



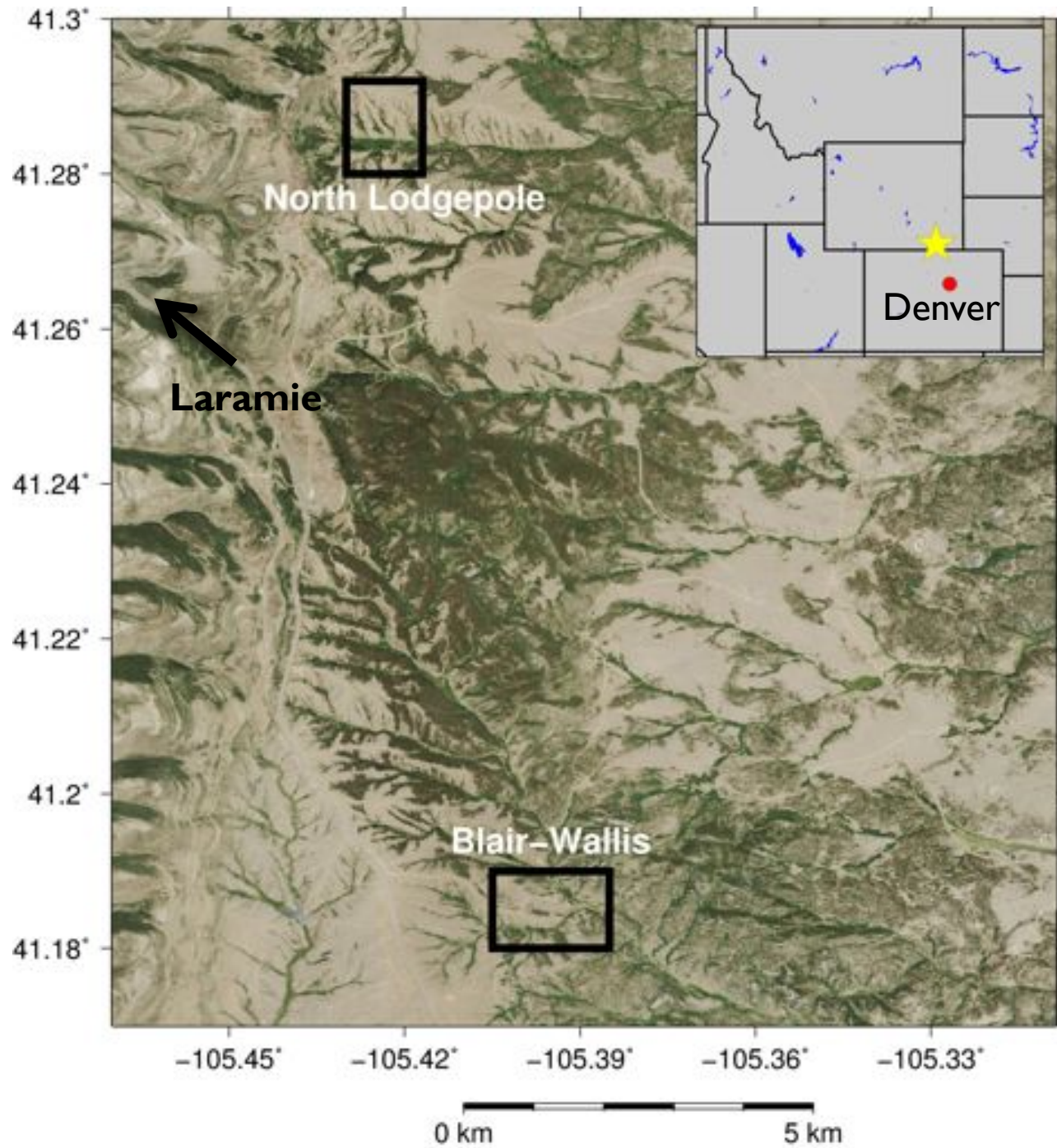
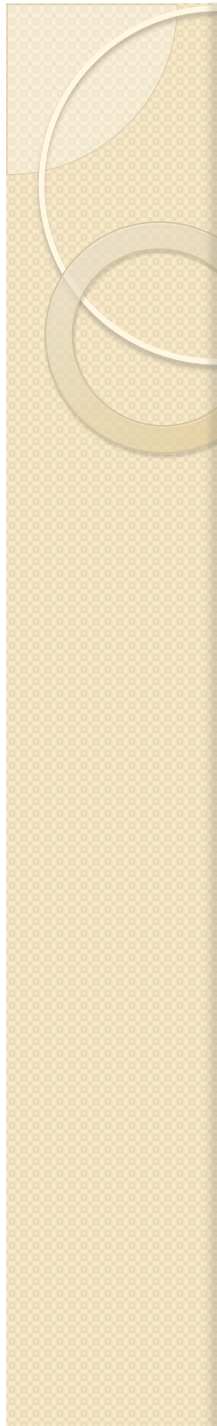
Geophysical Investigation of Variability in Granite Weathering Thickness, Laramie Range, Wyoming

Brady Flinchum, W Steven Holbrook, Matthew Provart
and Bradley Carr

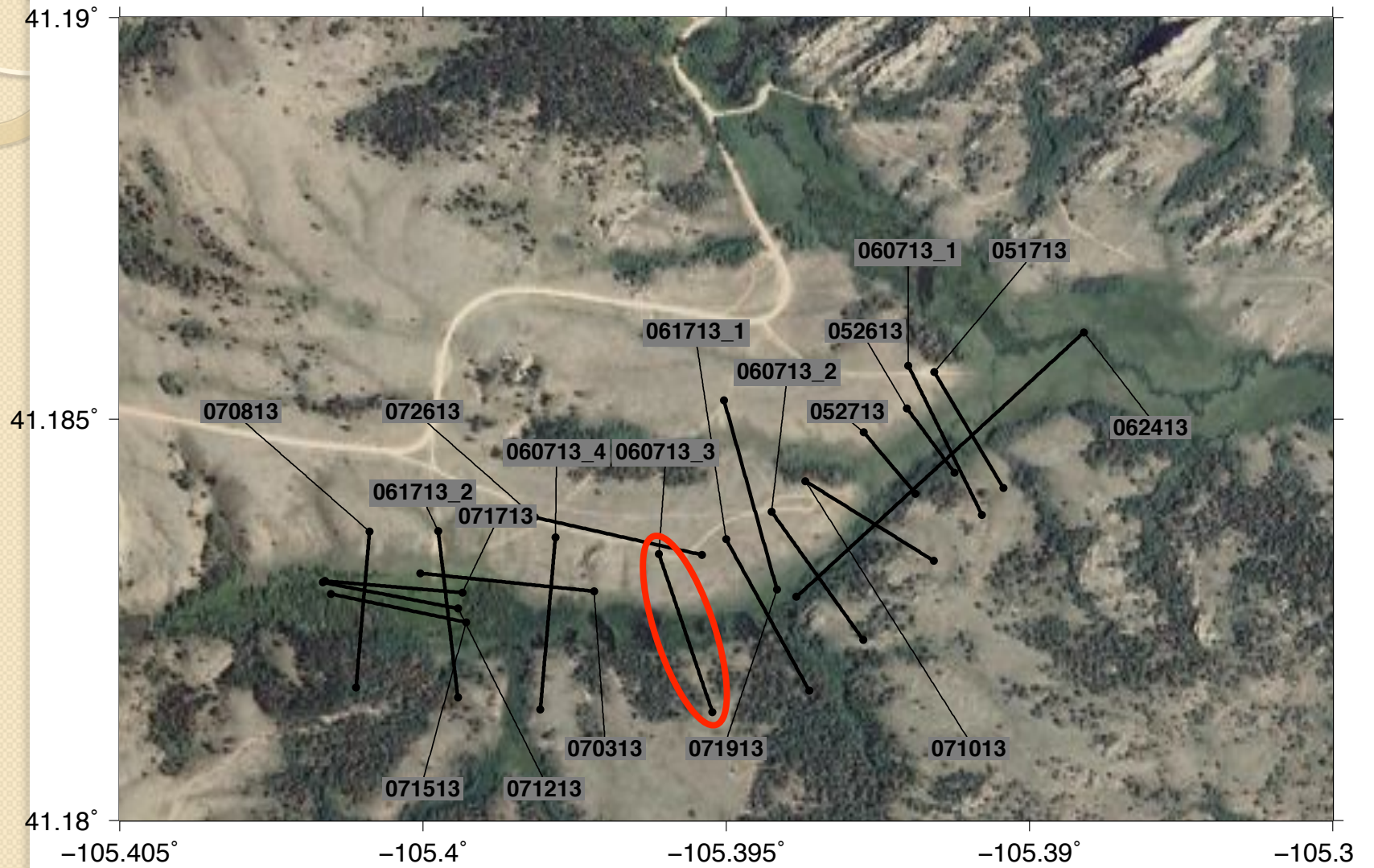


The Questions

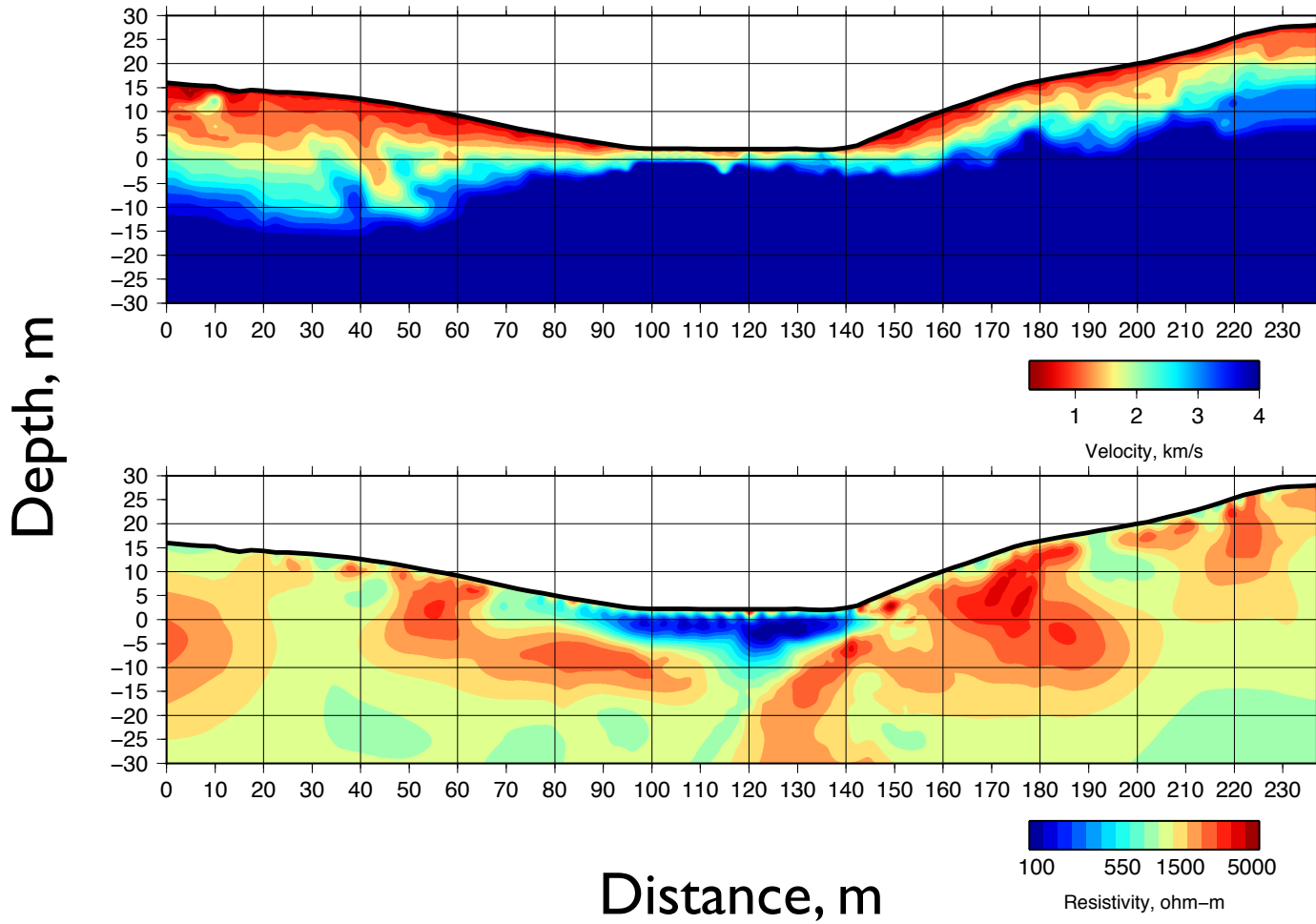
- Why are weathering profiles so different just 12 km apart?
 - Compositional variability
 - Elevation differences
 - Slope gradients
 - Biological processes
 - Climate/precipitation variability
- How does weathering variability affect groundwater flow?



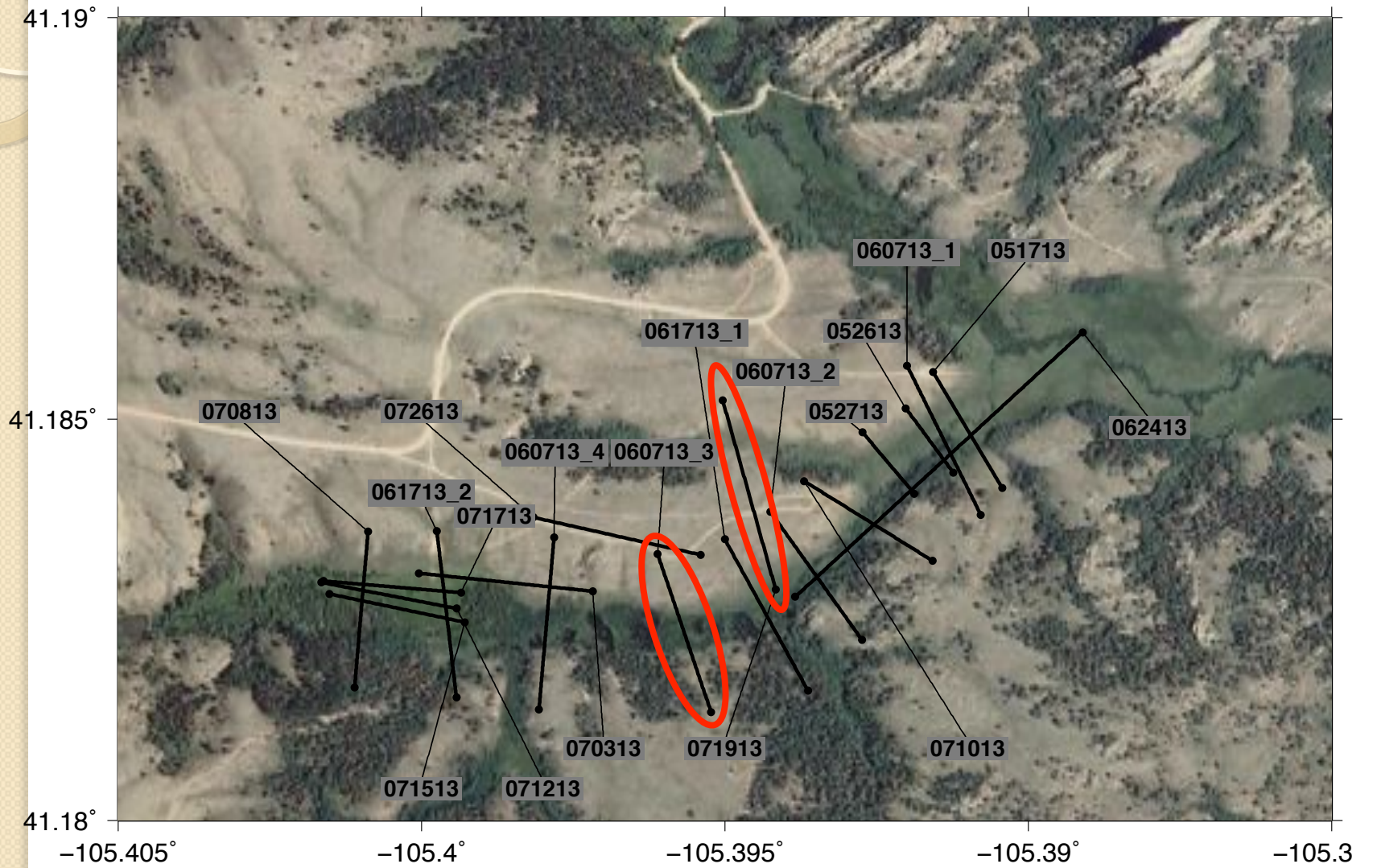
Blair-Wallis



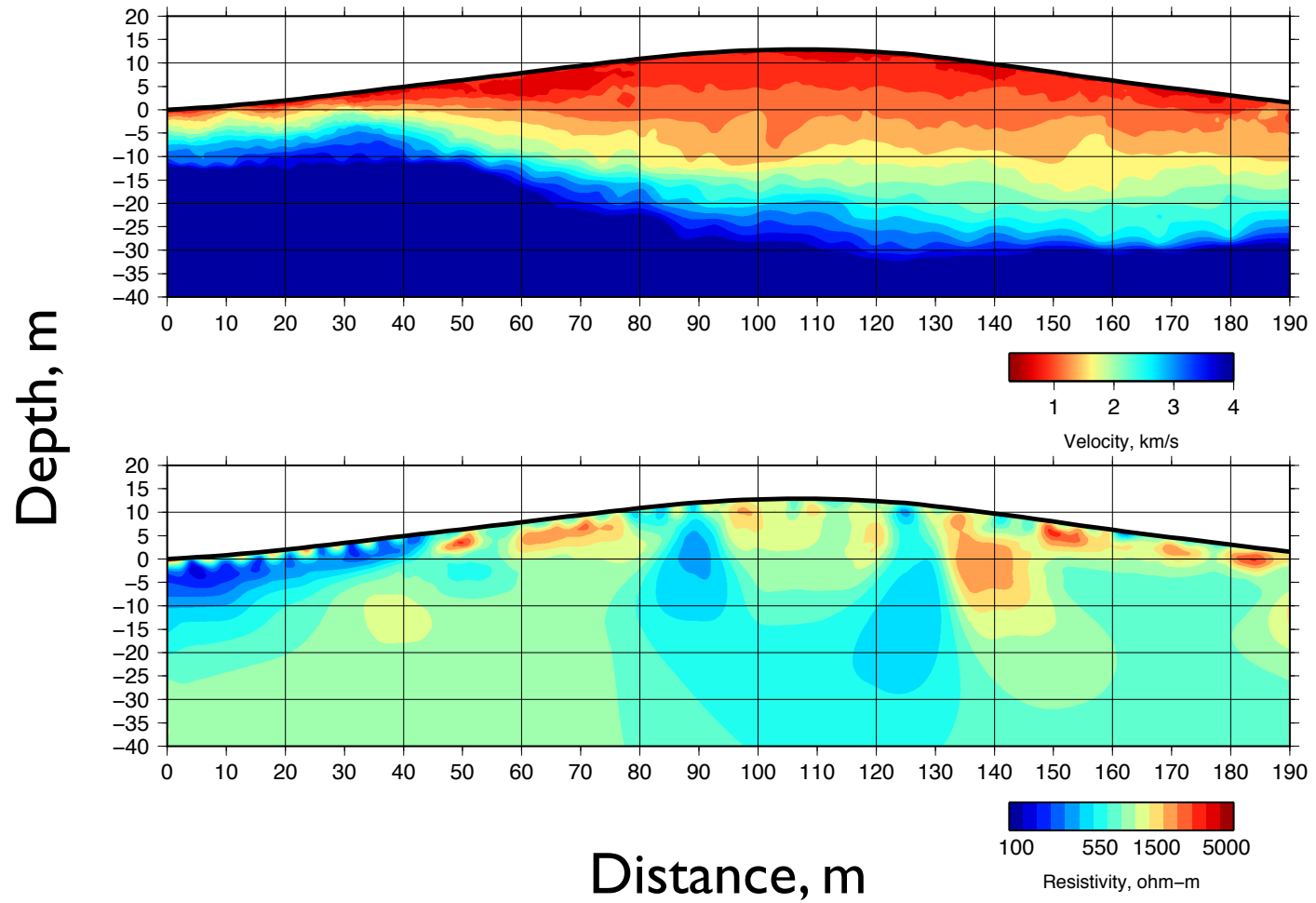
Weathering Profile



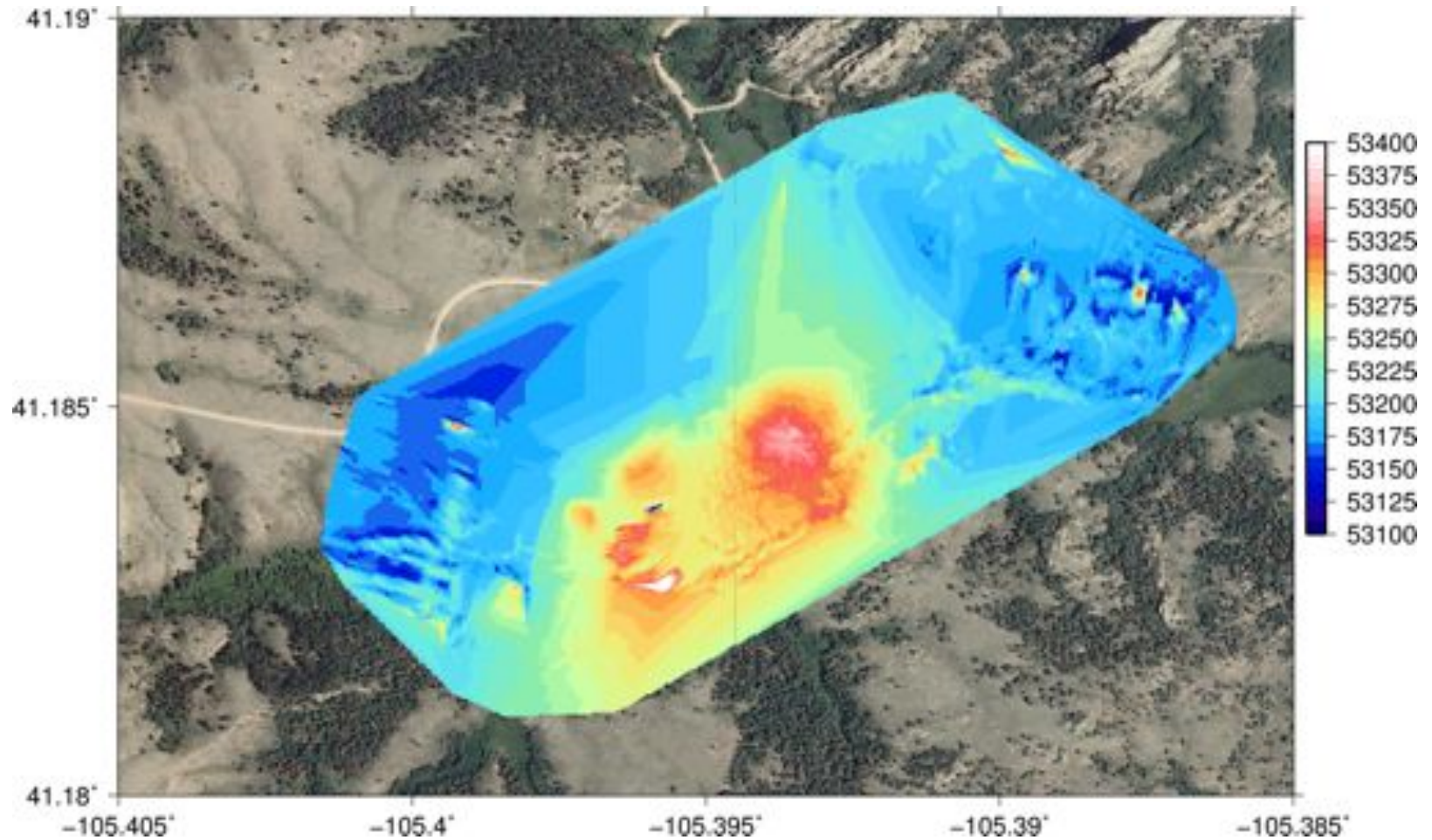
Blair-Wallis



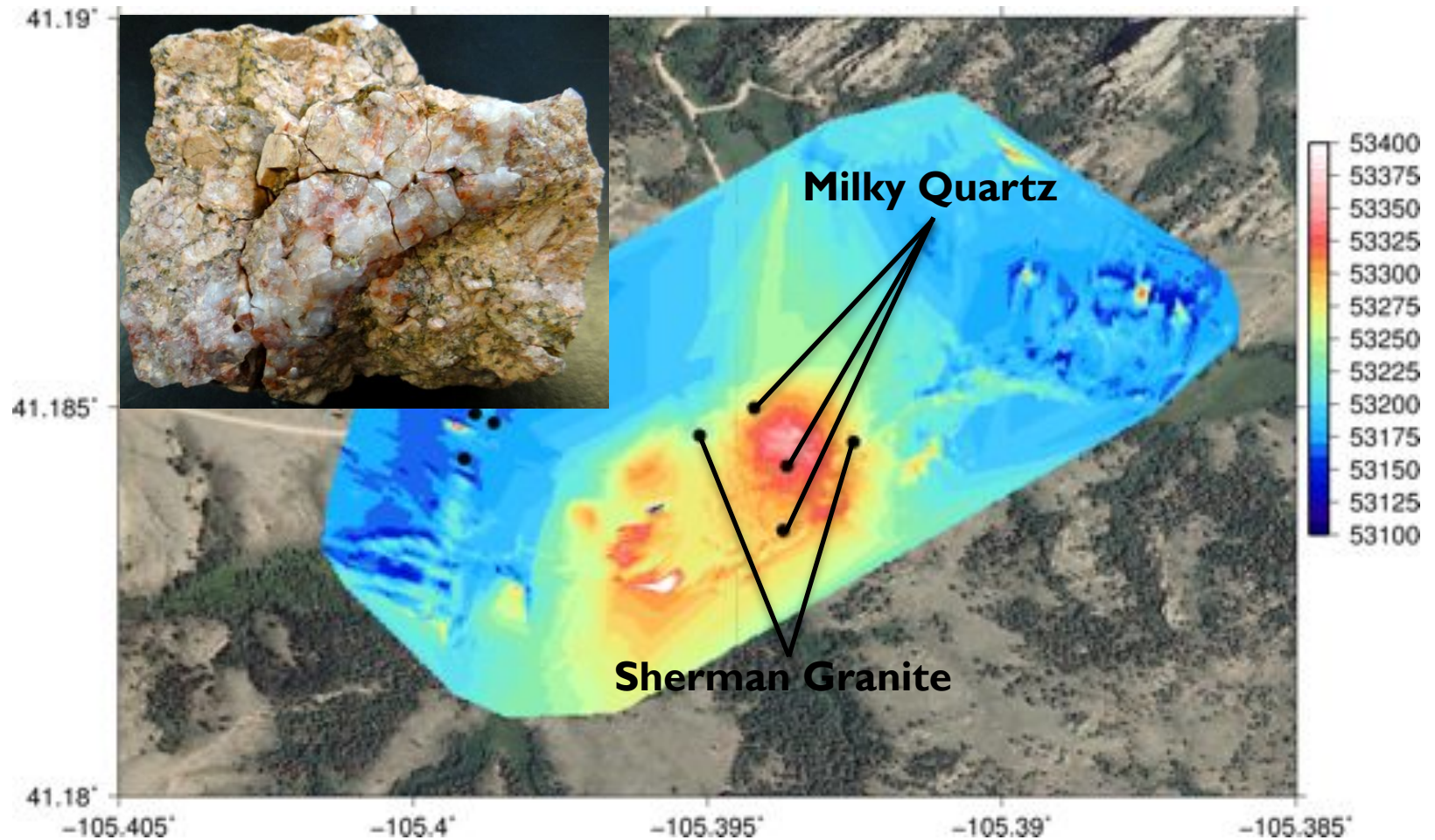
Weathering Profile



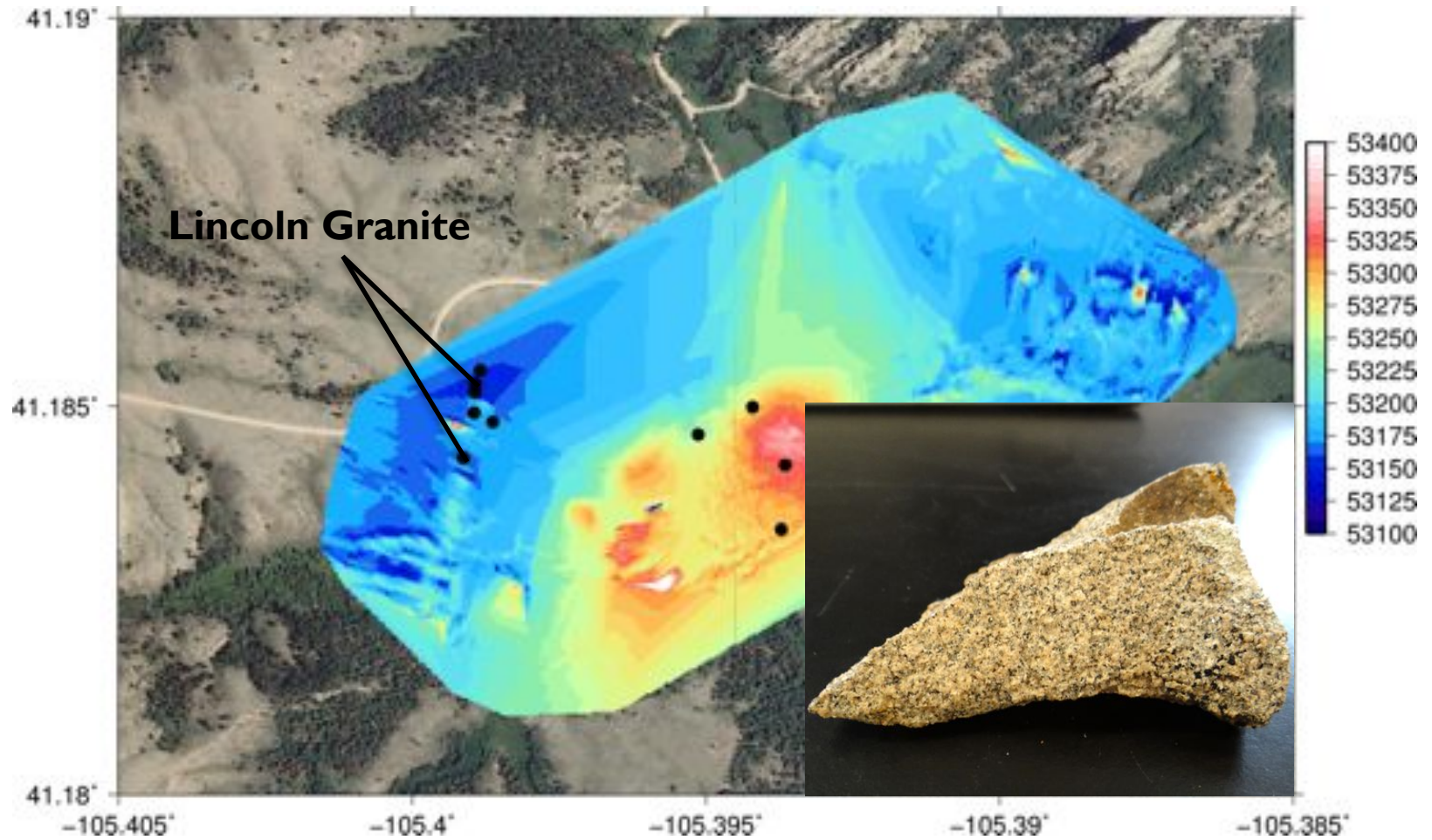
Total Magnetic Field, nT



Total Magnetic Field, nT



Total Magnetic Field, nT

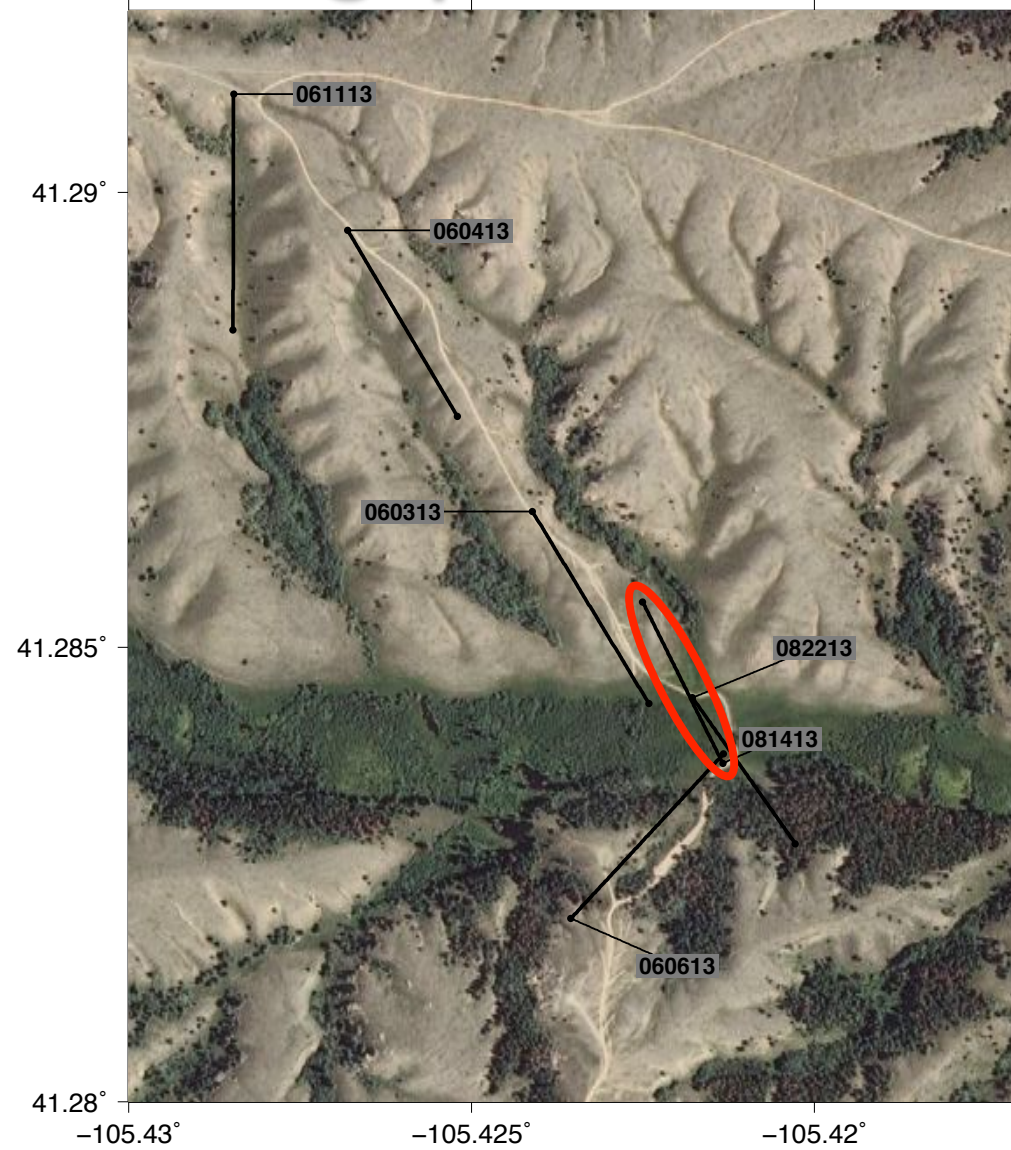




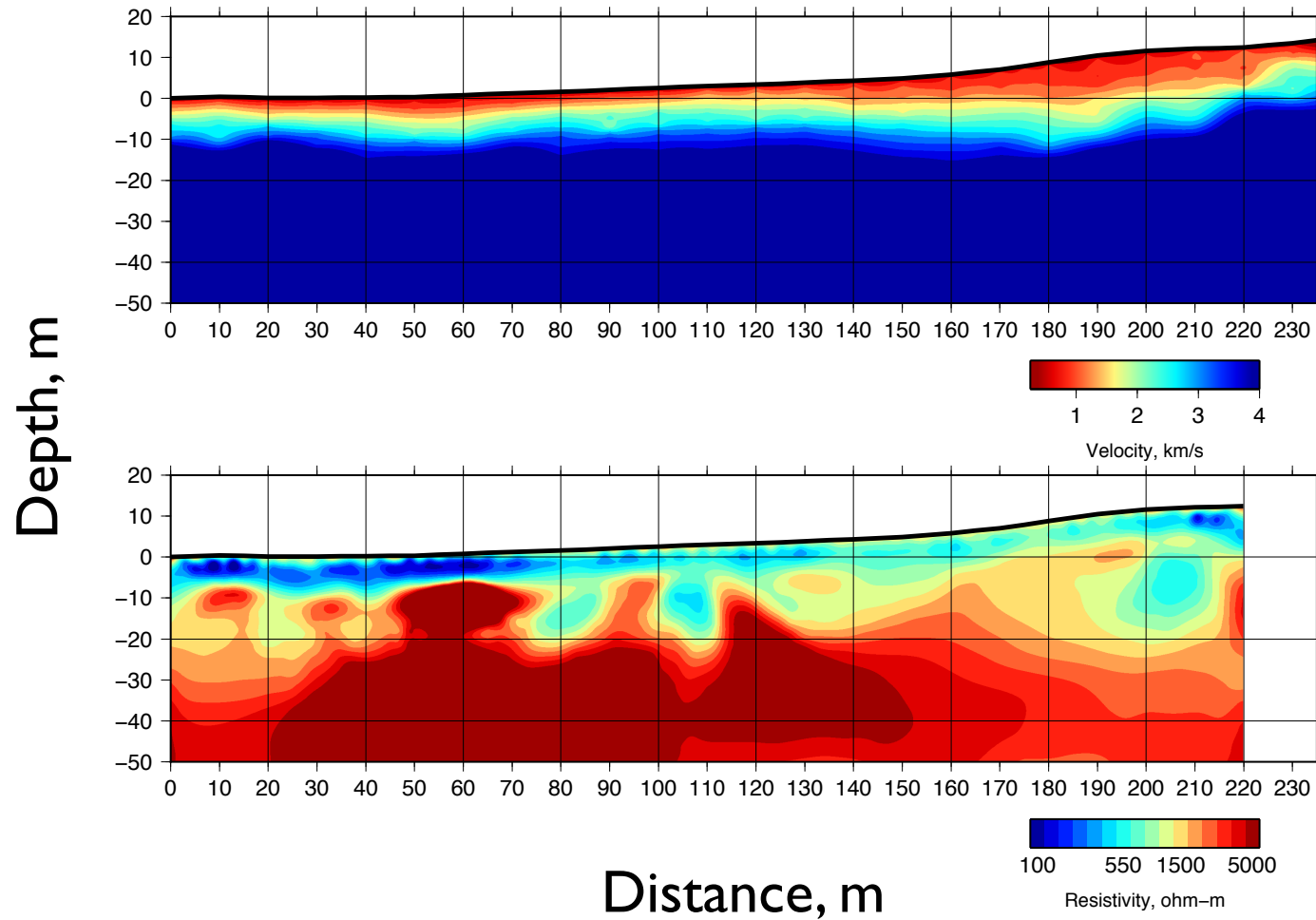
Observations: Blair-Wallis

- Weathering Profile is the thinnest (~5-7m) at the bottom of the drainage
- High variation in the total field magnetic data
- There are two known types of granite present

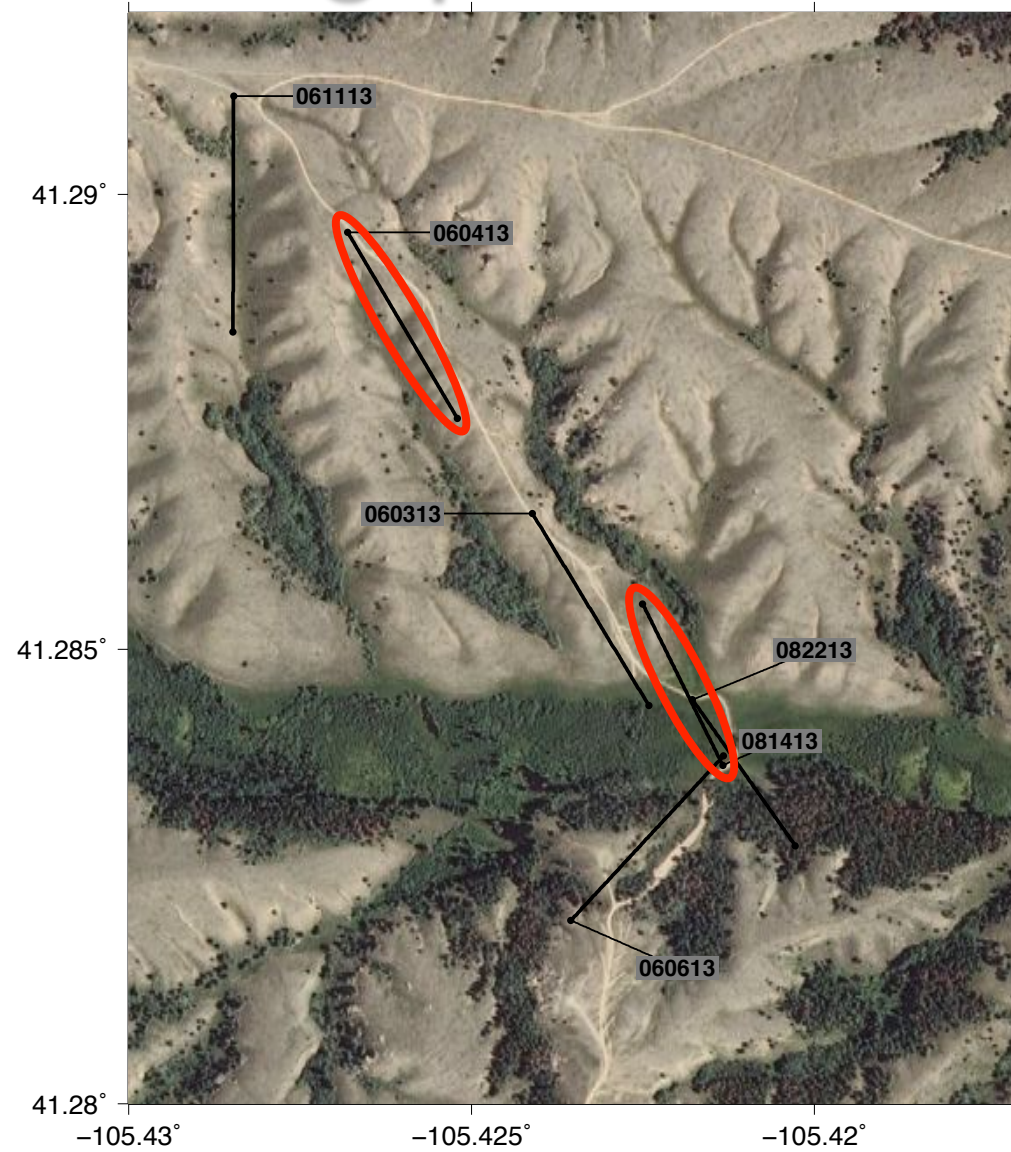
North Lodgepole Creek



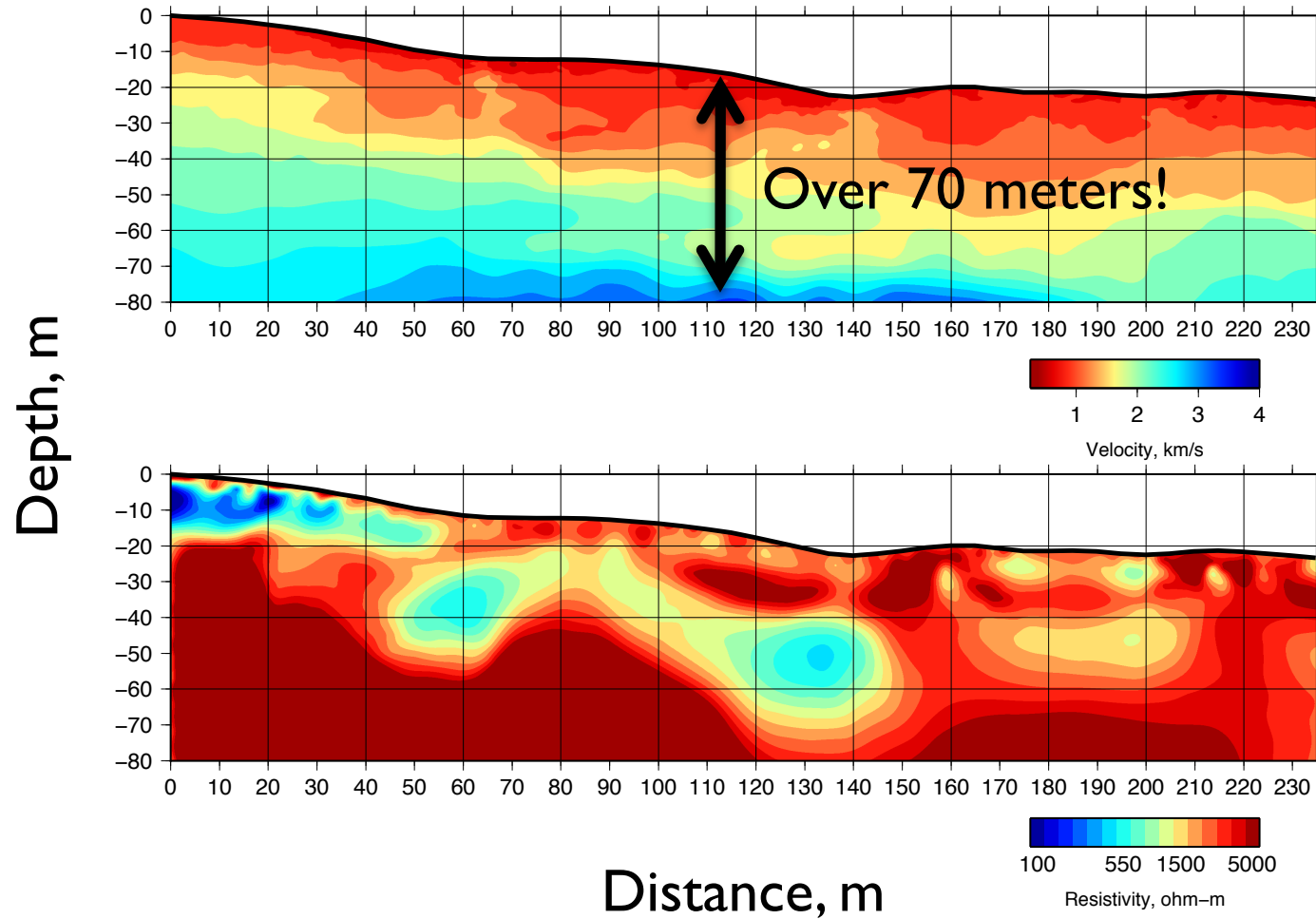
Weathering Profile



North Lodgepole Creek



Weathering Profile



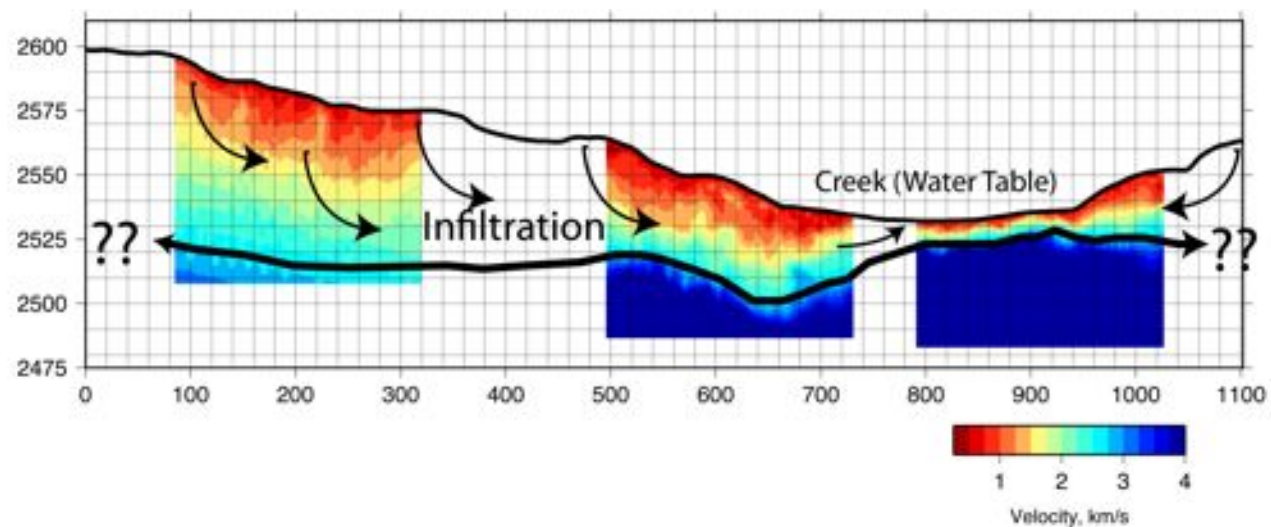


Observations: North Lodgepole

- Weathering profile is the thinnest (~10-12m) at the bottom of the drainage
- Weathering profile is over 70 m thick as distance from the bottom of the drainage increases

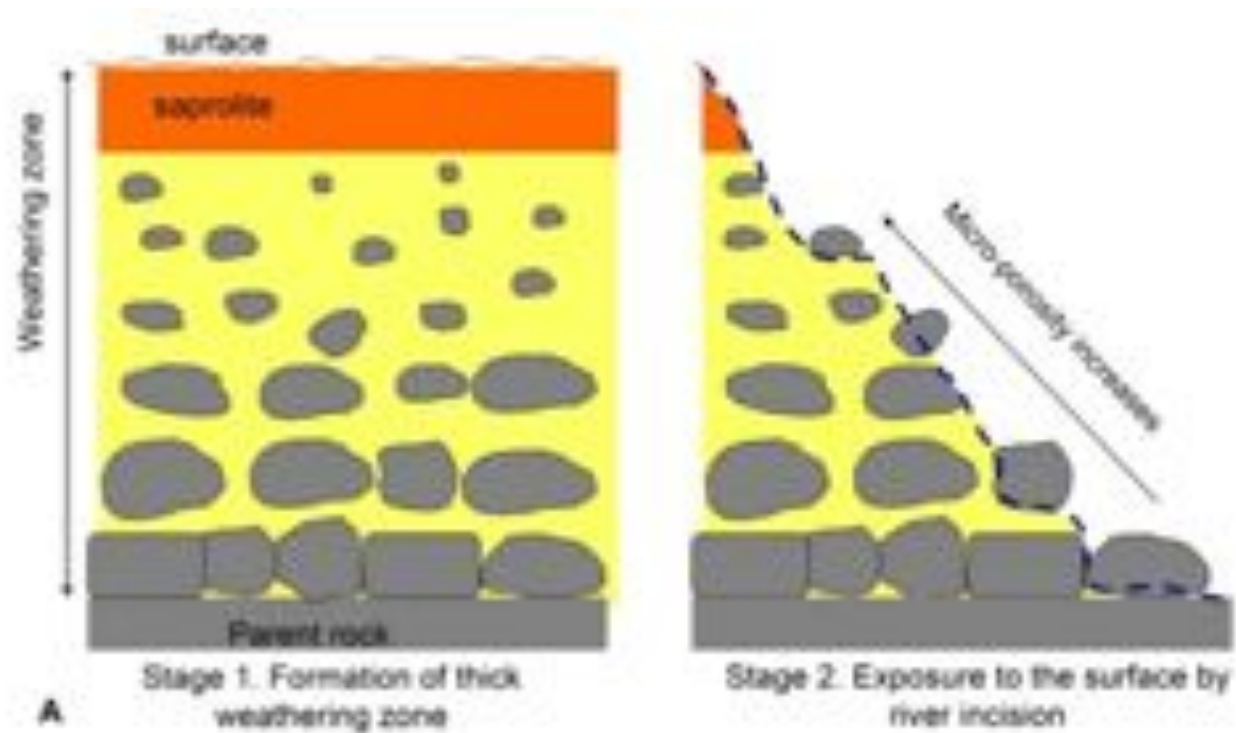
Interpretations

- Water table control hypothesis
 - Size of the watersheds
 - Longer infiltration paths leads to more chemical weathering



Interpretations

- Exhumation hypothesis
 - Erosion of an “ancient” weathered zone



(Buss et al. 2013)



Future Work

- Drilling
 - Confirm the location of the unweathered rock
 - Locate hydraulic heads
- Monitor stream flow in both watersheds
- Create a detailed geologic map

Conclusions

- In hard rock terrains:
 - Seismic velocity measures weathering
 - Resistivity shows water
 - Magnetics show composition
- Weathering thickness varies from 10->70 m in Laramie Range
 - Thick at ridge crests; thin in drainages
- Two hypotheses:
 - Exhumation of ancient weathering zone
 - Infiltration/water table control

Thank You!

