

SVALEX and ICESAR

During the field campaign "SVALEX" (Svalbard Experiment), which took place in April 2005, meteorological data and radar images were acquired over sea ice around Svalbard (see Fig. 1). The campaign was a collaboration between the AWI and DLR (German Aerospace Center). The measurements were carried out using two airplanes. The AWI-aircraft POLAR-2 was equipped with the "Meteopod" sonde, a radiation thermometer, and a laser altimeter for measuring atmospheric turbulence, ice surface temperature, and ice surface roughness. Optical images of the ice conditions were obtained with a scanner system. The airplane from DLR carried the "Experimental Synthetic Aperture Radar" (ESAR) which was operated at long (L-band, 1.3 GHz) and short (X-Band, 9.6 GHz) wavelengths (see Fig. 2), in parallel to the airborne meteorological measurements. The data are at present used to investigate a number of different items:

- The atmospheric drag coefficient over sea ice is evaluated from the turbulence measurements.
- The ice condition and surface roughness is quantified using the laser profiles and the L-band radar and optical scanner images.
- Models for calculating the drag coefficient as a function of ice conditions and roughness are checked and improved.

Two years later, in March 2007, a second campaign named ICESAR (Synthetic Aperture Radar for Ice) was carried out around Svalbard. ICESAR was partly funded by the European Space Agency (ESA) and was again a joint measurement program of AWI and DLR. The objectives of ICESAR were the same as for SVALEX, extended by two further items:

- The ICESAR data were employed to assess the quality of sea ice maps that are based on image products of ESA's Sentinel-1 satellite radar mission (to be launched in 2011).
- Pros and cons of different radar frequencies, polarisations, and other radar parameters such as spatial resolution were assessed.

Airborne radar images were acquired at L-band and C-band (5.3 GHz). In addition, satellite radar images were ordered from Envisat ASAR (C-band) and ALOS PALSAR (L-band). The Sentinel-1 mission is designed for continuation of operational C-band SAR monitoring. The results of the remote sensing work are published in an ESA report (Dierking, W., "Technical assistance for the deployment of airborne SAR and geophysical measurements during the ICESAR 2007", Final Report - Part 2: Sea Ice, ESA-ESTEC Contract No. 20655/07/NL/CB, 80 pp., 2008). A comparison of airborne C-band and optical scanner imagery is shown in Fig. 3, and of airborne and satellite radar imagery in Fig. 4.

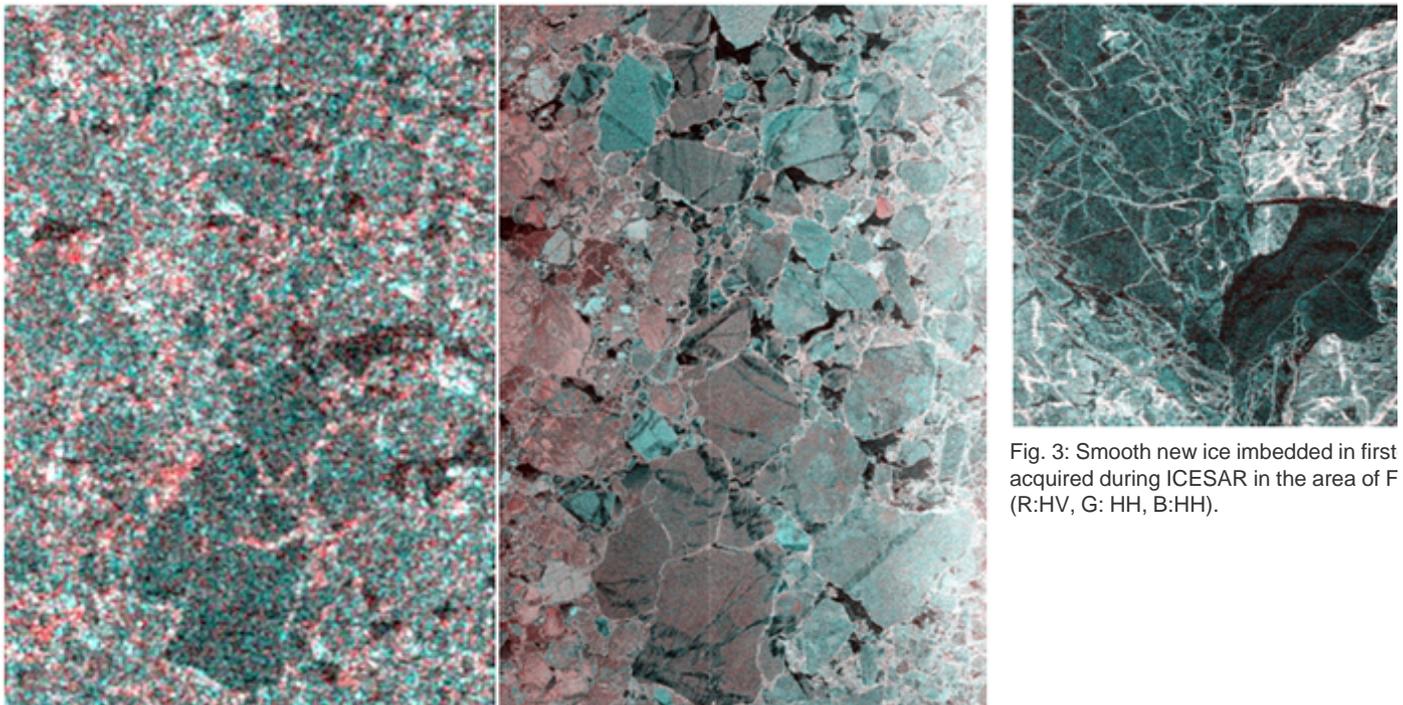


Fig. 3: Smooth new ice imbedded in first acquired during ICESAR in the area of F (R:HV, G: HH, B:HH).

