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Monitoring the Eyjafjöll volcanic plume using OPGC platforms : remote sensing and in-situ measurements

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OPGC (Observatoire de Physique du Globe de Clermont-Ferrand) presents a unique combination of knowledge in volcanology and atmosphere physics, for the tracking and the monitoring of volcanic plumes. These competences interact through the combination of the mastering of Lidar and radar techniques; gas and aerosol measurement (in-situ and airborne) by the Laboratoire de Météorologie Physique (LaMP,OPGC) and the expertise of the Laboratoire Magmas et Volcans (LMV,OPGC) in eruption dynamics and spatial remote sensing. Platforms for observations benefit from the technical support and expertise of the OPGC staff.

HOTVOLC group is dedicated to the near-real-time monitoring of thermal anomalies related to the eruptive activity of volcanoes. The main goal of HOTVOLC deals with estimation of quantitative parameters that give stringent constraints on ash plumes dynamics, from the vent to the atmosphere. Datas from HOTVOLC give near –real time monitoring of ash plume, and its height, crucial parameter for predictive models and risk assessment. The height of the plume of Eyjafjöll on April 15 2010 at 12:00 UTC was estimated at 5000-6500 m, in accordance with ground observations and Lidar data. TERRA MODIS and AURA OMI sensors were used for the daily quantitative estimation of ash and SO2 burden , respectively. Two peaks of ash and SO2 emissions occurring on April 15 (100 kt and 8 kt) and 19 (170 kt and 12 kt) were determined. HOTVOLC is involved in the monitoring of the eruption at Eyjafjöll(Iceland) and belongs to a volcano alert group, at the request of the MEEDDM (French Ministry for ecology, energy, sustainable development and sea).

LIDAR at the OPGC, is a Rayleigh-Mie LIDAR emitting at 355nm, with parallel and crossed polarization channels. On April 19, a layer of depolarizing particles i.e.-spherical particles was observed at 3000 m a.s.l, with maximum thickness of 500m. The instrumented station at the top of the Puy de Dôme allows measurements of gas-phase and of optical, chemical and microphysical properties of aerosols. A few days after the volcanic plume was observed from the Lidar, concentrations of supermicronic particles significantly increased, well correlated with SO2 (22-27 April).

In addition, from April 19 to April 22, the French research aircraft ATR42, equipped with microphysical probes FSSP100, FSSP300, 2D and PCASP100X performed 4 scientific flights above France, in order to quantify the volcanic ash plumes. In-situ measurements for a flight between Rouen and Toulouse on April 22nd passing over Clermont-Ferrand are presented here.