Geophysical Research Abstracts
Vol. 15, EGU2013-9795, 2013
EGU General Assembly 2013

ESA airborne campaigns in support of Earth Explorers

Tania Casal (1), Malcolm Davidson (1), Dirk Schuettemeyer (1), Andrea Perrera (1), and Remo Bianchi (2)
(1) ESA/ESTEC, Noordwijk, Netherlands (tania.casal@esa.int), (2) ESA/ESRIN, Frascati, Italy

In the framework of its Earth Observation Programmes the European Space Agency (ESA) carries out ground based and airborne campaigns to support geophysical algorithm development, calibration/validation, simulation of future spaceborne earth observation missions, and applications development related to land, oceans and atmosphere.

ESA has been conducting airborne and ground measurements campaigns since 1981 by deploying a broad range of active and passive instrumentation in both the optical and microwave regions of the electromagnetic spectrum such as lidars, limb/nadir sounding interferometers/spectrometers, high-resolution spectral imagers, advanced synthetic aperture radars, altimeters and radiometers. These campaigns take place inside and outside Europe in collaboration with national research organisations in the ESA member states as well as with international organisations harmonising European campaign activities. ESA campaigns address all phases of a spaceborne missions, from the very beginning of the design phase during which exploratory or proof-of-concept campaigns are carried out to the post-launch exploitation phase for calibration and validation. We present four recent campaigns illustrating the objectives and implementation of such campaigns.

Wavemill Proof Of Concept, an exploratory campaign to demonstrate feasibility of a future Earth Explorer (EE) mission, took place in October 2011 in the Liverpool Bay area in the UK. The main objectives, successfully achieved, were to test Astrium UKs new airborne X-band SAR instrument capability to obtain high resolution ocean current and topology retrievals. Results showed that new airborne instrument is able to retrieve ocean currents to an accuracy of $\pm$ 10 cms-1.

The IceSAR2012 campaign was set up to support of ESA's EE Candidate 7,BIOMASS. Its main objective was to document P-band radiometric signatures over ice-sheets, by upgrading ESA's airborne POLARIS P-band radar ice sounder with SAR capability. Campaign comprised three airborne campaigns in Greenland from April to June 2012 separated by roughly one month and preliminary results showed the instrument capability to detect ice motion.

CryoVEx 2012 was a large collaborative effort to help ensure the accuracy of ESA's ice mission CryoSat. The aim of this large-scale Arctic campaign was to record sea-ice thickness and conditions of the ice exactly below the CryoSat-2 path. A range of sensors installed on different aircraft included simple cameras to get a visual record of the sea ice, laser scanners to clearly map the height of the ice, an ice-thickness sensor (EM-Bird), ESA's radar altimeter (ASIRAS) and NASA's snow and Ku-band radars, which mimic CryoSat's measurements but at a higher resolution. Preliminary results reveal the ability to detect centimetre differences between sea-ice and thin ice/water which in turn allow for the estimation of actual sea ice thickness.

In support of two currently operating EE Missions: SMOS (Soil Moisture and Ocean Salinity) and GOCE (Gravity field and steady-state Ocean Circulation Explorer), DOMECair airborne campaign will take place in Antarctica, in the Dome C region during the middle of January 2013. The two main objectives are to quantify and document the spatial variability in the DOME C area, important to establish long-term cross-calibrated multi-mission L-band measurement time-series (SMOS) and fill in the gap in the high-quality gravity anomaly maps in Antarctica since airborne gravity measurements are sparse (GOCE). Key airborne instruments in the campaign are EMIRAD-2 L-band radiometer, designed and operated by DTU and a gravimeter from AWI.

ESA campaigns have been fundamental and an essential part in the preparation of new Earth Observation missions, as well as in the independent validation of their measurements and quantification of error sources.

For the different activities a rich variety of datasets has been recorded, are archived and users can access

campaign data through the EOPI web portal [http://eopi.esa.int].