

Terrain Analysis and Paleoaltimetry Proxy Evaluation: Chingaza National Park, Colombia

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Motivation

- Currently conducting many field studies in the area
 - Paleoclimate: L. Chingaza cores
 - Glacial: moraine mapping
 - Biogeochemical: high altitude grass δD offsets
 - Tectonics: paleoaltimetry of the Andes

Study Area

- Chingaza PNN: east of Bogota
- Additional sites:
 - Sierra Nevada Santa Marta
 - Sierra Nevada El Cocuy
 - Nevado del Huila
 - Pasto/Cumbal



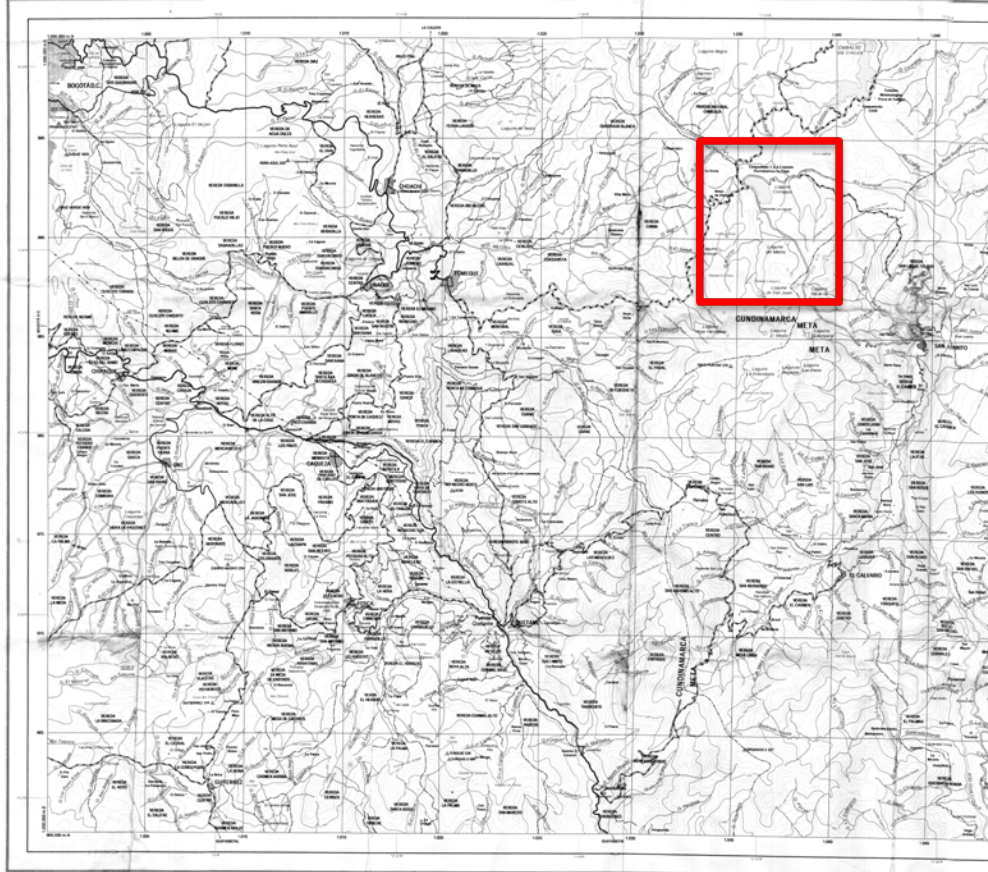
Initial Goals

- Create high resolution basemaps from scanned topographic maps purchased from IGAC, Bogota
- Plot coring locations, attempt bathymetry map from rough data
- Investigate patterns in soil temperature monitors, water isotopes, and soil archeal bacteria lipids (if available)

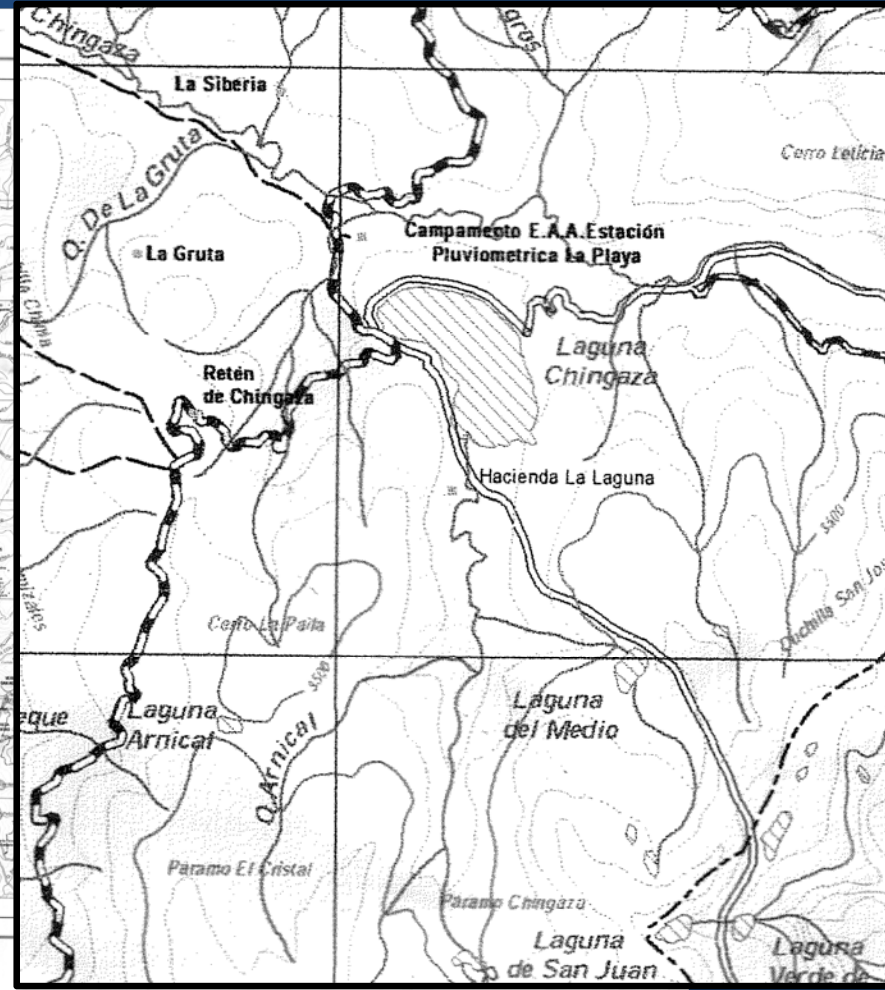
Basemaps

DEPARTAMENTOS DE CUNDINAMARCA Y META

CARTA GENERAL

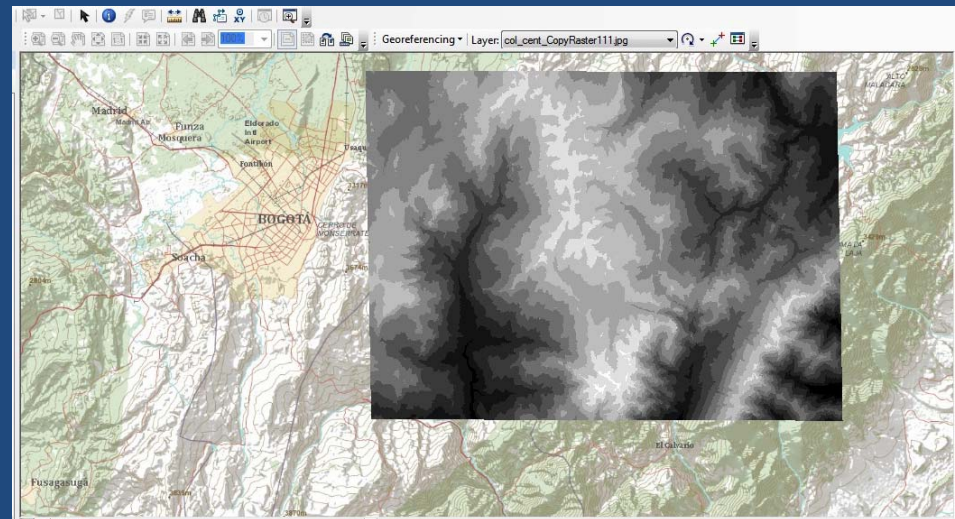
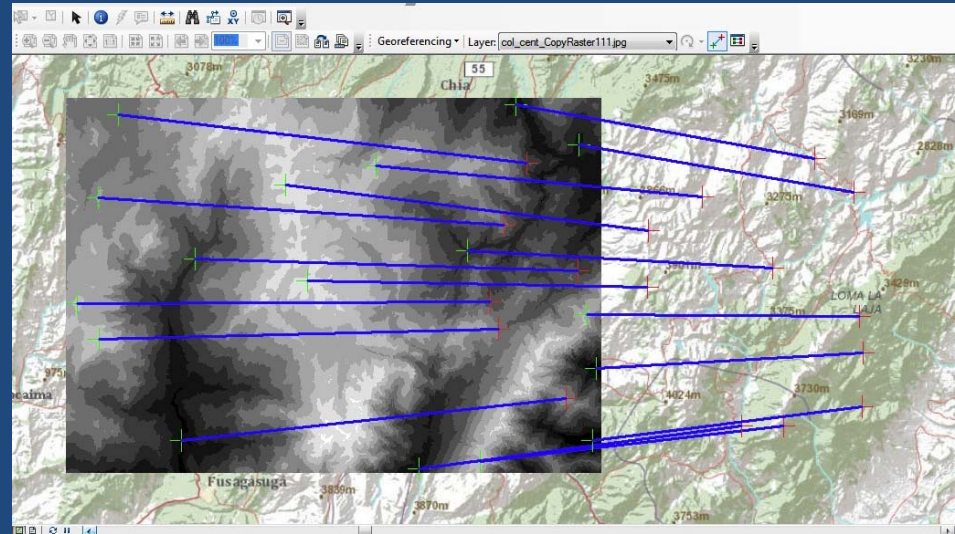


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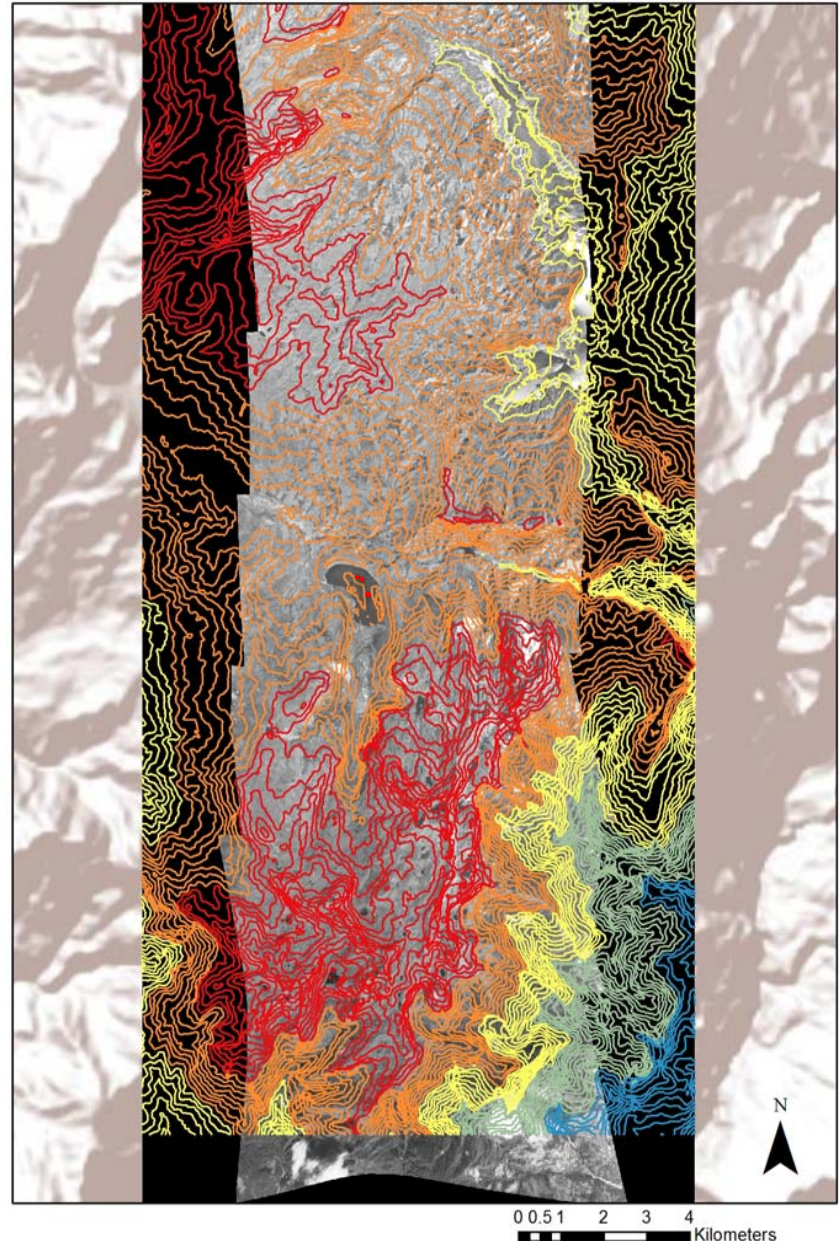
Chingaza Basemap

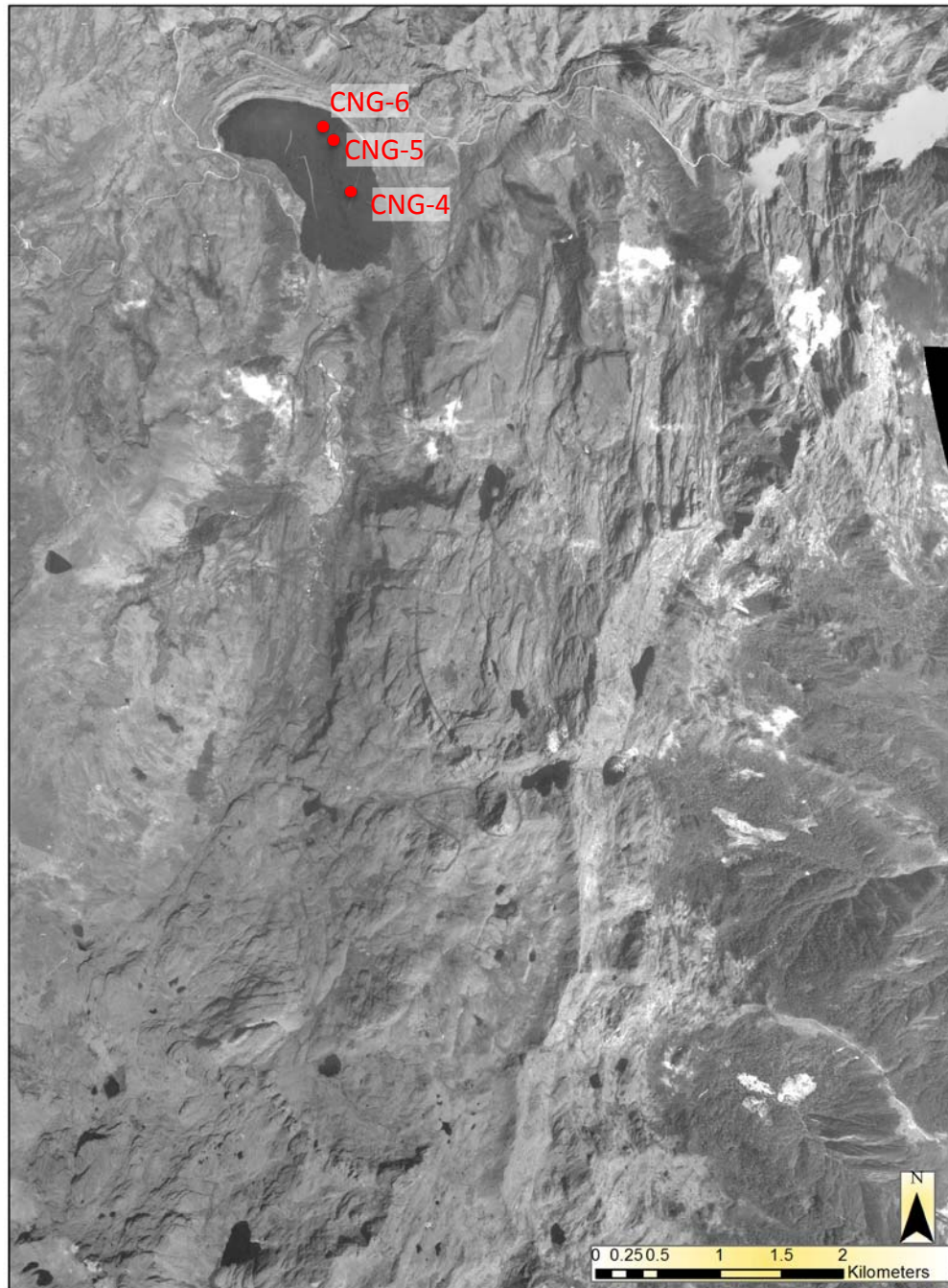
- Non-georeferenced images provided by A. Mora, Ecopetrol
 - DEM of Chingaza PNN
 - Aerial photo mosaic of L. Chingaza and paleo-glacial valley

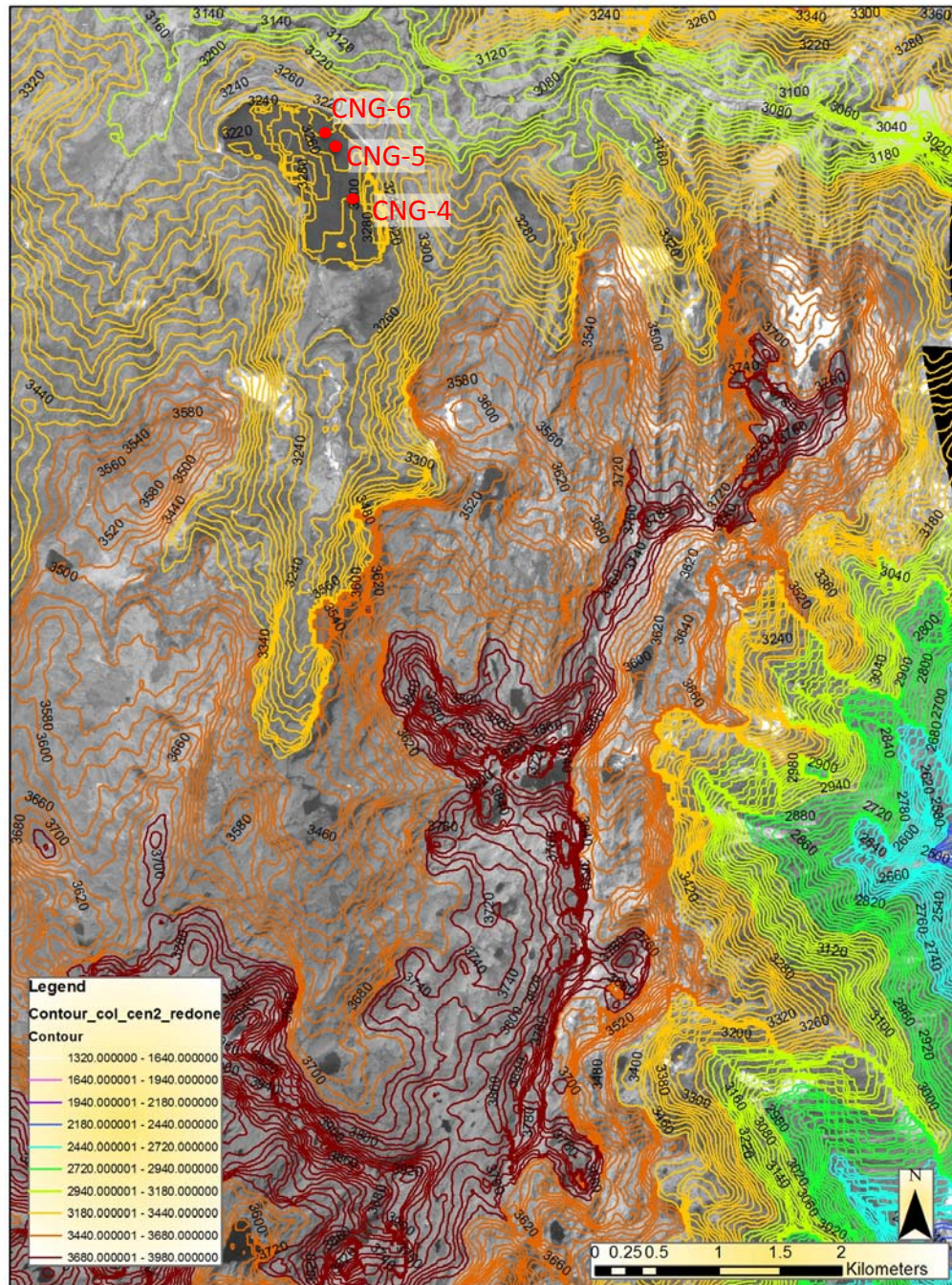


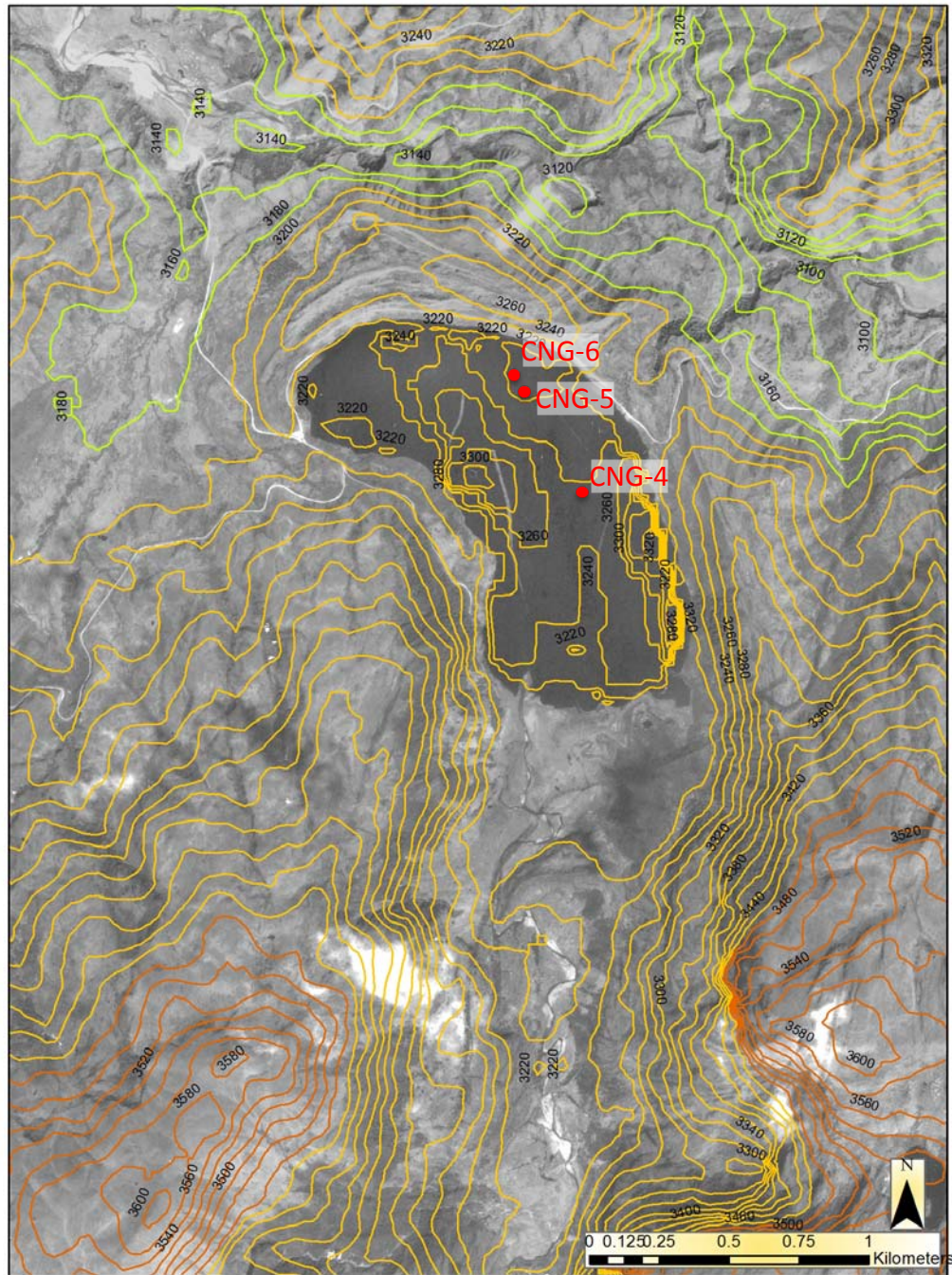
Chingaza DEM

- Extracted contour lines from Chingaza DEM
 - Higher resolution than Arc basemap or scanned map DEM
- CI = 50 meters
- Clipped DEM to photomosaic
- Clearly displays glacial valley above L. Chingaza
- Good starting map for further moraine mapping in the area



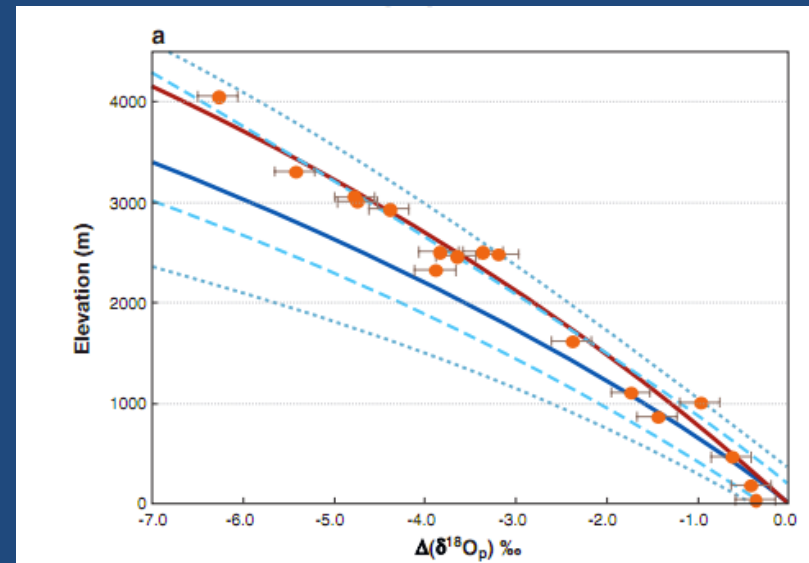
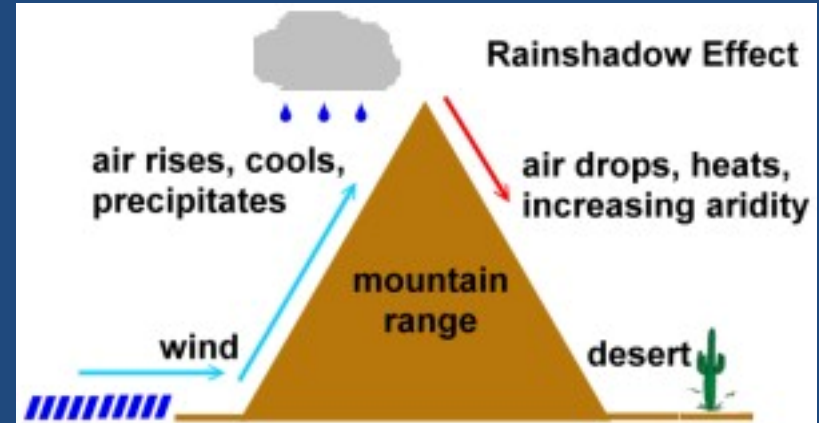




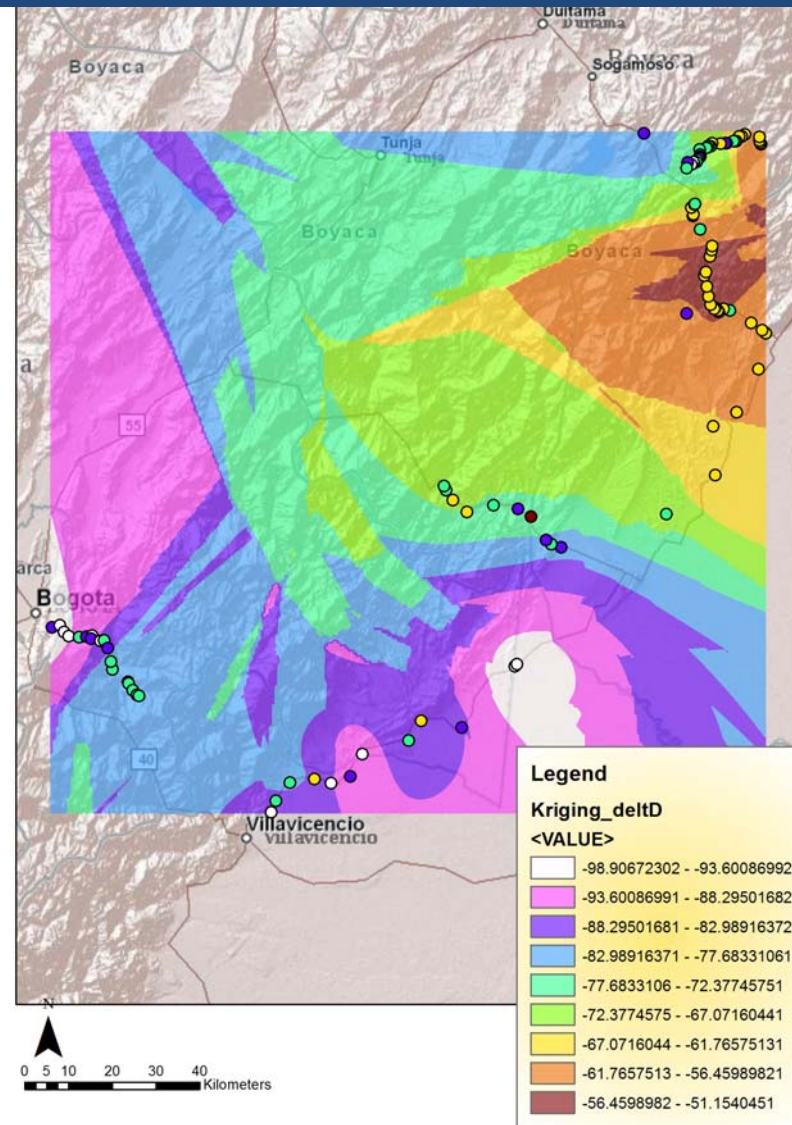
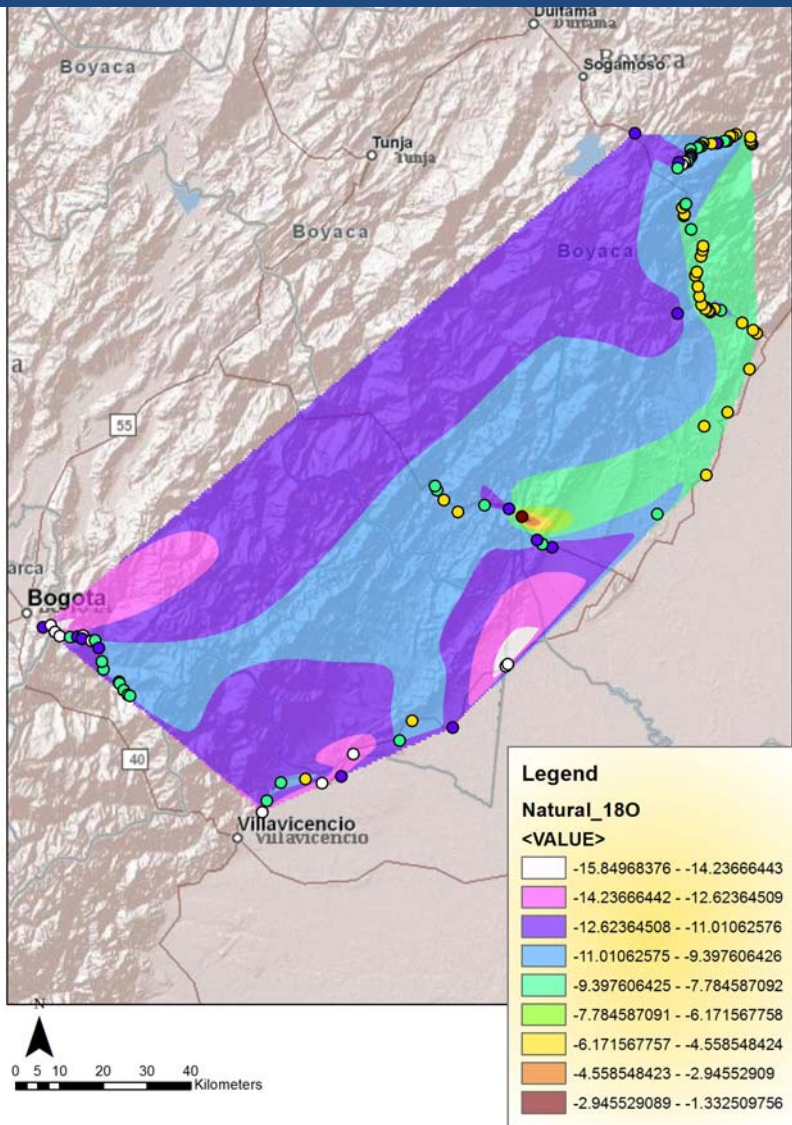


Stream Water O and H isotopes

- Widely used paleoaltimetry proxy
 - Pedogenic carbonates, lacustrine carbonates
- Most studies only look at precipitation isotopes
- Streams can transport water to vastly different elevations, hindering interpretations

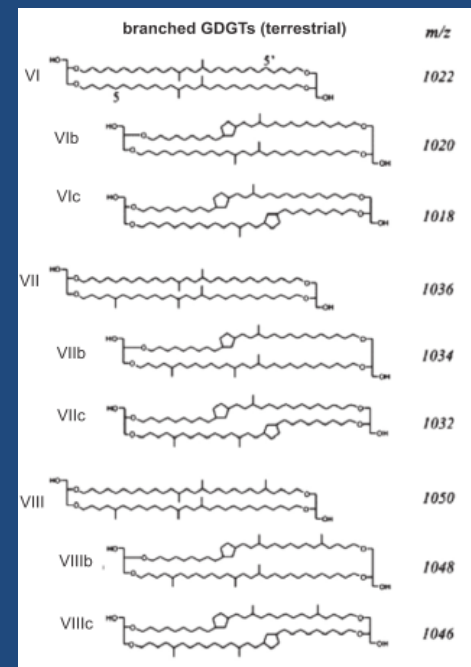


δD , $\delta^{18}O$ in the Eastern Cordillera

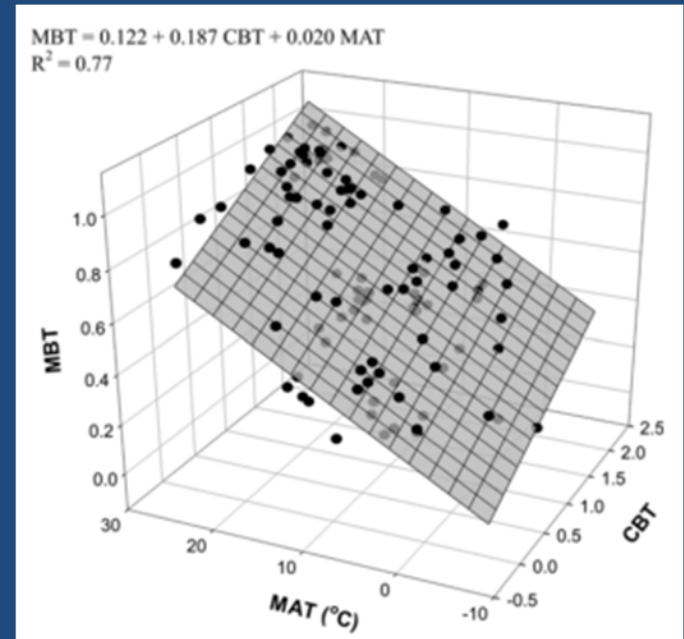


MBT/CBT Proxy

- Paleo-temperature index using the methylation and cyclisation of archeal lipid membrane compounds
- Both form in situ in soils

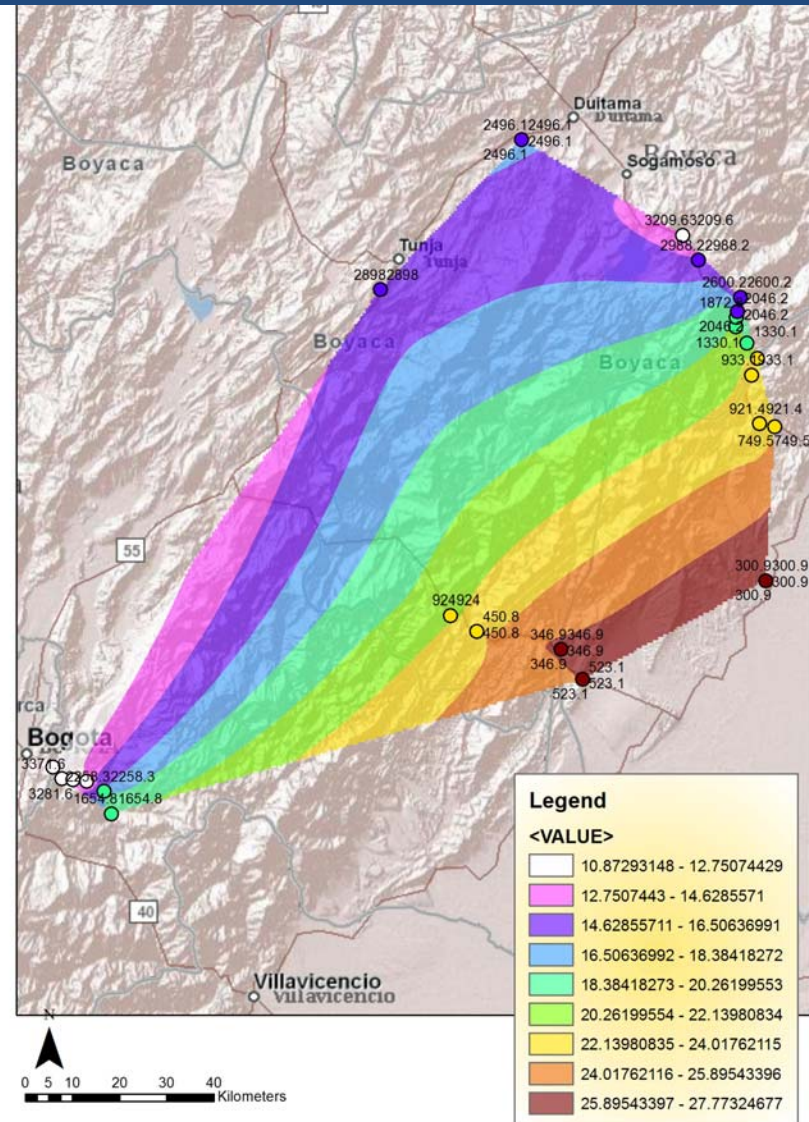
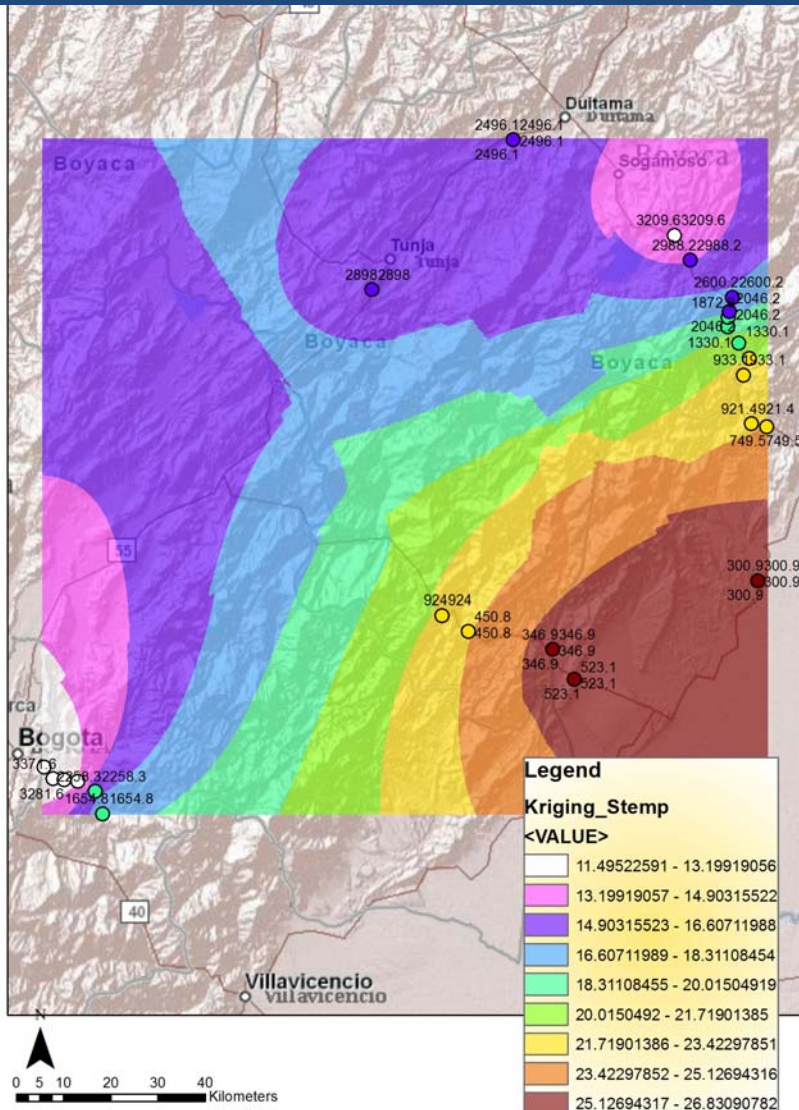


Bechtel et al., 2010



Weijers et al., 2007

Soil Temperature: Promising for MBT/CBT?



Summary/Future Work

- DEM basemaps were georeferenced for Chingaza PNN, contour lines overlain on high resolution aerial photomosaics
- Spatial data analysis tools were employed to investigate usefulness of two different paleoaltimetry proxies.
- Additional georeferencing of aerial photos (when delivered)
- Georeferencing higher resolution topographic maps
- Bathymetry of Laguna Chingaza
- Moraine mapping in Chingaza PNN
 - Waiting on stereo-image pairs to be delivered

Thanks!

