The accuracy of satellite radar altimeter data over the Greenland ice sheet determined from airborne laser data

The 336 days of the geodetic phase of ERS-1 provides dense coverage, by satellite radar altimetry, of the whole of the Greenland ice sheet. These data have been used to produce a digital elevation model of the ice sheet. The errors present in the altimeter data were investigated via a comparison with airborne laser altimeter data and an absolute accuracy typically in the range 2-10 cm +/- 10 cm. Comparison of differences between the radar and laser derived elevations, showed a correlation with surface slope. The difference between the two data sets ranged from 84 cm +/- 79 cm for slopes below 0.1 degrees, to 10.3 m +/- 8.4 m for a slope of 0.7 degrees (the half power beam-width of the ERS-1 radar altimeter). An explanation for the behaviour of the difference as a function of surface slope is given in terms of the pattern of surface roughness on the ice sheet.

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