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Global rates of continental volcanism on Earth

Paolo Papale
Istituto Nazionale di Geofisica e Vulcanologia, Sezione di Pisa, Pisa, Italy (paolo.papale@ingv.it)

The recent development and analysis of global databases of continental volcanic eruptions is increasingly providing new understanding of their global time-size distribution and of the global rates of volcanism on Earth. We now know that volcanic eruptions are globally Poissonian (memoryless) events, implying that previously widespread concepts such as that of retarding or "overdue" events are actually meaningless when referred to volcanic eruptions; and we have discovered a power law relationships between the size of explosive volcanic eruptions (VEI = Volcanic Explosivity Index equal or larger than 3) and their frequency, possibly placing a theoretical limit to our capability to anticipate the occurrence of a volcanic eruption of a given size, e.g., the occurrence of a cataclysmic super-eruption. Maximum likelihood estimates of rate parameters associated with exponentially-distributed inter-event eruption times allow global volcanic hazard and global rates of continental volcanism to be quantified over different time windows. Here I present the results of a Monte Carlo simulation showing the distribution of the global rates of continental volcanism over different time windows from 1 to 100,000 years. The new estimates presented here can be used as robust constraints for geodynamic models, e.g., models of plume dynamics and mantle-crust interaction, as well as for atmospheric evolution and climate change models.