Evaluation of observational infrastructure for measurement of volcanic ash from surface, air and satellite platforms

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The 2010 and 2011 eruptions in Iceland caused global economic losses and threatened national security in a number of European countries. In response, national governments called on scientists to provide as much information as possible on the location and amount of volcanic ash in the atmosphere. Consequently, many measurement techniques, originally conceived for measurement of gases, clouds and aerosol in the Earth' s atmosphere, were applied in an attempt to measure airborne volcanic ash characteristics. To date, the capability of these techniques for ash measurement has not been systematically evaluated.

The National Volcanic Ash Project (NVAP) is supported by the Norwegian Ministry of Transport and Avinor, and aims to provide a basis for decisions about future infrastructure investments related to the measurement of volcanic ash from surface and airborne platforms. Here we present an objective and systematic evaluation of various instrumental approaches, where the suitability and limitations are assessed in terms of detection limit, accuracy, temporal resolution, spatial resolution, ease of measurement, acquisition time and operational cost. The evaluation will guide potential future investments in regional surface measurement stations in Norway, for example, at airports and major cities.