



Gone with the wind: how to quantify the risk based on incomplete eruptive records on volcanic islands. An example of Sete Cidades volcano, Azores.

Ulrich Kueppers (1), Ben Ellis (2), Dominik Fahrner (1,3), Francesca Forni (2), Julia Neukampf (2), Adriano Pimentel (4,5), Jose Pacheco (5), and Maria Queiroz (5)

(1) Ludwig-Maximilians-Universität München (LMU), Experimental & Physical Volcanology, Munich, Germany (u.kueppers@lmu.de), (2) ETH Zürich, Department of Earth Sciences, Zurich, Switzerland, (3) University of Liverpool, Department of Geography and Planning, Liverpool, UK, (4) Centro de Informação e Vigilância Sismovulcânica dos Açores (CIVISA), Ponta Delgada, Portugal, (5) Instituto de Investigação em Vulcanologia e Avaliação de Riscos (IVAR), Universidade dos Açores, Ponta Delgada, Portugal

Sete Cidades is the westernmost central volcano on São Miguel island, Azores. Although currently dormant, it has been the most active volcano in the past 20 kyr. The largest eruption took place approx. 16 kyr ago and enlarged the summit caldera.

The related deposits consist of unwelded pyroclastic density current (PDC) deposits on most flanks of the volcano and a lapilli fall unit in the ENE sector. Because of significant erosion, vegetation cover and younger overlying deposits, PDC deposits are only found intermittently along the lower S, W and N flanks. The fall unit can only be found in an approx. 10 km² area. Thickness variations indicate strong wind conditions during the Plinian phase but don't allow for reliable isopach reconstruction.

Here we present new evidence for a distal outcrop on the Ponta do Cintrão peninsula on the N coast, >25 km E of the caldera. Lapilli collected from this outcrop show the same characteristics as the proximal deposits, including the striking presence of magmatic mafic enclaves (Paredes et al., 2017; Porreca et al., 2018). We investigated lapilli clasts from four different locations: A) PDC deposits on the S flank, B) Fall unit on ENE flank, C) Fall unit on Ponta do Cintrão and D) post-caldera Fall unit on the upper outer S flank of the caldera. The D) lapilli show different textures and – as expected - markedly distinct geochemical signatures. A)-C) however are compositionally identical and are interpreted as being related to the same eruption.

This is the first direct proof of distal deposits of Sete Cidades volcano in the central part of São Miguel island and allows for a more accurate estimation of eruption source parameters and meteorologic conditions. It also serves to constrain the erupted volume more precisely. All year round, wind is blowing predominantly to easterly directions making Sete Cidades the most likely volcano to affect the entire island of São Miguel with its current population of 150.000. Most critically, all major infrastructures (hospital, airport, harbour) are located in the capital Ponta Delgada, 13km to the SE of the caldera.