Modeling volcanic ash resuspension. Application to the 15-16 October 2011 outbreak episode in Central Patagonia, Argentina

Arnau Folch[1], Leonardo Mingari[3], Soledad Osores[2], Estela Collini[3]

[1]Barcelona Supercomputing Center (BSC-CNS), Spain, [2]CONICET, Argentina, [3]Servicio de Hidrografia Naval (SHN), Argentina

E-mail: arnau.folch@bsc.es

Resuspension of volcanic ash by wind can cause strong impacts at scales from local to regional, including deterioration of air quality and disruption of airports if the concentration of resuspended ash at low atmospheric levels exceeds critical values. For example, following the eruption of Cordon del Caulle in Chile, several Argentinean airports in central and northern Patagonia were continuously disrupted during strong wind episodes, causing considerable economic impact on the region. A major outbreak episode occurred during 15-16 October 2011, with resuspension forming a large ash cloud that reached as far as Buenos Aires city and Uruguay. The ash cloud forced the Ezeiza International airport to shut down and raised the air quality indicators above the maximum limits allowed. Resuspension of ash from fallout deposits depends on a complex combination of meteorological conditions (wind intensity, friction velocity, soil moisture) and physical properties of particles. When the intensity of wind blowing across a granular soil exceeds a certain threshold, mid-size particles (larger than about 50 um) begin to saltate and, when falling back to ground, break the cohesive forces of smaller particles on the surface favouring its suspension. The emission rate (vertical flux of particles), which strongly depends on the saltation flux of larger particles, determinate the formation and subsequent transport of ash clouds. Unfortunately, emission schemes specific for volcanic ash are inexistent. Here we implement several emission schemes originally developed for emission of mineral dust in the WRF-FALL3D modelling system and investigate its use for volcanic ash using the 15-16 October 2011 outbreak episode as a test case.

©IAVCEI 2013 Scientific Assembly. All rights reserved.