

Supervolcanic eruption – governance

Risk expert

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Monitoring volcanoes is largely the responsibility of national institutions that operate Volcano Observatories, and work with political authorities, civil protection agencies and communities to manage the risk. Over the past century, these institutions have been set up in many countries to monitor either a single volcano or multiple volcanoes: the World Organisation of Volcano Observatories lists 80 Volcano Observatories in 33 countries and regions, and plays a coordinating role among them. In countries with infrequent eruptions and no Volcano Observatory, national institutions responsible for natural hazards would be responsible for monitoring the risk.

On an international scale, bilateral and multilateral agreements support scientific investigation and volcanic risk management. These commonly involve developed nations (e.g. France, Italy, Japan, New Zealand, UK and USA) supporting developing nations. In particular, the Volcano Disaster Assistance Program of the US Geological Survey and the U.S. Agency for International Development provide global support to developing nations through training, donations of monitoring equipment and assistance in responding to volcanic emergencies at the invitation of governments. In addition, an international network of nine Volcanic Ash Advisory Centres issues warnings of volcanic ash eruptions into the atmosphere to protect aviation, with world-wide coverage. Apart from those, there is no organization or institution that has a mandate to manage volcanic risk on a global scale.

More informal global coordination is achieved through voluntary international and regional organizations, networks and projects that coordinate the sharing of scientific knowledge, technical expertise and best practice. The International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI) is the main scientific organization for volcanology with a membership of over 1000, consisting both of academics and Volcano Observatory staff. IAVCEI co-ordinates international commissions and working groups on many issues related to volcanic risk management. These activities are voluntary, so the coverage of key issues on volcanic risk and its governance can be uneven.



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Although super-eruptions are very infrequent (an estimated event every 17,000 years), seen through the lens of deep geological time they are rather common, and so humanity will eventually experience one. Volcanoes with potential for future super-eruptions either have a past record of super-eruptions or have been long dormant. Known sites include volcanoes in the USA, Japan, New Zealand, Turkey and several South American countries, but identifying potential future sites of eruptions with no previous record is significantly more challenging.

The existing system provides an effective, though imperfect, structure to manage local volcanic risk. Depending on the magnitude of the event, the system is likely to come under pressure and prove inadequate in the event of a catastrophic eruption with global reach. No organisation has a specific mandate to address risk from super-eruptions. If one occurred in a populated location, we could anticipate an immediate major humanitarian crisis, with overwhelmed institutions and services, and long term effects on the environment, climate, critical infrastructure, food security and global trade. Developing a global response plan under the auspices of a UN agency and IAVCEI would be a good start to improve governance of this global risk.

Volcanic eruptions

Volcanic eruptions are measured through a magnitude scale, a logarithmic scale, ranging from 0 to 9, where each unit increase indicates an eruption 10 times greater in erupted mass. At the top of the scale, supervolcanic eruptions (M 8) release more than 400 km³ of magma. By comparison, the largest volcano eruption recorded in human history, the 1815 Tambora eruption in Indonesia, had a magnitude of about 7.41 km³ of magma expelled, claiming over 70,000 lives. When Mount Vesuvius erupted in 79 AD, devastating the Roman cities of Pompeii and Herculaneum, it released approximately 4 km³ of magma, placing it at magnitude 6.15. More recently, the May 1980 eruption of Mount St. Helens in Washington, USA, with just over 0.5km³ released, was a magnitude 5.1.