



The CARIBIC aircraft as a versatile tool for measuring Eyjafjallajökull's volcanic plumes in April/May 2010

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The Civil Aircraft for the Regular Investigation of the Atmosphere Based on an Instrument Container (CARIBIC) project investigates physical and chemical processes in the Earth's atmosphere using a Lufthansa Airbus A340 long-distance passenger aircraft. After the explosive eruption of the Eyjafjallajökull volcano on Iceland began on 14 April 2010, the first CARIBIC measurement flight was carried out over the Baltic Sea and Southern Sweden on 20 April. Two more flights followed: one over Ireland and the Irish Sea on 16 May and one over the Norwegian Sea on 19 May 2010. All flights used the London Volcanic Ash Advisory Centre (VAAC) and other aerosol dispersion model predictions for the flight planning in order to intercept the ash plumes. During these flights the CARIBIC container proved its merits as a versatile and comprehensive flying laboratory.

Over Northern Ireland and the Irish Sea, the Differential Optical Absorption Spectroscopy (DOAS) instrument detected SO₂ and BrO colocated with volcanic ash particles that increased the aerosol optical depth. Over the Norwegian Sea, the optical particle counter detected a strong increase of particles larger than 400 nm in a region where ash clouds were predicted by the London VAAC and the Norwegian Institute for Air Research (NILU) FLEXPART model. Aerosol samples collected over the Irish Sea and the Norwegian Sea showed large relative enhancements of the elements silicon, iron, titanium and calcium. Non-methane hydrocarbon concentrations in whole air samples collected on 16 May and 19 May 2010 showed the removal of several hydrocarbons due to chlorine chemistry in the plumes. First comparisons of measured ash concentrations and improved FLEXPART dispersion model simulations demonstrate the large variability of the volcano plume and the thin layering of the ash clouds.