Geophysical Research Abstracts
Vol. 19, EGU2017-5134, 2017
EGU General Assembly 2017

Explosive eruption records from Eastern Africa: filling in the gaps with tephra records from stratified lake sequences

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On-going research into the preservation of volcanic ash fall in stratified Holocene lake sediments in Eastern Africa reveals the level of incompleteness of our explosive eruption record. Only nine eruptions with VEI >4 are recorded in the LaMEVE database (Crosweller et al., 2012) and of the 188 Holocene eruptions listed for East African volcanoes in the Global Volcanism Programme database, only 24 are dated to > 2000 years ago (GVP, 2013). Tephrostratigraphic investigation of Holocene sediments from a number of lakes, including Lake Kivu (south of the Virunga volcanic field), Lake Victoria (west of the Kenyan Rift volcanism) and palaeolake Chew Bahir (southern Ethiopia), all reveal multiple tephra layers, which indicate vastly underestimated eruption histories. Whereas the tephra layers in Lake Kivu were all located macroscopically, no visible tephra layers were observed in the sediments from Lake Victoria and Chew Bahir. Instead, tephra are preserved as non-visible horizons (cryptotephra), revealed only after laboratory processing. These results indicate that even where we do have stratified visible tephra records, the number of past eruptions may still be a minimum. Cryptotephra studies therefore play a fundamental role in building comprehensive records of past volcanism. Challenges remain, in this understudied region, to identify the volcanic source of each of the tephra layers, which requires geochemical correlation to proximal volcanic deposits. Where correlations to source can be achieved, explosive eruption frequencies and recurrence rates may be assessed for individual volcanoes. Furthermore, if a tephra layer can be traced into multiple sedimentary sequences, the potential exists to evaluate eruption magnitude, providing a more useful criterion for risk assessment. Filling in the gaps in our understanding of East African Rift volcanism and the associated hazards is therefore critically dependent upon bringing together this important data from distal tephrostratigraphic records with the work of volcanologists studying more proximal deposits, and hazard modellers.

Crosweller et al (2012) "Global database on large magnitude explosive volcanic eruptions (LaMEVE)" Journal of Applied Volcanology 1:4, doi:10.1186/2191-5040-1-4

Global Volcanism Program, 2013. Volcanoes of the World, v. 4.5.3. Venzke, E (ed.). Smithsonian Institution. Downloaded 06 Jan 2017. http://dx.doi.org/10.5479/si.GVP.VOTW4-2013