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Analysis of volcanic threat from Nisyros Island, Greece, with implications for aviation and population exposure

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Abstract. Nisyros island in the South Aegean volcanic arc, Greece, Quaternary composite volcano with a 3.8 km wide caldera that in 1 entered a volcano-seismic crisis, which heralded the islands' return state of unrest. The caldera has been the locus of at least thirteen eruptions in historical times, the most recent in 1888, and the system still presently affected by considerable hydrothermal activity. Although recent unrest waned off without eruption, there are still open questions relating to the current threat of volcanic activity from the island. Here we perform a detailed and systematic assessment of the volcanic threat to Nisyros using a threat analysis protocol established as part of the National Volcano Early Warning System (NVEWS). The evaluation is a methodical assessment of fifteen hazard and exposure factors, analysed based on a score system, whereby the higher the score, the higher the threat is. Uncertainty in assessment criteria are expressed by allowing a conservative and an extreme score for each factor. We draw our data from published data as well as from results of our research on Nisyros in the past years. Our analysis yields a conservative threat score of 100 and an extreme score of 262. The most adverse exposure factors include significant scores relating to aviation and population exposure to volcanic hazards from Nisyros. When looked at in comparison to US volcanic hazards scores place Nisyros in the "Very High Threat (VHT)" category, grouped with volcanoes such as Redoubt, Mount Ranier and Crater Lake. We identify a short-fall in recommended surveillance efforts for VHT volcanoes given existing monitoring capabilities on the island. We discuss potential pitfalls of applying the NVEWS scheme to Nisyros and suggest potential adaptation of analysis scheme to match industrial and societal conditions in Europe. At the same time, our findings indicate that the volcanic threat posed by Nisyros volcano may currently be underestimated.

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