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'Understanding volcanoes and society: the key for risk mitigation'

Effects of volcanic ash fallout and resuspension events on aviation: the 2015 Calbuco eruption example

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Volcanic ash poses a serious risk on aerial navigation causing loss of visibility, slippery runways, disruption of communication and electric systems, and direct damage to airplane's fuselage and turbines. The cancellation of flights and related indirect consequences can imply millionaire economic losses. In addition to syn-eruptive disruptions, ash resuspension events can occur sparsely for years after ash deposition causing also substantial impacts. For this reason, resuspension events (not always synchronous with an eruption) are being a subject of growing interest for some Volcanic Ash Advisory Centers (VAAC), although forecasting of resuspended ash clouds is mostly at a research level and not fully transferred into operations yet. In this work we describe different aspects of the unexpected 2015 Calbuco eruption and its impacts on the fly schedule of Aerolíneas Argentinas-Austral airlines, who canceled 185 flights between April 22 and May 6 as a consequence of the eruption. We coupled the meteorological Weather Research and Forecasting (WRF/ARW) model with the FALL3D dispersal model for eruptive and resuspension processes to determine ash loadings on the ground and ash concentrations at different flight levels. Then, we evaluate the impact on the aviation sector using dates, duration and location of ground traffic interruption, services interruption, and flight cancellations. Finally, we show the importance of having a database with pre-defined volcanological parameters (particle grain size and properties, column height, discharge rate, etc) for early forecast of Andean volcanoes ash plumes. This is particularly crucial for unexpected eruptions as occurred at Calbuco.