NIR model building excerise

Cost-efficient spectroscopy for soil analyses

TropiRes – Summer School – Uganda, 2024

Workshop II

Leo Ramirez-Lopez, Laura Summerauer, Moritz Mainka

Goals

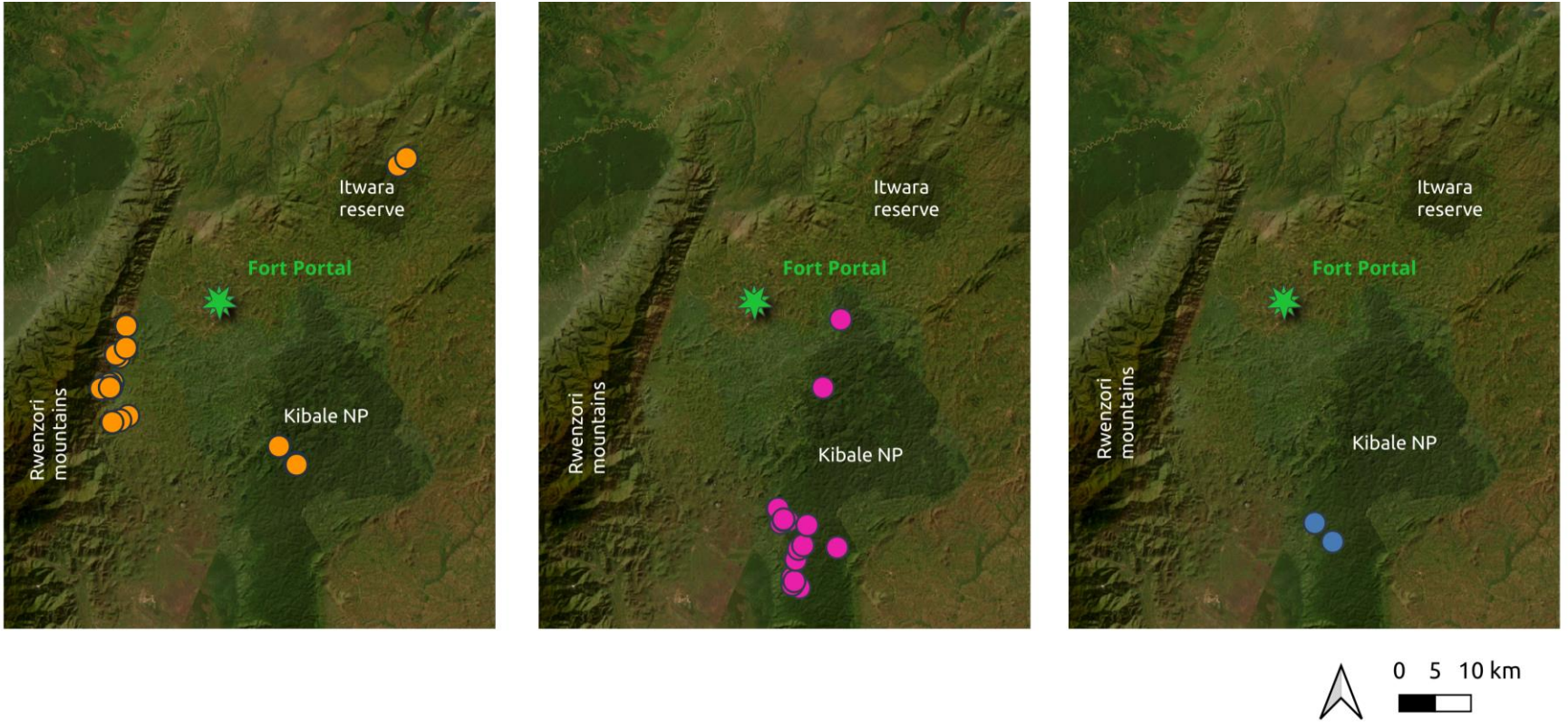
Develop a C model (with an existing soil NIR dataset) for a portable NIR sensor

Use the NIR model to predict the C content distribution across a soil profile with measurements conducted during this workshop

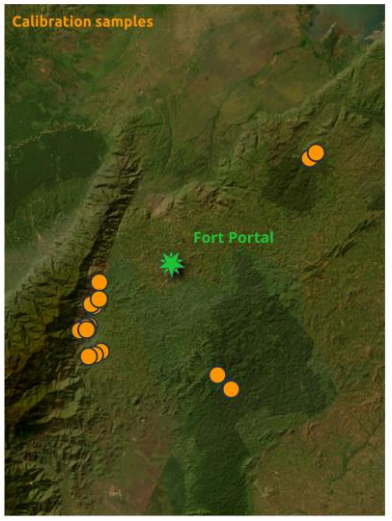
Calibration samples overview

- Calibration samples (model building)
- Validation samples (model testing)
- Test samples (Property prediction for further analyses)

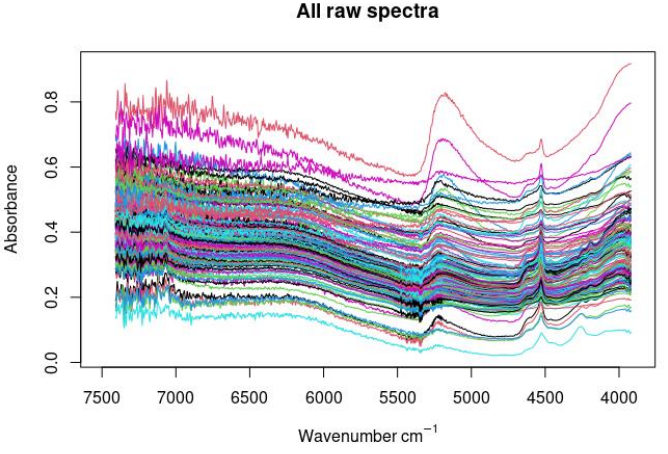
Sample sets / location



Calibration samples / model building

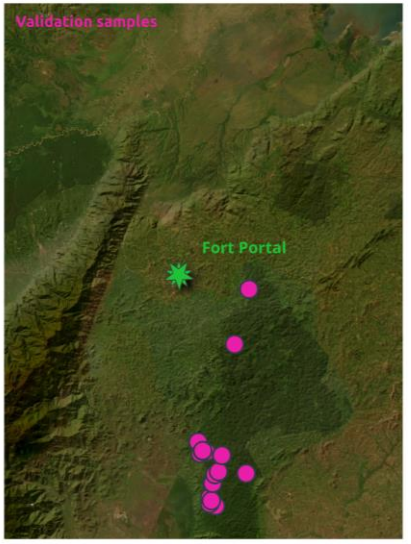


- 151 samples with available near-infrared data and paired wet chemistry data (soil organic carbon)
- Provide basis for calibration modeling
- Sample origin:
  Rwenzori foothills, Itwara forest reserve, Kibale National Park
- Land use: cropland and forest
- Infrared spectrometer: Vertex70 BRUKER
  NIR wavelength range: 1300 – 2550 nm
- Wet chemistry method: Dry combustion (CN analyzer)



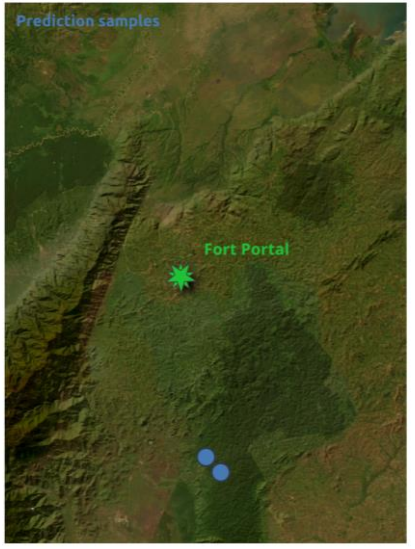
Validation samples / model testing

- 19 samples soil organic carbon data
- Provide basis for testing of the performance of the established calibration model
- Sample origin:
  Kibale National Park
- Land use: forest
- Wet chemistry method: Dry combustion (CN analyzer)



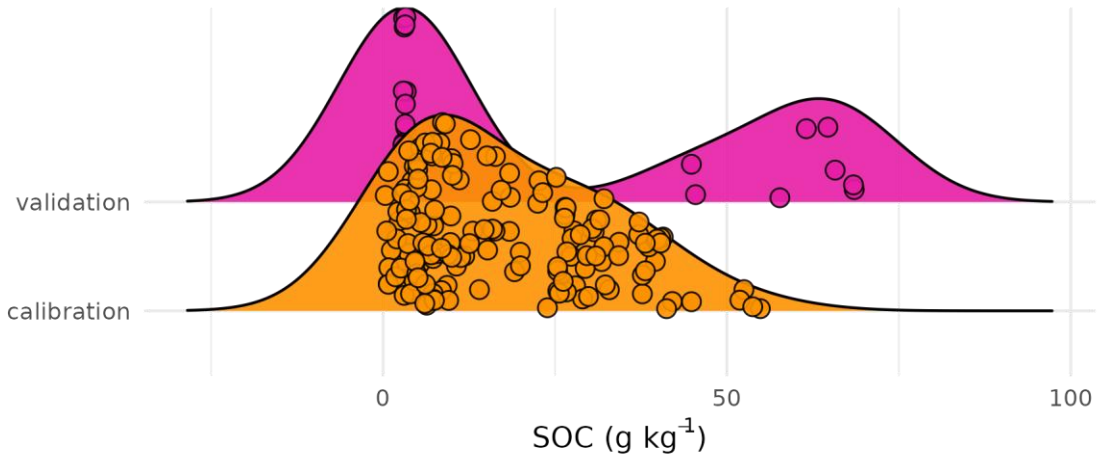
Test samples

- 20 samples without any data
- Need to be analyzed for subsequent data analyses
- Sample origin:
  Two contrasting soil cores 0 – 100 cm
  from Kibale National Park
- Land use: forest
- Infrared spectrometer: **need to be measured**

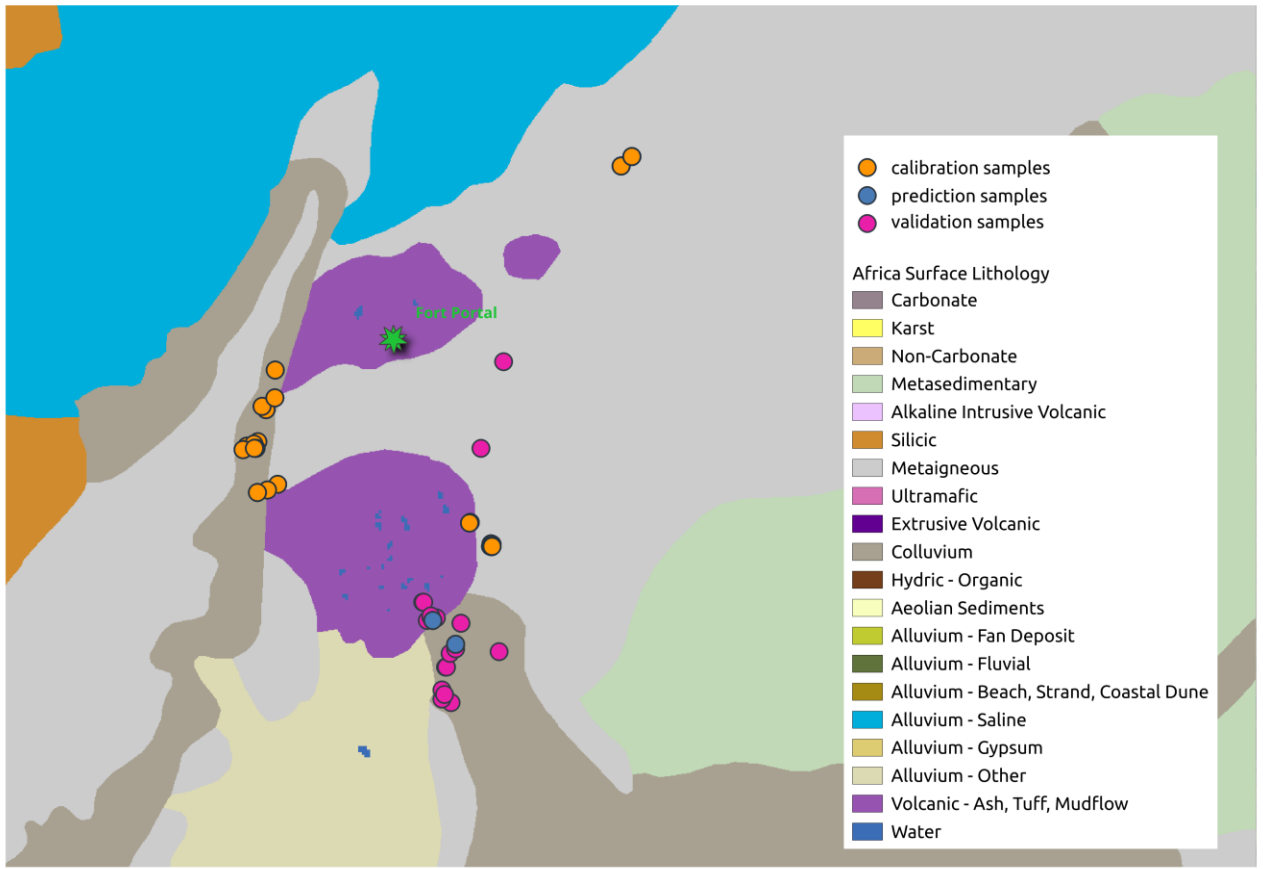


Reference data (C data)

- Calibration set: 0.3 – 54.9 g C kg^{-1} dry soil
- Validation set: 2.9 – 68.5 C kg^{-1} dry soil



Geology overview



Possibly some influence from volcanoes?