Geophysical Research Abstracts,
Vol. 10, EGU2008-A-00064, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-00064
EGU General Assembly 2008

Global database of large magnitude explosive eruptions for magnitude-frequency analysis

L. K. Hobbs (1), R. S. J. Sparks (1), N. I. Deligne (2), S. G. Coles (3), H. A. Dunning (1)

(1) Department of Earth Sciences, University of Bristol, Bristol, UK (2) Department of Geological Sciences, University of Oregon, Eugene, OR, USA (3) Dipartimento di Scienze Statistiche, Università di Padova, Padova, Italy (lh4605@bristol.ac.uk)

Large explosive volcanic eruptions can have severe consequences for life, property and climate. In the most extreme cases this can cause catastrophes on a global scale. Extreme value statistics can be used to evaluate the magnitude-frequency relationship of large magnitude explosive events, and also to assess how the quality of the volcanic record affects these results. Applying extreme value statistics to databases of explosive volcanic eruptions with a Volcanic Explosivity Index (VEI) of 4 or greater in the last 2000 and 10,000 years has yielded results that suggest the ability to constrain magnitude-frequency relationships for very large events is limited due to underrecording of the data which increases with age. Further analysis shows that this is dependent on both timing and the size of a given eruption; larger eruptions are more likely to be found in the historical or geological records. Analysis of the 10,000 year dataset predicted that a magnitude 8.0 eruption has a 40% chance of being recorded prior to 1 AD, and a magnitude 6.0 eruption only a 20% chance. However, as the repose period between events will increase with the size of the eruptions, the return periods of the largest and most devastating explosive eruptions are likely to exceed 10,000 years. In order to build on previous results, the eruption database has been expanded to include data extending back to greater than 1,000,000 years, with the aim of again using extreme value statistics to determine global frequency of large magnitude explosive eruptions. As predicted by earlier results, the record of volcanism decreases dramatically back through time, particularly beyond 100,000 years and the statistical model

can be applied to take account of underrecording to quantify its effects. An updated magnitude-frequency relationship for large explosive eruptions is presented.