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Detection of an underwater eruption near Tristan da Cunha using the IMS network

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The International Monitoring System (IMS) of the Comprehensive Nuclear Test Ban Treaty Organisation (CTBTO) is a global network of sensors designed to detect nuclear test explosions in the atmosphere, underwater and underground. Data is sent to the International Data Centre in Vienna for processing in near-real time. A few of the sensors are located close to active or potentially active volcanoes, some of which are not monitored.

One example is the remote volcanic island of Tristan da Cunha, in the South Atlantic Ocean. The last eruption was in 1961 and forced an evacuation. CTBTO installed a monitoring station on the island in early 2004 including the first seismometers ever to have been installed there.

The equipment recorded a swarm of nearby earthquakes which started in late July 2004. Activity was intense at first, including a number of felt earthquakes, and has continued at a declining rate. The data has been forwarded to the British Geological Survey which has monitored the activity in real-time. The data show characteristics of a volcano-tectonic earthquake swarm. However, S-P times are between 4 and 6 seconds, which precludes shallow seismicity beneath the volcano.

Shortly after the intense activity, pumice was seen floating in the waters near the island. This was later identified as being fresh and being typical of an underwater eruption. It was concluded that the earthquake swarm was associated with an underwater eruption, with a location between 20 and 30 km south-east of Tristan da Cunha.