Ash clouds of Antarctic volcanoes may disrupt air traffic in the southern hemisphere

November 30 2017

Ash clouds emitted during the eruption of an Antarctic volcano may disrupt air traffic in the southern hemisphere, according to a study made by researchers from the Institute of Earth Sciences Jaume Almera of the CSIC (ICTJA-CSIC) and the Barcelona Supercomputing Center (BSC). The authors have analyzed for the first time the effects and dispersion patterns of ash clouds released during a hypothetical eruption of the Deception Island volcano, which would have the potential to reach tropical latitudes. The research, published in *Scientific Reports* journal, demonstrated that Antarctic volcanoes may pose a greater threat than previously believed.

The simulations of ash dispersion have considered different meteorological scenarios and eruption characteristics. "Our models indicate that volcanic ash clouds in high latitudes of the southern hemisphere, like in Deception Island, may encircle the globe, affecting a vast part of the Atlantic coast of South America, South Africa and South Oceania," states Adelina Geyer, researcher of ICTJA-CSIC.

Ash dispersion may have a significant impact on aviation safety in the southern hemisphere. According to the simulation and in specific circumstances, the presence of ash in the atmosphere would be above the established safety limits, affecting the domestic and international flying routes of South Africa and also the flights connecting Africa with South America and Australia.

"The study highlights the need for further research in the area to

investigate the potential occurrence of an eruption in Deception Island and to perform a complete hazard assessment for other active Antarctic volcanoes, considering that, as in the case of Deception Island, there is more and more scientific and tourist activity every year," says Adelina Geyer.

The experiments were conducted in the BSC's MareNostrum 3 supercomputer with meteorological and atmospheric dispersion model NMMB-MONARCH-ASH at regional and global scales, with the eruption source parameters for the 1970 eruption scenario. 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 Cord Caulle (Chile, 2010) have led to large economic losses to a part of the aeronautical industry.

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 have reported volcanic activity in historical times. Deception Island volcano, located in the Bransfield Strait, is one of the most active of the region, with several dozen eruptions in the last 10,000 years.

Since the 19th century, the Deception Island volcano reveals periods of high activity, followed by decades of dormancy. The unrest episodes recorded in the years 1992, 1999 and 2014-2015 demonstrate that the volcanic system is still active. During the most recent explosive eruptions in 1967, 1969 and 1970, ash fall damaged scientific bases operating on the island at that time.

Adelina Geyer coordinates POSVOLDEC project, an interdisciplinary

study with the aim of characterizing the current state of the magmatic system of the Deception Island volcano.

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 clouds trajectories, concentration at relevant flight levels, and the deposits thickness for both regional and global domains.

More information: Geyer, A., A. Marti, S. Giralt, and A. Folch (2017), Potential ash impact from Antarctic volcanoes: Insights from Deception Island's most recent eruption, Scientific Reports, 7(1), 16534, DOI: 10.1038/s41598-017-16630-9

Provided by ICTJA-CSIC