SYSTEMATIC K–Ar GEOCHRONOLOGICAL SURVEY IN THE SOUTHERN PART OF THE MAIN ETHIOPIAN RIFT: IMPLICATIONS FOR RIFT EVOLUTION

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Introduction: The Main Ethiopian Rift (MER) is characterized by active ~E–W oriented crustal extension between the African and Somalian plates and associated with a bimodal (basalt-alkali rhyolite) volcanic activity since Oligocene to recent [1]. We present results from systematic K–Ar dating of major volcanic sequences conducted within a framework of development cooperation project for geological mapping of the southern part of the Main Ethiopian Rift. The research focused on several key-areas in the southern MER with an aim to fill the gap in knowledge about tectonic and magmatic evolution of this area.

Results: *Southern segment of MER (Arba Minch – Dila)* – two distinct magmatic periods have been recognized in the southern MER between Arba Minch and Dila. The pre-rift volcanic sequence comprises basaltic lavas and rhyolitic ignimbrites (Nazret formation). These rocks are exposed in the escarpments on both sides of the MER giving consistent K–Ar ages between ~38.5 Ma and 22.3 Ma. The late syn-rift volcanic sequences (basaltic lava flows and minor rhyolite breccia) form volcanic edifices on the rift bottom. These rocks has been dated at ~1.2 to 0.5 Ma.

Hawasa Caldera – the last large ignimbrite forming eruption of the Hawasa Caldera occurred around 1.3 Ma followed by several post-caldera rhyodacite and rhyolite domes (ca 1 Ma). Smaller Corbetti Caldera appeared in the northwest segment of the Hawasa Caldera [2] producing ignimbrites during 3 main eruptive events (0.7, 0.5 and 0.2 Ma). Simillar scenario as in Hawasa Caldera was observed also for other calderas in the area (Shalla, Ziway) with the last large ignimbrite eruptions at ca 1.3–1 Ma and post-caldera obsidian domes at ca 1–0.8 Ma.

Bale Volcanic Complex – first set of data suggest long-lasting (since ca 20 Ma) and complex evolution of the Bale Volcanic Complex comprising phases of lava accumulations, collapses and intrusions/extrusions of phonolitic bodies (e.g. 2 Ma), terminating with several smaller scoria cones capping the plateau (ca 1.5 Ma).

North Chamo Volcanic Field – the volcanic field in the area of NechSar National Park and northern part of Lake Chamo occurred at 0.5 Ma, post-dating the last activity of the Tosa Sucha Volcano (0.7 Ma; [3]) dividing Chamo Lake from the larger Abaya Lake. The North Chamo Volcanic Field comprises of several scoria cones with well exposed initial phreato-magmatic phase deposits. Chemical composition of erupted magmas ranges from olivine basalt to trachyte.

References: [1] Mazzarini et al. (2016) *Geosphere* **12**, 706-720. [2] Rapprich V. et al. (2016) *J Volcanol Geotherm Res* **310**, 159-171. [3] George R. & Rogers N. (1999) *AV* **11**, 121-130.