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Preliminary hazard maps associated to Cotopaxi volcano ash fallouts

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Cotopaxi volcano is located in the Eastern Cordillera of Ecuador, 60 km south east of Quito and 45 km north of Latacunga. This active stratovolcano has an eruptive history of moderate to large eruptions with frequent ash and lapilli fallouts. After 4 months of unrest, Cotopaxi experienced its first eruption in 73 years on August 14th, 2015. This eruption lasted about three and a half months and the only primary volcanic hazard were the ash plumes and consequent ash fallouts that affected air traffic and communities located to the west and north-west of the volcano. This unrest and the following eruption initiated an updated study on ash fallout hazard assessment in order to improve the current hazard map. Our approach compares numerical simulations and the real ash distribution obtained from high-frequency sampling campaigns on the 2015 fallout deposits. The sampling network is currently made of ~40 ashmeters installed around the volcano. Four eruptive scenarios (E1, E2, E3, and E4) were defined using Cotopaxi eruptive history. Eruption source parameters include volume, column height, and eruption and simulation durations. Daily simulations were performed using the Ash 3D model (USGS) between June 16th and September 9th, 2015. Hazard maps were compiled using a Geographic Information System (Q-GIS) and include a restricted high probability fallout zone and a larger potentially affected one. These hazard maps were compared to the results from 15 sampling campaigns performed during the 2015 eruption. The comparison between the hazard maps and the isomass maps from the sampling campaigns yield a ~90% correspondence with the restricted high probability fallout zone from the E1 scenario (VEI 1). Therefore we conclude that the 2015 eruption corresponds to the smallest eruptive scenario described in the literature and validate the use of Ash 3D model as a forecasting tool for this particular scenario.