



## **The Cryosat land ice validation experiment CryoVex 2004 – ASIRAS vs. laser altimeter measurements**

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The purpose of the CryoSat altimeter mission was to determine trends in the ice masses of the Earth over a period of  $\sim 3$  years. Although the launch failed in October 2005 the scientific objectives of the CryoVex validation experiments are still of undiminished importance. CryoVex activities included both ground-based and airborne campaigns. We will present the airborne data processing and validation results.

The primary goal of CryoVex2004 was to provide coincident laser and interferometric radar measurements, in order to understand the penetration of CryoSat radar signal into polar sea ice and continental ice caps and to quantify uncertainty in the CryoSat measurements.

For redundant calibration purposes the German airplane Polar 4 is equipped with a laser scanner, the ASIRAS instrument (Airborne SAR Interferometric Radar Altimeter System), a single-beam laser and two DGPS receivers.

During CryoVex 2004 two campaigns took place. Flights were performed in Svalbard across Austfonna, on the Greenland Ice Sheet along the EGIG line and on Devon ice cap (Canadian Arctic). For calibrating the system runway overflights and corner reflector cross flights were performed. We will demonstrate the extensive calibration processing flow and focus at squint angle and timeshift problems between the instruments.

By comparing DEM's determined from the laser scanner measurements and ASIRAS surface elevation data varying radar penetration, depending on snowpack properties, is observed. The results are interpreted as attenuation and scattering processes of the radar wave within the upper snowpack and can therefore be used for classifying snow

regimes.

Radar waveform plots show penetration of up to 8 m into the snow pack and single reflectors can be identified.