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LOCAL SEISMICITY NEAR THE ACTIVELY DEFORMING CORBETTI VOLCANO

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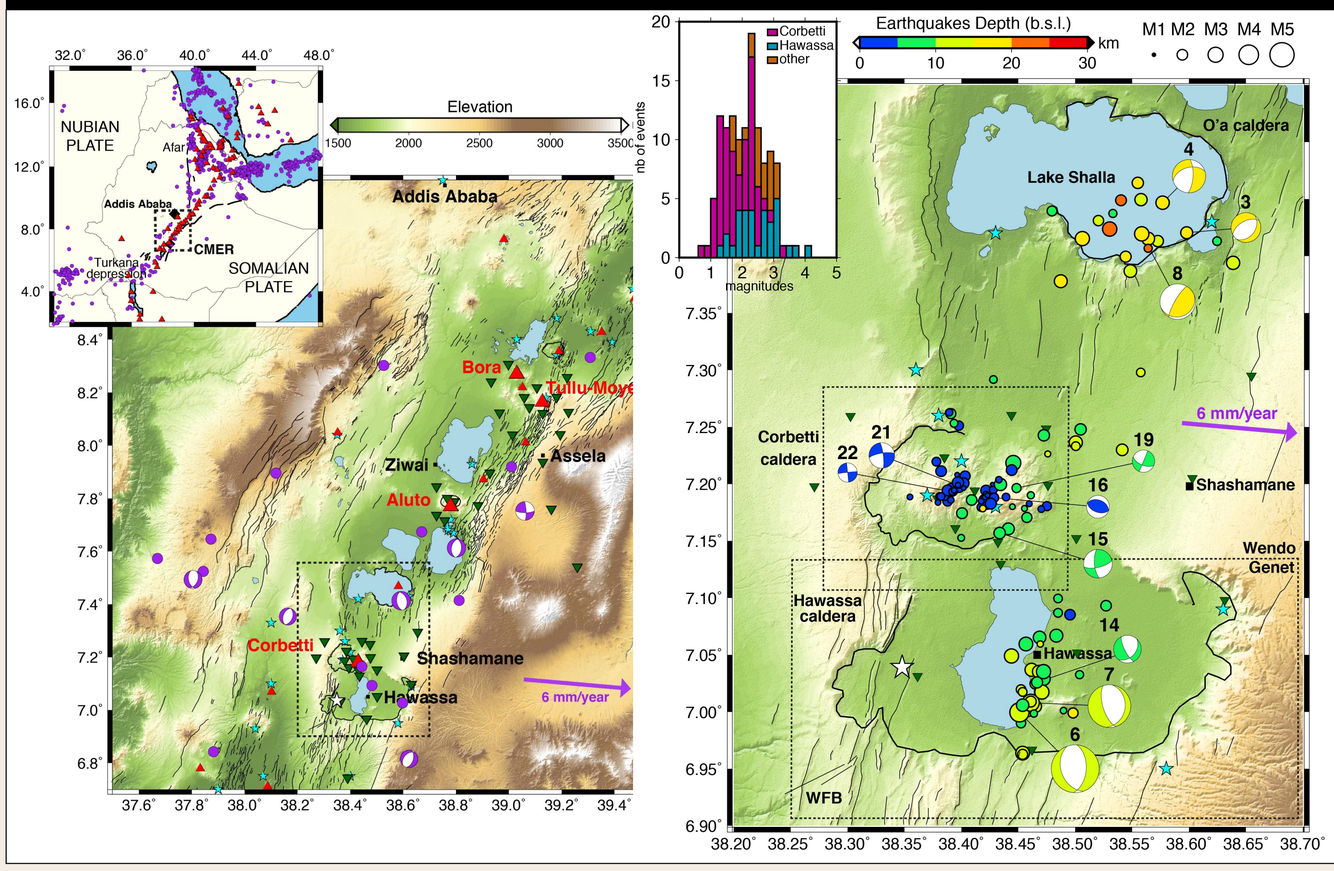
Lavayssière A., Keir D., Greenfield T., Ayele A., Kendall J.-M. Local seismicity near the actively deforming Corbetti volcano in the Main Ethiopian Rift. Journal of Volcanology and Geothermal Research, 381, 227-237.

Introduction



Corbetti: fast uplifting volcano with evidence for inflating magma body.

RiftVOLC seismic network across the Main Ethiopian Rift:

- 18 stations deployed around Corbetti volcano & Hawassa in February 2016,
- recorded 1.5 years of data.

122 events were located using NLLoc with a new local velocity model. Magnitudes (0.4 to 4.2) and focal mechanisms were estimated.

Seismicity distributed around 3 areas: Hawassa, Corbetti caldera and Lake Shalla.

Seismicity at Corbetti Volcano

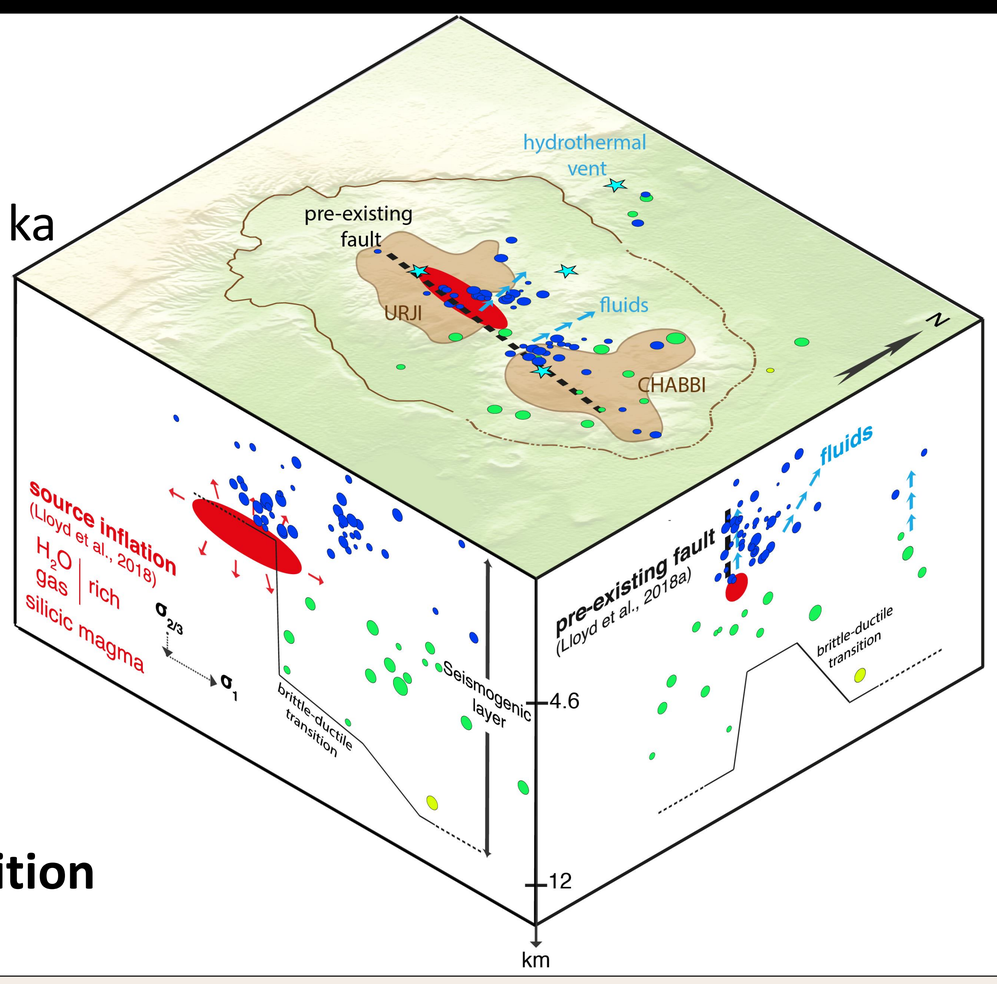
Corbetti volcano:

Large caldera ~10x15km
Silicic Holocene eruptions ~182 ka
~500.000 people living within 25km

5-12 km depth seismicity:

- *located on western side of Corbetti caldera*
- *deeper away from volcanic centres down to ~12km*

→ **shallow brittle-ductile transition**



0-5 km depth seismicity:

- source mechanisms predominantly strike-slip (→ local rotation of stress field compared to EW extension)
- low Vp/Vs ratio

→ **inflation of gas-rich, silicic sill**

- distributed north of pre-existing, cross-rift structure across the caldera (Lloyd et al., 2018)
- EW- and NS-elongated clusters around Chabbi & Urji volcanic centres

→ **northward migration of hydrothermal fluids away from pre-existing cross-rift fault**

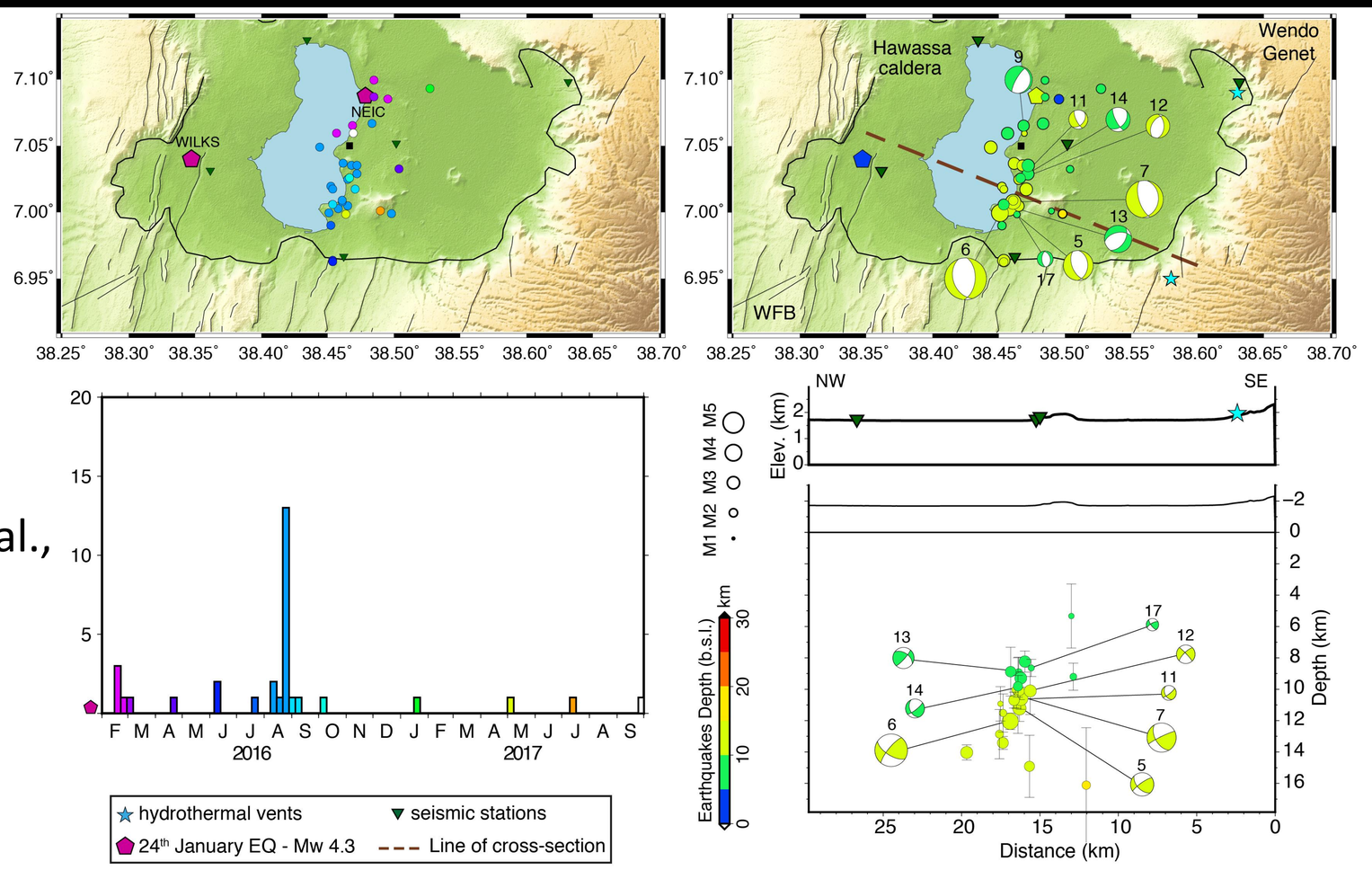
Seismicity at Hawassa

Seismicity:

→ brittle-ductile transition ~16 km
→ 8-10 km long segmented faults
→ active in swarms

24th January, 2016 earthquake:

- Mw 4.3 (Wilks et al., 2017)
- caused damaged buildings & human casualties
- poorly located



Hawassa:
population ~315,000

Swarm in August 2016:

- steep normal fault
- along eastern shoreline of Lake Hawassa
- 5-16 km depth

→ **active eastern fault, directly beneath Hawassa**

→ **high earthquake risk**