



The Role of International Science in Aviation-Risk Management Following the 2010 Eruption of Eyjafjallajökull, Iceland

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The severe disruption to air transport and related commercial and social activities in April 2010 that resulted from atmospheric transport of ash from the eruption of Eyjafjallajökull prompted a shift in Europe from the accepted global policy of strict avoidance by aircraft of any ash-contaminated airspace to one of allowing flight through zones of dilute ash concentrations under some circumstances. This shift was made in a crisis environment of rapidly mounting economic losses and social disruptions extending well beyond the European region. To get the global air transportation system moving again, European aviation authorities and associated meteorological offices created a new type of advisory product depicting forecast zones of low ash concentrations in Eyjafjallajökull's ash clouds that could be transited with expectation of no or minimal risk of aircraft damage, with requirements for more frequent aircraft inspections and enhanced risk management by airlines.

Following the crisis, recognizing that any global implementation of such a fundamental shift in risk management would require further evaluation based on sound scientific and engineering input, the International Civil Aviation Organization (ICAO) formed an International Volcanic Ash Task Force (IVATF) with wide representational membership. The IVATF has broad terms of reference, which can be found on the IVATF web site at <http://www2.icao.int/en/anb/met-aim/met/ivatf/default.aspx/>. Additionally in June 2010, the Executive Council of the World Meteorological Organization (WMO) endorsed a proposal made at the 5th International Workshop on Volcanic Ash in Santiago, Chile, in March 2010. The endorsement created a joint WMO-International Union of Geodesy and Geophysics (IUGG) Volcanic Ash Scientific Advisory Group to advise ICAO groups including the IVATF on volcanic ash science and training matters according to the working arrangements between WMO and ICAO.

With the active support of interested experts over the world, the IVATF and Volcanic Ash Scientific Advisory Group together comprise the formal conduit for advancing the operations and scientific underpinnings of ICAO's International Airways Volcano Watch. The first meetings for both groups were held in Montréal, Canada, in July/August 2010. The work of the IVATF will be time-limited and provide its findings to ICAO by 2013, whereas the work of the Volcanic Ash Science Advisory Group will be ongoing. The groups do not disburse research funds but rely on the ability of scientists in agencies and institutions worldwide to focus their efforts on the above issues. Such focus is indeed occurring, as evidenced by the ESA-EUMETSAT workshop on Monitoring Volcanic Ash from Space (May 2010 in Frascati, Italy; http://earth.eo.esa.int/workshops/Volcano/files/STM_280_ash101124.pdf/), the Workshop on Ash Dispersal Forecast and Civil Aviation (October 2010 in Geneva, Switzerland; <http://www.unige.ch/hazards/Workshop.html>), special sessions at the American Geophysical Union (December 2010 in San Francisco, USA; <http://www.agu.org/meetings/fm10/program/index.php/>), the meeting of the European Geosciences Union in Vienna, April 2011, and the forthcoming meeting of the IUGG in Melbourne, Australia, June/July 2011.

For scientific contributions to be applied to risk management, research results must be translated into appropriate products and services usable in an operational mode by the parties responsible for risk-management decisions and policies. Examples with respect to volcanic ash will include the incorporation of new volcanic ash and SO₂ remote sensing and dispersion modeling techniques into Volcanic Ash Advisory Centre operations, the continued establishment and maintenance of observational systems such as volcanological monitoring equipment, radar, and lidar across the world in a sustainable manner, and further airborne sampling of volcanic clouds by specialized aircraft, drop-sondes and possibly unmanned aircraft.