

The EPL-RADIO project

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The EPL-RADIO (EtnaPlumeLab-Radioactive Aerosols and other source parameters for better atmospheric Dispersion and Impact estimatiOns) project aims at improving the characterisation of Mt. Etna as atmospheric aerosols source, targeting emission processes, from inner degassing mechanisms to aerosol near-source characterisation. This project brings together different and original information, such as observations of (a) radioactive disequilibria of radon daughters, (b) coupled direct/remote size-resolved aerosols distribution, (c) primary/secondary near-source sulfate aerosols partitioning. The results of point (a) will give information on inner degassing dynamics. The results of points (b,c) will allow a detailed size-resolved physicochemical characterisation of the emitted aerosols to constrain the regional climatic impacts of Mt. Etna in the Mediterranean area.

Four campaigns are foreseen: two in summer 2016 (successfully carried out in June/July) and two in summer 2017. The volcanic aerosol source will be characterised by determining the size-resolved aerosol emissions, with a cascade impactor and a Microtops-II optical spectrometers, and the primary fraction of the emitted sulfate aerosols (with respect to the secondary sulfate aerosols produced by in-plume conversion of SO₂ emissions) by FTIR (Fourier Transform Infrared) spectroscopy. Complementary three-dimensional aerosols information will be obtained with a scanning AMPLE LiDAR (Aerosol Multi-wavelength Polarization Lidar Experiment - Light Detection And Ranging) system. The radioactivity characterisation of the plume will be obtained by direct sampling with new instruments developed specifically for these campaigns.

The data for 2016 campaign are now being analysed and 3 papers are foreseen: 1) description of a new Microtops-II observation methodology (under preparation, submission: end of 09/2016), 2) aerosol physicochemical characterisation for climatic impacts (submission: end of 2016), 3) radioactive disequilibria and inner degassing dynamics considerations (submission: first trimestre 2017). Results will be presented at international conferences.