EGU21-7594
https://doi.org/10.5194/egusphere-egu21-7594
EGU General Assembly 2021

Assessing potential impacts on the air traffic routes due to an ash-producing eruption on Jan Mayen Island (Norway)

Manuel Titos[1], Beatriz Martínez[2], Sara Barsotti[1], Laura Sandri[2], Arnau Folch[3], Leonardo Mingari[3], Antonio Costa[2], and Giovanni Macedonio[4]

[1]Icelandic Met Office, Division of Processing and Research, TSTC, Reykjavik, Iceland (manuel@vedur.is)
[2]stituto Nazionale di Geofisica e Vulcanologia, Sezione di Bologna, Bologna, Italy
[3]Barcelona Supercomputing Center - Centro Nacional de Supercomputación (BSC-CNS)
[4]Istituto Nazionale di Geofisica e Vulcanologia, Osservatorio Vesuviano, Naples, Italy

Jan Mayen Island (Norway), located in the North Atlantic, is considered the world's northernmost active subaerial volcano, with at least five eruptive periods recorded during the last 200 years. Explosive activity of the volcano may seriously affects the nearby important air traffic routes. However, no quantitative studies on the possible impact of a new explosive volcanic eruption on the air traffic have been conducted. In this work, we statistically characterise the spatial and temporal distribution of airborne volcanic ash cloud and its persistence at different flight levels. Since current operational forecast products do not always meet the requirements of the aviation sector and related stakeholders (using coarse time and space scales, with outputs on a 40 km horizontal resolution grid and 6 hour time averages), and they neglect epistemic/aleatory uncertainties in quantitative forecasts on real time, we propose hourly high resolution hazard maps over a 3D-grid covering a 2 km-resolution spatial domain 2000 km x 2000 km wide. We present the use of high-performance computing (HPC) to overcome the computational limitations associated with unbiased long-term probabilistic volcanic hazard assessment (PVHA) .Considering a continuum of possible combinations of Eruptive Source Parameters (ESP) to assess and quantify the uncertainty, and the natural variability associated with wind fields over 20 years of data, from 1999 to 2019, we run thousands of analytical solutions (numerical simulations) using the most recent version of the FALL3D model. As a result, the first comprehensive long-term PVHA for Jan Mayen volcanic island is presented.