1.978	0.015	0.078	3.283	0.057	0.009	0.023	0.074	0.103	0.002	0.003	0.234	7.11	0.576	19.66
12	1	2	10	5.199	1.814	0.018	0.081	3.337	0.058	0.009	0.025	0.070	0.100	0.001	0.004	0.225	7.14	0.515	18.08
13	1	2	15	4.758	1.825	0.015	0.072	3.607	0.067	0.010	0.022	0.065	0.093	0.004	0.005	0.178	7.3	0.424	17.52
14	1	2	20	5.261	1.858	0.012	0.082	4.146	0.075	0.012	0.024	0.066	0.104	0.005	0.005	0.189	7.28	0.402	17.27
15	1	2	25	5.028	1.753	0.013	0.083	3.331	0.056	0.011	0.023	0.066	0.094	0.005	0.004	0.197	7.13	0.347	17.06
16	1	2	30	5.134	1.809	0.013	0.098	4.291	0.094	0.013	0.026	0.063	0.102	0.005	0.005	0.162	7.01	0.379	17.59
17	1	2	35	4.968	1.579	0.016	0.083	4.836	0.084	0.015	0.025	0.053	0.110	0.005	0.004	0.147	7.09	0.451	19.68
18	1	2	40	4.960	1.742	0.014	0.096	5.094	0.114	0.016	0.026	0.054	0.104	0.005	0.006	0.164	6.99	0.430	30.73
19	1	2	45	4.846	1.759	0.016	0.095	5.083	0.098	0.015	0.024	0.053	0.110	0.004	0.005	0.129	7.09	0.412	22.27
20	1	2	50	4.622	1.518	0.015	0.044	4.555	0.078	0.014	0.023	0.053	0.094	0.003	0.003	0.143	7.2	0.355	22.56
21	1	3	5	5.426	1.750	0.014	0.082	3.850	0.077	0.012	0.027	0.074	0.120	0.004	0.005	0.223	6.62	0.521	18.53
22	1	3	10	5.652	1.910	0.015	0.089	3.574	0.065	0.011	0.026	0.073	0.107	0.002	0.005	0.210	7.08	0.449	19.11
23	1	3	15	4.726	1.603	0.016	0.071	3.179	0.064	0.009	0.022	0.063	0.095	0.003	0.004	0.190	6.85	0.501	19.32
24	1	3	20	6.127	2.080	0.019	0.091	3.412	0.058	0.012	0.028	0.082	0.112	0.003	0.004	0.210	7.41	0.415	20.1
25	1	3	25	5.606	2.632	0.015	0.077	3.661	0.060	0.012	0.025	0.069	0.100	0.004	0.006	0.163	7.19	0.345	16.24
26	1	3	30	4.918	2.596	0.016	0.141	4.571	0.097	0.015	0.026	0.052	0.103	0.004	0.006	0.117	7.23	0.496	16.9
27	1	3	35	4.384	2.351	0.017	0.245	5.161	0.095	0.014	0.022	0.044	0.106	0.002	0.005	0.093	7.24	0.504	17.82
28	1	3	40	4.394	1.892	0.015	0.115	5.093	0.106	0.016	0.025	0.038	0.101	0.005	0.005	0.074	7	0.579	18.91
29	1	3	45	4.765	1.953	0.019	0.069	4.947	0.091	0.015	0.025	0.049	0.107	0.004	0.006	0.107	7.24	0.466	18.26
30	1	3	50	5.740	2.816	0.021	0.057	4.407	0.076	0.012	0.026	0.068	0.094	0.003	0.003	0.151	7.12	0.523	18.87
31	1	4	5	4.129	1.564	0.022	0.254	5.887	0.110	0.018	0.027	0.054	0.114	0.004	0.005	0.131	4.95	1.484	22.69
32	1	4	10	5.282	2.472	0.014	0.143	4.392	0.081	0.012	0.024	0.063	0.100	0.002	0.005	0.137	4.82	1.409	21.65
33	1	4	15	5.865	2.794	0.015	0.489	4.840	0.077	0.016	0.026	0.071	0.115	0.005	0.005	0.128	5.77	1.110	28.4
34	1	4	20	4.437	1.229	0.020	0.108	6.860	0.129	0.022	0.031	0.031	0.123	0.005	0.008	0.062	6.41	0.862	23.25
35	1	4	25	4.254	1.396	0.022	0.116	7.130	0.104	0.023	0.031	0.031	0.123	0.005	0.008	0.066	6.52	0.764	23.44
36	1	4	30	4.539	1.524	0.024	0.088	8.019	0.170	0.023	0.029	0.029	0.119	0.006	0.007	0.053	6.44	0.833	24.93
37	1	4	35	4.432	1.426	0.019	0.041	8.019	0.134	0.022	0.028	0.030	0.116	0.003	0.007	0.063	6.74	0.832	20.64
38	1	4	40	4.562	1.471	0.018	0.214	9.094	0.183	0.024	0.027	0.027	0.128	0.005	0.007	0.048	6.8	0.663	21.58
39	1	4	45	4.588	1.656	0.019	0.041	7.312	0.126	0.023	0.030	0.033	0.121	0.005	0.007	0.068	6.87	0.626	20.85
40	1	4	50	4.199	1.429	0.021	0.027	5.835	0.117	0.020	0.027	0.032	0.117	0.003	0.006	0.073	6.88	0.760	20.34
41	1	5	5	4.584	1.410	0.016	0.087	6.552	0.123	0.023	0.030	0.031	0.121	0.006	0.007	0.069	5.05	1.871	
42	1	5	10	4.199	1.245	0.017	0.140	5.696	0.105	0.020	0.027	0.029	0.106	0.005	0.006	0.063	5.61	1.082	
43	1	5	15	4.400	1.252	0.015	0.088	5.947	0.112	0.020	0.027	0.030	0.114	0.005	0.006	0.062	5.86	1.018	
44	1	5	20	4.453	1.332	0.018	0.193	6.279	0.099	0.021	0.029	0.032	0.135	0.003	0.005	0.065	6.3	1.001	
45	1	5	25	4.427	1.433	0.021	0.098	7.368	0.105	0.022	0.029	0.027	0.130	0.002	0.009	0.050	6.47	0.906	
46	1	5	30	4.353	1.496	0.023	0.079	7.215	0.134	0.024	0.029	0.027	0.123	0.004	0.004	0.051	6.73	0.887	
47	1	5	35	4.268	1.477	0.021	0.167	7.760	0.139	0.022	0.029	0.027	0.123	0.002	0.007	0.050	6.51	0.886	
48	1	5	40	4.455	1.544	0.021	0.054	6.983	0.119	0.022	0.029	0.032	0.130	0.004	0.005	0.064	6.57	0.787	
49	1	5	45	4.295	1.512	0.022	0.047	7.181	0.113	0.023	0.027	0.028	0.122	0.003	0.005	0.053	6.75	0.665	
50	1	5	50	4.301	1.392	0.018	0.036	7.750	0.123	0.021	0.025	0.025	0.121	0.004	0.006	0.052	6.72	0.588	
51	2	1	5	3.671	2.239	0.011	0.100	3.136	0.060	0.009	0.017	0.023	0.068	0.003	0.005	0.121	7.45	1.569	
52	2	1	10	4.104	2.388	0.010	0.095	3.893	0.066	0.010	0.019	0.021	0.061	0.003	0.004	0.111	7.54	1.237	
53	2	1	15	4.066	2.259	0.014	0.103	3.584	0.074	0.010	0.019	0.023	0.061	0.004	0.005	0.124	7.61	1.025	
71	2	4	5	4.367	1.982	0.012	0.105	6.510	0.125	0.022	0.025	0.021	0.082	0.005	0.009	0.062	7.06	3.440	
72	2	4	10	4.598	2.130	0.013	0.085	5.592	0.111	0.018	0.027	0.022	0.078	0.004	0.006	0.069	7.34	1.558	

FIELD-MOIST ALLUVIUM – Ti-STABLE (cont.),

INCL. MOISTURE CONTENT ANALYSIS RESULTS

	Location information			PXRF Elemental data															
				mg/kg														%	%
	S	C	D	K	Ca	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	Zr	pH	SOC	Moisture
73	2	4	15	3.472	1.313	0.014	0.103	5.154	0.116	0.015	0.025	0.020	0.067	0.005	0.007	0.074	7.06	1.121	
74	2	4	20	3.876	0.912	0.016	0.145	6.174	0.127	0.014	0.025	0.019	0.085	0.004	0.007	0.060	7.34	0.854	
75	2	4	25	4.142	0.879	0.018	0.162	7.504	0.165	0.016	0.029	0.020	0.094	0.004	0.008	0.054	7.58	0.932	
76	2	4	30	4.086	0.766	0.016	0.251	6.970	0.139	0.014	0.027	0.020	0.086	0.003	0.008	0.056	7.49	1.315	
81	2	5	5	4.749	1.840	0.016	0.134	7.644	0.098	0.015	0.025	0.020	0.081	0.002	0.005	0.048	7.35	1.490	
82	2	5	10	4.720	1.876	0.015	0.083	7.924	0.146	0.017	0.027	0.021	0.092	0.004	0.007	0.050	7.26	1.558	
91	3	1	5	4.466	2.364	0.037	0.047	6.422	0.113	0.151	0.030	0.053	0.133	0.013	0.041	0.133	4.95	2.495	
92	3	1	10	4.981	1.146	0.018	0.056	5.363	0.095	0.074	0.031	0.044	0.112	0.007	0.008	0.129	4.75	1.245	
93	3	1	15	4.713	1.103	0.016	0.067	4.442	0.079	0.069	0.029	0.043	0.098	0.008	0.006	0.126	4.08	1.582	
94	3	1	20	4.612	1.220	0.015	0.069	4.539	0.080	0.066	0.029	0.044	0.105	0.006	0.007	0.125	4.19	3.383	
95	3	1	25	4.699	1.437	0.021	0.065	5.238	0.099	0.057	0.030	0.045	0.115	0.005	0.006	0.128	5.21	1.075	
96	3	1	30	4.899	1.514	0.019	0.090	7.431	0.112	0.045	0.030	0.044	0.114	0.004	0.007	0.124	5.47	1.064	
97	3	1	35	4.358	1.379	0.020	0.045	6.177	0.117	0.032	0.034	0.044	0.117	0.004	0.010	0.122	5.75	0.853	
98	3	1	40	4.617	1.521	0.022	0.084	6.868	0.132	0.024	0.029	0.035	0.120	0.004	0.010	0.094	5.97	0.778	
99	3	1	45	4.731	1.376	0.019	0.248	7.152	0.131	0.022	0.027	0.036	0.121	0.005	0.007	0.100	6.18	0.577	
100	3	1	50	4.581	1.345	0.017	0.059	6.278	0.099	0.024	0.029	0.033	0.106	0.003	0.006	0.081	6.14	0.582	
101	3	2	5	4.916	1.730	0.017	0.062	5.303	0.102	0.029	0.034	0.049	0.116	0.008	0.006	0.125	4.67	3.546	
102	3	2	10	4.651	1.444	0.016	0.047	5.104	0.103	0.025	0.031	0.048	0.118	0.009	0.008	0.122	4.9	1.614	
103	3	2	15	4.792	1.348	0.018	0.053	4.719	0.098	0.021	0.027	0.047	0.116	0.005	0.008	0.127	5.45	1.064	
104	3	2	20	4.488	1.410	0.020	0.036	4.784	0.087	0.021	0.028	0.046	0.106	0.006	0.005	0.112	5.71	0.877	
105	3	2	25	4.416	1.330	0.022	0.033	4.844	0.095	0.019	0.027	0.045	0.104	0.004	0.007	0.114	5.87	0.874	
106	3	2	30	4.608	1.450	0.021	0.025	6.072	0.109	0.019	0.027	0.044	0.116	0.003	0.009	0.110	6.1	0.932	
107	3	2	35	4.364	1.449	0.017	0.060	5.290	0.103	0.021	0.027	0.041	0.108	0.003	0.007	0.104	6.08	0.825	
108	3	2	40	4.311	1.430	0.018	0.036	6.475	0.117	0.021	0.025	0.037	0.110	0.003	0.006	0.096	5.92	0.789	
109	3	2	45	4.580	1.453	0.018	0.084	6.233	0.125	0.024	0.028	0.038	0.105	0.003	0.009	0.100	6.26	0.773	
110	3	2	50	4.528	1.370	0.019	0.060	5.651	0.098	0.025	0.028	0.036	0.113	0.003	0.009	0.087	6.46	0.716	
111	3	3	5	4.365	1.302	0.020	0.105	4.895	0.088	0.023	0.036	0.052	0.112	0.008	0.004	0.148	5.64	3.206	
112	3	3	10	4.709	1.232	0.018	0.065	4.317	0.085	0.019	0.031	0.048	0.091	0.007	0.007	0.130	5.41	1.791	
113	3	3	15	5.089	1.346	0.016	0.058	4.473	0.076	0.021	0.033	0.051	0.109	0.007	0.005	0.145	5.5	1.250	
114	3	3	20	4.717	1.236	0.017	0.109	4.312	0.073	0.017	0.030	0.049	0.106	0.007	0.005	0.134	5.65	1.015	
115	3	3	25	4.584	1.203	0.014	0.046	4.194	0.073	0.016	0.027	0.044	0.099	0.005	0.004	0.119	5.81	0.927	
116	3	3	30	4.905	1.308	0.018	0.048	5.242	0.096	0.018	0.030	0.048	0.114	0.005	0.006	0.131	6.02	0.865	
117	3	3	35	4.567	1.294	0.017	0.036	4.559	0.090	0.017	0.028	0.047	0.099	0.006	0.006	0.123	6.12	0.852	
118	3	3	40	4.771	1.381	0.015	0.043	5.121	0.087	0.018	0.029	0.049	0.103	0.006	0.005	0.129	6.35	0.895	
119	3	3	45	4.494	1.345	0.016	0.062	5.045	0.089	0.016	0.026	0.047	0.103	0.004	0.004	0.111	6.11	0.755	
120	3	3	50	4.814	1.457	0.015	0.039	4.826	0.090	0.017	0.029	0.052	0.112	0.005	0.006	0.132	6.45	0.768	
121	3	4	5	4.944	1.900	0.016	0.131	6.320	0.104	0.052	0.030	0.040	0.118	0.013	0.009	0.094	5.92	6.258	
122	3	4	10	4.593	1.997	0.019	0.070	5.904	0.101	0.044	0.030	0.040	0.098	0.013	0.008	0.096	5.89	3.474	
123	3	4	15	5.565	2.693	0.023	0.095	6.397	0.109	0.062	0.031	0.052	0.118	0.012	0.009	0.113	6.05	2.411	
124	3	4	20	4.981	2.008	0.016	0.071	5.826	0.102	0.033	0.031	0.046	0.113	0.007	0.008	0.111	6.29	1.307	
125	3	4	25	5.096	1.671	0.018	0.104	6.003	0.095	0.022	0.029	0.042	0.123	0.004	0.006	0.104	6.57	1.045	
126	3	4	30	4.781	1.448	0.019	0.124	7.272	0.145	0.021	0.029	0.028	0.114	0.004	0.008	0.055	6.61	1.093	
127	3	4	35	4.855	1.404	0.019	0.109	6.954	0.139	0.020	0.029	0.026	0.116	0.005	0.007	0.055	6.85	0.918	
128	3	4	40	4.623	1.420	0.020	0.078	6.770	0.130	0.020	0.028	0.027	0.106	0.005	0.005	0.057	6.87	0.846	
129	3	4	45	4.937	1.465	0.018	0.120	8.335	0.166	0.021	0.028	0.031	0.126	0.006	0.005	0.064	7	0.766	
130	3	4	50	4.633	1.445	0.019	0.048	7.056	0.125	0.020	0.027	0.029	0.105	0.005	0.007	0.059	7.13	0.719	
131	3	5	5	4.946	1.632	0.021	0.076	6.426	0.126	0.039	0.034	0.039	0.118	0.010	0.009	0.095	5.29	3.916	21.69
132	3	5	10	4.929	1.466	0.018	0.058	6.443	0.122	0.029	0.032	0.036	0.120	0.010	0.007	0.092	5.8	2.040	17.88
133	3	5	15	4.941	1.369	0.020	0.045	6.194	0.120	0.025	0.032	0.039	0.127	0.007	0.007	0.096	6.25	1.350	16.19
134	3	5	20	4.785	1.479	0.020	0.053	5.892	0.106	0.023	0.030	0.039	0.109	0.005	0.008	0.096	6.6	1.280	19.31
135	3	5	25	4.636	1.433	0.020	0.048	6.653	0.126	0.023	0.029	0.031	0.107	0.004	0.008	0.070	6.92	1.205	25.76
136	3	5	30	4.704	1.431	0.020	0.038	7.059	0.151	0.024	0.030	0.031	0.105	0.006	0.008	0.064	7.22	1.188	30.39
137	3	5	35	4.477	1.374	0.022	0.031	6.908	0.145	0.022	0.028	0.029	0.117	0.004	0.007	0.060	7	1.036	33.22
138	3	5	40	4.627	1.739	0.017	0.046	7.562	0.162	0.024	0.030	0.029	0.124	0.005	0.008	0.064	7.34	0.829	34.36
139	3	5	45	4.457	1.570	0.019	0.102	7.734	0.152	0.023	0.028	0.027	0.115	0.004	0.006	0.053	7.54	0.801	34.96
140	3	5	50	4.491	1.625	0.020	0.043	7.118	0.121	0.020	0.029	0.028	0.113	0.003	0.008	0.054	7.32	0.708	36.74

FIELD-MOIST ALLUVIUM – Zr-STABLE,

INCL. MOISTURE CONTENT ANALYSIS RESULTS

Location information				------PXRF Elemental data------															
				------mg/kg------														%	%
ID	S	C	D	K	Ca	Ti	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	pH	SOC	Moisture
1	1	1	5	29.177	9.346	5.516	0.081	0.543	21.536	0.420	0.070	0.135	0.364	0.570	0.024	0.022	6.62	0.595	20.39
2	1	1	10	28.014	9.598	5.756	0.078	0.549	18.347	0.359	0.060	0.130	0.349	0.506	0.022	0.032	7.08	0.553	20.49
3	1	1	15	27.995	13.557	4.926	0.064	0.542	17.631	0.329	0.059	0.128	0.369	0.547	0.026	0.017	6.85	0.553	19.97
4	1	1	20	29.200	9.921	5.467	0.074	0.441	18.418	0.333	0.056	0.136	0.374	0.541	0.027	0.021	7.13	0.471	19.16
5	1	1	25	29.226	10.542	5.777	0.098	0.706	32.896	0.362	0.066	0.141	0.362	0.602	0.018	0.030	7.01	0.512	18.35
6	1	1	30	40.004	16.656	9.240	0.129	0.878	38.251	0.763	0.125	0.212	0.421	0.896	0.024	0.043	6.85	0.497	20.45
7	1	1	35	30.487	14.938	6.549	0.091	0.829	33.896	0.508	0.096	0.158	0.389	0.731	0.027	0.031	6.7	0.450	20.5
8	1	1	40	26.519	11.286	5.807	0.080	0.679	27.027	0.567	0.078	0.157	0.393	0.548	0.029	0.029	6.96	0.479	23.19
9	1	1	45	48.324	19.453	10.146	0.158	1.279	61.595	1.166	0.186	0.280	0.474	1.251	0.053	0.077	6.98	0.561	25.01
10	1	1	50	40.971	14.383	8.842	0.135	0.743	46.379	0.904	0.125	0.224	0.438	0.878	0.042	0.048	9.97	0.486	25.39
11	1	2	5	22.786	8.448	4.272	0.066	0.331	14.023	0.244	0.040	0.099	0.314	0.442	0.010	0.015	7.11	0.576	19.66
12	1	2	10	23.056	8.043	4.435	0.081	0.360	14.800	0.257	0.039	0.111	0.309	0.441	0.003	0.018	7.14	0.515	18.08
13	1	2	15	26.721	10.248	5.616	0.084	0.405	20.258	0.375	0.058	0.122	0.365	0.520	0.024	0.030	7.3	0.424	17.52
14	1	2	20	27.800	9.819	5.284	0.065	0.431	21.908	0.398	0.062	0.129	0.347	0.547	0.025	0.029	7.28	0.402	17.27
15	1	2	25	25.542	8.907	5.080	0.066	0.421	16.924	0.287	0.054	0.116	0.336	0.478	0.023	0.023	7.13	0.347	17.06
16	1	2	30	31.664	11.160	6.168	0.083	0.602	26.465	0.581	0.080	0.161	0.388	0.630	0.029	0.031	7.01	0.379	17.59
17	1	2	35	33.767	10.736	6.797	0.106	0.567	32.869	0.572	0.100	0.169	0.359	0.750	0.036	0.031	7.09	0.451	19.68
18	1	2	40	30.291	10.642	6.107	0.084	0.587	31.110	0.697	0.098	0.156	0.332	0.632	0.032	0.038	6.99	0.430	30.73
19	1	2	45	37.561	13.637	7.752	0.127	0.739	39.401	0.761	0.115	0.185	0.408	0.850	0.029	0.035	7.09	0.412	22.27
20	1	2	50	32.394	10.637	7.008	0.108	0.312	31.921	0.550	0.096	0.160	0.371	0.660	0.020	0.020	7.2	0.355	22.56
21	1	3	5	24.289	7.836	4.477	0.063	0.366	17.235	0.345	0.052	0.119	0.333	0.535	0.019	0.021	6.62	0.521	18.53
22	1	3	10	26.937	9.105	4.766	0.071	0.422	17.034	0.310	0.052	0.125	0.346	0.510	0.011	0.022	7.08	0.449	19.11
23	1	3	15	24.891	8.442	5.267	0.085	0.374	16.745	0.338	0.049	0.117	0.333	0.499	0.015	0.024	6.85	0.501	19.32
24	1	3	20	29.179	9.904	4.763	0.091	0.432	16.248	0.275	0.056	0.133	0.392	0.533	0.014	0.019	7.41	0.415	20.1
25	1	3	25	34.418	16.158	6.139	0.093	0.470	22.478	0.369	0.071	0.152	0.426	0.615	0.024	0.036	7.19	0.345	16.24
26	1	3	30	41.915	22.122	8.522	0.139	1.200	38.956	0.827	0.125	0.218	0.441	0.878	0.036	0.054	7.23	0.496	16.9
27	1	3	35	46.992	25.202	10.719	0.179	2.627	55.316	1.019	0.152	0.231	0.467	1.133	0.025	0.057	7.24	0.504	17.82
28	1	3	40	59.000	25.404	13.427	0.202	1.540	68.380	1.427	0.221	0.336	0.507	1.352	0.068	0.070	7	0.579	18.91
29	1	3	45	44.368	18.188	9.312	0.173	0.643	46.064	0.850	0.143	0.232	0.456	1.000	0.035	0.060	7.24	0.466	18.26
30	1	3	50	38.013	18.649	6.622	0.137	0.378	29.181	0.505	0.083	0.170	0.452	0.625	0.020	0.020	7.12	0.523	18.87
31	1	4	5	31.609	11.975	7.655	0.171	1.947	45.064	0.840	0.139	0.205	0.414	0.875	0.032	0.036	4.95	1.484	22.69
32	1	4	10	38.535	18.032	7.296	0.102	1.042	32.046	0.592	0.088	0.176	0.461	0.732	0.015	0.035	4.82	1.409	21.65
33	1	4	15	45.765	21.803	7.803	0.118	3.813	37.765	0.599	0.125	0.201	0.557	0.896	0.039	0.042	5.77	1.110	28.4
34	1	4	20	71.615	19.833	16.141	0.321	1.750	110.724	2.077	0.359	0.504	0.494	1.987	0.084	0.122	6.41	0.862	23.25
35	1	4	25	64.252	21.084	15.103	0.329	1.755	107.684	1.568	0.342	0.473	0.470	1.858	0.080	0.123	6.52	0.764	23.44
36	1	4	30	85.358	28.662	18.804	0.453	1.662	150.791	3.189	0.426	0.544	0.539	2.236	0.106	0.135	6.44	0.833	24.93
37	1	4	35	69.959	22.512	15.785	0.297	0.645	126.581	2.122	0.343	0.444	0.475	1.826	0.052	0.116	6.74	0.832	20.64
38	1	4	40	94.340	30.424	20.681	0.382	4.431	188.069	3.778	0.486	0.551	0.556	2.639	0.109	0.139	6.8	0.663	21.58
39	1	4	45	67.590	24.395	14.733	0.282	0.610	107.723	1.851	0.338	0.438	0.482	1.790	0.068	0.103	6.87	0.626	20.85
40	1	4	50	57.249	19.487	13.635	0.289	0.365	79.558	1.599	0.274	0.372	0.443	1.594	0.037	0.081	6.88	0.760	20.34
41	1	5	5	66.864	20.566	14.586	0.237	1.263	95.566	1.793	0.333	0.438	0.449	1.763	0.090	0.096	5.05	1.871	
42	1	5	10	67.101	19.899	15.979	0.271	2.239	91.011	1.670	0.324	0.432	0.470	1.686	0.073	0.101	5.61	1.082	
43	1	5	15	70.641	20.108	16.056	0.246	1.415	95.492	1.795	0.323	0.439	0.489	1.831	0.083	0.103	5.86	1.018	
44	1	5	20	68.977	20.627	15.492	0.271	2.994	97.271	1.531	0.322	0.444	0.490	2.085	0.045	0.079	6.3	1.001	
45	1	5	25	89.185	28.862	20.146	0.415	1.977	148.431	2.115	0.446	0.592	0.552	2.615	0.043	0.177	6.47	0.906	
46	1	5	30	84.799	29.137	19.482	0.439	1.540	140.554	2.604	0.460	0.563	0.533	2.403	0.068	0.086	6.73	0.887	
47	1	5	35	85.822	29.705	20.109	0.426	3.364	156.047	2.791	0.442	0.581	0.536	2.465	0.045	0.147	6.51	0.886	
48	1	5	40	69.106	23.950	15.513	0.325	0.844	108.319	1.850	0.344	0.454	0.494	2.019	0.059	0.075	6.57	0.787	
49	1	5	45	81.114	28.550	18.886	0.407	0.879	135.614	2.129	0.436	0.517	0.522	2.307	0.063	0.093	6.75	0.665	
50	1	5	50	82.810	26.796	19.252	0.354	0.701	149.204	2.374	0.408	0.489	0.490	2.327	0.071	0.122	6.72	0.588	
51	2	1	5	30.264	18.458	8.244	0.088	0.821	25.851	0.496	0.075	0.138	0.188	0.557	0.028	0.045	7.45	1.569	
52	2	1	10	36.959	21.505	9.005	0.094	0.856	35.055	0.594	0.091	0.168	0.193	0.548	0.031	0.036	7.54	1.237	
53	2	1	15	32.845	18.245	8.077	0.111	0.831	28.952	0.598	0.079	0.152	0.186	0.492	0.032	0.039	7.61	1.025	
71	2	4	5	70.580	32.026	16.161	0.192	1.694	105.207	2.016	0.358	0.407	0.338	1.332	0.077	0.150	7.06	3.440	
72	2	4	10	66.335	30.723	14.426	0.181	1.229	80.665	1.601	0.266	0.390	0.312	1.122	0.062	0.090	7.34	1.558	

FIELD-MOIST ALLUVIUM – Zr-STABLE (cont.),

INCL. MOISTURE CONTENT ANALYSIS RESULTS

	Location information			PXRF Elemental data (mg/kg)															
	S	C	D	K	Ca	Ti	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	pH	% SOC	% Moisture
73	2	4	15	46.823	17.707	13.487	0.185	1.384	69.517	1.569	0.207	0.338	0.267	0.909	0.061	0.091	7.06	1.121	
74	2	4	20	64.355	15.145	16.605	0.260	2.400	102.515	2.105	0.235	0.420	0.316	1.405	0.066	0.110	7.34	0.854	
75	2	4	25	76.220	16.169	18.401	0.328	2.983	138.079	3.028	0.288	0.525	0.361	1.723	0.072	0.153	7.58	0.932	
76	2	4	30	73.292	13.746	17.935	0.286	4.503	125.000	2.492	0.254	0.485	0.351	1.546	0.059	0.146	7.49	1.315	
81	2	5	5	99.620	38.609	20.978	0.341	2.816	160.358	2.061	0.313	0.525	0.417	1.704	0.044	0.106	7.35	1.490	
82	2	5	10	94.254	37.461	19.969	0.306	1.648	158.233	2.917	0.347	0.540	0.424	1.845	0.073	0.135	7.26	1.558	
91	3	1	5	33.560	17.767	7.515	0.282	0.353	48.259	0.848	1.133	0.223	0.397	0.997	0.094	0.311	4.95	2.495	
92	3	1	10	38.511	8.859	7.731	0.141	0.430	41.462	0.734	0.570	0.238	0.340	0.866	0.054	0.062	4.75	1.245	
93	3	1	15	37.463	8.771	7.949	0.124	0.533	35.308	0.625	0.549	0.230	0.341	0.778	0.066	0.051	4.08	1.582	
94	3	1	20	36.796	9.736	7.978	0.116	0.550	36.214	0.642	0.528	0.233	0.349	0.836	0.046	0.057	4.19	3.383	
95	3	1	25	36.706	11.223	7.811	0.167	0.508	40.913	0.774	0.443	0.236	0.351	0.895	0.037	0.046	5.21	1.075	
96	3	1	30	39.439	12.189	8.050	0.150	0.728	59.817	0.904	0.365	0.239	0.355	0.920	0.035	0.053	5.47	1.064	
97	3	1	35	35.644	11.277	8.180	0.165	0.371	50.525	0.960	0.263	0.274	0.359	0.960	0.032	0.083	5.75	0.853	
98	3	1	40	49.174	16.199	10.651	0.232	0.892	73.158	1.411	0.257	0.307	0.370	1.278	0.046	0.108	5.97	0.778	
99	3	1	45	47.397	13.783	10.019	0.195	2.487	71.652	1.311	0.221	0.275	0.356	1.210	0.052	0.071	6.18	0.577	
100	3	1	50	56.626	16.626	12.360	0.207	0.730	77.604	1.230	0.293	0.355	0.413	1.306	0.033	0.072	6.14	0.582	
101	3	2	5	39.432	13.873	8.021	0.136	0.496	42.538	0.818	0.233	0.275	0.397	0.932	0.068	0.051	4.67	3.546	
102	3	2	10	38.056	11.815	8.181	0.130	0.381	41.756	0.841	0.204	0.257	0.395	0.963	0.071	0.063	4.9	1.614	
103	3	2	15	37.834	10.645	7.895	0.142	0.419	37.257	0.770	0.162	0.216	0.375	0.912	0.039	0.061	5.45	1.064	
104	3	2	20	40.142	12.607	8.944	0.180	0.326	42.783	0.775	0.187	0.250	0.411	0.948	0.049	0.041	5.71	0.877	
105	3	2	25	38.810	11.685	8.788	0.190	0.286	42.564	0.832	0.168	0.241	0.392	0.912	0.037	0.059	5.87	0.874	
106	3	2	30	41.758	13.145	9.063	0.188	0.223	55.023	0.992	0.176	0.246	0.395	1.051	0.032	0.078	6.1	0.932	
107	3	2	35	41.871	13.904	9.594	0.159	0.576	50.756	0.993	0.199	0.263	0.397	1.041	0.030	0.066	6.08	0.825	
108	3	2	40	44.753	14.846	10.382	0.185	0.378	67.220	1.212	0.220	0.264	0.385	1.143	0.033	0.066	5.92	0.789	
109	3	2	45	45.805	14.529	10.000	0.184	0.839	62.330	1.249	0.238	0.277	0.383	1.046	0.033	0.088	6.26	0.773	
110	3	2	50	51.813	15.672	11.443	0.217	0.685	64.660	1.119	0.281	0.325	0.416	1.298	0.034	0.098	6.46	0.716	
111	3	3	5	29.431	8.777	6.742	0.134	0.707	33.004	0.590	0.155	0.241	0.351	0.756	0.054	0.025	5.64	3.206	
112	3	3	10	36.098	9.443	7.666	0.141	0.498	33.095	0.649	0.148	0.237	0.368	0.698	0.053	0.052	5.41	1.791	
113	3	3	15	34.982	9.252	6.874	0.107	0.399	30.745	0.525	0.144	0.225	0.353	0.748	0.045	0.037	5.5	1.250	
114	3	3	20	35.164	9.217	7.455	0.130	0.809	32.147	0.542	0.130	0.225	0.367	0.789	0.052	0.040	5.65	1.015	
115	3	3	25	38.633	10.136	8.429	0.116	0.384	35.350	0.612	0.133	0.224	0.372	0.833	0.039	0.037	5.81	0.927	
116	3	3	30	37.382	9.967	7.621	0.141	0.363	39.951	0.732	0.134	0.225	0.363	0.866	0.039	0.046	6.02	0.865	
117	3	3	35	36.980	10.482	8.098	0.140	0.293	36.915	0.730	0.137	0.228	0.379	0.801	0.049	0.046	6.12	0.852	
118	3	3	40	37.067	10.732	7.769	0.114	0.334	39.786	0.672	0.137	0.228	0.382	0.803	0.045	0.040	6.35	0.895	
119	3	3	45	40.602	12.148	9.035	0.148	0.556	45.581	0.806	0.144	0.238	0.423	0.930	0.040	0.039	6.11	0.755	
120	3	3	50	36.459	11.036	7.573	0.111	0.296	36.547	0.684	0.127	0.222	0.390	0.847	0.036	0.042	6.45	0.768	
121	3	4	5	52.392	20.129	10.597	0.167	1.392	66.973	1.102	0.548	0.323	0.423	1.253	0.136	0.091	5.92	6.258	
122	3	4	10	48.014	20.882	10.455	0.195	0.732	61.723	1.055	0.464	0.316	0.419	1.023	0.137	0.086	5.89	3.474	
123	3	4	15	49.359	23.882	8.869	0.203	0.840	56.734	0.966	0.553	0.273	0.465	1.042	0.109	0.076	6.05	2.411	
124	3	4	20	44.785	18.052	8.992	0.147	0.641	52.386	0.916	0.295	0.278	0.411	1.016	0.061	0.072	6.29	1.307	
125	3	4	25	49.015	16.075	9.619	0.174	1.000	57.743	0.909	0.208	0.278	0.401	1.181	0.039	0.057	6.57	1.045	
126	3	4	30	86.407	26.167	18.074	0.340	2.247	131.432	2.623	0.383	0.524	0.498	2.056	0.079	0.142	6.61	1.093	
127	3	4	35	88.012	25.451	18.130	0.352	1.975	126.074	2.512	0.364	0.517	0.480	2.099	0.092	0.123	6.85	0.918	
128	3	4	40	81.048	24.899	17.530	0.357	1.369	118.679	2.280	0.351	0.483	0.477	1.851	0.086	0.095	6.87	0.846	
129	3	4	45	77.535	23.005	15.706	0.289	1.888	130.909	2.610	0.326	0.443	0.483	1.973	0.088	0.086	7	0.766	
130	3	4	50	79.144	24.680	17.083	0.320	0.812	120.530	2.133	0.343	0.462	0.490	1.801	0.082	0.122	7.13	0.719	
131	3	5	5	52.064	17.179	10.528	0.220	0.798	67.647	1.330	0.413	0.361	0.408	1.243	0.103	0.092	5.29	3.916	21.69
132	3	5	10	53.833	16.009	10.921	0.197	0.632	70.360	1.329	0.320	0.350	0.397	1.311	0.110	0.075	5.8	2.040	17.88
133	3	5	15	51.355	14.226	10.393	0.209	0.470	64.372	1.248	0.265	0.335	0.409	1.325	0.069	0.077	6.25	1.350	16.19
134	3	5	20	50.021	15.458	10.454	0.208	0.550	61.592	1.113	0.242	0.311	0.404	1.138	0.050	0.079	6.6	1.280	19.31
135	3	5	25	65.874	20.368	14.209	0.291	0.676	94.533	1.786	0.324	0.416	0.437	1.522	0.062	0.110	6.92	1.205	25.76
136	3	5	30	72.977	22.194	15.514	0.309	0.583	109.520	2.337	0.377	0.458	0.474	1.634	0.088	0.126	7.22	1.188	30.39
137	3	5	35	75.063	23.038	16.766	0.367	0.519	115.823	2.424	0.361	0.475	0.487	1.962	0.068	0.114	7	1.036	33.22
138	3	5	40	72.405	27.220	15.649	0.268	0.726	118.339	2.536	0.381	0.464	0.454	1.940	0.079	0.125	7.34	0.829	34.36
139	3	5	45	83.896	29.545	18.825	0.351	1.916	145.591	2.857	0.435	0.536	0.505	2.162	0.079	0.117	7.54	0.801	34.96
140	3	5	50	82.953	30.020	18.470	0.369	0.792	131.477	2.228	0.376	0.527	0.510	2.081	0.062	0.141	7.32	0.708	36.74

FIELD-MOIST LOESS – RAW,

INCL. MOISTURE CONTENT ANALYSIS RESULTS

·Location information·				---PXRF Elemental data---																
					---mg/kg---														%	%
ID	S	C	D	K	Ca	Ti	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	Zr	pH	SOC	Moisture
1	1	1	5	6118.0	219.0	3194.0	31.0	104.0	10574.0	210.0	17.0	31.2	33.9	183.0	16.4	14.0	710.0	4.12	1.606	
2	1	1	10	7036.0	375.0	3693.0	43.0	132.0	13347.0	230.0	21.1	34.4	35.2	210.0	16.4	16.0	778.0	4.08	1.131	
3	1	1	15	7920.0	585.0	4085.0	45.0	89.0	19422.0	395.0	27.5	49.3	42.7	245.0	13.9	19.0	610.0	4.24	0.642	
4	1	1	20	8022.0	308.0	3963.0	48.0	60.0	20498.0	374.0	26.0	46.2	40.3	248.0	11.6	19.0	528.0	4.29	0.405	
5	1	1	25	8008.0	261.0	3760.0	53.0	83.0	17804.0	339.0	27.3	47.1	40.7	261.0	15.3	17.0	507.0	4.31	0.379	
6	1	1	30	9950.0	320.0	4380.0	53.0	73.0	28051.0	487.0	40.0	62.9	52.1	282.0	17.2	23.0	576.0	4.34	0.316	
7	1	1	35	9529.0	200.0	4017.0	42.0	57.0	24078.0	427.0	29.0	48.7	45.1	293.0	10.1	16.0	478.0	4.26	0.245	
8	1	1	40	9068.0	129.0	3710.0	44.0	173.0	22280.0	345.0	32.0	50.2	47.8	242.0	12.9	14.0	456.0	4.15	0.238	
9	1	1	45	9188.0	81.0	3532.0	39.0	120.0	19825.0	349.0	31.0	49.4	52.8	246.0	14.1	20.0	451.0	4.05	0.188	
10	1	1	50	7856.0	370.0	3094.0	44.0	109.0	16403.0	259.0	29.0	47.4	61.9	251.0	10.0	15.0	495.0	4.07	0.180	
11	1	2	5	6007.0	812.0	2678.0	23.0	259.0	10437.0	183.0	49.0	39.9	35.1	165.0	11.0	12.0	566.0	4.1	3.692	
12	1	2	10	7922.0	1288.0	3628.0	43.0	138.0	20868.0	423.0	37.0	53.1	41.6	255.0	10.5	22.0	539.0	4.96	1.256	
13	1	2	15	8334.0	1332.0	4257.0	46.0	177.0	18401.0	367.0	43.0	54.7	45.7	235.0	17.1	24.0	627.0	5.33	0.744	
14	1	2	20	8592.0	867.0	3801.0	56.0	74.0	22497.0	354.0	31.0	52.9	40.8	255.0	7.9	16.0	470.0	5.29	0.635	
15	1	2	25	7079.0	340.0	4346.0	40.0	52.0	22087.0	335.0	26.0	41.7	33.6	217.0	8.3	18.0	515.0	5.35	0.592	
16	1	2	30	8950.0	738.0	4083.0	44.0	89.0	22102.0	405.0	32.0	54.2	44.5	230.0	13.1	21.0	549.0	5.24	0.476	
17	1	2	35	8584.0	537.0	3894.0	44.0	60.0	20976.0	339.0	29.0	50.9	38.6	237.0	4.1	19.0	473.0	5.34	0.536	
18	1	2	40	9698.0	665.0	4133.0	53.0	69.0	21775.0	407.0	34.0	53.3	46.1	259.0	12.4	21.0	536.0	5.44	0.475	
19	1	2	45	9434.0	368.0	3953.0	41.0	91.0	18483.0	306.0	26.2	46.0	42.8	213.0	10.4	18.0	647.0	4.93	0.401	
20	1	2	50	10059.0	493.0	4376.0	48.0	104.0	21458.0	406.0	33.0	53.7	48.1	298.0	12.1	26.0	610.0	4.97	0.303	
21	1	3	5	5719.0	248.0	3026.0	33.0	131.0	8923.0	165.0	16.5	33.4	33.2	162.0	11.3	11.0	591.0	4.78	1.499	1.3
22	1	3	10	8418.0	580.0	4050.0	49.0	125.0	17233.0	331.0	30.0	48.5	41.7	217.0	17.3	12.0	617.0	4.95	0.877	2.24
23	1	3	15	7506.0	474.0	3768.0	44.0	87.0	17101.0	324.0	27.0	45.0	37.7	226.0	8.9	20.0	537.0	5.11	0.753	2.23
24	1	3	20	8082.0	673.0	3779.0	56.0	89.0	22892.0	403.0	35.0	51.2	38.9	271.0	9.4	21.0	457.0	5.19	0.674	2.17
25	1	3	25	7953.0	699.0	3823.0	52.0	95.0	22529.0	361.0	36.0	49.6	38.4	230.0	9.3	16.0	453.0	5.2	0.646	2.52
26	1	3	30	7809.0	425.0	3509.0	51.0	80.0	19652.0	288.0	28.0	46.2	37.3	255.0	8.6	10.0	452.0	5.02	0.563	2.21
27	1	3	35	13547.0	1233.0	3485.5	39.0	82.0	11888.5	205.5	52.5	72.7	97.4	283.5	9.8	18.5	284.5	4.52	0.411	2.12
28	1	3	40	8499.0	226.0	3712.0	43.0	190.0	17544.0	253.0	27.0	45.5	43.0	213.0	8.1	17.0	496.0	4.49	0.266	1.47
29	1	3	45	9300.0	246.0	4090.0	49.0	135.0	15346.0	282.0	29.0	48.8	46.9	222.0	10.4	16.0	537.0	4.57	0.191	1.78
30	1	3	50	8344.0	167.0	3616.0	42.0	186.0	19749.0	363.0	31.0	47.9	49.9	226.0	13.8	18.0	569.0	4.57	0.161	1.65
31	1	4	5	5864.0	790.0	2767.0	29.0	207.0	10733.0	148.0	26.2	37.7	29.9	174.0	15.0	11.0	428.0	4.42	2.929	24.71
32	1	4	10	8818.0	840.0	3564.0	48.0	375.0	16551.0	305.0	33.0	47.1	38.1	240.0	14.5	20.0	506.0	4.99	1.143	16.68
33	1	4	15	8659.0	558.0	3884.0	43.0	422.0	16149.0	271.0	31.0	50.4	39.3	225.0	15.5	10.0	489.0	4.78	0.804	16.65
34	1	4	20	10059.0	656.0	3736.0	46.0	336.0	20728.0	393.0	39.0	52.0	40.9	283.0	17.1	23.0	464.0	5.04	0.600	23.84
35	1	4	25	8047.0	566.0	3250.0	36.0	218.0	20143.0	300.0	34.0	50.1	39.7	244.0	8.3	18.0	416.0	5.22	0.464	19.09
36	1	4	30	10480.0	691.0	3998.0	49.0	264.0	20136.0	292.0	37.0	52.3	43.5	273.0	11.2	15.0	456.0	5.64	0.397	18.47
37	1	4	35	9855.0	594.0	3910.0	46.0	235.0	18560.0	285.0	31.0	49.5	43.8	233.0	12.7	19.0	430.0	5.75	0.357	17.46
38	1	4	40	10630.0	579.0	4108.0	50.0	229.0	19146.0	305.0	34.0	49.3	42.3	257.0	13.6	18.0	472.0	5.45	0.248	16.13
39	1	4	45	10919.0	291.0	4128.0	42.0	216.0	17830.0	247.0	30.0	46.2	39.1	255.0	12.2	16.0	403.0	5.06	0.202	15.03
40	1	4	50	10374.0	238.0	3874.0	41.0	220.0	16504.0	235.0	28.0	43.4	36.0	242.0	8.3	16.0	393.0	4.92	0.164	13.55
41	1	5	5	5171.0	126.0	3200.0	31.0	568.0	6925.0	100.0	18.0	31.0	40.5	153.0	14.2	11.0	589.0	4.44	1.617	28.23
42	1	5	10	5689.0	276.0	3646.0	33.0	534.0	9541.0	137.0	15.0	28.1	42.8	213.0	15.5	13.0	677.0	4.53	0.751	18.9
43	1	5	15	5206.0	490.0	3278.0	27.0	457.0	6356.0	137.0	14.9	27.4	39.6	160.0	12.1	8.0	600.0	5.41	0.615	17.17
44	1	5	20	4509.0	490.0	3305.0	35.0	828.0	5529.0	93.0	10.3	24.3	40.2	187.0	10.4	11.0	593.0	5.73	0.540	17.14
45	1	5	25	5582.0	631.0	3535.0	29.0	392.0	5297.0	65.0	14.0	29.9	51.5	160.0	10.2	5.0	641.0	5.6	0.649	17.85
46	1	5	30	5041.0	604.0	3435.0	31.0	795.0	5163.0	95.0	12.9	24.7	45.2	155.0	10.3	10.0	587.0	5.43	0.652	18.51
47	1	5	35	5703.0	503.0	3844.0	29.0	605.0	6029.0	113.0	10.2	26.6	48.5	200.0	11.0	6.0	658.0	5.11	0.658	18.45
48	1	5	40	6303.0	552.0	4504.0	40.0	377.0	4973.0	86.0	11.7	30.7	51.4	180.0	10.4	11.0	624.0	5.04	0.695	17.05
49	1	5	45	6346.0	322.0	4778.0	68.0	135.0	6696.0	131.0	17.5	34.6	53.7	206.0	9.3	10.0	590.0	4.99	0.826	15.46
50	1	5	50	6570.0	335.0	4109.0	41.0	147.0	11126.0	221.0	24.1	40.9	53.7	234.0	12.7	13.0	518.0	4.74	0.392	16.82
51	2	1	5	4724.0	1118.0	2394.0	26.0	434.0	6751.0	128.0	24.7	30.5	62.7	162.0	18.2	8.0	461.0	4.55	2.416	32.05
52	2	1	10	5720.0	1201.0	2879.0	31.0	209.0	6024.0	102.0	21.3	32.6	68.9	183.0	19.8	12.0	506.0	4.58	1.452	24.71
53	2	1	15	5901.0	1321.0	3130.0	36.0	923.0	7227.0	167.0	19.9	33.7	72.4	173.0	19.3	10.0	562.0	4.98	0.831	20.29
54	2	1	20	5812.0	1311.0	3105.0	33.0	226.0	7745.0	160.0	19.5	35.7	74.4	191.0	15.3	7.0	589.0	5.47	0.613	19.72
55	2	1	25	5845.0	1383.0	3047.0	34.0	314.0	8648.0	137.0	15.3	34.0	73.8	169.0	12.6	6.0	571.0	5.45	0.485	11.97
56	2	1	30	5966.0	1431.0	3080.0	33.0	126.0	8463.0	157.0	14.3	37.1	76.4	194.0	9.0	15.0	574.0	5.09	0.374	7.72
57	2	1	35	6242.0	1591.0	3227.0	33.0	130.0	8098.0	173.0	21.6	41.6	84.0	188.0	14.4	16.0	585.0	5.03	0.393	11.63
58	2	1	40	6169.0	2214.0	2848.0	38.0	242.0	8731.0	219.0	27.2	40.5	76.7	188.0	13.5	9.0	504.0	5.09	0.384	20.12
59	2	1	45	6497.0	1587.0	3089.0	34.0	129.0	10585.0	217.0	23.3	44.7	75.3	207.0	10.9	16.0	498.0	5.02	0.328	41.01
60	2	1	50	7073.0	2037.0	3268.0	33.0	162.0	17329.0	436.0	29.6	46.9	75.7	222.0	12.9	15.0	462.0	5.08	0.290	32.58
61	2	2	5	6203.0	284.0	3028.0	37.0	485.0	7957.0	155.0	21.5	39.7	56.9	190.0	9.6	12.0	592.0	4.43	0.479	18.74
62	2	2	10	7349.0	313.0	3451.0	42.0	518.0	12473.0	285.0	19.9	43.6	53.5	218.0	10.7	17.0	576.0	3.65	0.327	18.48
63	2	2	15	7230.0	282.0	3422.0	45.0	112.0	11070.0	236.0	24.3	48.0	54.0	200.0	9.3	12.0	526.0	3.76	0.313	19.21
64	2	2	20	7340.0	439.0	3234.0	42.0	309.0	9474.0	179.0	22.7	44.6	58.5	201.0	10.0	9.0	513.0	3.74	0.248	20.86
65	2	2	25	9156.0	328.0	3526.0	45.0	100.0	19752.0	376.0	41.0	57.8	51.7	267.0	10.0	19.0	423.0	3.81	0.233	23.51
66	2	2	30	9386.0	389.0	3639.0	47.0	128.0	22607.0	456.0	47.0	59.3	56.8	266.0	12.8	21.0	449.0	4	0.273	24.93
67	2	2	35	9259.0	503.0	3587.0	42.0	103.0	21862.0	428.0	40.0	54.7	56.0	271.0	9.9	20.0	441.0	4.08	0.281	24.3
68	2	2	40	8854.0	538.0	3699.0	47.0	80.0	15238.0	310.0	32.0	52.4	60.9	269.0	9.8	19.0	473.0	4.15	0.311	23.72
69	2	2	45	9404.0	678.0	3836.0	42.0	63.0	19278.0	407.0	28.6	52.1	63.7	239.0	13.9	21.0	495.0	4.1	0.267	24.19
70	2	2	50	8901.0	749.0	3294.0	39.0	86.0	13894.0	282.0	26.9	50.2	70.6	227.0	11.7	17.0	527.0	4.16	0.217	22.76
71	2	3	5	5293.0	1115.0	2427.0	26.0	277.0	9606.0	159.0	35.2	41.2	62.5	184.0	27.0	12.0	335.0	3.92	4.013	28.59
72	2	3	10	8464.0	2186.0	3059.0	41.0	511.0	12026.0	215.0	38.0	51.7	85.6	223.0	16.1	16.0	436.0	4.58	1.328	23.3
73	2	3	15	7799.0	1905.0	3121.0	35.0	824.0	11273.0	240.0	37.0	53.9	84.2	231.0	14.4	15.0	450.0	4.69	1.099	21.86
74	2	3	20	7627.0	1759.0	3211.0	29.0	447.0	9267.0	156.0	31.0	52.1	81.1	208.0	18.6	10.0	469.0	4.82	1.052	22.36
75	2	3	25	8212.0	1968.0	3536.0	39.0	457.0	11802.0	241.0	35.0	53.8	79.7	228.0	20.2	17.0	468.0	4.82	0.774	22.2

FIELD-MOIST LOESS – RAW (cont.) ,

INCL. MOISTURE CONTENT ANALYSIS RESULTS

·Location information·				----PXRF Elemental data----																
					----mg/kg----														%	%
ID	S	C	D	K	Ca	Ti	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	Zr	pH	SOC	Moisture
76	2	3	30	6935.0	1438.0	3068.0	37.0	547.0	9414.0	158.0	30.2	49.8	75.8	185.0	15.9	14.0	469.0	4.68	0.831	21
77	2	3	35	7387.0	1173.0	3423.0	49.0	183.0	11037.0	219.0	27.0	51.2	76.6	240.0	11.7	15.0	581.0	4.22	0.746	17.95
78	2	3	40	8636.0	1482.0	3884.0	49.0	148.0	17027.0	375.0	48.0	64.3	71.9	273.0	12.9	19.0	495.0	4.04	0.362	19.81
79	2	3	45	8700.0	1246.0	3753.0	47.0	254.0	19709.0	366.0	52.0	62.6	73.5	262.0	14.3	24.0	494.0	4.05	0.422	22.11
80	2	3	50	7713.0	1338.0	3248.0	42.0	155.0	18593.0	276.0	46.0	55.9	68.5	229.0	3.3	14.0	410.0	4.09	0.384	24.33
81	2	4	5	6578.0	1094.0	2667.0	34.0	221.0	5205.0	109.0	17.1	35.4	61.0	180.0	12.1	8.0	616.0	4.87	1.395	21.74
82	2	4	10	6729.0	1066.0	2939.0	33.0	772.0	6164.0	134.0	18.7	37.0	65.3	191.0	12.8	9.0	643.0	5.5	0.645	18.09
83	2	4	15	6720.0	1195.0	2740.0	46.0	218.0	5635.0	106.0	17.1	38.7	63.1	172.0	8.7	8.0	647.0	5.79	0.515	17.05
84	2	4	20	6699.0	1083.0	2670.0	33.0	503.0	6169.0	108.0	15.7	36.1	64.2	183.0	11.6	9.0	619.0	6.06	0.437	19.11
85	2	4	25	7581.0	1056.0	2885.0	37.0	203.0	5588.0	81.0	15.7	40.6	67.1	189.0	4.9	10.0	559.0	5.58	0.278	19.64
86	2	4	30	7882.0	1139.0	3381.0	39.0	784.0	9673.0	176.0	20.1	42.8	68.3	212.0	13.0	14.0	592.0	5.33	0.248	20.6
87	2	4	35	7069.0	1122.0	3087.0	39.0	352.0	7425.0	169.0	19.2	37.8	65.8	171.0	16.3	9.0	640.0	5.66	0.247	11.89
88	2	4	40	5770.0	2029.0	3069.0	31.0	190.0	8280.0	175.0	27.0	40.3	72.9	176.0	16.5	11.0	518.0	4.38	0.257	21.41
89	2	4	45	6119.0	2487.0	3230.0	31.0	335.0	8566.0	184.0	23.6	39.3	71.7	192.0	18.7	11.0	495.0	4.43	0.267	19.81
90	2	4	50	6615.0	2552.0	3472.0	38.0	279.0	10085.0	251.0	24.7	42.6	81.2	222.0	12.7	11.0	468.0	4.49	0.211	20.39
91	2	5	5	5443.0	2105.0	2963.0	41.0	264.0	7307.0	170.0	19.2	35.4	70.2	194.0	15.0	12.0	501.0	5.06	2.101	26.1
92	2	5	10	4929.0	2024.0	2683.0	30.0	289.0	9038.0	160.0	19.0	33.9	63.8	176.0	12.7	8.0	492.0	5.46	1.522	21.08
93	2	5	15	6113.0	2068.0	3638.0	37.0	520.0	8708.0	177.0	17.2	38.7	76.1	236.0	12.0	10.0	627.0	5.77	1.098	19.44
94	2	5	20	6941.0	2628.0	3807.0	48.0	937.0	20033.0	491.0	27.0	44.7	74.6	274.0	25.8	16.0	577.0	5.97	1.177	20.74
95	2	5	25	5930.0	1917.0	3350.0	46.0	298.0	15005.0	290.0	24.3	46.5	67.8	228.0	12.3	16.0	537.0	6.19	1.157	22.34
96	2	5	30	6239.0	2172.0	3433.0	50.0	126.0	12277.0	227.0	32.0	52.5	67.5	217.0	10.4	13.0	509.0	5.82	0.815	20.58
97	2	5	35	6141.0	2029.0	3260.0	40.0	124.0	11222.0	257.0	30.6	50.8	69.5	221.0	6.0	16.0	509.0	5.13	0.758	19.44
98	2	5	40	7655.0	2853.0	3350.0	53.0	183.0	16913.0	324.0	44.0	57.8	70.0	257.0	12.1	15.0	417.0	4.59	0.768	20.49
99	2	5	45	7605.0	2822.0	3379.0	54.0	485.0	18127.0	358.0	42.0	56.9	73.3	285.0	6.8	23.0	412.0	4.55	0.709	20.34
100	2	5	50	8672.0	3167.0	3719.0	59.0	451.0	18499.0	377.0	41.0	58.3	78.3	319.0	12.9	22.0	449.0	4.74	0.660	21.02
101	3	1	5	9396.0	755.0	3659.0	50.0	2251.0	11659.0	113.0	39.0	51.4	65.7	251.0	12.5	10.0	626.0	4.69	1.551	9.1
102	3	1	10	9195.0	1107.0	3284.0	37.0	879.0	9028.0	130.0	37.0	52.7	66.8	252.0	15.9	13.0	623.0	5.98	0.898	8.07
103	3	1	15	10018.0	1237.0	4205.0	47.0	1052.0	16985.0	301.0	44.0	60.4	79.2	224.0	10.1	14.0	703.0	6.4	0.598	7.22
104	3	1	20	10130.0	1158.0	4117.0	53.0	2061.0	13187.0	172.0	37.0	55.1	79.0	252.0	19.2	10.0	684.0	6.37	0.524	7.38
105	3	1	25	10947.0	1784.0	4136.0	46.0	1007.0	26679.0	437.0	50.0	65.1	88.7	370.0	25.9	25.0	591.0	6.15	0.366	12.26
106	3	1	30	10842.0	1645.0	3731.0	40.0	129.0	12782.0	252.0	56.0	76.3	90.5	269.0	11.0	16.0	377.0	5.41	0.295	12.18
107	3	1	35	11405.0	1439.0	4129.0	47.0	453.0	14020.0	311.0	45.0	67.1	94.0	263.0	9.6	20.0	474.0	4.65	0.344	12.06
108	3	1	40	11896.0	1579.0	3781.0	53.0	101.0	15117.0	309.0	50.0	73.2	90.6	284.0	9.5	18.0	370.0	4.53	0.256	12.64
109	3	1	45	13335.0	1204.0	3475.0	32.0	81.0	12001.0	202.0	54.0	72.5	97.9	280.0	8.5	21.0	289.0	4.86	0.262	11.6
110	3	1	50	12988.0	1692.0	4599.5	46.5	157.5	11588.5	198.0	43.0	68.5	107.8	280.0	10.5	16.5	487.5	4.71	0.286	11.47
111	3	2	5	10164.5	985.0	3699.5	39.0	1143.0	8450.0	183.0	37.0	55.0	72.4	245.0	16.9	9.5	600.0	6.98	0.907	12.54
112	3	2	10	10384.0	912.5	3701.5	39.5	1257.0	9197.0	179.0	36.0	54.5	71.7	238.0	17.1	13.0	592.0	6.77	0.652	14.65
113	3	2	15	10937.5	1021.0	3801.0	39.5	459.5	7075.5	143.0	36.0	65.6	76.1	238.5	11.6	10.5	511.5	6.74	0.584	15.8
114	3	2	20	10818.5	992.5	3615.0	30.0	1293.0	7477.5	112.5	30.0	56.5	68.8	207.0	7.9	9.5	504.5	5.82	0.517	18.02
115	3	2	25	11045.5	848.5	3745.5	33.0	835.5	8028.0	138.5	32.6	60.2	70.9	244.0	11.1	13.0	535.5	5.36	0.290	18.62
116	3	2	30	10608.5	733.0	3593.0	37.5	273.0	5378.0	101.0	27.7	57.7	71.1	206.5	10.4	8.5	548.5	4.85	0.271	19.5
117	3	2	35	11674.0	927.5	4014.0	41.5	1043.5	10522.0	207.0	33.5	66.1	74.2	264.5	12.7	13.5	528.0	4.52	0.210	20.38
118	3	2	40	11217.5	935.5	3524.0	33.5	637.0	7843.5	151.0	29.6	63.7	72.3	231.5	11.4	11.5	529.0	4.4	0.172	19.47
119	3	2	45	12216.5	838.5	3938.0	31.5	195.5	6975.5	165.5	28.0	67.4	91.8	209.0	12.8	14.0	662.5	4.29	0.192	22.84
120	3	2	50	10030.5	728.0	3333.0	39.0	226.5	6535.5	156.5	30.7	64.2	77.7	217.5	10.4	11.0	573.5	4.18	0.148	17.65
121	3	3	5	8184.0	1374.0	3244.0	42.5	501.5	9487.5	182.5	21.1	49.0	53.9	216.5	14.2	16.0	743.5	5.66	0.708	11.29
122	3	3	10	8379.5	541.0	3462.5	44.0	504.5	11362.0	232.0	29.8	53.8	57.2	214.5	17.0	16.0	806.5	5.7	0.377	12.94
123	3	3	15	9441.0	453.5	3579.5	38.0	471.0	12745.5	233.5	31.5	56.5	49.8	232.5	8.4	14.5	547.5	5.01	0.330	16.01
124	3	3	20	10240.5	369.5	3843.5	46.0	383.5	14695.0	293.0	33.0	62.1	52.3	261.5	11.8	16.0	550.0	4.35	0.263	21.48
125	3	3	25	11145.0	551.0	3953.5	44.5	288.5	24401.0	477.5	48.0	67.9	51.9	305.5	13.5	27.0	465.5	4.56	0.238	23.96
126	3	3	30	10743.5	279.5	3890.5	36.5	832.5	15694.5	345.5	37.5	65.0	55.4	259.5	18.2	19.5	471.0	4.25	0.299	25.07
127	3	3	35	10847.5	365.0	4083.5	56.5	98.5	23551.5	454.5	44.0	65.0	54.3	278.5	13.8	22.5	456.0	4.23	0.176	25.64
128	3	3	40	8830.5	78.5	3384.0	58.0	122.5	21365.5	393.0	40.0	61.2	49.6	264.0	11.2	23.5	422.5	4.1	0.147	25.87
129	3	3	45	11386.5	141.5	4125.5	51.5	143.5	23374.0	499.5	44.0	67.7	63.7	272.0	16.2	27.5	523.0	4.19	0.133	25.66
130	3	3	50	11338.5	155.0	3931.0	50.0	331.5	23533.0	386.0	37.5	59.6	53.8	276.5	13.8	20.5	424.0	4.12	0.140	25.72
131	3	4	5	10600.5	849.5	3747.0	45.0	900.5	10480.0	210.5	33.0	56.1	69.2	261.0	15.6	15.0	574.5	4.93	1.208	9.6
132	3	4	10	11589.0	1090.0	3839.5	44.5	854.5	15362.0	296.5	36.5	59.1	78.8	250.5	13.0	16.0	537.0	4.2	0.847	11.1
133	3	4	15	12032.0	1529.0	3968.0	50.0	1055.5	20977.5	375.5	38.0	61.7	82.8	397.5	11.7	16.5	577.5	5.13	0.631	12.05
134	3	4	20	12394.5	1953.0	3987.5	40.0	1616.0	36713.0	700.0	45.0	64.3	90.8	390.5	15.9	15.0	487.0	5.59	0.440	13.13
135	3	4	25	10394.0	861.0	3707.0	52.5	1492.5	9311.0	180.5	28.4	58.9	78.7	256.0	16.5	15.5	635.5	4.52	0.585	11.96
136	3	4	30	10528.5	994.5	3876.0	40.0	258.0	11835.0	253.0	29.2	57.0	84.2	270.0	13.6	16.0	599.0	4.84	0.642	9.03
137	3	4	35	10034.5	867.5	3680.0	38.5	160.5	11477.0	239.5	25.1	57.5	80.8	250.0	10.9	12.5	554.5	4.87	0.646	9.06
138	3	4	40	9808.5	722.5	3757.0	41.0	1393.0	9688.0	163.0	25.8	56.0	75.6	255.5	14.1	13.5	589.5	4.68	0.463	11.02
139	3	4	45	9293.5	524.0	3518.5	44.0	243.5	6386.0	119.0	24.0	53.6	70.0	220.0	14.7	16.0	625.0	4.82	0.470	13.42
140	3	4	50	9615.0	604.0	3587.0	44.0	589.0	8641.0	161.0	25.6	53.4	75.4	226.0	11.9	12.0	536.0	4.89	0.447	15.24
141	3	5	5	8565.5	970.5	4531.5	43.0	246.5	8563.5	177.0	34.1	53.7	68.1	250.5	23.3	12.0	513.0	4.19	1.512	20.18
142	3	5	10	8156.0	901.5	3687.0	34.5	483.5	8108.5	158.5	17.8	44.0	73.6	197.5	12.8	12.0	519.5	4.23	1.386	13.41
143	3	5	15	8592.0	1012.0	3952.5	48.0	99.0	6512.5	122.0	18.5	46.5	78.7	199.5	16.5	9.0	574.0	6.06	0.478	14.05
144	3	5	20	8440.5	899.5	3969.0	32.0	169.0	7217.5	162.0	21.1	47.9	75.6	217.5	12.7	8.5	543.0	6.22	0.404	12.21
145	3	5	25	8448.5	871.0	3883.0	36.0	477.0	9456.0	191.0	20.0	47.9	76.1	218.5	14.3	7.5	594.5	5.99	0.370	14.51
146	3	5	30	8586.5	863.5	3973.5	46.0	69.0	12004.5	233.5	20.3	54.9	73.2	206.0	12.2	11.0	512.5	5.62	0.337	15.96
147	3	5	35	8848.0	762.0	4092.0	40.5	48.5	15099.5	276.5	27.4	56.9	69.5	248.0	15.4	11.0	501.5	5.32	0.317	16.26
148	3	5	40	8644.0	888.0	4270.0	38.0	48.5	12513.5	292.5	22.8	57.9	72.7	247.5	14.1	17.0	719.5	5.16	0.289	17.61
149	3	5	45	9139.5	880.0	4155.5	52.5	371.5	20955.5	359.5	40.0	64.9	71.8	262.0	19.1	17.0	426.5	5.18	0.257	18.27
150	3	5	50	8560.0	705.5	3591.5	38.5	62.0	12044.5	199.5	26.3	53.7	72.2	205.5	10.8	6.5	428.5	5.55	0.205	18.56

FIELD-MOIST LOESS – Ti-STABLE,

INCL. MOISTURE CONTENT ANALYSIS RESULTS

Location information				PXRF Elemental data (mg/kg)															
ID	S	C	D	K	Ca	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	Zr	pH	% SOC	% Moisture
1	1	1	5	1.915	0.069	0.010	0.033	3.311	0.066	0.005	0.010	0.011	0.057	0.005	0.004	0.222	4.12	1.606	
2	1	1	10	1.905	0.102	0.012	0.036	3.614	0.062	0.006	0.009	0.010	0.057	0.004	0.004	0.211	4.08	1.131	
3	1	1	15	1.939	0.143	0.011	0.022	4.754	0.097	0.007	0.012	0.010	0.060	0.003	0.005	0.149	4.24	0.642	
4	1	1	20	2.024	0.078	0.012	0.015	5.172	0.094	0.007	0.012	0.010	0.063	0.003	0.005	0.133	4.29	0.405	
5	1	1	25	2.130	0.069	0.014	0.022	4.735	0.090	0.007	0.013	0.011	0.069	0.004	0.005	0.135	4.31	0.379	
6	1	1	30	2.272	0.073	0.012	0.017	6.404	0.111	0.009	0.014	0.012	0.064	0.004	0.005	0.132	4.34	0.316	
7	1	1	35	2.372	0.050	0.010	0.014	5.994	0.106	0.007	0.012	0.011	0.073	0.003	0.004	0.119	4.26	0.245	
8	1	1	40	2.444	0.035	0.012	0.047	6.005	0.093	0.009	0.014	0.013	0.065	0.003	0.004	0.123	4.15	0.238	
9	1	1	45	2.601	0.023	0.011	0.034	5.613	0.099	0.009	0.014	0.015	0.070	0.004	0.006	0.128	4.05	0.188	
10	1	1	50	2.539	0.120	0.014	0.035	5.302	0.084	0.009	0.015	0.020	0.081	0.003	0.005	0.160	4.07	0.180	
11	1	2	5	2.243	0.303	0.009	0.097	3.897	0.068	0.018	0.015	0.013	0.062	0.004	0.004	0.211	4.1	3.692	
12	1	2	10	2.184	0.355	0.012	0.038	5.752	0.117	0.010	0.015	0.011	0.070	0.003	0.006	0.149	4.96	1.256	
13	1	2	15	1.958	0.313	0.011	0.042	4.323	0.086	0.010	0.013	0.011	0.055	0.004	0.006	0.147	5.33	0.744	
14	1	2	20	2.260	0.228	0.015	0.019	5.919	0.093	0.008	0.014	0.011	0.067	0.002	0.004	0.124	5.29	0.635	
15	1	2	25	1.629	0.078	0.009	0.012	5.082	0.077	0.006	0.010	0.008	0.050	0.002	0.004	0.118	5.35	0.592	
16	1	2	30	2.192	0.181	0.011	0.022	5.413	0.099	0.008	0.013	0.011	0.056	0.003	0.005	0.134	5.24	0.476	
17	1	2	35	2.204	0.138	0.011	0.015	5.387	0.087	0.007	0.013	0.010	0.061	0.001	0.005	0.121	5.34	0.536	
18	1	2	40	2.346	0.161	0.013	0.017	5.269	0.098	0.008	0.013	0.011	0.063	0.003	0.005	0.130	5.44	0.475	
19	1	2	45	2.387	0.093	0.010	0.023	4.676	0.077	0.007	0.012	0.011	0.054	0.003	0.005	0.164	4.93	0.401	
20	1	2	50	2.299	0.113	0.011	0.024	4.904	0.093	0.008	0.012	0.011	0.068	0.003	0.006	0.139	4.97	0.303	
21	1	3	5	1.890	0.082	0.011	0.043	2.949	0.055	0.005	0.011	0.011	0.054	0.004	0.004	0.195	4.78	1.499	1.3
22	1	3	10	2.079	0.143	0.012	0.031	4.255	0.082	0.007	0.012	0.010	0.054	0.004	0.003	0.152	4.95	0.877	2.24
23	1	3	15	1.992	0.126	0.012	0.023	4.538	0.086	0.007	0.012	0.010	0.060	0.002	0.005	0.143	5.11	0.753	2.23
24	1	3	20	2.139	0.178	0.015	0.024	6.058	0.107	0.009	0.014	0.010	0.072	0.002	0.006	0.121	5.19	0.674	2.17
25	1	3	25	2.080	0.183	0.014	0.025	5.893	0.094	0.009	0.013	0.010	0.060	0.002	0.004	0.118	5.2	0.646	2.52
26	1	3	30	2.225	0.121	0.015	0.023	5.600	0.082	0.008	0.013	0.011	0.073	0.002	0.003	0.129	5.02	0.563	2.21
27	1	3	35	3.887	0.354	0.011	0.024	3.411	0.059	0.015	0.021	0.028	0.081	0.003	0.005	0.082	4.52	0.411	2.12
28	1	3	40	2.290	0.061	0.012	0.051	4.726	0.068	0.007	0.012	0.012	0.057	0.002	0.005	0.134	4.49	0.266	1.47
29	1	3	45	2.274	0.060	0.012	0.033	3.752	0.069	0.007	0.012	0.011	0.054	0.003	0.004	0.131	4.57	0.191	1.78
30	1	3	50	2.308	0.046	0.012	0.051	5.462	0.100	0.009	0.013	0.014	0.063	0.004	0.005	0.157	4.57	0.161	1.65
31	1	4	5	2.119	0.286	0.010	0.075	3.879	0.053	0.009	0.014	0.011	0.063	0.005	0.004	0.155	4.42	2.929	24.71
32	1	4	10	2.474	0.236	0.013	0.105	4.644	0.086	0.009	0.013	0.011	0.067	0.004	0.006	0.142	4.99	1.143	16.68
33	1	4	15	2.229	0.144	0.011	0.109	4.158	0.070	0.008	0.013	0.010	0.058	0.004	0.003	0.126	4.78	0.804	16.65
34	1	4	20	2.692	0.176	0.012	0.090	5.548	0.105	0.010	0.014	0.011	0.076	0.005	0.006	0.124	5.04	0.600	23.84
35	1	4	25	2.476	0.174	0.011	0.067	6.198	0.092	0.010	0.015	0.012	0.075	0.003	0.006	0.128	5.22	0.464	19.09
36	1	4	30	2.621	0.173	0.012	0.066	5.037	0.073	0.009	0.013	0.011	0.068	0.003	0.004	0.114	5.64	0.397	18.47
37	1	4	35	2.520	0.152	0.012	0.060	4.747	0.073	0.008	0.013	0.011	0.060	0.003	0.005	0.110	5.75	0.357	17.46
38	1	4	40	2.588	0.141	0.012	0.056	4.661	0.074	0.008	0.012	0.010	0.063	0.003	0.004	0.115	5.45	0.248	16.13
39	1	4	45	2.645	0.070	0.010	0.052	4.319	0.060	0.007	0.011	0.009	0.062	0.003	0.004	0.098	5.06	0.202	15.03
40	1	4	50	2.678	0.061	0.011	0.057	4.260	0.061	0.007	0.011	0.009	0.062	0.002	0.004	0.101	4.92	0.164	13.55
41	1	5	5	1.616	0.039	0.010	0.178	2.164	0.031	0.006	0.010	0.013	0.048	0.004	0.003	0.184	4.44	1.617	28.23
42	1	5	10	1.560	0.076	0.009	0.146	2.617	0.038	0.004	0.008	0.012	0.058	0.004	0.004	0.186	4.53	0.751	18.9
43	1	5	15	1.588	0.149	0.008	0.139	1.939	0.042	0.005	0.008	0.012	0.049	0.004	0.002	0.183	5.41	0.615	17.17
44	1	5	20	1.364	0.148	0.011	0.251	1.673	0.028	0.003	0.007	0.012	0.057	0.003	0.003	0.179	5.73	0.540	17.14
45	1	5	25	1.579	0.179	0.008	0.111	1.498	0.018	0.004	0.008	0.015	0.045	0.003	0.001	0.181	5.6	0.649	17.85
46	1	5	30	1.468	0.176	0.009	0.231	1.503	0.028	0.004	0.007	0.013	0.045	0.003	0.003	0.171	5.43	0.652	18.51
47	1	5	35	1.484	0.131	0.008	0.157	1.568	0.029	0.003	0.007	0.013	0.052	0.003	0.002	0.171	5.11	0.658	18.45
48	1	5	40	1.399	0.123	0.009	0.084	1.104	0.019	0.003	0.007	0.011	0.040	0.002	0.002	0.139	5.04	0.695	17.05
49	1	5	45	1.328	0.067	0.014	0.028	1.401	0.027	0.004	0.007	0.011	0.043	0.002	0.002	0.123	4.99	0.826	15.46
50	1	5	50	1.599	0.082	0.010	0.036	2.708	0.054	0.006	0.010	0.013	0.057	0.003	0.003	0.126	4.74	0.392	16.82
51	2	1	5	1.973	0.467	0.011	0.181	2.820	0.053	0.010	0.013	0.026	0.068	0.008	0.003	0.193	4.55	2.416	32.05
52	2	1	10	1.987	0.417	0.011	0.073	2.092	0.035	0.007	0.011	0.024	0.064	0.007	0.004	0.176	4.58	1.452	24.71
53	2	1	15	1.885	0.422	0.012	0.295	2.309	0.053	0.006	0.011	0.023	0.055	0.006	0.003	0.180	4.98	0.831	20.29
54	2	1	20	1.872	0.422	0.011	0.073	2.494	0.052	0.006	0.011	0.024	0.062	0.005	0.002	0.190	5.47	0.613	19.72
55	2	1	25	1.918	0.454	0.011	0.103	2.838	0.045	0.005	0.011	0.024	0.055	0.004	0.002	0.187	5.45	0.485	11.97
56	2	1	30	1.937	0.465	0.011	0.041	2.748	0.051	0.005	0.012	0.025	0.063	0.003	0.005	0.186	5.09	0.374	7.72
57	2	1	35	1.934	0.493	0.010	0.040	2.509	0.054	0.007	0.013	0.026	0.058	0.004	0.005	0.181	5.03	0.393	11.63
58	2	1	40	2.166	0.777	0.013	0.085	3.066	0.077	0.010	0.014	0.027	0.066	0.005	0.003	0.177	5.09	0.384	20.12
59	2	1	45	2.103	0.514	0.011	0.042	3.427	0.070	0.008	0.014	0.024	0.067	0.004	0.005	0.161	5.02	0.328	41.01
60	2	1	50	2.164	0.623	0.010	0.050	5.303	0.133	0.009	0.014	0.023	0.068	0.004	0.005	0.141	5.08	0.290	32.58
61	2	2	5	2.049	0.094	0.012	0.160	2.628	0.051	0.007	0.013	0.019	0.063	0.003	0.004	0.196	4.43	0.479	18.74
62	2	2	10	2.130	0.091	0.012	0.150	3.614	0.083	0.006	0.013	0.016	0.063	0.003	0.005	0.167	3.65	0.327	18.48
63	2	2	15	2.113	0.082	0.013	0.033	3.235	0.069	0.007	0.014	0.016	0.058	0.003	0.004	0.154	3.76	0.313	19.21
64	2	2	20	2.270	0.136	0.013	0.096	2.929	0.055	0.007	0.014	0.018	0.062	0.003	0.003	0.159	3.74	0.248	20.86
65	2	2	25	2.597	0.093	0.013	0.028	5.602	0.107	0.012	0.016	0.015	0.076	0.003	0.005	0.120	3.81	0.233	23.51
66	2	2	30	2.579	0.107	0.013	0.035	6.212	0.125	0.013	0.016	0.016	0.073	0.004	0.006	0.123	4	0.273	24.93
67	2	2	35	2.581	0.140	0.012	0.029	6.095	0.119	0.011	0.015	0.016	0.076	0.003	0.006	0.123	4.08	0.281	24.3
68	2	2	40	2.394	0.145	0.013	0.022	4.119	0.084	0.009	0.014	0.016	0.073	0.003	0.005	0.128	4.15	0.311	23.72
69	2	2	45	2.452	0.177	0.011	0.016	5.026	0.106	0.007	0.014	0.017	0.062	0.004	0.005	0.129	4.1	0.267	24.19
70	2	2	50	2.702	0.227	0.012	0.026	4.218	0.086	0.008	0.015	0.021	0.069	0.004	0.005	0.160	4.16	0.217	22.76
71	2	3	5	2.181	0.459	0.011	0.114	3.958	0.066	0.015	0.017	0.026	0.076	0.011	0.005	0.138	3.92	4.013	28.59
72	2	3	10	2.767	0.715	0.013	0.167	3.931	0.070	0.012	0.017	0.028	0.073	0.005	0.005	0.143	4.58	1.328	23.3
73	2	3	15	2.499	0.610	0.011	0.264	3.612	0.077	0.012	0.017	0.027	0.074	0.005	0.005	0.144	4.69	1.099	21.86
74	2	3	20	2.375	0.548	0.009	0.139	2.886	0.049	0.010	0.016	0.025	0.065	0.006	0.003	0.146	4.82	1.052	22.36
75				2.322	0.557	0.011	0.129	3.338	0.068	0.010	0.015	0.023	0.064	0.006	0.005	0.132	4.82	0.774	22.2

FIELD-MOIST LOESS – Ti-STABLE (cont.) ,

INCL. MOISTURE CONTENT ANALYSIS RESULTS

Location information				PXRF Elemental data (mg/kg)														%	%
ID	2	3	25	K	Ca	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	Zr	pH	SOC	Moisture
76	2	3	30	2.260	0.469	0.012	0.178	3.068	0.051	0.010	0.016	0.025	0.060	0.005	0.005	0.153	4.68	0.831	21
77	2	3	35	2.158	0.343	0.014	0.053	3.224	0.064	0.008	0.015	0.022	0.070	0.003	0.004	0.170	4.22	0.746	17.95
78	2	3	40	2.223	0.382	0.013	0.038	4.384	0.097	0.012	0.017	0.019	0.070	0.003	0.005	0.127	4.04	0.362	19.81
79	2	3	45	2.318	0.332	0.013	0.068	5.252	0.098	0.014	0.017	0.020	0.070	0.004	0.006	0.132	4.05	0.422	22.11
80	2	3	50	2.375	0.412	0.013	0.048	5.724	0.085	0.014	0.017	0.021	0.071	0.001	0.004	0.126	4.09	0.384	24.33
81	2	4	5	2.466	0.410	0.013	0.083	1.952	0.041	0.006	0.013	0.023	0.067	0.005	0.003	0.231	4.87	1.395	21.74
82	2	4	10	2.290	0.363	0.011	0.263	2.097	0.046	0.006	0.013	0.022	0.065	0.004	0.003	0.219	5.5	0.645	18.09
83	2	4	15	2.453	0.436	0.017	0.080	2.057	0.039	0.006	0.014	0.023	0.063	0.003	0.003	0.236	5.79	0.515	17.05
84	2	4	20	2.509	0.406	0.012	0.188	2.310	0.040	0.006	0.014	0.024	0.069	0.004	0.003	0.232	6.06	0.437	19.11
85	2	4	25	2.628	0.366	0.013	0.070	1.937	0.028	0.005	0.014	0.023	0.066	0.002	0.003	0.194	5.58	0.278	19.64
86	2	4	30	2.331	0.337	0.012	0.232	2.861	0.052	0.006	0.013	0.020	0.063	0.004	0.004	0.175	5.33	0.248	20.6
87	2	4	35	2.290	0.363	0.013	0.114	2.405	0.055	0.006	0.012	0.021	0.055	0.005	0.003	0.207	5.66	0.247	11.89
88	2	4	40	1.880	0.661	0.010	0.062	2.698	0.057	0.009	0.013	0.024	0.057	0.005	0.004	0.169	4.38	0.257	21.41
89	2	4	45	1.894	0.770	0.010	0.104	2.652	0.057	0.007	0.012	0.022	0.059	0.006	0.003	0.153	4.43	0.267	19.81
90	2	4	50	1.905	0.735	0.011	0.080	2.905	0.072	0.007	0.012	0.023	0.064	0.004	0.003	0.135	4.49	0.211	20.39
91	2	5	5	1.837	0.710	0.014	0.089	2.466	0.057	0.006	0.012	0.024	0.065	0.005	0.004	0.169	5.06	2.101	26.1
92	2	5	10	1.837	0.754	0.011	0.108	3.369	0.060	0.007	0.013	0.024	0.066	0.005	0.003	0.183	5.46	1.522	21.08
93	2	5	15	1.680	0.568	0.010	0.143	2.394	0.049	0.005	0.011	0.021	0.065	0.003	0.003	0.172	5.77	1.098	19.44
94	2	5	20	1.823	0.690	0.013	0.246	5.262	0.129	0.007	0.012	0.020	0.072	0.007	0.004	0.152	5.97	1.177	20.74
95	2	5	25	1.770	0.572	0.014	0.089	4.479	0.087	0.007	0.014	0.020	0.068	0.004	0.005	0.160	6.19	1.157	22.34
96	2	5	30	1.817	0.633	0.015	0.037	3.576	0.066	0.009	0.015	0.020	0.063	0.003	0.004	0.148	5.82	0.815	20.58
97	2	5	35	1.884	0.622	0.012	0.038	3.442	0.079	0.009	0.016	0.021	0.068	0.002	0.005	0.156	5.13	0.758	19.44
98	2	5	40	2.285	0.852	0.016	0.055	5.049	0.097	0.013	0.017	0.021	0.077	0.004	0.004	0.124	4.59	0.768	20.49
99	2	5	45	2.251	0.835	0.016	0.144	5.365	0.106	0.012	0.017	0.022	0.084	0.002	0.007	0.122	4.55	0.709	20.34
100	2	5	50	2.332	0.852	0.016	0.121	4.974	0.101	0.011	0.016	0.021	0.086	0.003	0.006	0.121	4.74	0.660	21.02
101	3	1	5	2.568	0.206	0.014	0.615	3.186	0.031	0.011	0.014	0.018	0.069	0.003	0.003	0.171	4.69	1.551	9.1
102	3	1	10	2.800	0.337	0.011	0.268	2.749	0.040	0.011	0.016	0.020	0.077	0.005	0.004	0.190	5.98	0.898	8.07
103	3	1	15	2.382	0.294	0.011	0.250	4.039	0.072	0.010	0.014	0.019	0.053	0.002	0.003	0.167	6.4	0.598	7.22
104	3	1	20	2.461	0.281	0.013	0.501	3.203	0.042	0.009	0.013	0.019	0.061	0.005	0.002	0.166	6.37	0.524	7.38
105	3	1	25	2.647	0.431	0.011	0.243	6.450	0.106	0.012	0.016	0.021	0.089	0.006	0.006	0.143	6.15	0.366	12.26
106	3	1	30	2.906	0.441	0.011	0.035	3.426	0.068	0.015	0.020	0.024	0.072	0.003	0.004	0.101	5.41	0.295	12.18
107	3	1	35	2.762	0.349	0.011	0.110	3.395	0.075	0.011	0.016	0.023	0.064	0.002	0.005	0.115	4.65	0.344	12.06
108	3	1	40	3.146	0.418	0.014	0.027	3.998	0.082	0.013	0.019	0.024	0.075	0.003	0.005	0.098	4.53	0.256	12.64
109	3	1	45	3.837	0.346	0.009	0.023	3.454	0.058	0.016	0.021	0.028	0.081	0.002	0.006	0.083	4.86	0.262	11.6
110	3	1	50	2.824	0.368	0.010	0.034	2.520	0.043	0.009	0.015	0.023	0.061	0.002	0.004	0.106	4.71	0.286	11.47
111	3	2	5	2.748	0.266	0.011	0.309	2.284	0.049	0.010	0.015	0.020	0.066	0.005	0.003	0.162	6.98	0.907	12.54
112	3	2	10	2.805	0.247	0.011	0.340	2.485	0.048	0.010	0.015	0.019	0.064	0.005	0.004	0.160	6.77	0.652	14.65
113	3	2	15	2.878	0.269	0.010	0.121	1.861	0.038	0.009	0.017	0.020	0.063	0.003	0.003	0.135	6.74	0.584	15.8
114	3	2	20	2.993	0.275	0.008	0.358	2.068	0.031	0.008	0.016	0.019	0.057	0.002	0.003	0.140	5.82	0.517	18.02
115	3	2	25	2.949	0.227	0.009	0.223	2.143	0.037	0.009	0.016	0.019	0.065	0.003	0.003	0.143	5.36	0.290	18.62
116	3	2	30	2.953	0.204	0.010	0.076	1.497	0.028	0.008	0.016	0.020	0.057	0.003	0.002	0.153	4.85	0.271	19.5
117	3	2	35	2.908	0.231	0.010	0.260	2.621	0.052	0.008	0.016	0.018	0.066	0.003	0.003	0.132	4.52	0.210	20.38
118	3	2	40	3.183	0.265	0.010	0.181	2.226	0.043	0.008	0.018	0.021	0.066	0.003	0.003	0.150	4.4	0.172	19.47
119	3	2	45	3.102	0.213	0.008	0.050	1.771	0.042	0.007	0.017	0.023	0.053	0.003	0.004	0.168	4.29	0.192	22.84
120	3	2	50	3.009	0.218	0.012	0.068	1.961	0.047	0.009	0.019	0.023	0.065	0.003	0.003	0.172	4.18	0.148	17.65
121	3	3	5	2.523	0.424	0.013	0.155	2.925	0.056	0.006	0.015	0.017	0.067	0.004	0.005	0.229	5.66	0.708	11.29
122	3	3	10	2.420	0.156	0.013	0.146	3.281	0.067	0.009	0.016	0.017	0.062	0.005	0.005	0.233	5.7	0.377	12.94
123	3	3	15	2.638	0.127	0.011	0.132	3.561	0.065	0.009	0.016	0.014	0.065	0.002	0.004	0.153	5.01	0.330	16.01
124	3	3	20	2.664	0.096	0.012	0.100	3.823	0.076	0.009	0.016	0.014	0.068	0.003	0.004	0.143	4.35	0.263	21.48
125	3	3	25	2.819	0.139	0.011	0.073	6.172	0.121	0.012	0.017	0.013	0.077	0.003	0.007	0.118	4.56	0.238	23.96
126	3	3	30	2.761	0.072	0.009	0.214	4.034	0.089	0.010	0.017	0.014	0.067	0.005	0.005	0.121	4.25	0.299	25.07
127	3	3	35	2.656	0.089	0.014	0.024	5.767	0.111	0.011	0.016	0.013	0.068	0.003	0.006	0.112	4.23	0.176	25.64
128	3	3	40	2.609	0.023	0.017	0.036	6.314	0.116	0.012	0.018	0.015	0.078	0.003	0.007	0.125	4.1	0.147	25.87
129	3	3	45	2.760	0.034	0.012	0.035	5.666	0.121	0.011	0.016	0.015	0.066	0.004	0.007	0.127	4.19	0.133	25.66
130	3	3	50	2.884	0.039	0.013	0.084	5.987	0.098	0.010	0.015	0.014	0.070	0.004	0.005	0.108	4.12	0.140	25.72
131	3	4	5	2.829	0.227	0.012	0.240	2.797	0.056	0.009	0.015	0.018	0.070	0.004	0.004	0.153	4.93	1.208	9.6
132	3	4	10	3.018	0.284	0.012	0.223	4.001	0.077	0.010	0.015	0.021	0.065	0.003	0.004	0.140	4.2	0.847	11.1
133	3	4	15	3.032	0.385	0.013	0.266	5.287	0.095	0.010	0.016	0.021	0.100	0.003	0.004	0.146	5.13	0.631	12.05
134	3	4	20	3.108	0.490	0.010	0.405	9.207	0.176	0.011	0.016	0.023	0.098	0.004	0.004	0.122	5.59	0.440	13.13
135	3	4	25	2.804	0.232	0.014	0.403	2.512	0.049	0.008	0.016	0.021	0.069	0.004	0.004	0.171	4.52	0.585	11.96
136	3	4	30	2.716	0.257	0.010	0.067	3.053	0.065	0.008	0.015	0.022	0.070	0.003	0.004	0.155	4.84	0.642	9.03
137	3	4	35	2.727	0.236	0.010	0.044	3.119	0.065	0.007	0.016	0.022	0.068	0.003	0.003	0.151	4.87	0.646	9.06
138	3	4	40	2.611	0.192	0.011	0.371	2.579	0.043	0.007	0.015	0.020	0.068	0.004	0.004	0.157	4.68	0.463	11.02
139	3	4	45	2.641	0.149	0.013	0.069	1.815	0.034	0.007	0.015	0.020	0.063	0.004	0.005	0.178	4.82	0.470	13.42
140	3	4	50	2.681	0.168	0.012	0.164	2.409	0.045	0.007	0.015	0.021	0.063	0.003	0.003	0.149	4.89	0.447	15.24
141	3	5	5	1.890	0.214	0.009	0.054	1.890	0.039	0.008	0.012	0.015	0.055	0.005	0.003	0.113	4.19	1.512	20.18
142	3	5	10	2.212	0.245	0.009	0.131	2.199	0.043	0.005	0.012	0.020	0.054	0.003	0.003	0.141	4.23	1.386	13.41
143	3	5	15	2.174	0.256	0.012	0.025	1.648	0.031	0.005	0.012	0.020	0.050	0.004	0.002	0.145	6.06	0.478	14.05
144	3	5	20	2.127	0.227	0.008	0.043	1.818	0.041	0.005	0.012	0.019	0.055	0.003	0.002	0.137	6.22	0.404	12.21
145	3	5	25	2.176	0.224	0.009	0.123	2.435	0.049	0.005	0.012	0.020	0.056	0.004	0.002	0.153	5.99	0.370	14.51
146	3	5	30	2.161	0.217	0.012	0.017	3.021	0.059	0.005	0.014	0.018	0.052	0.003	0.003	0.129	5.62	0.337	15.96
147	3	5	35	2.162	0.186	0.010	0.012	3.690	0.068	0.007	0.014	0.017	0.061	0.004	0.003	0.123	5.32	0.317	16.26
148	3	5	40	2.024	0.208	0.009	0.011	2.931	0.069	0.005	0.014	0.017	0.058	0.003	0.004	0.169	5.16	0.289	17.61
149	3	5	45	2.199	0.212	0.013	0.089	5.043	0.087	0.010	0.016	0.017	0.063	0.005	0.004	0.103	5.18	0.257	18.27
150	3	5	50	2.383	0.196	0.011	0.017	3.354	0.056	0.007	0.015	0.020	0.057	0.003	0.002	0.119	5.55	0.205	18.56

FIELD-MOIST LOESS – Zr-STABLE,

INCL. MOISTURE CONTENT ANALYSIS RESULTS

Location information				PXRF Elemental data															
				mg/kg														%	%
ID	S	C	D	K	Ca	Ti	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	pH	SOC	Moisture
1	1	1	5	8.617	0.308	4.499	0.044	0.146	14.893	0.296	0.024	0.044	0.048	0.258	0.023	0.020	4.12	1.606	
2	1	1	10	9.044	0.482	4.747	0.055	0.170	17.156	0.296	0.027	0.044	0.045	0.270	0.021	0.021	4.08	1.131	
3	1	1	15	12.984	0.959	6.697	0.074	0.146	31.839	0.648	0.045	0.081	0.070	0.402	0.023	0.031	4.24	0.642	
4	1	1	20	15.193	0.583	7.506	0.091	0.114	38.822	0.708	0.049	0.088	0.076	0.470	0.022	0.036	4.29	0.405	
5	1	1	25	15.795	0.515	7.416	0.105	0.164	35.116	0.669	0.054	0.093	0.080	0.515	0.030	0.034	4.31	0.379	
6	1	1	30	17.274	0.556	7.604	0.092	0.127	48.700	0.845	0.069	0.109	0.090	0.490	0.030	0.040	4.34	0.316	
7	1	1	35	19.935	0.418	8.404	0.088	0.119	50.372	0.893	0.061	0.102	0.094	0.613	0.021	0.033	4.26	0.245	
8	1	1	40	19.886	0.283	8.136	0.096	0.379	48.860	0.757	0.070	0.110	0.105	0.531	0.028	0.031	4.15	0.238	
9	1	1	45	20.373	0.180	7.831	0.086	0.266	43.958	0.774	0.069	0.110	0.117	0.545	0.031	0.044	4.05	0.188	
10	1	1	50	15.871	0.747	6.251	0.089	0.220	33.137	0.523	0.059	0.096	0.125	0.507	0.020	0.030	4.07	0.180	
11	1	2	5	10.613	1.435	4.731	0.041	0.458	18.440	0.323	0.087	0.070	0.062	0.292	0.019	0.021	4.1	3.692	
12	1	2	10	14.698	2.390	6.731	0.080	0.256	38.716	0.785	0.069	0.099	0.077	0.473	0.019	0.041	4.96	1.256	
13	1	2	15	13.292	2.124	6.789	0.073	0.282	29.348	0.585	0.069	0.087	0.073	0.375	0.027	0.038	5.33	0.744	
14	1	2	20	18.281	1.845	8.087	0.119	0.157	47.866	0.753	0.066	0.113	0.087	0.543	0.017	0.034	5.29	0.635	
15	1	2	25	13.746	0.660	8.439	0.078	0.101	42.887	0.650	0.050	0.081	0.065	0.421	0.016	0.035	5.35	0.592	
16	1	2	30	16.302	1.344	7.437	0.080	0.162	40.259	0.738	0.058	0.099	0.081	0.419	0.024	0.038	5.24	0.476	
17	1	2	35	18.148	1.135	8.233	0.093	0.127	44.347	0.717	0.061	0.108	0.082	0.501	0.009	0.040	5.34	0.536	
18	1	2	40	18.093	1.241	7.711	0.099	0.129	40.625	0.759	0.063	0.099	0.086	0.483	0.023	0.039	5.44	0.475	
19	1	2	45	14.581	0.569	6.110	0.063	0.141	28.567	0.473	0.040	0.071	0.066	0.329	0.016	0.028	4.93	0.401	
20	1	2	50	16.490	0.808	7.174	0.079	0.170	35.177	0.666	0.054	0.088	0.079	0.489	0.020	0.043	4.97	0.303	
21	1	3	5	9.677	0.420	5.120	0.056	0.222	15.098	0.279	0.028	0.057	0.056	0.274	0.019	0.019	4.78	1.499	1.3
22	1	3	10	13.643	0.940	6.564	0.079	0.203	27.930	0.536	0.049	0.079	0.068	0.352	0.028	0.019	4.95	0.877	2.24
23	1	3	15	13.978	0.883	7.017	0.082	0.162	31.845	0.603	0.050	0.084	0.070	0.421	0.017	0.037	5.11	0.753	2.23
24	1	3	20	17.685	1.473	8.269	0.123	0.195	50.092	0.882	0.077	0.112	0.085	0.593	0.021	0.046	5.19	0.674	2.17
25	1	3	25	17.556	1.543	8.439	0.115	0.210	49.733	0.797	0.079	0.109	0.085	0.508	0.021	0.035	5.2	0.646	2.52
26	1	3	30	17.277	0.940	7.763	0.113	0.177	43.478	0.637	0.062	0.102	0.083	0.564	0.019	0.022	5.02	0.563	2.21
27	1	3	35	47.617	4.334	12.251	0.137	0.288	41.787	0.722	0.185	0.255	0.342	0.996	0.034	0.065	4.52	0.411	2.12
28	1	3	40	17.135	0.456	7.484	0.087	0.383	35.371	0.510	0.054	0.092	0.087	0.429	0.016	0.034	4.49	0.266	1.47
29	1	3	45	17.318	0.458	7.616	0.091	0.251	28.577	0.525	0.054	0.091	0.087	0.413	0.019	0.030	4.57	0.191	1.78
30	1	3	50	14.664	0.293	6.355	0.074	0.327	34.708	0.638	0.054	0.084	0.088	0.397	0.024	0.032	4.57	0.161	1.65
31	1	4	5	13.701	1.846	6.465	0.068	0.484	25.077	0.346	0.061	0.088	0.070	0.407	0.035	0.026	4.42	2.929	24.71
32	1	4	10	17.427	1.660	7.043	0.095	0.741	32.709	0.603	0.065	0.093	0.075	0.474	0.029	0.040	4.99	1.143	16.68
33	1	4	15	17.708	1.141	7.943	0.088	0.863	33.025	0.554	0.063	0.103	0.080	0.460	0.032	0.020	4.78	0.804	16.65
34	1	4	20	21.679	1.414	8.052	0.099	0.724	44.672	0.847	0.084	0.112	0.088	0.610	0.037	0.050	5.04	0.600	23.84
35	1	4	25	19.344	1.361	7.813	0.087	0.524	48.421	0.721	0.082	0.120	0.095	0.587	0.020	0.043	5.22	0.464	19.09
36	1	4	30	22.982	1.515	8.768	0.107	0.579	44.158	0.640	0.081	0.115	0.095	0.599	0.025	0.033	5.64	0.397	18.47
37	1	4	35	22.919	1.381	9.093	0.107	0.547	43.163	0.663	0.072	0.115	0.102	0.542	0.030	0.044	5.75	0.357	17.46
38	1	4	40	22.521	1.227	8.703	0.106	0.485	40.564	0.646	0.072	0.104	0.090	0.544	0.029	0.038	5.45	0.248	16.13
39	1	4	45	27.094	0.722	10.243	0.104	0.536	44.243	0.613	0.074	0.115	0.097	0.633	0.030	0.040	5.06	0.202	15.03
40	1	4	50	26.397	0.606	9.858	0.104	0.560	41.995	0.598	0.071	0.110	0.092	0.616	0.021	0.041	4.92	0.164	13.55
41	1	5	5	8.779	0.214	5.433	0.053	0.964	11.757	0.170	0.031	0.053	0.069	0.260	0.024	0.019	4.44	1.617	28.23
42	1	5	10	8.403	0.408	5.386	0.049	0.789	14.093	0.202	0.022	0.042	0.063	0.315	0.023	0.019	4.53	0.751	18.9
43	1	5	15	8.677	0.817	5.463	0.045	0.762	10.593	0.228	0.025	0.046	0.066	0.267	0.020	0.013	5.41	0.615	17.17
44	1	5	20	7.604	0.826	5.573	0.059	1.396	9.324	0.157	0.017	0.041	0.068	0.315	0.018	0.019	5.73	0.540	17.14
45	1	5	25	8.708	0.984	5.515	0.045	0.612	8.264	0.101	0.022	0.047	0.080	0.250	0.016	0.008	5.6	0.649	17.85
46	1	5	30	8.588	1.029	5.852	0.053	1.354	8.796	0.162	0.022	0.042	0.077	0.264	0.018	0.017	5.43	0.652	18.51
47	1	5	35	8.667	0.764	5.842	0.044	0.919	9.163	0.172	0.016	0.040	0.074	0.304	0.017	0.009	5.11	0.658	18.45
48	1	5	40	10.101	0.885	7.218	0.064	0.604	7.970	0.138	0.019	0.049	0.082	0.288	0.017	0.018	5.04	0.695	17.05
49	1	5	45	10.756	0.546	8.098	0.115	0.229	11.349	0.222	0.030	0.059	0.091	0.349	0.016	0.017	4.99	0.826	15.46
50	1	5	50	12.683	0.647	7.932	0.079	0.284	21.479	0.427	0.047	0.079	0.104	0.452	0.025	0.025	4.74	0.392	16.82
51	2	1	5	10.247	2.425	5.193	0.056	0.941	14.644	0.278	0.054	0.066	0.136	0.351	0.039	0.017	4.55	2.416	32.05
52	2	1	10	11.304	2.374	5.690	0.061	0.413	11.905	0.202	0.042	0.064	0.136	0.362	0.039	0.024	4.58	1.452	24.71
53	2	1	15	10.500	2.351	5.569	0.064	1.642	12.859	0.297	0.035	0.060	0.129	0.308	0.034	0.018	4.98	0.831	20.29
54	2	1	20	9.868	2.226	5.272	0.056	0.384	13.149	0.272	0.033	0.061	0.126	0.324	0.026	0.012	5.47	0.613	19.72
55	2	1	25	10.236	2.422	5.336	0.060	0.550	15.145	0.240	0.027	0.060	0.129	0.296	0.022	0.011	5.45	0.485	11.97
56	2	1	30	10.394	2.493	5.366	0.057	0.220	14.744	0.274	0.025	0.065	0.133	0.338	0.016	0.026	5.09	0.374	7.72
57	2	1	35	10.670	2.720	5.516	0.056	0.222	13.843	0.296	0.037	0.071	0.144	0.321	0.025	0.027	5.03	0.393	11.63
58	2	1	40	12.240	4.393	5.651	0.075	0.480	17.323	0.435	0.054	0.080	0.152	0.373	0.027	0.018	5.09	0.384	20.12
59	2	1	45	13.046	3.187	6.203	0.068	0.259	21.255	0.436	0.047	0.090	0.151	0.416	0.022	0.032	5.02	0.328	41.01
60	2	1	50	15.310	4.409	7.074	0.071	0.351	37.509	0.944	0.064	0.102	0.164	0.481	0.028	0.032	5.08	0.290	32.58
61	2	2	5	10.478	0.480	5.115	0.063	0.819	13.441	0.262	0.036	0.067	0.096	0.321	0.016	0.020	4.43	0.479	18.74
62	2	2	10	12.759	0.543	5.991	0.073	0.899	21.655	0.495	0.035	0.076	0.093	0.378	0.019	0.030	3.65	0.327	18.48
63	2	2	15	13.745	0.536	6.506	0.086	0.213	21.046	0.449	0.046	0.091	0.103	0.380	0.018	0.023	3.76	0.313	19.21
64	2	2	20	14.308	0.856	6.304	0.082	0.602	18.468	0.349	0.044	0.087	0.114	0.392	0.019	0.018	3.74	0.248	20.86
65	2	2	25	21.645	0.775	8.336	0.106	0.236	46.695	0.889	0.097	0.137	0.122	0.631	0.024	0.045	3.81	0.233	23.51
66	2	2	30	20.904	0.866	8.105	0.105	0.285	50.350	1.016	0.105	0.132	0.127	0.592	0.029	0.047	4	0.273	24.93
67	2	2	35	20.995	1.141	8.134	0.095	0.234	49.574	0.971	0.091	0.124	0.127	0.615	0.022	0.045	4.08	0.281	24.3
68	2	2	40	18.719	1.137	7.820	0.099	0.169	32.216	0.655	0.068	0.111	0.129	0.569	0.021	0.040	4.15	0.311	23.72
69	2	2	45	18.998	1.370	7.749	0.085	0.127	38.945	0.822	0.058	0.105	0.129	0.483	0.028	0.042	4.1	0.267	24.19
70	2	2	50	16.890	1.421	6.250	0.074	0.163	26.364	0.535	0.051	0.095	0.134	0.431	0.022	0.032	4.16	0.217	22.76
71	2	3	5	15.800	3.328	7.245	0.078	0.827	28.675	0.475	0.105	0.123	0.187	0.549	0.081	0.036	3.92	4.013	28.59
72	2	3	10	19.413	5.014	7.016	0.094	1.172	27.583	0.493	0.087	0.119	0.196	0.511	0.037	0.037	4.58	1.328	23.3
73	2	3	15	17.331	4.233	6.936	0.078	1.831	25.051	0.533	0.082	0.120	0.187	0.513	0.032	0.033	4.69	1.099	21.86
74	2	3	20	16.262	3.751	6.846	0.062	0.953	19.759	0.333	0.066	0.111	0.173	0.443	0.040	0.021	4.82	1.052	22.36
75	2	3	25	17.547	4.205	7.556	0.083	0.976	25.218	0.515	0.075	0.115	0.170	0.487	0.043	0.036	4.82	0.774	22.2

FIELD-MOIST LOESS – Zr-STABLE (cont.),

INCL. MOISTURE CONTENT ANALYSIS RESULTS

Location information				PXRF Elemental data															
				mg/kg														%	%
ID	S	C	D	K	Ca	Ti	Cr	Mn	Fe	Co	Zn	Rb	Sr	Ba	Pb	Cu	pH	SOC	Moisture
76	2	3	30	14.787	3.066	6.542	0.079	1.166	20.072	0.337	0.064	0.106	0.162	0.394	0.034	0.030	4.68	0.831	21
77	2	3	35	12.714	2.019	5.892	0.084	0.315	18.997	0.377	0.046	0.088	0.132	0.413	0.020	0.026	4.22	0.746	17.95
78	2	3	40	17.446	2.994	7.846	0.099	0.299	34.398	0.758	0.097	0.130	0.145	0.552	0.026	0.038	4.04	0.362	19.81
79	2	3	45	17.611	2.522	7.597	0.095	0.514	39.897	0.741	0.105	0.127	0.149	0.530	0.029	0.049	4.05	0.422	22.11
80	2	3	50	18.812	3.263	7.922	0.102	0.378	45.349	0.673	0.112	0.136	0.167	0.559	0.008	0.034	4.09	0.384	24.33
81	2	4	5	10.679	1.776	4.330	0.055	0.359	8.450	0.177	0.028	0.057	0.099	0.292	0.020	0.013	4.87	1.395	21.74
82	2	4	10	10.465	1.658	4.571	0.051	1.201	9.586	0.208	0.029	0.058	0.102	0.297	0.020	0.014	5.5	0.645	18.09
83	2	4	15	10.386	1.847	4.235	0.071	0.337	8.709	0.164	0.026	0.060	0.098	0.266	0.013	0.012	5.79	0.515	17.05
84	2	4	20	10.822	1.750	4.313	0.053	0.813	9.966	0.174	0.025	0.058	0.104	0.296	0.019	0.015	6.06	0.437	19.11
85	2	4	25	13.562	1.889	5.161	0.066	0.363	9.996	0.145	0.028	0.073	0.120	0.338	0.009	0.018	5.58	0.278	19.64
86	2	4	30	13.314	1.924	5.711	0.066	1.324	16.340	0.297	0.034	0.072	0.115	0.358	0.022	0.024	5.33	0.248	20.6
87	2	4	35	11.045	1.753	4.823	0.061	0.550	11.602	0.264	0.030	0.059	0.103	0.267	0.025	0.014	5.66	0.247	11.89
88	2	4	40	11.139	3.917	5.925	0.060	0.367	15.985	0.338	0.052	0.078	0.141	0.340	0.032	0.021	4.38	0.257	21.41
89	2	4	45	12.362	5.024	6.525	0.063	0.677	17.305	0.372	0.048	0.079	0.145	0.388	0.038	0.022	4.43	0.267	19.81
90	2	4	50	14.135	5.453	7.419	0.081	0.596	21.549	0.536	0.053	0.091	0.174	0.474	0.027	0.024	4.49	0.211	20.39
91	2	5	5	10.864	4.202	5.914	0.082	0.527	14.585	0.339	0.038	0.071	0.140	0.387	0.030	0.024	5.06	2.101	26.1
92	2	5	10	10.018	4.114	5.453	0.061	0.587	18.370	0.325	0.039	0.069	0.130	0.358	0.026	0.016	5.46	1.522	21.08
93	2	5	15	9.750	3.298	5.802	0.059	0.829	13.888	0.282	0.027	0.062	0.121	0.376	0.019	0.016	5.77	1.098	19.44
94	2	5	20	12.029	4.555	6.598	0.083	1.624	34.719	0.851	0.047	0.077	0.129	0.475	0.045	0.028	5.97	1.177	20.74
95	2	5	25	11.043	3.570	6.238	0.086	0.555	27.942	0.540	0.045	0.087	0.126	0.425	0.023	0.030	6.19	1.157	22.34
96	2	5	30	12.257	4.267	6.745	0.098	0.248	24.120	0.446	0.063	0.103	0.133	0.426	0.020	0.026	5.82	0.815	20.58
97	2	5	35	12.065	3.986	6.405	0.079	0.244	22.047	0.505	0.060	0.100	0.137	0.434	0.012	0.031	5.13	0.758	19.44
98	2	5	40	18.357	6.842	8.034	0.127	0.439	40.559	0.777	0.106	0.139	0.168	0.616	0.029	0.036	4.59	0.768	20.49
99	2	5	45	18.459	6.850	8.201	0.131	1.177	43.998	0.869	0.102	0.138	0.178	0.692	0.017	0.056	4.55	0.709	20.34
100	2	5	50	19.314	7.053	8.283	0.131	1.004	41.200	0.840	0.091	0.130	0.174	0.710	0.029	0.049	4.74	0.660	21.02
101	3	1	5	15.010	1.206	5.845	0.080	3.596	18.625	0.181	0.062	0.082	0.105	0.401	0.020	0.016	4.69	1.551	9.1
102	3	1	10	14.759	1.777	5.271	0.059	1.411	14.491	0.209	0.059	0.085	0.107	0.404	0.026	0.021	5.98	0.898	8.07
103	3	1	15	14.250	1.760	5.982	0.067	1.496	24.161	0.428	0.063	0.086	0.113	0.319	0.014	0.020	6.4	0.598	7.22
104	3	1	20	14.810	1.693	6.019	0.077	3.013	19.279	0.251	0.054	0.081	0.115	0.368	0.028	0.015	6.37	0.524	7.38
105	3	1	25	18.523	3.019	6.998	0.078	1.704	45.142	0.739	0.085	0.110	0.150	0.626	0.044	0.042	6.15	0.366	12.26
106	3	1	30	28.759	4.363	9.897	0.106	0.342	33.905	0.668	0.149	0.202	0.240	0.714	0.029	0.042	5.41	0.295	12.18
107	3	1	35	24.061	3.036	8.711	0.099	0.956	29.578	0.656	0.095	0.142	0.198	0.555	0.020	0.042	4.65	0.344	12.06
108	3	1	40	32.151	4.268	10.219	0.143	0.273	40.857	0.835	0.135	0.198	0.245	0.768	0.026	0.049	4.53	0.256	12.64
109	3	1	45	46.142	4.166	12.024	0.111	0.280	41.526	0.699	0.187	0.251	0.339	0.969	0.029	0.073	4.86	0.262	11.6
110	3	1	50	26.642	3.471	9.435	0.095	0.323	23.771	0.406	0.088	0.140	0.221	0.574	0.022	0.034	4.71	0.286	11.47
111	3	2	5	16.941	1.642	6.166	0.065	1.905	14.083	0.305	0.062	0.092	0.121	0.408	0.028	0.016	6.98	0.907	12.54
112	3	2	10	17.541	1.541	6.253	0.067	2.123	15.535	0.302	0.061	0.092	0.121	0.402	0.029	0.022	6.77	0.652	14.65
113	3	2	15	21.383	1.996	7.431	0.077	0.898	13.833	0.280	0.070	0.128	0.149	0.466	0.023	0.021	6.74	0.584	15.8
114	3	2	20	21.444	1.967	7.166	0.059	2.563	14.822	0.223	0.059	0.112	0.136	0.410	0.016	0.019	5.82	0.517	18.02
115	3	2	25	20.627	1.585	6.994	0.062	1.560	14.992	0.259	0.061	0.112	0.132	0.456	0.021	0.024	5.36	0.290	18.62
116	3	2	30	19.341	1.336	6.551	0.068	0.498	9.805	0.184	0.050	0.105	0.130	0.376	0.019	0.015	4.85	0.271	19.5
117	3	2	35	22.110	1.757	7.602	0.079	1.976	19.928	0.392	0.063	0.125	0.141	0.501	0.024	0.026	4.52	0.210	20.38
118	3	2	40	21.205	1.768	6.662	0.063	1.204	14.827	0.285	0.056	0.120	0.137	0.438	0.022	0.022	4.4	0.172	19.47
119	3	2	45	18.440	1.266	5.944	0.048	0.295	10.529	0.250	0.042	0.102	0.139	0.315	0.019	0.021	4.29	0.192	22.84
120	3	2	50	17.490	1.269	5.812	0.068	0.395	11.396	0.273	0.053	0.112	0.135	0.379	0.018	0.019	4.18	0.148	17.65
121	3	3	5	11.007	1.848	4.363	0.057	0.675	12.761	0.245	0.028	0.066	0.072	0.291	0.019	0.022	5.66	0.708	11.29
122	3	3	10	10.390	0.671	4.293	0.055	0.626	14.088	0.288	0.037	0.067	0.071	0.266	0.021	0.020	5.7	0.377	12.94
123	3	3	15	17.244	0.828	6.538	0.069	0.860	23.279	0.426	0.058	0.103	0.091	0.425	0.015	0.026	5.01	0.330	16.01
124	3	3	20	18.619	0.672	6.988	0.084	0.697	26.718	0.533	0.060	0.113	0.095	0.475	0.021	0.029	4.35	0.263	21.48
125	3	3	25	23.942	1.184	8.493	0.096	0.620	52.419	1.026	0.103	0.146	0.111	0.656	0.029	0.058	4.56	0.238	23.96
126	3	3	30	22.810	0.593	8.260	0.077	1.768	33.322	0.734	0.080	0.138	0.118	0.551	0.039	0.041	4.25	0.299	25.07
127	3	3	35	23.788	0.800	8.955	0.124	0.216	51.648	0.997	0.096	0.143	0.119	0.611	0.030	0.049	4.23	0.176	25.64
128	3	3	40	20.901	0.186	8.009	0.137	0.290	50.569	0.930	0.095	0.145	0.117	0.625	0.026	0.056	4.1	0.147	25.87
129	3	3	45	21.772	0.271	7.888	0.098	0.274	44.692	0.955	0.084	0.129	0.122	0.520	0.031	0.053	4.19	0.133	25.66
130	3	3	50	26.742	0.366	9.271	0.118	0.782	55.502	0.910	0.088	0.140	0.127	0.652	0.033	0.048	4.12	0.140	25.72
131	3	4	5	18.452	1.479	6.522	0.078	1.567	18.242	0.366	0.057	0.098	0.120	0.454	0.027	0.026	4.93	1.208	9.6
132	3	4	10	21.581	2.030	7.150	0.083	1.591	28.607	0.552	0.068	0.110	0.147	0.466	0.024	0.030	4.2	0.847	11.1
133	3	4	15	20.835	2.648	6.871	0.087	1.828	36.325	0.650	0.066	0.107	0.143	0.688	0.020	0.029	5.13	0.631	12.05
134	3	4	20	25.451	4.010	8.188	0.082	3.318	75.386	1.437	0.092	0.132	0.186	0.802	0.033	0.031	5.59	0.440	13.13
135	3	4	25	16.356	1.355	5.833	0.083	2.349	14.651	0.284	0.045	0.093	0.124	0.403	0.026	0.024	4.52	0.585	11.96
136	3	4	30	17.577	1.660	6.471	0.067	0.431	19.758	0.422	0.049	0.095	0.140	0.451	0.023	0.027	4.84	0.642	9.03
137	3	4	35	18.096	1.564	6.637	0.069	0.289	20.698	0.432	0.045	0.104	0.146	0.451	0.020	0.023	4.87	0.646	9.06
138	3	4	40	16.639	1.226	6.373	0.070	2.363	16.434	0.277	0.044	0.095	0.128	0.433	0.024	0.023	4.68	0.463	11.02
139	3	4	45	14.870	0.838	5.630	0.070	0.390	10.218	0.190	0.038	0.086	0.112	0.352	0.024	0.026	4.82	0.470	13.42
140	3	4	50	17.938	1.127	6.692	0.082	1.099	16.121	0.300	0.048	0.100	0.141	0.422	0.022	0.022	4.89	0.447	15.24
141	3	5	5	16.697	1.892	8.833	0.084	0.481	16.693	0.345	0.066	0.105	0.133	0.488	0.045	0.023	4.19	1.512	20.18
142	3	5	10	15.700	1.735	7.097	0.066	0.931	15.608	0.305	0.034	0.085	0.142	0.380	0.025	0.023	4.23	1.386	13.41
143	3	5	15	14.969	1.763	6.886	0.084	0.172	11.346	0.213	0.032	0.081	0.137	0.348	0.029	0.016	6.06	0.478	14.05
144	3	5	20	15.544	1.657	7.309	0.059	0.311	13.292	0.298	0.039	0.088	0.139	0.401	0.023	0.016	6.22	0.404	12.21
145	3	5	25	14.211	1.465	6.532	0.061	0.802	15.906	0.321	0.034	0.081	0.128	0.368	0.024	0.013	5.99	0.370	14.51
146	3	5	30	16.754	1.685	7.753	0.090	0.135	23.423	0.456	0.040	0.107	0.143	0.402	0.024	0.021	5.62	0.337	15.96
147	3	5	35	17.643	1.519	8.160	0.081	0.097	30.109	0.551	0.055	0.113	0.139	0.495	0.031	0.022	5.32	0.317	16.26
148	3	5	40	12.014	1.234	5.935	0.053	0.067	17.392	0.407	0.032	0.080	0.101	0.344	0.020	0.024	5.16	0.289	17.61
149	3	5	45	21.429	2.063	9.743	0.123	0.871	49.134	0.843	0.094	0.152	0.168	0.614	0.045	0.040	5.18	0.257	18.27
150	3	5	50	19.977	1.646	8.382	0.090	0.145	28.109	0.466	0.061	0.125	0.168	0.480	0.025	0.015	5.55	0.205	18.56

APPENDIX E: PREDICTED VS. MEASURED SOC CONTENTS

MLR: Oven-dry validations

Model	AR	AT	AZ	FAR	FAT	FAZ
SOC	Predicted SOC values					
0.471	0.467	0.458	0.481	0.764	0.821	0.812
0.450	0.404	0.427	0.397	0.714	0.843	0.787
0.576	0.833	0.798	0.819	1.009	1.102	1.081
0.379	0.465	0.420	0.464	0.669	0.755	0.720
0.430	0.524	0.544	0.503	0.649	0.726	0.722
0.496	0.477	0.420	0.478	0.777	0.853	0.845
0.833	0.803	0.725	0.791	1.302	1.516	1.430
1.018	1.270	1.528	1.246	2.010	2.135	2.272
0.906	1.143	1.304	1.139	1.856	2.007	2.067
0.588	0.784	0.801	0.771	1.220	1.345	1.357
1.569	1.205	1.280	1.234	1.482	1.635	1.521
0.618	0.669	0.668	0.684	0.839	0.991	0.865
0.112	0.353	0.347	0.395	0.955	1.224	0.963
0.107	0.337	0.346	0.391	1.080	1.327	1.072
0.537	0.764	0.770	0.795	0.993	1.278	0.996
1.558	1.143	1.404	1.158	2.048	2.018	2.208
1.002	0.627	0.598	0.651	1.742	1.975	1.924
1.558	1.371	1.686	1.412	3.020	3.031	3.330
1.371	1.326	1.474	1.330	2.317	2.421	2.573
0.703	0.893	0.893	0.891	1.538	1.544	1.702
3.383	2.556	2.134	2.802	3.512	3.179	3.773
0.582	0.741	0.862	0.730	0.993	1.171	1.081
0.932	0.902	0.864	0.896	1.310	1.482	1.446
0.825	0.679	0.779	0.682	1.249	1.422	1.377
0.716	0.697	0.645	0.679	0.951	1.090	1.055
1.015	0.867	0.821	0.853	1.387	1.683	1.536
6.258	2.847	2.999	3.156	5.989	5.954	6.374
1.307	1.113	0.980	1.086	1.690	1.985	1.922
1.045	0.698	0.748	0.700	1.471	1.608	1.639
0.829	0.892	0.850	0.902	1.415	1.517	1.549

MLR: Field-moist validations

Model	AR	AT	AZ	FAR	FAT	FAZ
SOC	Predicted SOC values					
0.471	0.416	0.389	0.443	0.499	0.496	0.493
0.450	0.366	0.475	0.368	0.433	0.476	0.449
0.576	0.427	0.396	0.436	0.520	0.526	0.516
0.379	0.394	0.317	0.410	0.574	0.590	0.585
0.430	0.458	0.359	0.462	0.536	0.590	0.552
0.496	0.402	0.304	0.426	0.702	0.724	0.716
0.833	0.976	0.710	1.042	1.199	1.187	1.188
1.018	1.149	0.835	1.161	1.094	1.095	1.123
0.906	0.612	0.507	0.651	0.826	0.795	0.819
0.588	0.876	0.682	0.914	0.589	0.578	0.573
1.569	1.029	0.768	1.017	0.739	0.851	0.730
1.558	1.231	0.887	1.391	2.292	2.346	2.237
1.558	1.330	1.036	1.327	1.793	1.927	1.923
3.383	1.320	0.794	1.425	1.470	1.339	1.483
0.582	0.538	0.444	0.569	0.773	0.770	0.786
0.932	0.752	0.631	0.785	0.682	0.695	0.673
0.825	0.555	0.402	0.577	0.729	0.742	0.742
0.716	0.553	0.369	0.574	0.626	0.628	0.638
1.015	0.710	0.733	0.761	0.969	1.009	0.967
6.258	2.655	2.427	3.071	2.583	2.293	2.405
1.307	1.069	0.882	1.169	1.345	1.352	1.347
1.045	0.639	0.537	0.646	0.704	0.769	0.728
0.829	1.011	0.567	1.056	0.887	0.944	0.885

MLR: Oven-dry validations

Model	LR	LT	LZ	FLR	FLT	FLZ
SOC	Predicted SOC values					
3.692	2.573	1.822	1.771	2.573	3.537	3.031
0.592	0.449	0.491	0.489	0.449	0.576	0.513
0.401	0.288	0.294	0.293	0.288	0.374	0.357
0.161	0.273	0.262	0.257	0.273	0.284	0.282
0.397	0.391	0.336	0.339	0.391	0.471	0.454
0.357	0.370	0.333	0.334	0.370	0.388	0.370
0.826	0.258	0.344	0.346	0.258	0.324	0.380
0.613	0.848	0.971	0.954	0.848	0.841	0.938
0.290	0.412	0.352	0.356	0.412	0.422	0.429
0.479	1.439	1.409	1.396	1.439	1.491	1.705
0.267	0.272	0.241	0.242	0.272	0.302	0.302
1.099	0.871	0.844	0.856	0.871	0.699	0.747
0.384	0.377	0.368	0.371	0.377	0.414	0.412
0.645	1.060	0.991	0.945	1.060	0.914	0.946
0.437	0.541	0.551	0.535	0.541	0.640	0.662
0.248	0.392	0.401	0.391	0.392	0.368	0.356
0.257	0.291	0.294	0.290	0.291	0.311	0.316
0.768	0.516	0.551	0.548	0.516	0.637	0.616
0.524	0.460	0.425	0.421	0.460	0.543	0.560
0.344	0.310	0.288	0.301	0.310	0.313	0.384
0.652	0.776	0.830	0.829	0.776	0.733	0.809
0.290	0.305	0.339	0.340	0.305	0.363	0.393
0.377	0.621	0.711	0.674	0.621	0.654	0.601
0.140	0.197	0.206	0.209	0.197	0.201	0.208
1.208	1.104	1.082	1.094	1.104	1.044	1.161
0.440	0.504	0.448	0.461	0.504	0.462	0.528
0.463	0.281	0.274	0.268	0.281	0.285	0.291
0.447	0.225	0.233	0.229	0.225	0.232	0.239
0.257	0.266	0.288	0.287	0.266	0.276	0.286
0.257	0.266	0.288	0.287	0.266	0.276	0.286

MLR: Field-moist validations

Model	LR	LT	LZ	FLR	FLT	FLZ
SOC	Predicted SOC values					
0.238	0.185	0.155	0.159	0.191	0.204	0.207
1.256	0.827	0.803	0.823	1.248	1.144	1.068
0.476	0.324	0.295	0.302	0.461	0.445	0.423
0.411	0.232	0.160	0.175	0.286	0.249	0.331
0.804	0.524	0.488	0.509	0.744	0.719	0.613
0.600	0.460	0.454	0.470	0.535	0.471	0.458
0.652	0.471	0.354	0.356	0.608	0.625	0.631
2.416	2.599	1.827	1.871	1.865	2.000	2.046
0.393	0.471	0.380	0.382	0.445	0.464	0.511
0.384	0.532	0.394	0.395	0.453	0.425	0.360
0.273	0.306	0.248	0.257	0.308	0.303	0.310
0.217	0.220	0.183	0.182	0.213	0.200	0.203
0.746	0.351	0.326	0.327	0.373	0.408	0.414
0.422	0.351	0.278	0.287	0.338	0.421	0.437
1.395	1.302	1.100	1.080	1.263	1.123	1.054
0.515	0.556	0.445	0.429	0.585	0.617	0.540
0.278	0.274	0.217	0.212	0.391	0.441	0.465
1.157	0.595	0.607	0.621	0.765	0.767	0.814
1.551	1.091	0.826	0.838	1.062	2.005	2.023
0.524	0.509	0.409	0.412	0.440	0.704	0.630
0.262	0.194	0.128	0.139	0.238	0.222	0.300
0.652	0.697	0.542	0.551	0.638	0.677	0.656
0.192	0.162	0.122	0.121	0.166	0.157	0.149
0.176	0.227	0.201	0.209	0.269	0.252	0.262
0.147	0.158	0.141	0.144	0.151	0.157	0.180
1.208	0.947	0.836	0.861	1.035	0.930	0.994
0.585	0.321	0.305	0.304	0.304	0.322	0.324
0.646	0.223	0.205	0.207	0.266	0.232	0.232
0.337	0.266	0.246	0.256	0.417	0.341	0.366
0.257	0.291	0.272	0.291	0.352	0.365	0.405

PCA: Oven-dry validations

Model	AR	FAR	FAT
SOC	Predicted SOC values		
0.471	0.505	0.858	0.851
0.450	0.473	0.962	0.831
0.576	0.834	1.212	1.175
0.379	0.483	0.892	0.800
0.430	0.517	1.018	0.823
0.496	0.491	0.954	0.844
0.833	0.834	1.434	1.398
1.018	1.543	2.545	2.303
0.906	1.076	1.793	1.651
0.588	0.812	1.527	1.373
1.569	1.129	1.224	1.528
0.618	0.615	0.814	0.951
0.112	0.308	0.464	0.546
0.107	0.308	0.449	0.528
0.537	0.726	0.890	1.162
1.558	1.341	1.589	1.811
1.002	0.636	1.047	1.017
1.558	1.252	1.643	1.686
1.371	1.281	1.742	1.617
0.703	0.959	1.401	1.317
3.383	2.200	5.468	4.717
0.582	0.729	1.277	1.181
0.932	0.791	1.398	1.191
0.825	0.698	1.308	1.153
0.716	0.689	1.371	1.195
1.015	0.956	1.552	1.421
6.258	2.378	3.843	4.037
1.307	1.066	1.970	1.592
1.045	0.814	1.474	1.408
0.829	0.786	1.353	1.333

PCA: Field-moist validations

Model	AR	FAR	FAT
SOC	Predicted SOC values		
0.471	0.409	0.532	0.520
0.450	0.397	0.652	0.591
0.576	0.441	0.508	0.515
0.379	0.414	0.623	0.598
0.430	0.450	0.723	0.676
0.496	0.426	0.675	0.647
0.833	0.860	1.074	1.047
1.018	1.156	1.358	1.280
0.906	0.658	0.795	0.862
0.588	0.607	0.735	0.686
1.569	0.935	0.941	1.091
1.558	0.977	0.980	1.211
1.558	1.081	1.264	1.113
3.383	1.348	1.999	1.849
0.582	0.530	0.748	0.712
0.932	0.596	0.796	0.750
0.825	0.566	0.820	0.809
0.716	0.525	0.793	0.747
1.015	0.844	1.042	1.121
6.258	2.007	2.108	2.578
1.307	0.850	1.189	1.179
1.045	0.608	0.849	0.768
0.829	0.634	0.821	0.801

PCA: Oven-dry validations

Model	LR	LT	LZ	FLR	FLT	FLZ
SOC	Predicted SOC values					
3.692	1.793	1.986	1.165	1.329	1.579	1.230
0.592	0.478	0.461	0.287	0.445	0.732	0.434
0.401	0.343	0.323	0.237	0.366	0.573	0.383
0.161	0.450	0.436	0.395	0.559	0.620	0.569
0.397	0.329	0.330	0.317	0.474	0.529	0.423
0.357	0.443	0.426	0.378	0.559	0.623	0.493
0.826	0.262	0.253	0.385	0.497	0.741	0.555
0.613	0.958	1.133	0.629	0.729	1.696	0.789
0.290	0.384	0.378	0.239	0.401	0.710	0.404
0.479	1.220	1.337	1.549	1.203	1.766	1.454
0.267	0.287	0.269	0.251	0.355	0.474	0.408
1.099	0.925	0.889	0.789	0.806	1.008	0.907
0.384	0.372	0.402	0.253	0.375	0.663	0.414
0.645	1.245	1.443	1.080	1.119	1.752	1.153
0.437	0.552	0.617	0.560	0.604	1.004	0.667
0.248	0.455	0.489	0.461	0.513	0.897	0.607
0.257	0.296	0.318	0.338	0.438	0.643	0.507
0.768	0.565	0.602	0.414	0.563	0.985	0.616
0.524	0.406	0.446	0.590	0.485	0.848	0.622
0.344	0.278	0.250	0.335	0.380	0.424	0.453
0.652	0.870	0.893	1.038	0.732	1.251	0.923
0.290	0.324	0.312	0.584	0.481	0.540	0.647
0.377	0.705	0.798	0.739	0.657	1.254	0.811
0.140	0.240	0.231	0.313	0.349	0.426	0.441
1.208	0.785	0.809	1.126	0.857	1.068	1.047
0.440	0.364	0.400	0.440	0.472	0.684	0.535
0.463	0.301	0.337	0.392	0.469	0.708	0.543
0.447	0.275	0.288	0.383	0.455	0.582	0.526
0.257	0.307	0.298	0.262	0.370	0.633	0.412
0.257	0.307	0.298	0.262	0.370	0.633	0.412

PCA: Field-moist validations

Model	LR	LT	LZ	FLR	FLT	FLZ
SOC			Predicted SOC values			
0.238	0.139	0.133	0.290	0.398	0.304	0.390
1.256	0.421	0.419	0.402	0.552	0.652	0.505
0.476	0.260	0.221	0.253	0.377	0.421	0.365
0.411	0.089	0.074	0.206	0.282	0.147	0.276
0.804	0.311	0.259	0.589	0.579	0.473	0.618
0.600	0.369	0.337	0.485	0.542	0.508	0.541
0.652	0.276	0.280	0.493	0.655	0.686	0.589
2.416	1.427	1.417	1.725	1.966	1.449	1.530
0.393	0.412	0.392	0.363	0.593	0.688	0.534
0.384	0.363	0.374	0.362	0.595	0.704	0.516
0.273	0.204	0.197	0.292	0.419	0.360	0.407
0.217	0.185	0.186	0.228	0.404	0.393	0.376
0.746	0.230	0.251	0.294	0.425	0.579	0.444
0.422	0.262	0.251	0.302	0.424	0.422	0.439
1.395	0.640	0.704	0.958	1.071	1.166	0.981
0.515	0.273	0.338	0.392	0.541	0.890	0.499
0.278	0.098	0.127	0.212	0.350	0.421	0.308
1.157	0.386	0.417	0.323	0.483	0.853	0.439
1.551	0.403	0.436	1.171	0.745	0.759	0.959
0.524	0.378	0.353	0.666	0.482	0.671	0.643
0.262	0.079	0.066	0.173	0.267	0.125	0.243
0.652	0.464	0.420	0.827	0.632	0.640	0.719
0.192	0.148	0.122	0.309	0.380	0.256	0.448
0.176	0.160	0.144	0.241	0.318	0.307	0.342
0.147	0.114	0.130	0.230	0.345	0.327	0.325
1.208	0.477	0.454	1.038	0.748	0.712	0.915
0.585	0.263	0.277	0.600	0.518	0.595	0.672
0.646	0.148	0.142	0.254	0.349	0.339	0.371
0.337	0.164	0.136	0.221	0.309	0.373	0.325
0.257	0.231	0.189	0.328	0.369	0.376	0.415

APPENDIX F: SAS CODE FOR STATISTCAL ANALYSES

```
dm 'log;clear;output;clear';
ods rtf file= 'F:\SAS\OUTPUT\NORM-FLR.rtf';
options nodate nocenter pageno=1 ls=90 ps=56;

Title1 'Test for NORMALITY of elemental variables';

data AR;
infile 'F:\DATA\FLR_ALL.csv' dlm= ',' dsd missover firstobs=2;
        input ID S C D K Ca Ti Cr Mn Fe Co Zn Rb Sr Ba Pb Cu Zr pH SOC LSOC LD LK
LCa LTi LCr LMn LFe LCo LZn LRb LSr LBa LPb LCu LZr;
        LSOC = log(SOC);
     LD = log(D);
     LK = log(K);
        LCa = log(Ca);
        LTi = log(Ti);
        LCr = log(Cr);
        LMn = log(Mn);
        LFe = log(Fe);
        LCo = log(Co);
        LZn = log(Zn);
        LRb = log(Rb);
        LSr = log(Sr);
        LBa = log(Ba);
        LPb = log(Pb);
     LCu = log(Cu);
        LZr = log(Zr);
        datalines; run;
        ;
run;

proc univariate data=AR plot normal CIBasic;
  var K Ca Ti Cr Mn Fe Co Zn Rb Sr Ba Pb Cu Zr pH SOC;
       title2 'Test of elemental variables for normal distrubution';
  ods exclude BasicMeasures ExtremeObs ExtremeValues Modes
  Moments MissingValues Quantiles TestsForLocation;
run;

ods rtf close;
quit;


dm 'log;clear;output;clear';
ods rtf file= 'F:\SAS\OUTPUT\NORM-FLR.rtf';
options nodate nocenter pageno=1 ls=90 ps=56;
```

```
Title1 'Test for NORMALITY of elemental variables';

data AR;
infile 'F:\DATA\FLR_ALL.csv' dlm= ',' dsd missover firstobs=2;
        input ID S C D K Ca Ti Cr Mn Fe Co Zn Rb Sr Ba Pb Cu Zr pH SOC LSOC LD LK
LCa LTi LCr LMn LFe LCo LZn LRb LSr LBa LPb LCu LZr;
        LSOC = log(SOC);
    LD = log(D);
    LK = log(K);
        LCa = log(Ca);
        LTi = log(Ti);
        LCr = log(Cr);
        LMn = log(Mn);
        LFe = log(Fe);
        LCo = log(Co);
        LZn = log(Zn);
        LRb = log(Rb);
        LSr = log(Sr);
        LBa = log(Ba);
        LPb = log(Pb);
    LCu = log(Cu);
        LZr = log(Zr);
        datalines; run;
        ;
run;

proc univariate data=AR plot normal CIBasic;
  var K Ca Ti Cr Mn Fe Co Zn Rb Sr Ba Pb Cu Zr pH SOC;
       title2 'Test of elemental variables for normal distrubution';
  ods exclude BasicMeasures ExtremeObs ExtremeValues Modes
  Moments MissingValues Quantiles TestsForLocation;
run;

ods rtf close;
quit;


dm 'log;clear;output;clear';
ods rtf file= 'F:\SAS\OUTPUT\COLL-FAR.rtf';
options nodate nocenter pageno=1 ls=90 ps=56;

Title1 'Test for MULTICOLLINEARITY of elemental variables';

data AR;
infile 'F:\DATA\FAR_ALL.csv' dlm= ',' dsd missover firstobs=2;
        input ID S C D K Ca Ti Cr Mn Fe Co Zn Rb Sr Ba Pb Cu Zr pH SOC LSOC LD LK
LCa LTi LCr LMn LFe LCo LZn LRb LSr LBa LPb LCu LZr;
```

```
            LSOC = log(SOC);
      LD = log(D);
      LK = log(K);
            LCa = log(Ca);
            LTi = log(Ti);
            LCr = log(Cr);
            LMn = log(Mn);
            LFe = log(Fe);
            LCo = log(Co);
            LZn = log(Zn);
            LRb = log(Rb);
            LSr = log(Sr);
            LBa = log(Ba);
            LPb = log(Pb);
       LCu = log(Cu);
            LZr = log(Zr);
            datalines; run;
            ;
run;

proc corr data=AR;
   var D K Ca Ti Cr Mn Fe Co Zn Rb Sr Ba Pb Cu Zr pH;
run;

ods rtf close;
quit;


dm 'log;clear;output;clear';
ods rtf file= 'C:\\users\snuss1\Downloads\MRA-FLRp.rtf';
options nodate nocenter pageno=1 ls=90 ps=56;

Title1 'MRA';

data ARg;
   infile 'c:\\users\snuss1\Downloads\DATA\FLRg.csv' dlm= ',' dsd missover firstobs=2;
   input ID S C D K Ca Ti Cr Mn Fe Co Zn Rb Sr Ba Pb Cu Zr pH SOC LSOC LD LK LCa LTi
LCr LMn LFe LCo LZn LRb LSr LBa LPb LCu LZr;
   LSOC = log(SOC);
   LD = log(D);
   LK = log(K);
   LCa = log(Ca);

   LCr = log(Cr);
   LMn = log(Mn);
   LFe = log(Fe);
   LCo = log(Co);
```

```
   LZn = log(Zn);
   LRb = log(Rb);
   LSr = log(Sr);
   LBa = log(Ba);
   LPb = log(Pb);
   LCu = log(Cu);
   LZr = log(Zr);
   datalines; run;
   ;
run;

data ARv;
   infile 'c:\\users\snuss1\Downloads\DATA\LRv.csv' dlm= ',' dsd missover firstobs=2;
   input ID S C D K Ca Ti Cr Mn Fe Co Zn Rb Sr Ba Pb Cu Zr pH SOC LSOC LD LK LCa LTi
LCr LMn LFe LCo LZn LRb LSr LBa LPb LCu LZr;
   LSOC = log(SOC);
   LD = log(D);
   LK = log(K);
   LCa = log(Ca);

   LCr = log(Cr);
   LMn = log(Mn);
   LFe = log(Fe);
   LCo = log(Co);
   LZn = log(Zn);
   LRb = log(Rb);
   LSr = log(Sr);
   LBa = log(Ba);
   LPb = log(Pb);
   LCu = log(Cu);
   LZr = log(Zr);
   datalines; run;
   ;
run;
data FARv;
   infile 'c:\\users\snuss1\Downloads\DATA\FLRv.csv' dlm= ',' dsd missover firstobs=2;
  input ID S C D K Ca Ti Cr Mn Fe Co Zn Rb Sr Ba Pb Cu Zr pH SOC LSOC LD LK LCa LTi
LCr LMn LFe LCo LZn LRb LSr LBa LPb LCu LZr;
   LSOC = log(SOC);
   LD = log(D);
   LK = log(K);
   LCa = log(Ca);

   LCr = log(Cr);
   LMn = log(Mn);
   LFe = log(Fe);
```

```
   LCo = log(Co);
   LZn = log(Zn);
   LRb = log(Rb);
   LSr = log(Sr);
   LBa = log(Ba);
   LPb = log(Pb);
   LCu = log(Cu);
   LZr = log(Zr);
   datalines; run;
   ;
run;

proc reg data=ARg outest=AR3out;
   P:model SOC = LD LK LCa LTi LCr LMn LFe LCo LZn LRb LSr LBa LPb LCu LZr
pH/selection=stepwise;
run;
proc print data=AR3; run;
proc univariate data=AR3 plot normal;
   var resids;
   ods exclude BasicMeasures ExtremeObs ExtremeValues Modes
   Moments MissingValues Quantiles TestsForLocation;
run;

proc score data=ARv score=AR3out out=AR3pred type=parms predict;
   var LD LK LCa LTi LCr LMn LFe LCo LZn LRb LSr LBa LPb LCu LZr pH;
run;

proc reg data=ARg outest=AR3out2 noprint;
   R:model LSOC = LD LK LCa LTi LCr LMn LFe LCo LZn LRb LSr LBa LPb LCu LZr
pH/selection=stepwise;
run;

proc score data=ARv score=AR3out2 out=AR3res type=parms residual;
   var LSOC LD LK LCa LTi LCr LMn LFe LCo LZn LRb LSr LBa LPb LCu LZr pH;
run;

proc sort data=AR3pred;
   by ID S C D LSOC;
run;
proc sort data=AR3res;
   by ID S C D LSOC;
run;

data combinedAR3;
   merge AR3pred AR3res;
run;
```

```
proc corr data=combinedAR3;
   var LSOC P;
run;

proc print data=combinedAR3;
run;

proc score data=FARv score=AR3out out=FAR3pred type=parms predict;
   var LD LK LCa LTi LCr LMn LFe LCo LZn LRb LSr LBa LPb LCu LZr pH;
run;

proc score data=FARv score=AR3out2 out=FAR3res type=parms residual;
   var LSOC LD LK LCa LTi LCr LMn LFe LCo LZn LRb LSr LBa LPb LCu LZr pH;
run;

proc sort data=FAR3pred;
   by ID S C D LSOC;
run;
proc sort data=FAR3res;
   by ID S C D LSOC;
run;

data combinedFAR3;
   merge FAR3pred FAR3res;
run;

proc corr data=combinedFAR3;
   var LSOC P;
run;

proc print data=combinedFAR3;
run;

ods rtf close;
quit;


dm 'log;clear;output;clear';
ods rtf file= 'F:\SAS\PCA-AZ.rtf';
options nodate nocenter pageno=1 ls=90 ps=56;

Title1 'PCA';

data A_X;
   infile 'F:\DATA\AZg.csv' dlm= ',' dsd missover firstobs=2;
```

```
   input ID S C D K Ca Ti Cr Mn Fe Co Zn Rb Sr Ba Pb Cu pH SOC LSOC LD LK LCa LTi
LCr LMn LFe LCo LZn LRb LSr LBa LPb LCu;
   LSOC = log(SOC);
   LD = log(D);
   LK = log(K);
   LCa = log(Ca);
         LTi = log(Ti);
   LCr = log(Cr);
   LMn = log(Mn);
   LFe = log(Fe);
   LCo = log(Co);
   LZn = log(Zn);
   LRb = log(Rb);
   LSr = log(Sr);
   LBa = log(Ba);
   LPb = log(Pb);
   LCu = log(Cu);
   datalines; run;
   ;
run;

data A_V;
   infile 'F:\DATA\AZv.csv' dlm= ',' dsd missover firstobs=2;
   input ID S C D K Ca Ti Cr Mn Fe Co Zn Rb Sr Ba Pb Cu pH SOC LSOC LD LK LCa LTi
LCr LMn LFe LCo LZn LRb LSr LBa LPb LCu;
   LSOC = log(SOC);
   LD = log(D);
   LK = log(K);
   LCa = log(Ca);
         LTi = log(Ti);
   LCr = log(Cr);
   LMn = log(Mn);
   LFe = log(Fe);
   LCo = log(Co);
   LZn = log(Zn);
   LRb = log(Rb);
   LSr = log(Sr);
   LBa = log(Ba);
   LPb = log(Pb);
   LCu = log(Cu);
   datalines; run;
   ;
run;
data A_F;
   infile 'F:\DATA\FAZv.csv' dlm= ',' dsd missover firstobs=2;
```

```
  input ID S C D K Ca Ti Cr Mn Fe Co Zn Rb Sr Ba Pb Cu pH SOC LSOC LD LK LCa LTi LCr
LMn LFe LCo LZn LRb LSr LBa LPb LCu;
   LSOC = log(SOC);
   LD = log(D);
   LK = log(K);
   LCa = log(Ca);
         LTi = log(Ti);
   LCr = log(Cr);
   LMn = log(Mn);
   LFe = log(Fe);
   LCo = log(Co);
   LZn = log(Zn);
   LRb = log(Rb);
   LSr = log(Sr);
   LBa = log(Ba);
   LPb = log(Pb);
   LCu = log(Cu);
   datalines; run;
   ;
run;

proc factor data=A_X method=prin rotate=varimax nfactors=3 outstat=factorsX1 score ;
   var D K Ca Ti Cr Mn Fe Co Zn Rb Sr Ba Pb Cu pH;
   title2 'PCA analysis of generatiion data (R=R)';
run;

proc score data=A_X score=factorsX1 out=Gscores1;
   var D K Ca Ti Cr Mn Fe Co Zn Rb Sr Ba Pb Cu pH;
   id ID SOC;
run;
proc reg data=Gscores1 outest=G1out;
   model SOC=factor1 factor2 factor3;
   title2 'dry model PCA prediction modeling results for (R=R) generation dataset';
   output out=Greg1 p=GPSOC r=Gresids;
run;
Proc plot data=Greg1 noprint;
Title3 'Residual plot - (R=R) model generation';
plot Gresids*GPSOC;
run;
Proc Univariate data=Greg1 normal plot;
Title3 'Residual Analysis from PCA (R=R) model generation';
Var Gresids;
run;

proc score data=A_V score=factorsX1 out=D1scores;
   var D K Ca Ti Cr Mn Fe Co Zn Rb Sr Ba Pb Cu pH;
```

```
   id ID SOC;
run;
proc reg data=D1scores outest=D1out noprint;
   model SOC=factor1 factor2 factor3;
   title2 'dry model application to (R=R) dry validation dataset';
   output out=D1reg p=DPSOC r=Dresids;
run;

proc corr data=D1reg outp=D1regout noprint;
   var DPSOC SOC;
run;
proc plot data=D1reg;
   plot DPSOC*SOC;
run;

proc score data=A_F score=factorsX1 out=F1scores;
   var D K Ca Ti Cr Mn Fe Co Zn Rb Sr Ba Pb Cu pH;
   id ID SOC;
run;

proc reg data=F1scores outest=F1out noprint;
   model SOC=factor1 factor2 factor3;
   title2 'dry model application to field-moist validation data';
   output out=F1reg p=FPSOC r=Fresids;
run;

proc corr data=F1reg outp=F1regout noprint;
   var FPSOC SOC;

run;
proc plot data=F1reg;
   plot FPSOC*SOC;
run;

proc factor data=A_X method=prin rotate=varimax nfactors=3 outstat=factorsX2 score noprint;
   var D K Ca Ti Cr Mn Fe Co Zn Rb Sr Ba Pb Cu pH;
   title2 'PCA analysis of generatiion data (L=R)';
run;

proc score data=A_X score=factorsX2 out=Gscores2;
 var D K Ca Ti Cr Mn Fe Co Zn Rb Sr Ba Pb Cu pH;
 id ID LSOC;
run;
proc reg data=Gscores2 outest=G2out noprint;
   model LSOC=factor1 factor2 factor3;
   title2 'dry model PCA prediction modeling results for (L=R) generation dataset';
```

```
   output out=Greg2 p=GPSOC r=Gresids;
run;
Proc plot data=Greg2;
Title3 'Residual plot - (L=R) model generation';
plot Gresids*GPSOC;
run;
Proc Univariate data=Greg2 normal plot;
Title3 'Residual Analysis from PCA (L=R) model generation';
Var Gresids;
run;

proc score data=A_V score=factorsX2 out=D2scores;
   var D K Ca Ti Cr Mn Fe Co Zn Rb Sr Ba Pb Cu pH;
   id ID LSOC;
run;
proc reg data=D2scores outest=D2out noprint;
   model LSOC=factor1 factor2 factor3;
   title2 'dry model application to (L=R) dry validation dataset';
   output out=D2reg p=DPSOC r=Dresids;
run;

proc corr data=D2reg outp=D2regout noprint;
   var DPSOC LSOC;

run;
proc plot data=D2reg;
   plot DPSOC*LSOC;
run;


proc score data=A_F score=factorsX2 out=F2scores;
   var D K Ca Ti Cr Mn Fe Co Zn Rb Sr Ba Pb Cu pH;
   id ID LSOC;
run;

proc reg data=F2scores outest=F2out noprint;
   model LSOC=factor1 factor2 factor3;
   title2 'dry model application to (L=R) field-moist validation data';
   output out=F2reg p=FPSOC r=Fresids;
run;

proc corr data=F2reg outp=F2regout noprint;
   var FPSOC LSOC;

run;
proc plot data=F2reg;
```

```
   plot FPSOC*LSOC;
run;

proc factor data=A_X method=prin rotate=varimax nfactors=3 outstat=factorsX3 score;
   var LD LK LCa LTi LCr LMn LFe LCo LZn LRb LSr LBa LPb LCu pH;
   title2 'PCA analysis of generatiion data (L=L)';
run;

proc score data=A_X score=factorsX3 out=Gscores3;
 var LD LK LCa LTi LCr LMn LFe LCo LZn LRb LSr LBa LPb LCu pH;
 id ID LSOC;
run;
proc reg data=Gscores3 outest=G3out;
   model LSOC=factor1 factor2 factor3;
   title2 'dry model PCA prediction modeling results for (L=L) generation dataset';
   output out=Greg3 p=GPSOC r=Gresids;
run;
Proc plot data=Greg3;
Title3 'Residual plot - (L=L) model generation';
plot Gresids*GPSOC;
run;
Proc Univariate data=Greg3 normal plot;
Title3 'Residual Analysis from PCA (L=L) model generation';
Var Gresids;
run;

proc score data=A_V score=factorsX3 out=D3scores;
   var LD LK LCa LTi LCr LMn LFe LCo LZn LRb LSr LBa LPb LCu pH;
   id ID LSOC;
run;
proc reg data=D3scores outest=D3out noprint;
   model LSOC=factor1 factor2 factor3;
   title2 'dry model application to (L=L) dry validation dataset';
   output out=D3reg p=DPSOC r=Dresids;
run;

proc corr data=D3reg outp=D3regout;
   var DPSOC LSOC;

run;
proc plot data=D3reg;
   plot DPSOC*LSOC;
run;


proc score data=A_F score=factorsX3 out=F3scores;
```

```
   var LD LK LCa LTi LCr LMn LFe LCo LZn LRb LSr LBa LPb LCu pH;
   id ID LSOC;
run;

proc reg data=F3scores outest=F3out noprint;
   model LSOC=factor1 factor2 factor3;
   title2 'dry model application to (L=L) field-moist validation data';
   output out=F3reg p=FPSOC r=Fresids;
run;

proc corr data=F3reg outp=F3regout;
   var FPSOC LSOC;

run;
proc plot data=F3reg;
   plot FPSOC*LSOC;
run;

proc factor data=A_X method=prin rotate=varimax nfactors=3 outstat=factorsX4 score;
   var LD LK LCa LTi LCr LMn LFe LCo LZn LRb LSr LBa LPb LCu pH;
   title2 'PCA analysis of generatiion data (R=L)';
run;

proc score data=A_X score=factorsX4 out=Gscores4;
 var LD LK LCa LTi LCr LMn LFe LCo LZn LRb LSr LBa LPb LCu pH;
 id ID SOC;
run;
proc reg data=Gscores4 outest=G4out;
   model SOC=factor1 factor2 factor3;
   title2 'dry model PCA prediction modeling results for (R=L) generation dataset';
   output out=Greg4 p=GPSOC r=Gresids;
run;
Proc plot data=Greg4;
Title3 'Residual plot - (R=L) model generation';
plot Gresids*GPSOC;
run;
Proc Univariate data=Greg4 normal plot;
Title3 'Residual Analysis from PCA (R=L) model generation';
Var Gresids;
run;

proc score data=A_V score=factorsX4 out=D4scores;
   var LD LK LCa LTi LCr LMn LFe LCo LZn LRb LSr LBa LPb LCu pH;
   id ID SOC;
run;
proc reg data=D4scores outest=D4out noprint;
```

```
   model SOC=factor1 factor2 factor3;
   title2 'dry model application to (R=L) dry validation dataset';
   output out=D4reg p=DPSOC r=Dresids;
run;

proc corr data=D4reg outp=D4regout;
   var DPSOC SOC;

run;
proc plot data=D4reg;
   plot DPSOC*SOC;
run;


proc score data=A_F score=factorsX4 out=F4scores;
   var LD LK LCa LTi LCr LMn LFe LCo LZn LRb LSr LBa LPb LCu pH;
   id ID SOC;
run;

proc reg data=F4scores outest=F4out noprint;
   model SOC=factor1 factor2 factor3;
   title2 'dry model application to (R=L) field-moist validation data';
   output out=F4reg p=FPSOC r=Fresids;
run;

proc corr data=F4reg outp=F4regout;
   var FPSOC SOC;

run;
proc plot data=F4reg;
   plot FPSOC*SOC;
run;

ods rtf close;
quit;

dm 'log;clear;output;clear';
ods rtf file= 'F:\SAS\OUTPUT\TT-LZ.rtf';
options nodate nocenter pageno=1 ls=90 ps=56;

Title1 'T-test of XRF elemental values between OD and FM datasets';

data AR;
infile 'F:\DATA\TT_LZ.csv' dlm= ',' dsd missover firstobs=2;
         input ID S C D K Ca Ti Cr Mn Fe Co Zn Rb Sr Ba Pb Cu pH SOC fK fCa fTi fCr fMn
fFe fCo fZn fRb fSr fBa fPb fCu;
```

```
        datalines; run;
        ;
run;

proc ttest data=AR sides=u;
   paired K*fK;
run;

proc ttest data=AR sides=u;
   paired Ca*fCa;
run;
proc ttest data=AR sides=u;
   paired Ti*fTi;
run;

proc ttest data=AR sides=u;
   paired Cr*fCr;
run;
proc ttest data=AR sides=u;
   paired Fe*fFe;
run;

proc ttest data=AR sides=u;
   paired Co*fCo;
run;
proc ttest data=AR sides=u;
   paired Zn*fZn;
run;

proc ttest data=AR sides=u;
   paired Rb*fRb;
run;
proc ttest data=AR sides=u;
   paired Sr*fSr;
run;

proc ttest data=AR sides=u;
   paired Ba*fBa;
run;
proc ttest data=AR sides=u;
   paired Pb*fPb;
run;

proc ttest data=AR sides=u;
   paired Cu*fCu;
run;
```

```
proc ttest data=AR sides=u;
   paired Zr*fZr;
run;

ods rtf close;
quit;


dm 'log;clear;output;clear';
ods rtf file= 'C:\\users\snuss1\Downloads\residsMOI.rtf';
options nodate nocenter pageno=1 ls=90 ps=56;

Title1 'Testing correlations between prediction model residuals and moisture-content of FM
samples';

data A_r;
   infile 'c:\\users\snuss1\Downloads\DATA\A_FMar.csv' dlm= ',' dsd missover firstobs=2;
run;
data A_f;
   infile 'c:\\users\snuss1\Downloads\DATA\A_FMf.csv' dlm= ',' dsd missover firstobs=2;
run;
data L_r;
   infile 'c:\\users\snuss1\Downloads\DATA\L_FMdry.csv' dlm= ',' dsd missover firstobs=2;
   datalines; run;
run;
data L_f;
   infile 'c:\\users\snuss1\Downloads\DATA\L_FMf.csv' dlm= ',' dsd missover firstobs=2
run;
proc corr data=A_r;
   var MOI aAR;
run;
proc corr data=A_f;
   var MOI aFAR;
run;
proc corr data=A_f;
   var MOI aFAT;
run;
proc corr data=L_r;
   var MOI aLR;
run;
proc corr data=L_r;
   var MOI aLT;
run;
proc corr data=L_r;
   var MOI aLZ;
run;
```

```
proc corr data=L_f;
   var MOI aFLR;
run;
proc corr data=L_f;
   var MOI aFLT;
run;
proc corr data=L_f;
   var MOI aFLZ;
run;
ods rtf close;
quit;


dm 'log;clear;output;clear';
ods rtf file= 'C:\\users\snuss1\Downloads\residsMRA.rtf';
options nodate nocenter pageno=1 ls=90 ps=56;

Title1 'Testing correlations between prediction model residuals and moisture-content of FM
samples';

data A_r;
   infile 'c:\\users\snuss1\Downloads\DATA\Av.csv' dlm= ',' dsd missover firstobs=2;
         input S C D SOC MOI AR ARR AT ATR AZ AZR aAR aAT aAZ;
         aAR = abs(ARR);
         aAT = abs(ATR);
         aAZ = abs(AZR);
         datalines; run;
         ;
run;
data A_f;
   infile 'c:\\users\snuss1\Downloads\DATA\Atotal.csv' dlm= ',' dsd missover firstobs=2;
         input S C D SOC MOI FAR FARR FAT FATR FAZ FAZR aFAR aFAT aFAZ;
         aFAR = abs(FARR);
         aFAT = abs(FATR);
         aFAZ = abs(FAZR);
         datalines; run;
         ;
run;
data L_r;
   infile 'c:\\users\snuss1\Downloads\DATA\Lv.csv' dlm= ',' dsd missover firstobs=2;
         input S C D SOC MOI LR LRR LT LTR LZ LZR aLR aLT aLZ;
         aLR = abs(LRR);
         aLT = abs(LTR);
         aLZ = abs(LZR);
   datalines; run;
         ;
run;
```

```
data L_f;
   infile 'c:\\users\snuss1\Downloads\DATA\Ltotal.csv' dlm= ',' dsd missover firstobs=2;
         input S C D SOC MOI FLR FLRR FLT FLTR FLZ FLZR aFLR aFLT aFLZ;
         aFLR = abs(FLRR);
         aFLT = abs(FLTR);
         aFLZ = abs(FLZR);
         datalines; run;
         ;
run;

proc corr data=A_r;
   var MOI aAR;
run;
proc corr data=A_r;
   var MOI aAT;
run;
proc corr data=A_r;
   var MOI aAZ;
run;
proc corr data=A_f;
   var MOI aFAR;
run;
proc corr data=A_f;
   var MOI aFAT;
run;
proc corr data=A_f;
   var MOI aFAZ;
run;
proc corr data=L_r;
   var MOI aLR;
run;
proc corr data=L_r;
   var MOI aLT;
run;
proc corr data=L_r;
   var MOI aLZ;
run;
proc corr data=L_f;
   var MOI aFLR;
run;
proc corr data=L_f;
   var MOI aFLT;
run;
proc corr data=L_f;
   var MOI aFLZ;
run;
```

```
ods rtf close;
quit;
dm 'log;clear;output;clear';
ods rtf file= 'C:\\users\snuss1\Downloads\residsPCA.rtf';
options nodate nocenter pageno=1 ls=90 ps=56;

Title1 'Testing correlations between prediction model residuals and moisture-content of FM
samples';

data A_r;
   infile 'c:\\users\snuss1\Downloads\DATA\PCA_Av.csv' dlm= ',' dsd missover firstobs=2;
         input S C D SOC MOI AR ARR aAR;
         aAR = abs(ARR);
         datalines; run;
         ;
run;
data A_f;
   infile 'c:\\users\snuss1\Downloads\DATA\PCA_Atotal.csv' dlm= ',' dsd missover firstobs=2;
         input S C D SOC MOI FAR FARR FAT FATR aFAR aFAT;
         aFAR = abs(FARR);
         aFAT = abs(FATR);
         datalines; run;
         ;
run;
data L_r;
   infile 'c:\\users\snuss1\Downloads\DATA\PCA_Lv.csv' dlm= ',' dsd missover firstobs=2;
         input S C D SOC MOI LR LRR LT LTR LZ LZR aLR aLT aLZ;
         aLR = abs(LRR);
         aLT = abs(LTR);
         aLZ = abs(LZR);
   datalines; run;
         ;
run;
data L_f;
   infile 'c:\\users\snuss1\Downloads\DATA\PCA_Ltotal.csv' dlm= ',' dsd missover firstobs=2;
         input S C D SOC MOI FLR FLRR FLT FLTR FLZ FLZR aFLR aFLT aFLZ;
         aFLR = abs(FLRR);
         aFLT = abs(FLTR);
         aFLZ = abs(FLZR);
         datalines; run;
         ;
run;

proc corr data=A_r;
   var MOI aAR;
```

```
run;
proc corr data=A_f;
   var MOI aFAR;
run;
proc corr data=A_f;
   var MOI aFAT;
run;
proc corr data=L_r;
   var MOI aLR;
run;
proc corr data=L_r;
   var MOI aLT;
run;
proc corr data=L_r;
   var MOI aLZ;
run;
proc corr data=L_f;
   var MOI aFLR;
run;
proc corr data=L_f;
   var MOI aFLT;
run;
proc corr data=L_f;
   var MOI aFLZ;
run;

ods rtf close;
quit;
```

VITA

Sara Nuss was born in 1986 and grew up in Covington, Louisiana. She obtained a Bachelor's of Science in Biology in May of 2010, from Louisiana State University in Baton Rouge, LA. She returned to LSU in the Fall of 2011 to begin work on a Master's degree in Agronomy, under the guidance of Dr. David C. Weindorf, Associate Professor of Pedology for the Louisiana State University Agricultural Center. An introduction to her Master's work was presented at the 2012 Soil Science Society of America annual meeting, held in Cincinnati, Ohio, where her poster presentation was awarded second place in the Pedology division of the graduate student competition. The title of her thesis is, "Soil organic carbon determination for Louisiana soils via portable x-ray fluorescent spectroscopy".