

Automated Detection and Cataloging of Global Explosive Volcanism Using the IMS Infrasound Network

Explosive volcanic eruptions are among the most powerful sources of infrasound observed on Earth, with recordings routinely made at ranges of hundreds to thousands of kilometers. These eruptions can also inject large volumes of ash into heavily travelled aviation routes, thus posing a significant societal and economic hazard. Detecting and counting the global occurrence of explosive volcanism helps with progress toward several goals in Earth sciences and has direct applications in volcanic hazard mitigation. We experiment with a new method to search systematically through multi-year data from the International Monitoring System (IMS) infrasound network to identify explosive volcanic eruption signals originating anywhere on Earth. We combine infrasound signal association across multiple stations with source location using a brute-force, grid-search, cross-bearings approach. We apply the method to global IMS infrasound data from 2005–2010 to construct a preliminary acoustic catalog that emphasizes sustained explosive volcanic activity (long-duration signals or sequences of impulsive transients lasting hours to days). This work represents a step toward the goal of integrating IMS infrasound data products into global volcanic eruption early warning and notification systems.

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