

## Press Release

# University of Washington and the U.S. Geological Survey announce a new tool for detecting Explosive Volcanic Eruptions at remote volcanoes

[San Francisco, CA American Geophysical Union Meeting,  
Wednesday, December 15, 2010]

The USGS Cascade and Alaskan Volcano Observatories, in collaboration with the Earth and Space Sciences Department of the new College of the Environment at the University of Washington, announce the development of a new global network for early warning of explosive ash cloud eruptions that present a hazard to aviation. Used in combination with other monitoring methods, the explosive eruption early warning system uses the detection of lightning activity within a few kilometers of each of about 1500 volcanoes globally to alert USGS operators of possible explosive eruptions. The global lightning data are obtained from WWLLN, the World Wide Lightning Location Network (see <http://wwlln.net>) which is a consortium of over 60 universities and government laboratories around the world. The WWLLN locates lightning using the detection of VLF (very low frequency) radio transients (called sferics) caused by lightning. Highly accurate timing allows the triangulation of data from multiple receivers to locate powerful lightning strokes occurring anywhere in the world. Lightning at larger distances from each volcano (up to 100 km) is also monitored, to help determine if new lightning strokes over the volcano are possibly caused by meteorological lightning.

The first successful advance warning detection of an explosive eruption came from the Shiveluch volcano in Kamchatka at 2010-10-27 17:04:34 UTC when the ash cloud lightning started, and the system began sending automatic alert emails to USGS and UW personnel approximately one hour before the ash cloud was visible in weather satellite data. For more information about this event see <http://wwlln.net/>.

The results of this explosive eruption detection along with an after-the-fact comparison of known eruptions to the historical, global lightning data were presented today in an invited paper at the American Geophysical Union meeting in San Francisco by John Ewert of the USGS Cascade Volcano Observatory in Vancouver, WA. Analysis of the archival data indicate this technique was successful in detecting all eruptions with Volcanic Explosivity Index (VEI)  $\geq 4$  and many with VEI=3.

The global lightning data are analyzed every minute, in real time to search for lightning strokes over each of the ~1500 global volcanoes. Only volcanoes in Alaska, the Commonwealth of the Northern Marianas, and the Russian far east are presently being noted with alert emails. For volcanoes in the tropics, where meteorological lightning is very common, the technique requires ancillary weather evaluation to prevent false positive alerts, and thus only a sub-set the middle and high latitude volcanoes have real time alert warnings available at the present time.

The USGS and affiliated partners operate five volcano observatories monitoring approximately 170 volcanoes in U.S. territory to provide information and warnings about hazardous volcanic events.

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