

Challenges in Long-Term Volcanic Hazard Assessment. C.B. Connor (Department of Geology, University of South Florida, 4202 E. Fowler Ave., Tampa, FL, 33620, cconnor@cas.usf.edu).

Assessments of hazards and risks to small communities can benefit from methods developed for long-term volcanic hazard assessments at critical facilities, which are characterized as long-term (i.e. low probability) risk and hazard assessments generally. Increasingly, volcanologists are called upon to make hazard assessments for critical facilities, such as nuclear power plants, high-level radioactive waste repositories, dam projects, and other such projects that depend on immense societal investment, and hence require siting in regions of very low geological risk. For many nuclear facilities, acceptable hazard levels are considered to be $1E-8$ to $1E-6$ per annum. In contrast, many small communities exist in areas with much higher hazard rates, on order $1E-4$ to $1E-2$ per annum. Evaluation of such low hazard rates places a high burden on volcanological interpretations and on probabilistic volcanic hazard assessments.

To address some of these challenges, the International Atomic Energy Agency (IAEA) has commissioned a multinational panel of volcanologists to revise preliminary guidance for assessing volcanic hazards at surface sites for nuclear installations. The goal of these guidelines is to formulate a systematic approach for evaluating volcanic hazards for any site. The approach must be flexible enough to assess a broad range of complex, often interrelated volcanic phenomena, yet still provide a transparent methodology to support decision making. Two fundamental outcomes need to be supported by the volcanic hazards assessment. If the assessment determines that volcanic hazards are credible external events at a site, the results of the assessment will need to provide sufficient technical detail to support development of design bases or operational criteria to mitigate the effects of potential future events on safety. However, if volcanic hazards appear beyond the design or operational limits of a potential installation, then the results of the hazards assessment will need to provide an appropriate technical basis for a site suitability decision. Clearly a similar systematic approach would benefit hazards assessments for small communities.

Several outstanding challenges in long-term volcanic hazard assessments include: the need to develop consistent methods to estimate the probability of eruptions of long-dormant volcanoes; the need to quantify uncertainty in the application of spatial and temporal probability models; the strong requirements placed on

model verification and validation when numerical simulations are used to characterize rare or energetic events.