

Assessing volcanic risk in regions with low frequency eruptions: the Laacher See case study

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Approximately 13,000 years ago, the Laacher See volcano located in present-day western Germany (East Eifel volcanic field, Rhenish Shield) erupted cataclysmically and, to-date, for the last time. In addition to the near-vent destruction wrought by pyroclastic flows and massive tephra deposition, a swath of airfall ash covered Europe from the Alps to the Baltic. Mofettes in the caldera lake as well as tomography studies clearly reveal the presence of a still-active hot spot in the Eifel suggestive of the possibility of renewed activity. Previous studies have focused on the near-vent situation and on unraveling the eruption sequence. Archive legacy data harvested from a variety of disciplinary and often obscure sources (palynology, pedology, archaeology, geological grey literature) now provide new insights into the medial, distal and ultra-distal distribution of Laacher See fallout. This tephra-fall distribution and its utility as a chronostratigraphic marker at archaeological sites allow a detailed reconstruction of contemporaneous human impacts. At the same time, tephra samples collected from sites across northern Europe also reveal the causal contributions of different hazard phenomena (dental abrasion, vegetation impacts, health hazards). Given the high density of key infrastructure installations and of population in the region, risk calculations using the recently proposed Volcanic Risk Coefficient (VRC) place the Laacher See volcano on par with many more active and routinely monitored volcanoes (e.g. Teide, Ischia) – despite the Laacher See's long repose period. Indeed, the lack of prior exposure of Western European populations, coupled with the large number of countries likely to be affected by any future eruption would further aggravate any given impact. The data extant now could be used to construct robust Realistic Disaster Scenarios, and to improve outreach efforts aimed at raising awareness of this major volcano in the heart of Europe.