



Lake sediments provide the first eruptive history for Corbetti, a high-risk Main Ethiopian Rift volcano

Catherine M. Martin-Jones (1), Christine S. Lane (2), Nicholas J. G. Pearce (1), Victoria C. Smith (3), Henry F. Lamb (1), Frank Schaebitz (4), Finn Viehberg (5), Maxwell C. Brown (6), Ute Frank (7), and Asfawossen Asrat (8)

(1) Department of Geography and Earth Sciences, Aberystwyth University, Aberystwyth SY23 3DB, UK, (2) Department of Geography, University of Cambridge, Downing Place, Cambridge CB2 3EN, UK, (3) Research Laboratory for Archaeology and the History of Art, University of Oxford, Oxford OX1 3QY, UK, (4) Institute of Geography Education, University of Cologne, 50931 Köln, Germany, (5) Institute for Geology and Mineralogy, University of Cologne, 50674 Köln, Germany, (6) Institute of Earth Sciences, University of Iceland, 101 Reykjavik, Iceland, (7) GFZ German Research Centre for Geosciences, Telegrafenberg, 14473 Potsdam, Germany, (8) School of Earth Sciences, Addis Ababa University, P.O. Box 1176, Addis Ababa, Ethiopia

A recent World Bank report found that 49 of Ethiopia's 65 known Holocene volcanoes pose a high-risk to the surrounding population. One of these volcanoes, Corbetti, located in the densely populated Main Ethiopian Rift (MER), has only one documented Holocene eruption. Any risk assessment for Corbetti is therefore highly uncertain. Reliable hazard forecasting is dependent on the completeness of volcanic records. In the case of Ethiopian Rift volcanoes complete records are hindered by frequently poorly exposed, buried and inaccessible proximal outcrops.

Lake sediments can yield comprehensive, stratigraphically-resolved dossiers of past volcanism. Here we use volcanic ash (tephra) layers preserved in sediments from three MER lakes to provide the first record of Holocene volcanism for Corbetti. It shows that Corbetti has erupted explosively throughout the Holocene at an average return period of ~800 years. Based on the thickness and dispersal of the tephra, at least six eruptions were of a large magnitude, and there were four eruptions in the past 2000 years. Future explosive eruptions are likely and these could have significant societal impacts, they could blanket nearby Awassa and Shashamene, home to ~260,000 people, with pumice deposits.

Our data indicate that the threat posed by Corbetti has been significantly underestimated. These data can be used to refine regional volcano monitoring and develop evacuation plans. This lake sediment-tephrostratigraphic approach shows significant potential for application throughout the East African Rift system, and is essential to understanding volcanic hazards in this rapidly developing region.