ESA CryoVEx 2012: Airborne field campaign with ASIRAS radar, EM induction sounder and laser scanner

This report describes the airborne part of the Arctic CryoSat Validation Experiment (CryoVEx) 2012, which took place in the period March 25 – May 5, 2012, and includes: 1) Data collected with the ESA airborne Ku-band interferometric radar (ASIRAS), coincident airborne laser scanner (ALS) and vertical photography to acquire data over sea- and land ice along CryoSat-2 ground tracks. The airborne campaign was coordinated by DTU Space using the Norlandair Twin Otter (TF-POF). 2) Sea ice thickness data obtained with an airborne electromagnetic (AEM) induction sounder conducted by Alfred Wegener Institute (AWI) with fixed-wing airplane (Polar-5, Basler BT-67). The airborne systems are described in detail, together with campaign implementation plan, data processing and data quality analysis. The CryoVEx 2012 campaign was a success and the processed data is of high quality. The data set includes 16 CryoSat underflights covering distances from 81-523 km. Of these, eight tracks were measured over sea ice north of CFS Alert, north of Station Nord and north of Svalbard to acquire data in areas representing different sea ice types and settings. Parts of the flights north of CFS Alert were coordinated with NASA Operation IceBridge P-3 carrying a variety of instruments for sea ice and snow retrieval. In addition, a special effort was made to acquire data in the “Wingham Box” off Canada, where CryoSat-2 is switched from SAR mode typically used over sea ice to SARIn mode. Land ice measurements were acquired over the Greenland ice sheet (the EGIG line and selected CryoSat-2 ground tracks), together with Austfonna and Devon ice caps. At Austfonna and Devon ice caps ground teams measured ice and snow properties, and raised corner reflectors acting as a surface reference point to estimate the penetration depth of the ASIRAS radar. Unlike previous CryoVEx campaigns no ground teams were located on the Greenland ice sheet, but airborne measurements are still important to monitor changes in the ice sheet mass balance.