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The geodetic-geophysical flight mission GEOHALO to acquire measurements of the gravity and magnetic fields, of GNSS remote sensing and of laser altimetry over the Mediterranean

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The new German research aircraft HALO was equiped with an ensemble of geodetic-geophysical instrumentation to carry out geoscientific research in the tectonically active region of the Mediterranean and to demonstrate the feasibility and performance of this instrumentation. This so-called GEOHALO flight mission could finally be realized in the time period from June 2 to 12, 2012.

The mission flights took place taking off and landing at the special airfield Oberpfaffenhofen (near Munich, Germany), close to the premises of the German Aerospace Center (DLR). The flights were conducted over Italy and the adjacent seas, comprising seven parallel profiles directing from north-west to south-east, in a height of about 3,500 m, with a length of about 1,000 km each and a line spacing of about 40 km. These long profiles were complemented by four crossing profiles and a profile at an altitude of approx. 10 km along the same track as the center long profile.

We will give an overview on the challenges to integrate the scientific instrumentation aboard the aircraft, which comprised two airborne spring-type gravity meters, scalar and vector magnetometers, GNSS zenith, sideward and nadir antennas, and a laser altimeter. We discuss the performance of this instrumentation and present preliminary results to accomplish measurements of the gravity and magnetic fields, of GNSS reflectometry, scatterometry and occultation, and of laser altimeter distances over the ocean. The gathered data shall finally be used to investigate the lithospheric structure in the working area, which is characterized by a puzzle of tectonic microplates, yielding to an increased georisk of earthquakes and volcanism.

Altogether, GEOHALO is the first geoscientific mission utilizing HALO. Its success was possible only by the joint efforts of the group of German, Swiss and Spanish universities and research institutions, Italian authorities and institutions as well as by the financial and logistic support of the German Research Foundation, the Helmholtz Association of German Research Centers, the German Aerospace Center and further national and international partners.