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Using lake cores and terrestrial tephras as a record of Holocene volcanism in the Central Main Ethiopian Rift



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Ethiopia is home to 60 volcanoes fed from the Main Ethiopian Rift (MER), a northern section of the East African Rift System (EARS). A recent report on volcanic hazard for the World Bank has classified many of these volcanoes at the highest level of uncertainty due to the deficit of data in this region [1]. With some 10 million people estimated to live within 10km of an active Ethiopian Holocene volcanic centre [2], improving knowledge of the eruptive history of potentially hazardous volcanic centres is vital.

Remote sensing data indicate that several volcanoes in the Central Main Ethiopian Rift (CMER) are currently deforming, including the volcanoes Aluto and Corbetti [3]. Consequently, we are examining the tephra record of these volcanoes with the aim of constraining information about the frequency and type of eruption by undergoing a tephrostratigraphic study using pyroclastic deposits found in nearby lakes and on land.

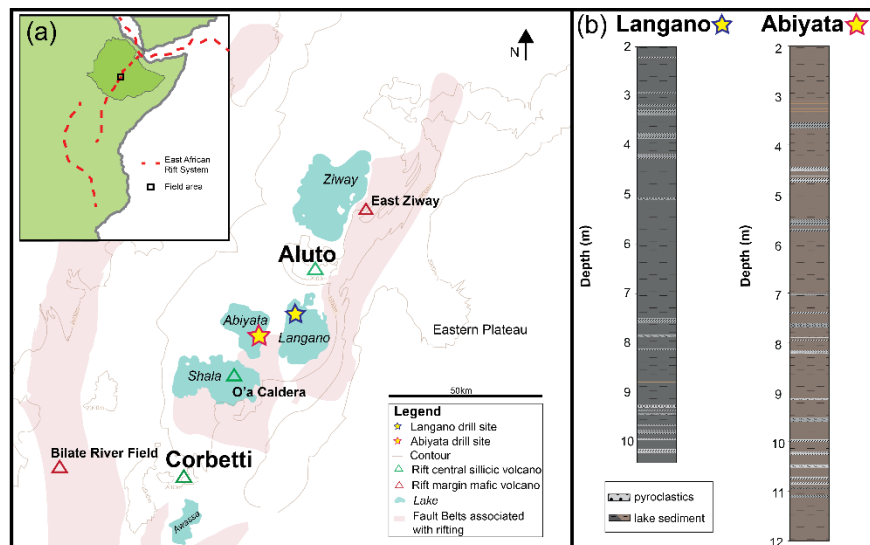


Figure 1: (a) Map of field area showing locations of Corbetti and Aluto volcanoes and the core drill sites. (b) Diagram of cores shows the frequency of pyroclastic layers in lake sediment.

This is done using sediment cores from lakes Langanu and Abiyata, which lie between Aluto and Corbetti volcanoes and have a sediment record that has been dated to 13kyrs at the base [4][5]. These cores contain at least 20 tephra layers, which suggest an average of one ash deposition event every c. 500 years (Figure 1).

Grain size, SEM and geochemical analyses allow us to correlate the tephra records between cores, and terrestrial sections near to the volcanoes. The microtextures and compositions of the ash reveal that most layers in the cores are from the more proximal Aluto volcano suggesting it is considerably more active than previously thought. The Global Volcanism Program from the Smithsonian database currently (January 2016) lists one Holocene eruption at Aluto [6] suggesting present estimates of volcanic activity are inadequate for volcanic hazard assessment in the CMER.

References:

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