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Maar deposits in North Tanzania: phreatomagmatic or dry fragmentation?

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Several maar craters with associated tuff rings are clustered along the Manyara rift escarpment near Hanang and Kwahara volcanoes, Tanzania (Fig 1). The Manyara escarpment belongs to the east branch of the East African Rift. We here present field observations, grain size distribution and componentry analyses of few tuff rings to investigate the dynamic processes of the eruptions.

The tuff deposits are similar to the ones near the Natron rift (Tanzania) described by Mattsson and Tripoli [1] and Berghuijs and Mattsson [2], where evidence for phreatomagmatic fragmentation and deposition in wet environment is lacking. For example, impact sags and accretionary lapilli are rare. The juvenile component is mostly represented by lava marbles from mm to few cm sizes. Most of the deposits are made of mm to few cm thick non continuous layers and lenses, suggesting that most of the volcanic deposits have been emplaced through small scale pyroclastic density currents. This implies small, sporadic but numerous explosions from the crater. Thick layers of breccia have been however observed at one maar, implying that larger disruption and explosion had occurred.

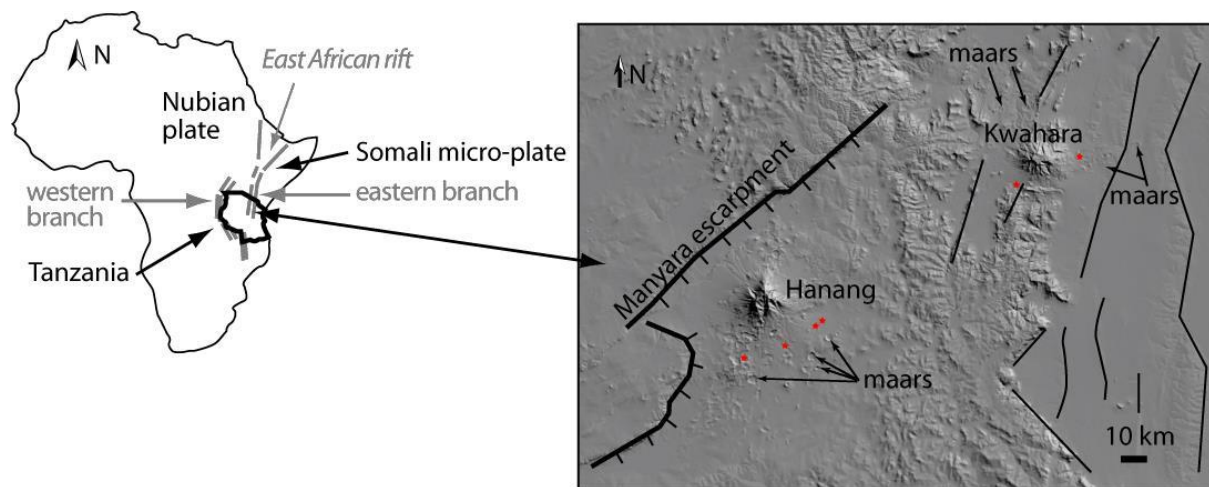


Figure 1: Geological context and location of studied maars along the Manyara rift, Tanzania. Sampled tuff rings are marked with the red stars.

Our study suggests thus similar emplacement mechanisms for the maars along the Manyara rift than the maars along the Natron rift [1, 2], where fragmentation was due to sudden exsolution of volatiles during rapid magma ascent, hence resulting in dry fragmentation. Chemical and petrological study of the juvenile magma component of the Manyara maars is undergoing and should give more insight into magma properties.

References:

- 1 Mattsson HB and Tripoli BA (2011) J Volcanol Geotherm Res 203: 23-34
- 2 Berghuijs JF and Mattsson HB (2013) J Volcanol Geotherm Res 252:53-72

