Simulations predict that Antarctic volcanic ash can disrupt air traffic in vast areas of the south hemisphere

Barcelona Supercomputing Center research points the need of hazard assessments for aviation safety

Simulations performed by Barcelona Supercomputing Center in collaboration with the ICTJA-CSIC demonstrated that Antarctic volcanoes might pose a higher threat than previously considered. A research focused on the potential impacts of ash dispersal and fallout from Deception Island highlights how ash clouds entrapped in circumpolar upper-level winds have the potential to reach lower latitudes and disrupt Austral hemisphere air traffic. The study has been published today in the Nature group journal, Scientific Reports.

The research has been based in different sets of simulations, considering different meteorological scenarios and different eruption characteristics. These simulations demonstrated that ash from lower-latitudes, as those in Deception Island, are likely to encircle the globe even in case of moderate eruptions, as it could reach up to tropical latitudes, a vast part of Atlantic coast of South America, South Africa and/or South Oceania. Thus, a wider dispersion of volcanic particles than previously believed can result in significant consequences for aviation safety in these areas.

The experiments have been conducted with BSC’s NMMB-MONARCH-ASH meteorological and atmospheric dispersion model at regional and global scales. One of the aims of the study is to raise concern for the need of performing dedicated hazard assessments to better manage air traffic in case of an eruption. Several volcanic events having occurred in recent years, including Eyjafjallajökull (Iceland, 2010), Grímsvötn (Iceland, 2010) and Cordón Caulle (Chile, 2010) have led to large economic losses to the aviation industry and its stakeholders.
The paper concludes that, in specific circumstances, volcanic ash from Antarctic volcanoes can disrupt air traffic, not only in proximity, but as far as South Africa (6,400 KM) and in flying routes connecting Africa with South America and Australia.

**About volcanos in Antarctica**

From the tens of volcanoes located in Antarctica, at least nine (Berlin, Buckle Island, Deception Island, Erebus, Hudson Mountains, Melbourne, Penguin Island, Takahe, and The Pleiades) are known to be active and five of them, all stratovolcanoes, have reported frequent volcanic activity in historical times. Deception Island is an active composite volcano with several tens of eruptions in the last 10,000 years.

Located at the spreading center of the Bransfield Strait marginal basin, Deception Island consists of a horseshoe-shaped composite volcanic system truncated by the formation of a collapse caldera represented as a sea-flooded depression known as Port Foster. Tephra deposits from Deception and neighboring islands, reveal over 30 post-caldera Holocene eruptions. However, it is inferred that a considerably higher number of eruptions have actually occurred. Indeed, over 50 relatively well-preserved craters and eruptive vents, scattered across the island, can be reconstructed and mapped.

The eruption record in Deception Island since the 19th century reveals periods of high activity (1818–1828, 1906-1912), followed by decades of dormancy (e.g. 1912–1967). The unrest episodes recorded in 1992, 1999 and 2014-2015 demonstrate that the volcanic system is still active and could be a cause of concern in the future.

During the most recent explosive eruptions occurred in 1967, 1969 and 1970, ash fall and lahars destroyed or severely damaged the scientific bases operating on the island at that time.

**About BSC’s NMMB-MONARCH-ASH model**

NMMB-MONARCH-ASH is a novel on-line meteorological and atmospheric transport model to simulate the emission, transport and deposition of tephra (ash) particles released from volcanic eruptions. The model predicts ash cloud trajectories, concentration at relevant flight levels, and deposit thickness for both regional and global domains.

**Reference of the study:**


**Videos:**


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