

Volcanoes of the World 4.0: The volcano and eruption database of Smithsonian's Global Volcanism Program

Elizabeth Cottrell, Venzke Edward, Siebert Lee, Andrews J Benjamin

National Museum of Natural History, Smithsonian Institution, USA

E-mail: cottrelle@si.edu

Volcanoes of the World 4.0 (VOTW4.0) is a relational database of recent volcanism compiled over the last four decades by Smithsonian's Global Volcanism Program (GVP). This online database is an updated digital version of the classic catalog Volcanoes of the World 3rd Edition (Siebert et al., 2010) that documents more than 10,000 known or suspected Holocene eruptions from over 1500 volcanoes. Information is contained within 32 interrelated data tables, and uses another 28 lookup tables to constrain and standardize the data.

Maintained fields at the volcano level describe names, location and coordinates, elevation, morphology, tectonic setting, major rock types, geologic age, volume, affiliated observatories, nearby population, subsidiary features, images, and references. Reports from the Smithsonian U.S. Geological Survey Weekly Volcanic Activity Report and the Bulletin of the Global Volcanism Network are also linked to each volcano. Volcanic activity is organized into eruptions, episodes, and events. Episodes within an eruption can be distinguished by time, location, or style of activity. The database also allows episodes of associated precursory or secondary episodes to be identified. Episode level data includes vent location descriptors, dating technique, and reported volumes of tephra and lava. Specific Events within dated episodes may be given more specific time stamps, data permitting. Examples of events include reports of explosive eruptions, pyroclastic flows, lahars, lava flow, debris avalanches, lava dome formation, bombs, and deformation. Tables of event details can also be linked, which is currently done in the case of fatalities, evacuations, and calculations of the volcanic explosivity index.

GVP attempts to capture all eruptions at all scales, and the database is dominated by small to moderate eruptions (90% of eruptions have a Volcanic Explosivity Index of less than or equal to 3). VOTW4.0 can be interrogated to research and model global volcanic patterns in space in time. Several complementary efforts (LaMEVE, WOVOdat, other chemical and physical databases under development) rely on VOTW4.0 for their backbone structure, naming conventions, and metadata standards such that one can envisage a powerful network of resources that may transform scientific discovery as well as the forecasting and management of volcanic hazards. The VOTW4.0 can be queried at all scales, from the eruptive history of a single volcano, to regional and global compilations, and downloaded from www.volcano.si.edu.