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SOAViz: Visualization for Portable X-ray Fluorescence Soil Profiles

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TEXAS TECH UNIVERSITY

Current approaches to soil horizons data analysis

ArcGIS

SAGA

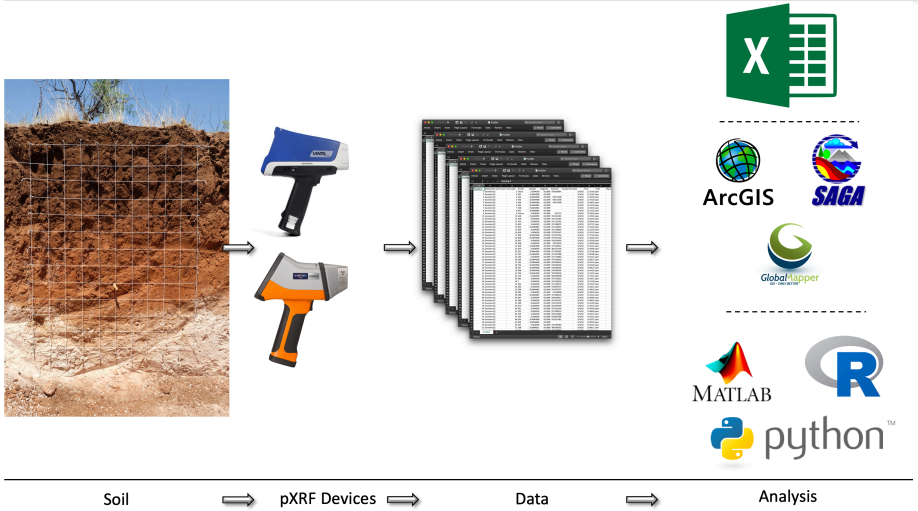
GlobalMapper

MATLAB

python™

Soil ⇒ pXRF Devices ⇒ Data ⇒ Analysis

Current approaches to soil horizons data analysis



Problems:

- *Time consuming:* The whole process can takes days to weeks
- *Involving many people:* Soil scientist might not be able to extract the data, process and combine the data, and build analysis output using a custom software
- *Mistakes are irreversible* in many cases

pXRF Device built-in data visualization

This figure is adapted from Vanta Family X-Ray Fluorescence Analyzer User's Manual

Problems:

- *Correlations of different shoots,* especially when the data is collected on a specific layout --> No distribution overview
- *Correlation between different chemical elements.* This is important since chemical correlation define soil classifications: such as **clay** or **sandy** soils

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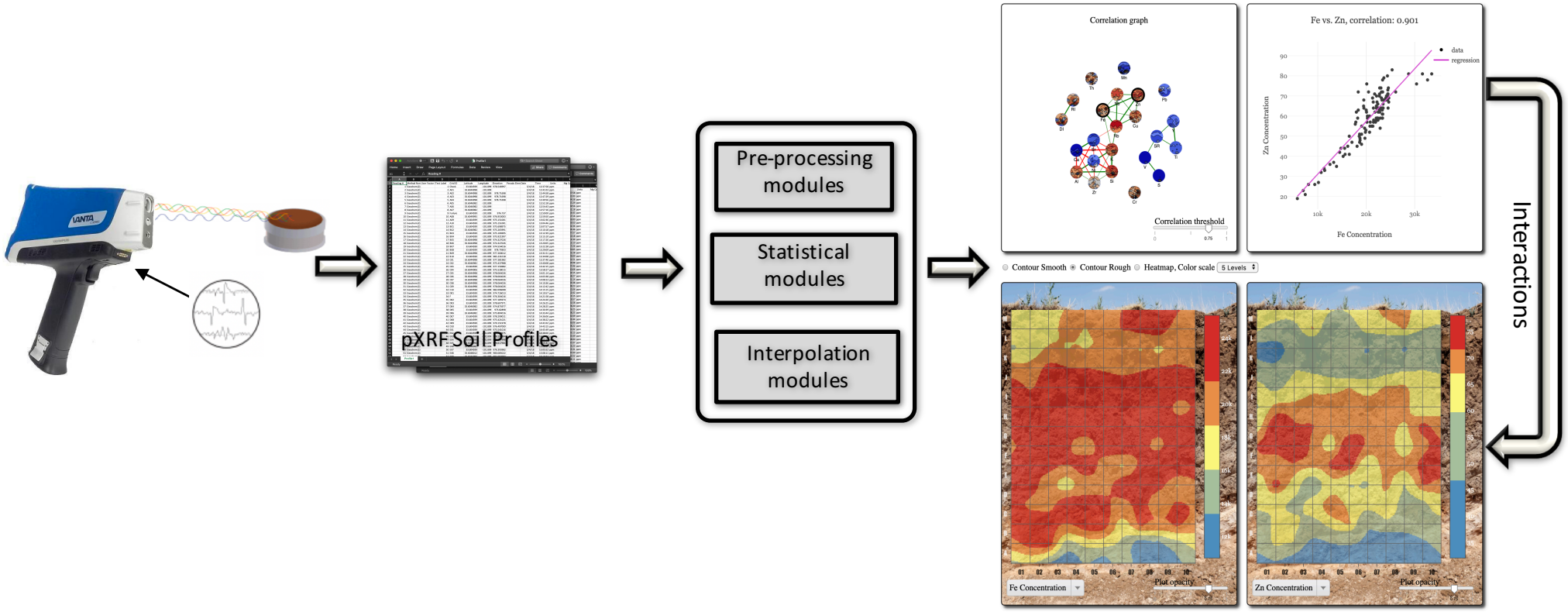
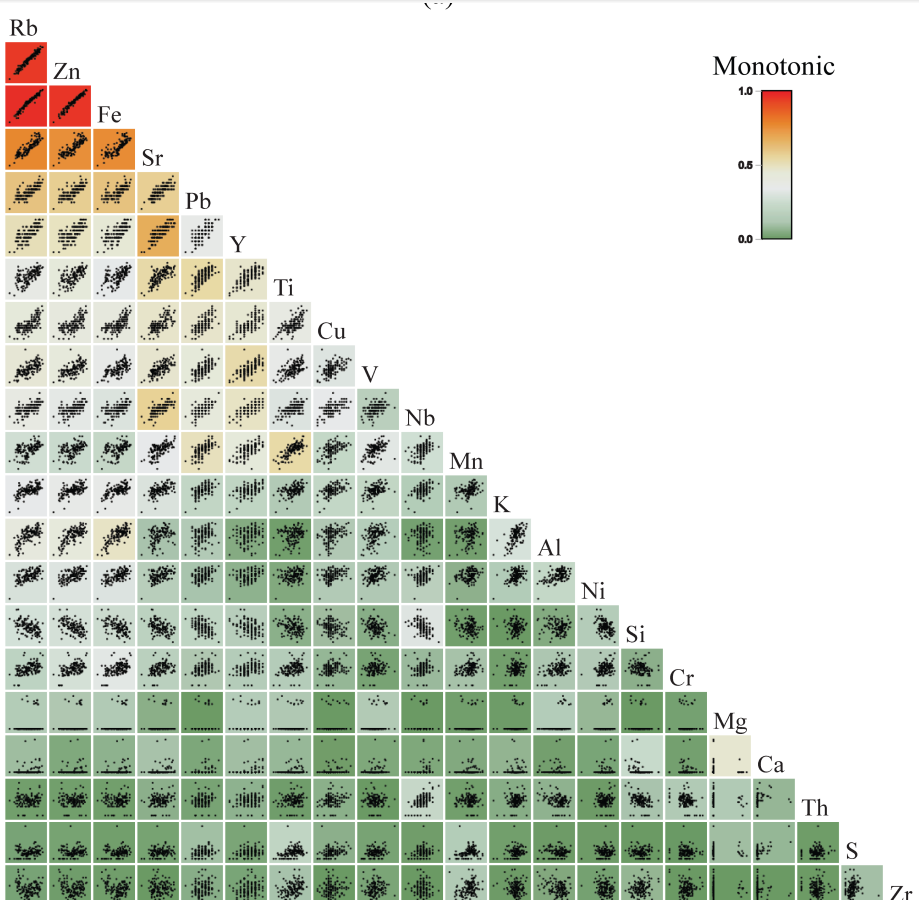
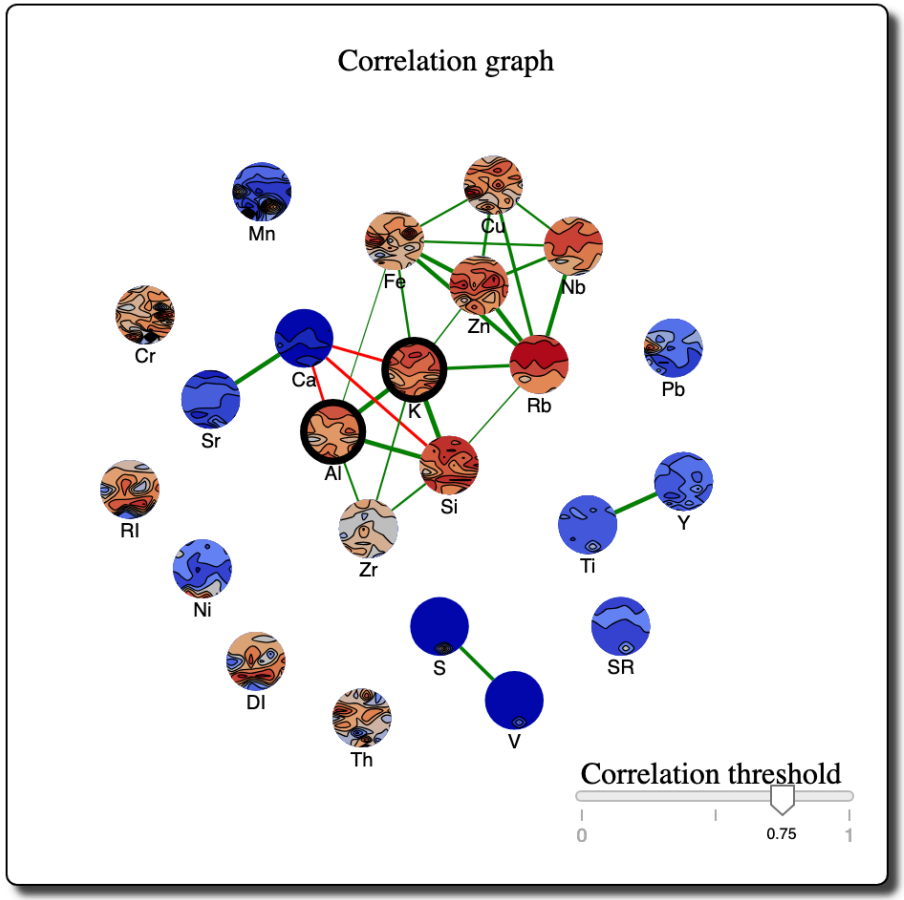


Scanning | Data importing | Data processing | Visualization

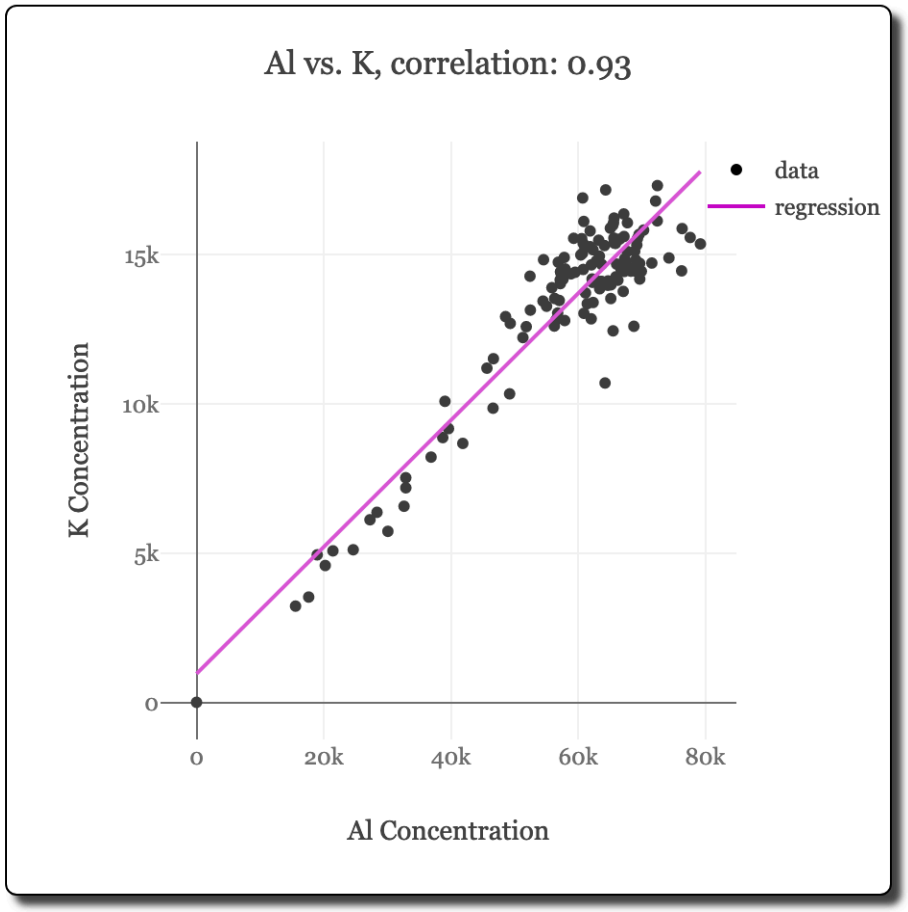
Collected pXRF data: Soil Profile 3



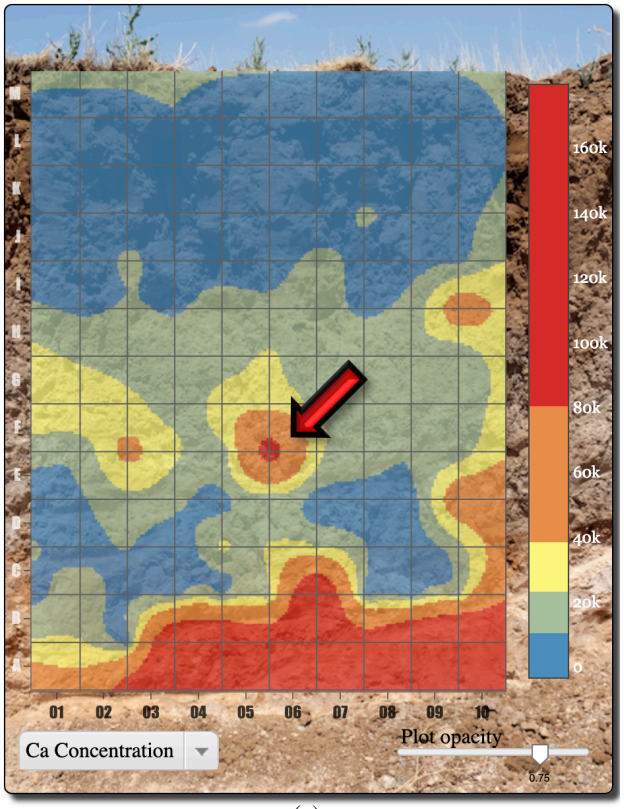
SOAViz components: Correlation network



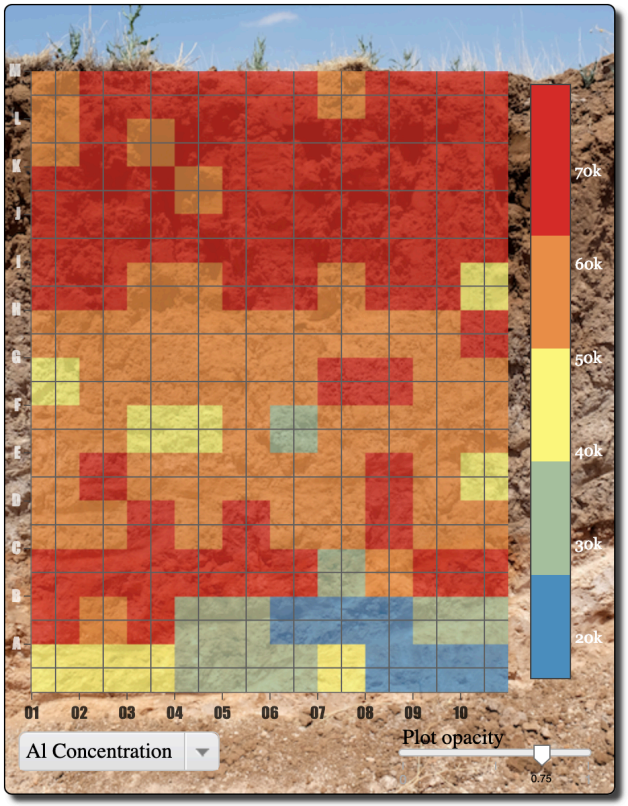
The correlation graphs



The contamination spatial distributions

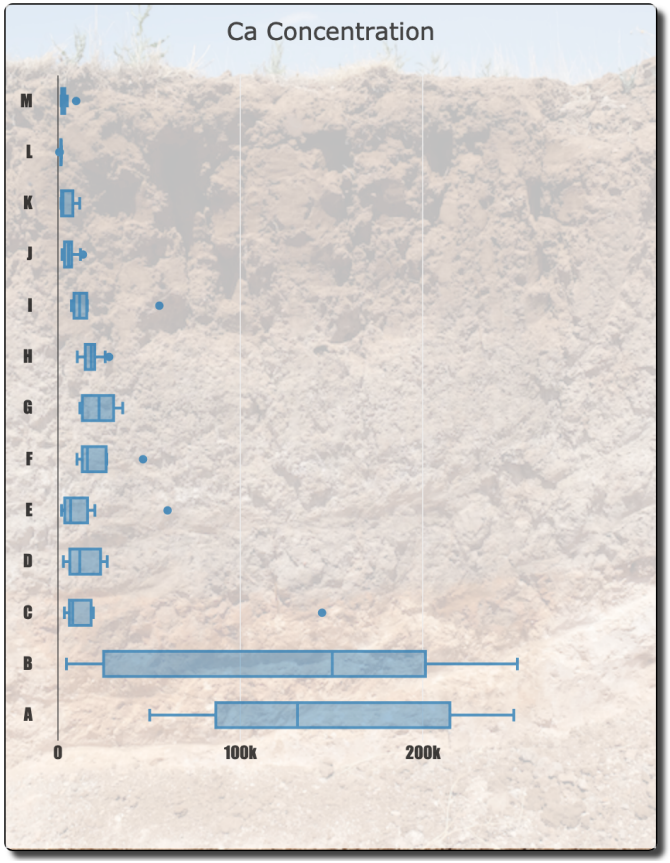


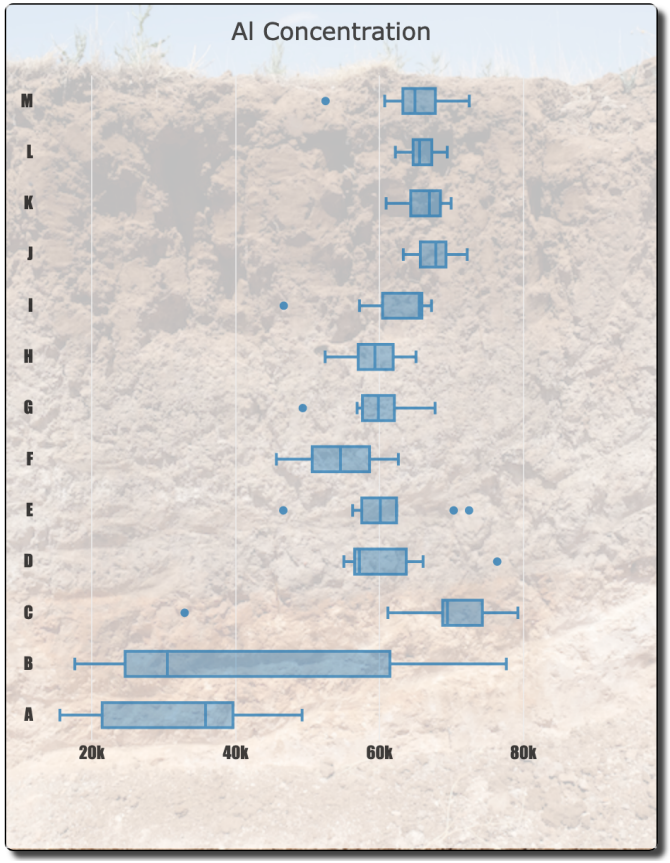
(a)



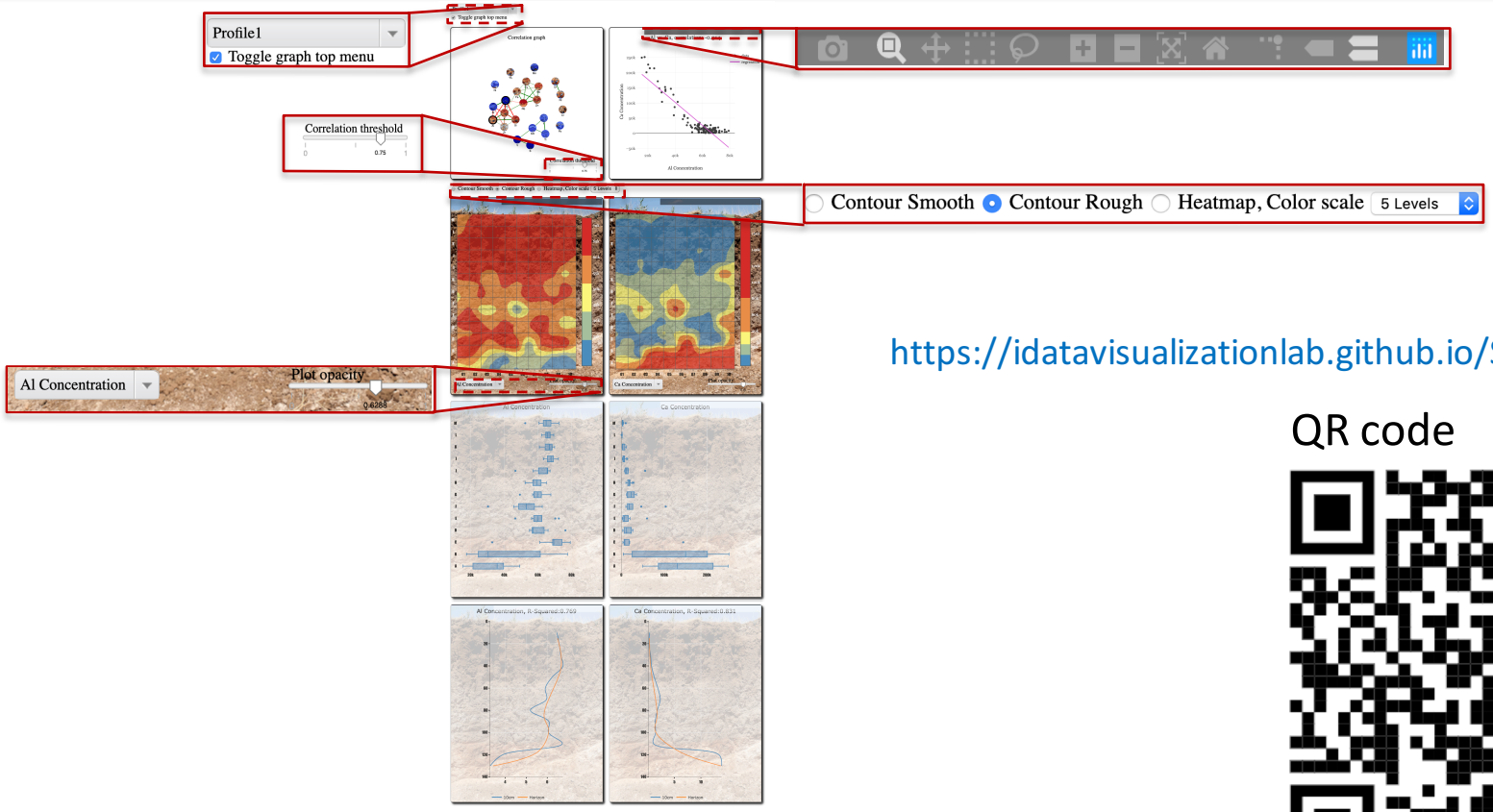
(b)

The box-plots





Interactions

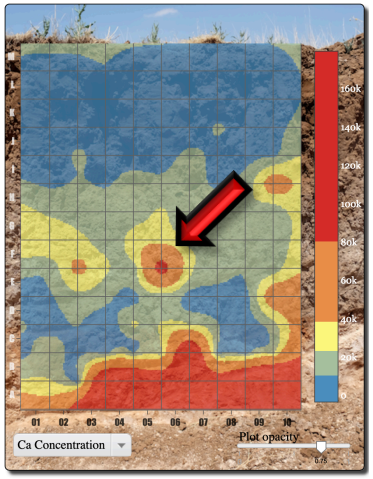


https://idatavisualizationlab.github.io/Soil/demos.html

QR code

We validated SOAViz

- Using 3 soil horizon profiles
- With two soil scientists
- With four soil survey staff from USDA



Future directions

- Pulling data directly from pXRF devices
- Deploying SOAViz directly into pXRF devices
- Making this as a standard framework for soil horizon data analysis using pXRF