

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

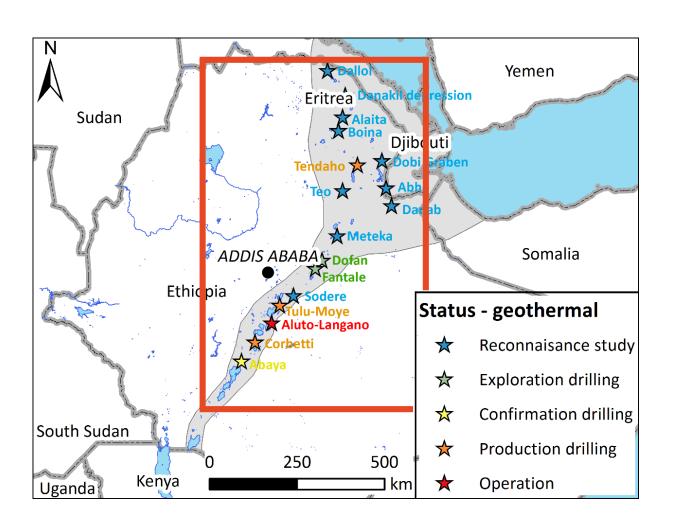
• Huge geothermal potential - ~ 10,000 MW → Geothermal as an alternative source of energy

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

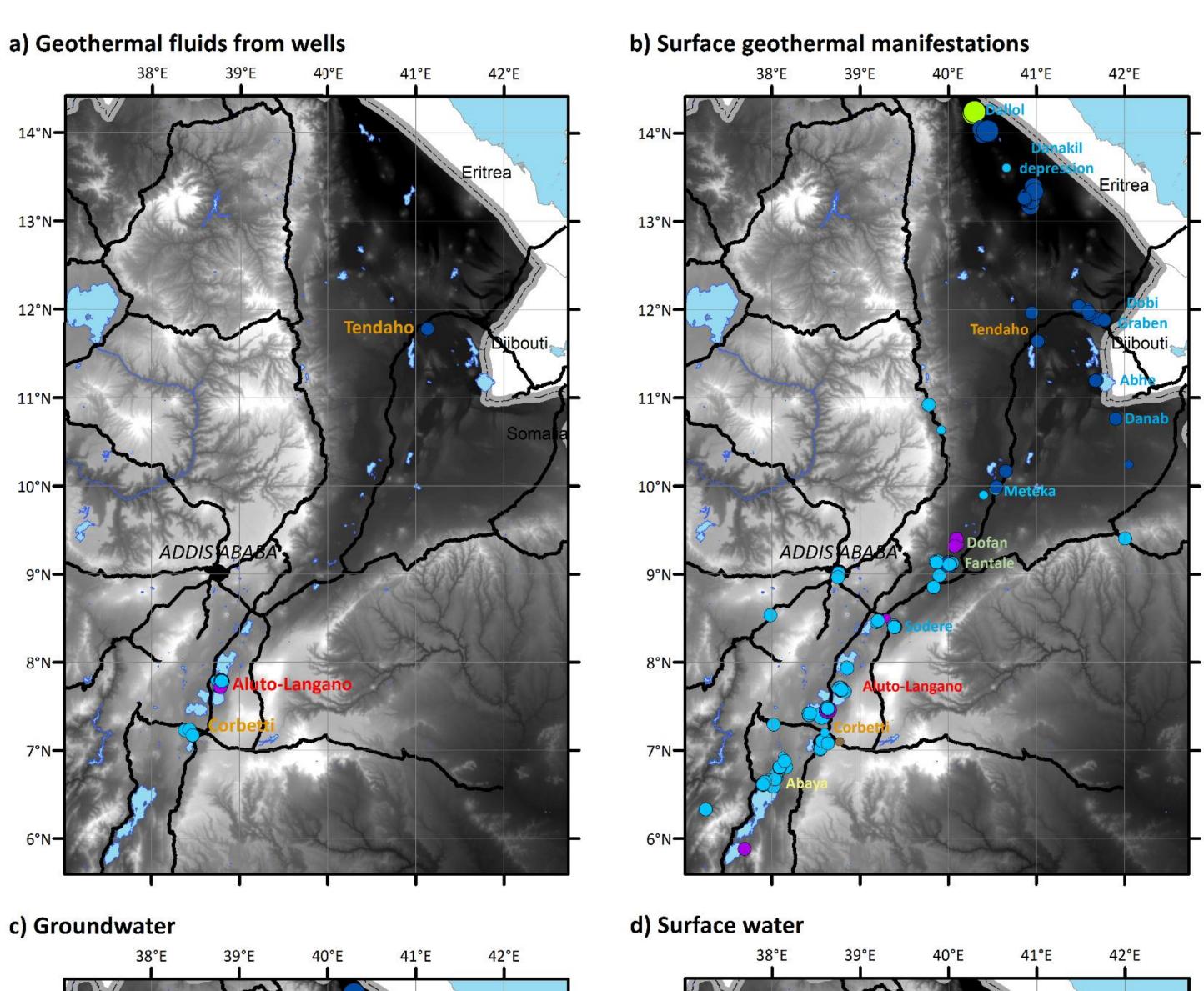
- Dominant water types:
 - ✓ Na-alkalinity in the Main Ethiopian Rift
 - ✓ Na-Cl brine type in the Afar Depression
 - \checkmark Ca-HCO₃ mostly for surface and groundwater in the Highlands
- Spatial variability between the geothermal fields and within the geothermal fields
- Temporal variability: measurements 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)

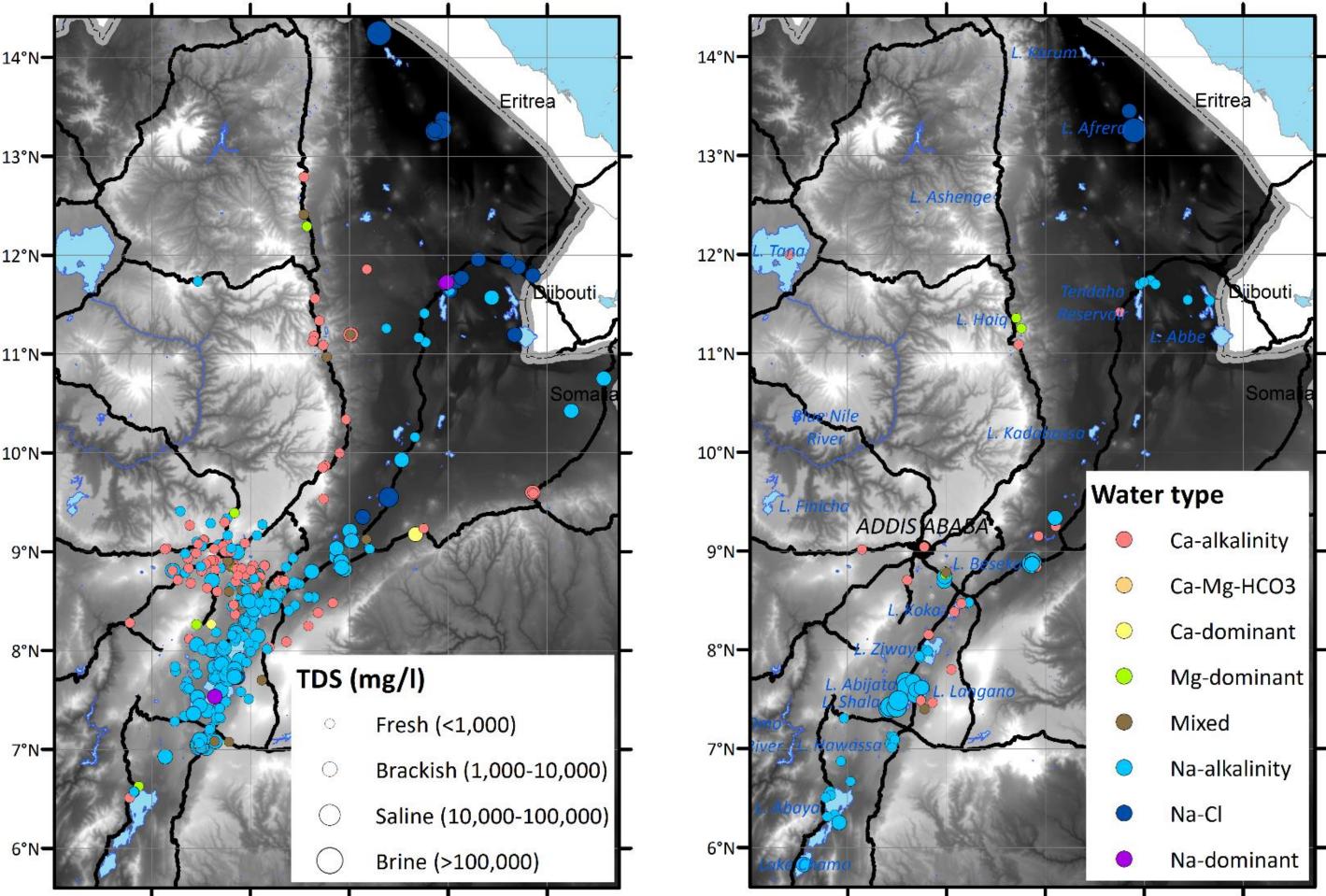
Limited recharge and long residence time may affect the sustainability of geothermal exploitation

GEOTHERMAL ENERGY AND WATER RESOURCES IN ETHIOPIA

RESULTS

CHEMICAL ANALYSES





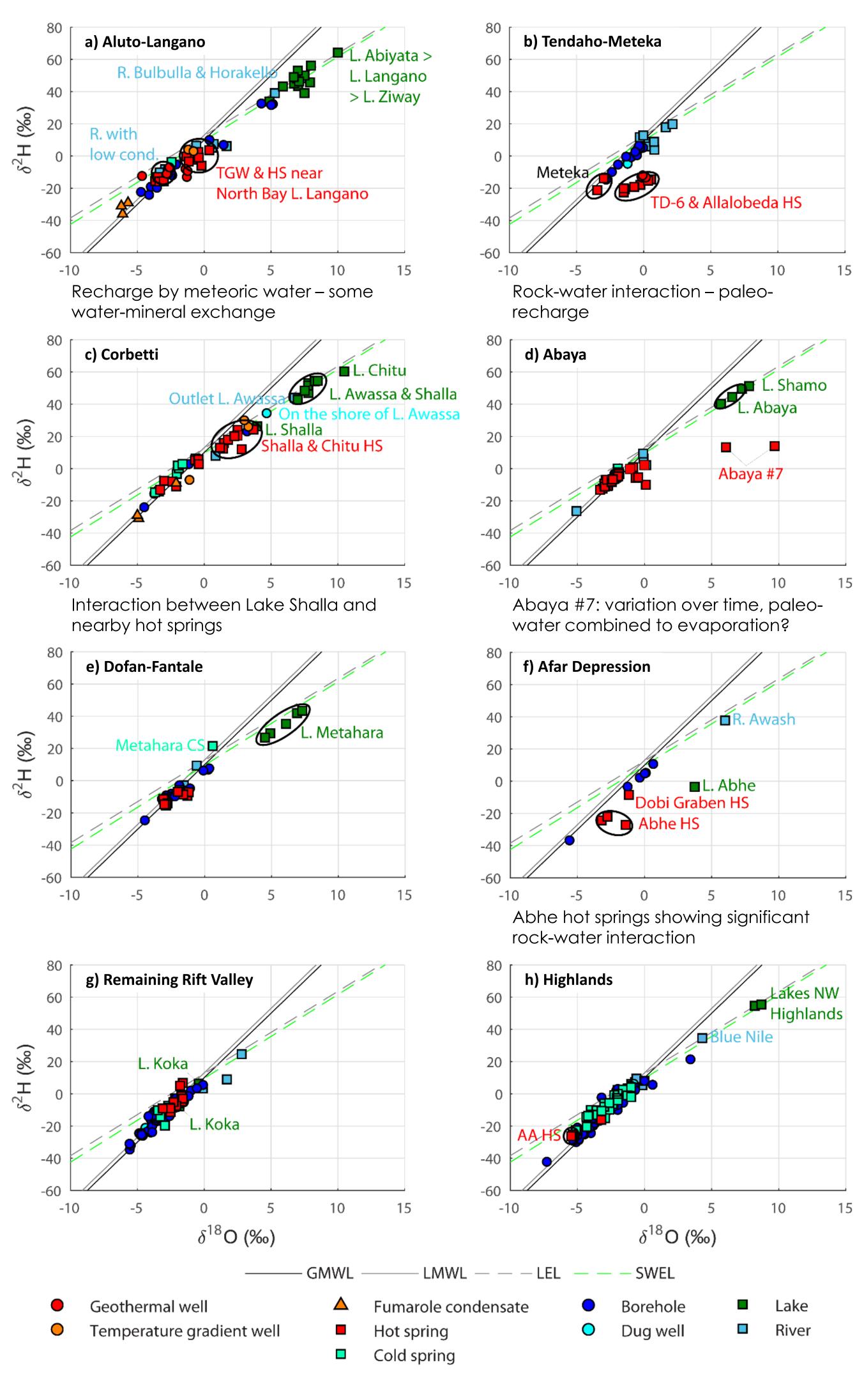
DEM from http://srtm.csi.cgiar.org and other background layers from http://download.geofabrik.de

REFERENCES

IAEA/WMO. (2019). Global Network of Isotopes in Precipitation. GNIP Database. <u>https://nucleus.iaea.org/wiser</u> World Bank (2017) Indicator – Population growth. https://data.worldbank.org/indicator/SP.POP.GROW

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$\delta^2 H \& \delta^{18} O$ ISOTOPES



ACKNOWLEDGEMENTS

This work is part of the Combi-Gen project funded by the Engineering and Physical Sciences Research Council (EPSRC) through the Global Challenges Research Fund (GRCF) under reference EP/P028829/1.

