



Eruption Source Parameters for forecasting ash dispersion and deposition from vulcanian eruptions at Tungurahua volcano: Insights from field data from the July 2013 eruption

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Abstract

Tungurahua volcano, located in the central area of the Ecuadorian Sierra, is erupting intermittently since 1999 alternating between periods of quiescence and explosive activity. Volcanic ash has been the most frequent and widespread hazard provoking air contamination episodes and impacts on human health, animals and crops in the surrounding area. After two months of quiescence, Tungurahua erupted violently on 14th July 2013 generating short-lived eruptive columns rising up to 9 km above the vent characterized as a vulcanian eruption. The resulting fallout deposits were sampled daily during and after the eruptions to determine grain size distributions and perform morphological and componentry analyses. Dispersion and sedimentation of ash were simulated numerically coupling the meteorological Weather Research Forecasting (WRF) with the volcanic ash dispersion FALL3D models. The combination of field and numerical studies allowed constraining the Eruption Source Parameters (ESP) for this event, which could be used to forecast ash dispersion and deposition from future vulcanian eruptions at Tungurahua. This set of pre-defined ESP was further validated using two different eruptions, as blind test, occurring on 16th December 2012 and 1st February 2014.

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