Characterizing Floodplain Sediments in Riverton, WY

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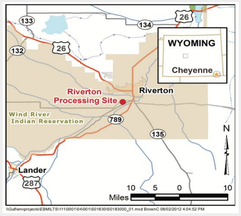


Figure 1: Site sampled in Riverton, WY.

Objective: This study addresses the need to understand current subsurface geochemical characteristics in Riverton, Wyoming, home to a former uranium mining site. After a five year drought, Riverton experienced record-setting flooding. There is concern that a decreased water stage can have major impacts on the geochemical makeup of this ecosystem as 1) a decreased water volume may result in an increase of pollutant concentrations and 2) a decreased water stage can have a significant impact the redox cycling within the subsurface and affect major biogeochemical cycles.

Samples for this study were taken three time points over a year (August 2015, June 2016, August 2016). This summer 77 samples from August 2016, and 28 samples from June 2016 were geochemically characterized and compared. These samples encompass the terminus of a five year drought (2011-2016) and the second largest flood on record at Riverton, WY. Findings indicate that subsurface geochemistry variation during these time points may decrease with depth.

Figure 2: Soil characterization methods.

Freeze Drying

Homogenization

Elemental Analysis

Methods: A total of 105 samples were processed. Each sample was freeze dried (48 hours), weighed pre-and post-drying to determine soil moisture content (%), homogenized, and analyzed for carbon and nitrogen content on the Elemental Analysis (EA) machine.

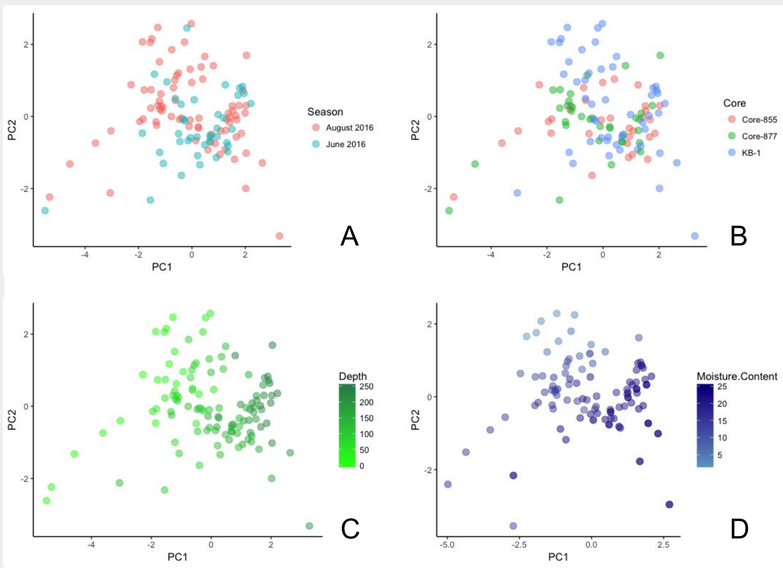


Figure 3: Principal Component Analysis (PCA) of sample data matrix. 49.84% of the sample variation can be explained by PC1 and 23.35% of the variation can be explained by PC2. Graphs are colored by A) Season, B) Core Identifier, C) Depth(cm) and D) Moisture Content(%).

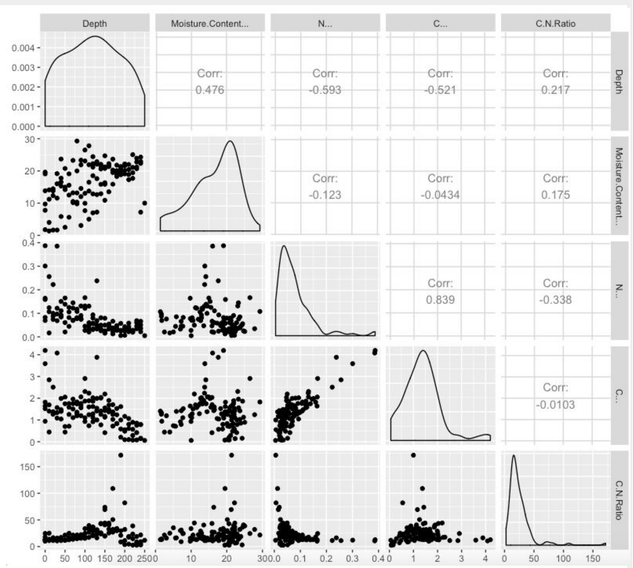
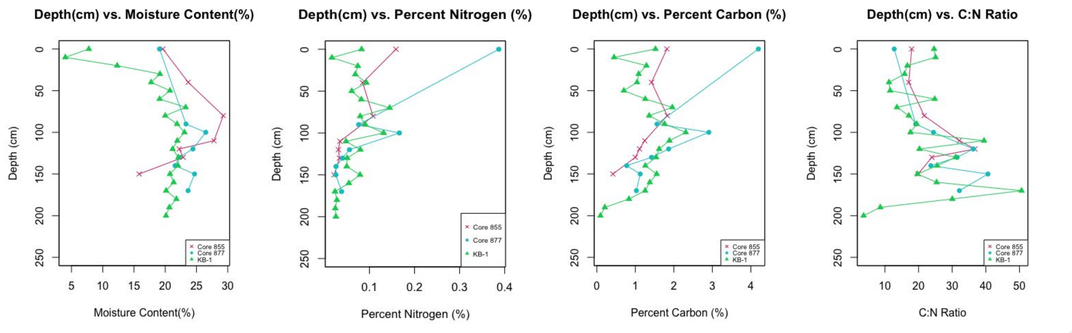


Figure 4: Pairwise combinations of each measured variable into scatterplots with their corresponding linear correlation coefficients.

June 2016



August 2016

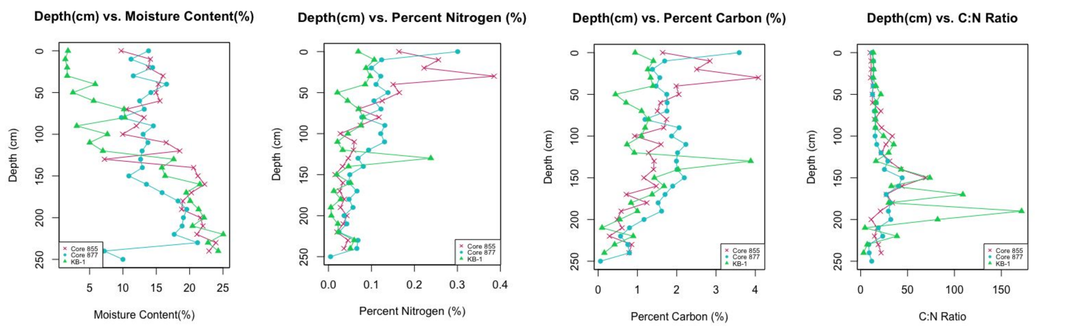


Figure 5: Depth plots of measured and calculated quantities in June 2016 and August 2016.

Conclusions:

- In June 2016 and August 2016 variation in moisture, nitrogen, and carbon contents decreased with depth.
- Total % C and % N contents were also highly correlated with each other.
- PCA results indicate sample depth and moisture content appear to contribute most to the observed variation in the dataset.

Acknowledgements: This material is based upon work supported by the National Science Foundation through the Robert Noyce Teacher Scholarship Program under Grant 1340110, Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation. The research was also made possible by the California State University STEM Teacher and Researcher Program, in partnership with Chevron (www.chevron.com), the National Marine Sanctuary Foundation (www.marinesanctuary.org), and SLAC National Accelerator Laboratory. This project was additionally supported by the SLAC Science Focus Area program, "Coupled Cycling of Organic Matter, Uranium, and Biogeochemical Critical Elements in the Subsurface Systems", funded by the Department of Energy. Special thanks to the Francis Lab and the STAR SLAC, SFSU and RTC 2017 Cohort.