



## **Violent Explosive Eruptions in the Ararat Valley, Armenia and Associated Volcanic Hazards**

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The Anatolian-Armenian-Iranian volcanically active orogenic plateau is located in the collision zone between the Arabian and Eurasian plates. The majority of regional geodynamic and petrologic models of collision-related magmatism use the model proposed by Keskin (2003), where volcanism is driven by Neo-Tethyan slab break-off, however an updated model by Neill et al. (2015) and Skolbeltsyn et al. (2014) comprise break-off of two slabs.

One of the significant (and understudied) features of the regionally extensive collision zone volcanism is the diversity of eruption styles and also the presence of large number of highly explosive (Plinian) eruptions with  $VEI \geq 5$  during the Middle-Upper Pleistocene. Geological records of the Ararat depression include several generations of thick low aspect ratio Quaternary ignimbrites erupted from Aragats volcano, as well as up to 3 m thick ash and pumice fall deposit from the Holocene-historically active Ararat volcano. The Ararat tephra fall deposit is studied at 12 newly discovered outcrops covering an area  $\sim 1000 \text{ km}^2$ . It is noteworthy, that the Ararat tephra deposits are loose and unwelded and observed only in cross-sections in small depressions or in areas where they were rapidly covered by younger, colluvium deposits, presumably of Holocene age. Therefore, the spatial extent of the explosive deposits of Ararat is much bigger but not well preserved due to rapid erosion.

Whole rock elemental, isotope (Sr, Nd) and mineral chemistry data demonstrate significant difference in the magma sources of the large Aragats and Ararat stratovolcanoes. Lavas and pyroclastic products of Aragats are high K calc-alkaline, and nearly always deprived from H<sub>2</sub>O rich phases such as amphibole. In contrast lavas and pyroclastic products from Ararat are medium K calc-alkaline and volatile-rich ( $>4.6 \text{ wt\% H}_2\text{O}$  and amphibole bearing) magmas. Here we shall attempt to reveal possible geochemical triggers of explosive eruptions in these volcanoes and assess volcanic hazards for the region of Ararat valley based on numerical simulations. Our work is important as Ararat Valley host the capital city of Yerevan (population  $\sim 1.4$  million) and also the currently operating Armenian Nuclear Power Plant at Metsamor.

### References

Keskin, 2003. *GRL* 30, 1–4; Neill et al., 2015 *Chemical Geology*, 403, p. 24–41; Skolbeltsyn et al. 2014. *Tectonics* 33, 207–221.