German Aerospace Center
DLR

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DLR's research aircraft 'Falcon 20E' completes measurement flight successfully

19 April 2010

+++ Update: 20 April 2010, 21.00 CEST +++

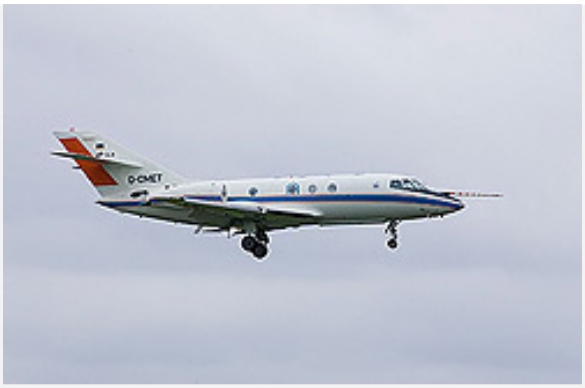
DLR's report regarding the measurement flight (PDF, 12 pages) is now available for download at the website of the German Federal Ministry of Transport.

+++ Update: 19 April 2010, 22:00 CEST (UTC+2) +++

The German Aerospace Center (DLR) completed a successful measurement flight of the volcanic ash cloud over Germany on 19 April 2010. After a flight time lasting more than three hours, the Falcon 20E returned to its home base at 20:45 CEST. The route for this measurement flight led from Oberpfaffenhofen to Leipzig, then over Hamburg and on to Bilthoven (the Netherlands) and returned via Stuttgart to Oberpfaffenhofen.

The flight left Oberpfaffenhofen in a northerly direction, heading for Leipzig. There, the Falcon descended to an altitude of about two kilometres and then climbed back to its cruising height. During the flight, further measurements were made at heights between two and twelve kilometres. All measurement systems on board functioned perfectly.

The lidar (Light Detection and Ranging) instrument showed ash cloud structures in vertical layers. These layers were at very different heights along the air route. The aerosol measurements suggest that the volcanic ash clouds that blew in had already aged. At times during the flight a brown-coloured cloud could be seen. These measurements allow for comparison with ground-based measurements performed in Germany by several bodies.



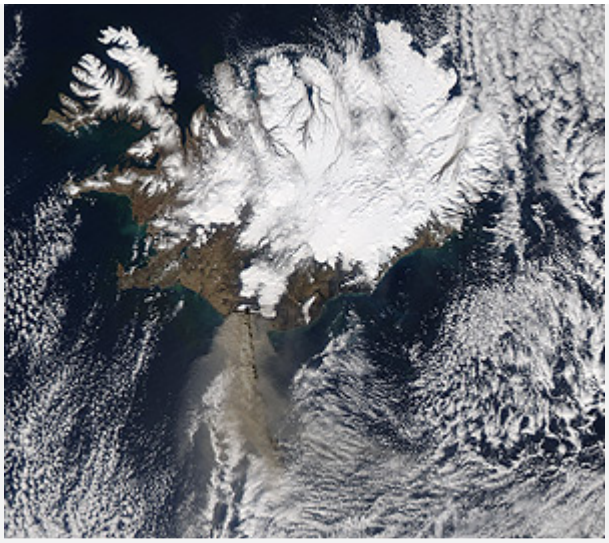
DLR research aircraft 'Falcon 20E' on its measurement flight in German airspace

What will be the impact of the Eyjafjallajökull volcano's ash cloud in the atmosphere over Europe? Scientists from the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) are addressing this question: aboard DLR's 'Dassault Falcon 20E', a crew of six set out at 16:00 CEST on Monday, 19 April 2010 on a research flight lasting several hours.

DLR scientists Dr Bernadette Weinzierl, Dr Oliver Reitebuch and Monika Scheibe, with DLR pilots Steffen Gemsa and Roland Welser and flight engineer Alexander Wolf will take the 'Falcon 20E' research aircraft from DLR's research airport at Oberpfaffenhofen on a flight over Leipzig, Hamburg and the Dutch

border, then along the southern border to Frankfurt and Stuttgart. "We want to examine the volcanic cloud's height, coverage and composition, and to measure the particle size and concentration of volcanic ash which formed from the lava cloud of the volcano Eyjafjallajökull at different flight altitudes," said Prof. Dr Ulrich Schumann, Director of the DLR Institute of Atmospheric Physics (Institut für Physik der Atmosphäre; IPA), summarising the goals of the measurement flight.

"Such a flight is anything but routine"



Eruption of the Icelandic volcano Eyjafjallajökull on 17 April 2010

"We prepared the instruments over the weekend for this unusual research flight," reported DLR scientist Schumann. The German Federal Ministry of Transport (Bundesverkehrsministerium) and the German Weather Service (Deutsche Wetterdienst; DWD) support the deployment and want to commission more such flights. The DWD and the Volcanic Ash Advisory Centre in London use DLR data in order to measure the exact distribution of the volcanic ash. The German Federal Office of Civil Aviation (Luftfahrt-Bundesamt) approved the aircraft with its instruments to carry out its research flight on Monday morning, and German air traffic control helped plan and execute the flight.

"Such a measurement flight is anything but routine, so we hope that it succeeds in acquiring reliable data for an extensive evaluation of the situation," said Prof. Dr Johann Dietrich Wörner, Chairman of the DLR Board. DLR has a large fleet of specialised research aircraft. "As the name implies, these aircraft can be equipped for specific tasks. For the investigation of the atmospheric volcanic ash, suitable instruments are installed on the aircraft, just as they are for ice surveys over Spitzbergen," he explained.

Laser impulses from 10,000 meters above

The scientific instruments on the Falcon are installed in the cabin and underneath the wings. The measurements take place via air inlets and optical windows in the roof and floor of the aircraft. The lidar (Light Detection and Ranging) instrument is also installed there. "The lidar is a remote sensing instrument, which transmits laser impulses from an altitude of 10,000 metres and receives the backscatter signal from the atmosphere. From this, for instance, the concentration profiles of aerosol particles can be derived," explain DLR atmosphere researcher Ulrich Schumann.

The crew of the Falcon 20E

Similar to satellites, which can give information regarding the horizontal distribution of the ash cloud, the lidar data make it possible to study the vertical structure of the ash cloud as well. The measured signal provides information on the number and size of the ash particles. With a second instrument, the size and number as well as optical characteristics of aerosols, and hence the dust particles in the ash cloud, can be measured. The DLR scientists also use a combination of several physical detection methods on board the Falcon. The aerosol measurement principle is based on the intake of air by the aircraft, so the Falcon must actually fly within the volcanic cloud for a short time.

The DLR 'Falcon 20E' has been in use since 1976 and is one of the most important platforms for German and European aircraft-based atmosphere research. A flying laboratory for environment and climate research, it flies higher than most commercial airliners and is robust and agile; it is permitted to fly close to thunderstorms or just 30 metres behind the engines of an airliner. The service ceiling of the Falcon is sufficient to reach the middle layers of the lower stratosphere – an area that has been the focus of research recently, due to the depletion of ozone.

Related Contacts

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