Title: *On-line coupling of volcanic ash and aerosols transport with multiscale meteorological models*

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Large explosive volcanic eruptions can inject significant amounts of tephra and aerosols (e.g. SO_2) into the atmosphere inducing a multi-scale array of physical, chemical and biological feedbacks within the environment. Effective coupled Numerical Weather Prediction (NWP) models capable to forecast on-line the spatial and temporal distribution of volcanic ash and aerosols are necessary to assess the magnitude of these feedback effects. However, due to several limitations (users from different communities, operational constrains, computational power, etc.), tephra transport models and NWP models have evolved independently from one another.

Within the framework of NEMOH (an Initial Training Network of the European Commission FP7 Program), we aim to quantify the feedback effects of volcanic ash clouds and aerosols emitted during large-magnitude eruptions on regional meteorology. As a first step, we have focused on the differences between the off-line hypothesis, currently assumed by tephra transport models (e.g. FALL3D), and the on-line approach, where the transport and sedimentation of volcanic ash is coupled to the NMMB/BSC-CTM chemical weather prediction model; the evolution of the WRF-NMME model. We compared the spatiotemporal transport of volcanic ash particles simulated with the on-line coupled -NMMB-ASH model-, with those of the off-line FALL3D model by using a range of test case eruptions and validating results against satellite data. This talk shows the latest results from a collaboration between the BSC and the Istituto Nazionale di Geofisica e Vulcanologia (INGV) to couple an analytical model that describes cloud spreading as gravity current within the advection-diffusion routine of the NMMB/BSC-CHEM model for the Campanian Ignimbrite super-eruption in Italy. This collaboration has been funded by the Severo Ochoa Training and Mobility program. To conclude, we will introduce the forthcoming steps to implement a sulfate aerosol module within the chemical transport module of the FALL3D-NMMB/BSC-CTM model, used to quantify the feedback effects on the atmospheric radiative budget, particularly during large-magnitude explosive volcanic eruptions.