

## **Potential of weather radar in estimating volcanic eruption source parameters: case study of Eiyafjallajökull volcano eruption**

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The forty days Eiyafjallajökull volcano eruption on April-May 2010 was of modest size but characterized by a widely ash dispersion over Europe. This eruption was continuously monitored by the Keflavik C-band weather radar. The time period considered for the analysis is between 4th-8th May, 2010. Time series of radar volume data have been analyzed and quantitatively interpreted using the Volcanic Ash Radar Retrieval (VARR) physically-based technique, successfully applied in several past works to estimate the tephra particle size, fall rate and mass concentration. VARR methodology is further extended to provide both mean diameter and airborne tephra particle size distribution (PSD) within the observed radar resolution cells. Deposited tephra on the ground are retrieved and compared with those derived from direct tephra samplings in terms of ash PSD and ash mass loading. The mass flow rate (MFR) and plume height estimations are provided as airborne products of radar-based three-dimensional ash concentration estimates within the column above the volcanic vent. We estimate the MFR as an input source term, due to the mass flow rate, minus a sink term, due to the flow divergence rate, outside the column. This methodology has provided very promising results, when compared to other model-based and experimental techniques, and is opening interesting perspectives for future research which will be presented and discussed.