Geophysical Research Abstracts
Vol. 18, EGU2016-5140, 2016
EGU General Assembly 2016

The use of incomplete global data for probabilistic event trees: challenges and strategies

Sarah Ogburn, Chris Harpel, Jeremy Pesicek, Jay Wellik, Heather Wright, and John Pallister
US Geological Survey/USAID, Volcano Disaster Assistance Program, Vancouver, United States (sogburn@usgs.gov)

To prevent volcanic crises from becoming disasters, the USGS-USAID Volcano Disaster Assistance Program (VDAP) helps foreign counterparts to assess volcanic unrest, activity, and hazards before and during crises. Bayesian event trees are frequently used to facilitate discussion, reach consensus, evaluate uncertainty, and produce probabilistic forecasts of volcanic activity. VDAP uses a "method of multiple data sets" (Newhall & Pallister 2014), which combines conceptual and physical models of volcanic processes, current monitoring data, patterns of prior occurrence, and expert judgement from multiple disciplines to assign probabilities for each node of an event tree. The global volcanic record is used to inform our conceptual models, improve uncertainty estimates by leveraging larger datasets, and to fill in gaps where local information is sparse. For example, event trees for the recent Sinabung, Indonesia eruption relied upon local monitoring data-streams, but also on the global frequency-magnitude (VEI) of eruptions. A variety of databases are used, including the Smithsonian Institution's Global Volcanism Program (GVP) database, WOVOdat, GeoDIVA, DomeHaz, and FlowDat. Inhomogeneity and incompleteness of the global record present challenges for the use of such data in event trees, resulting in large and difficult to quantify uncertainties. Under-recording of small events, lack of documentation of 'failed eruptions', and variability of geophysical monitoring data-streams present particular problems.

This contribution seeks to:

(1) review VDAP's use of global data for probabilistic event tree creation;
(2) summarize the problems presented by under-recording, spatial and temporal inhomogeneity, and incompleteness of the global record;
(3) highlight ways to compensate for these effects, such as the development of hierarchical models to borrow strength from the global record while retaining local information, and the use of ranges in expert judgements to assess uncertainty;
(4) and introduce the Eruption Forecasting Information (EFIS) database project.