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Geothermal Energy and Water Resources in Ethiopia

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Energy Challenges faced by Ethiopia

- Hydropower highly unreliable (droughts)
- A growing population (2.46%; World Bank 2017)
- Government plan to achieve universal energy access by 2025
- Huge geothermal potential - ~ 10,000 MW

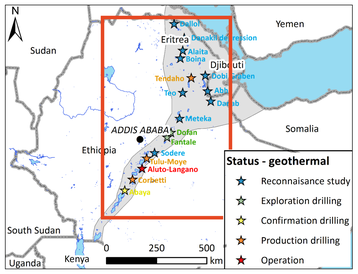
➔ **Geothermal as an alternative source of energy**

Objectives

- Assess the variability of geothermal fluids' quality
- Discuss the sustainability of geothermal energy

Methodology

- Literature review of publicly available data
- Selection of chemical and isotopic analyses



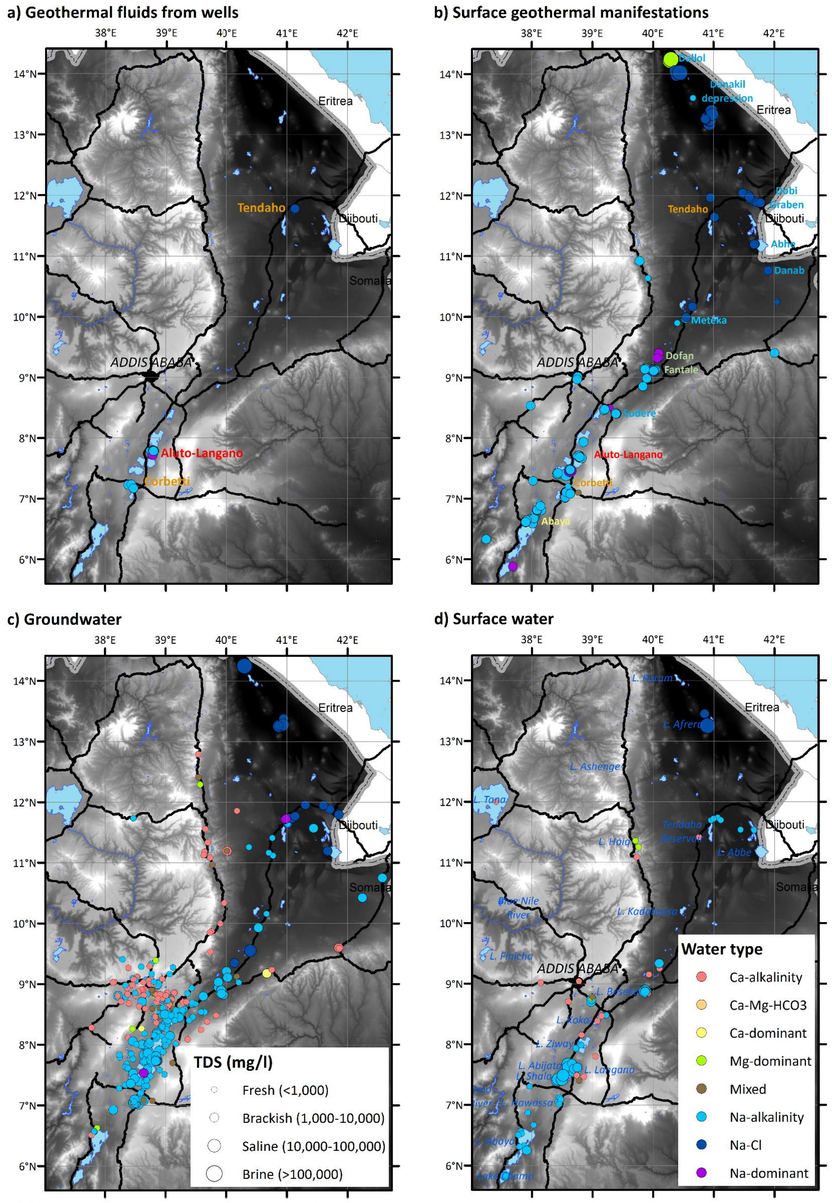
Conclusion

- Dominant water types:
  - ✓ Na-alkalinity in the Main Ethiopian Rift
  - ✓ Na-Cl brine type in the Afar Depression
  - ✓ Ca-HCO_3 mostly for surface and groundwater in the Highlands
- Spatial variability between the geothermal fields and within the geothermal fields
- Temporal variability: measurements span a few months to several decades
- Most lakes affected by evaporation. Some rivers and groundwater samples as well.
- Geothermal fluids of (paleo-)meteoric origin
- Some water-rock interaction (e.g. Tendaho)

Limited recharge and long residence time may affect the sustainability of geothermal exploitation

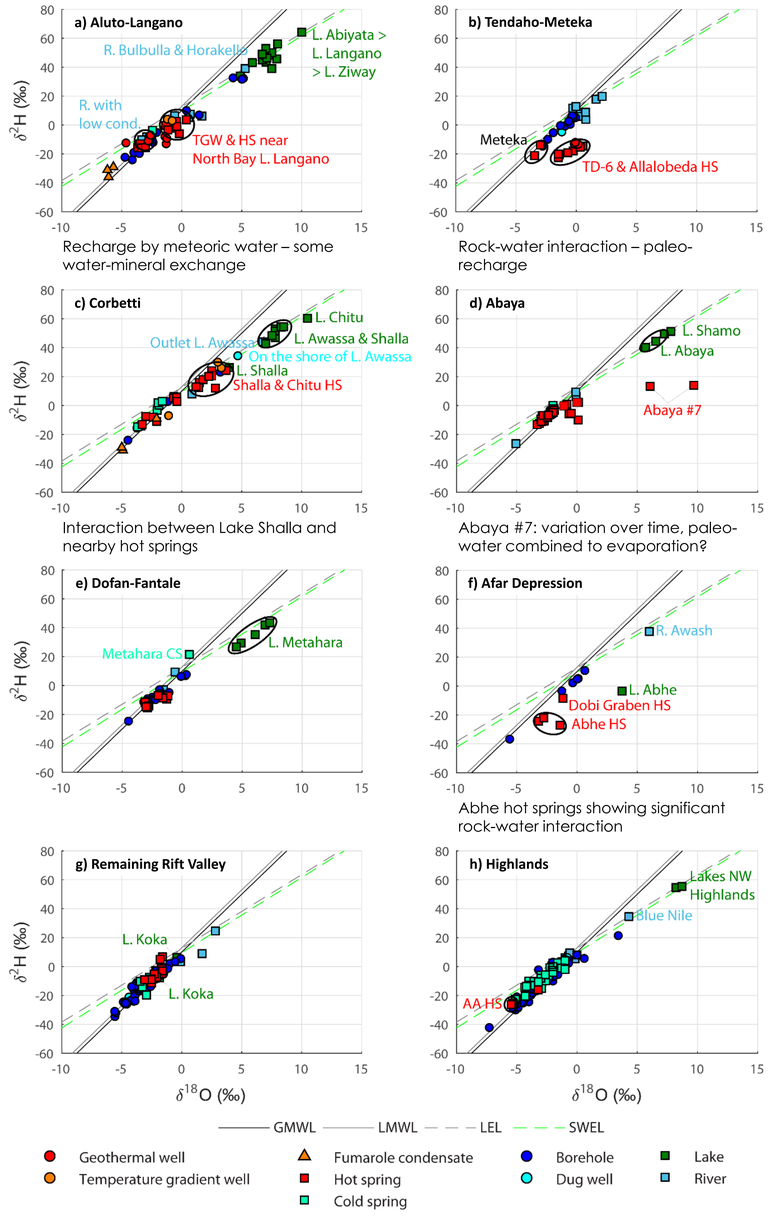
Results

Chemical Analyses



DEM from http://srtm.csi.cgiar.org and other background layers from http://download.geofabrik.de

δ^2H & $\delta^{18}O$ Isotopes



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