Abstract

Digital elevation models of glaciated terrain produced by the NASA/Jet Propulsion Laboratory (JPL) airborne interferometric synthetic-aperture radar (InSAR) instrument in Greenland and Alaska at the C- (5.6 cm wavelength) and L-band (24-cm) frequencies were compared with surface elevation measured from airborne laser altimetry to estimate the phase center of the interferometric depth, or penetration depth, δ_p. On cold polar firn at Greenland summit, $\delta_p = 9\pm2$m at C- and 14 ± 4m at L-band. On the exposed ice surface of Jakobshavn Isbrae, west Greenland, $\delta_p = 1\pm2$ m at C- and 3 ± 3 m at L-band except on smooth, marginal ice where $\delta_p = 15\pm5$ m. On colder marginal ice of northeast Greenland, δ_p reaches 60 to 120 m at L-band. On the temperate ice of Brady Glacier, Alaska, δ_p is 4 ± 2 m at C- and 12 ± 6 m at L-band, with little dependence on snow/ice conditions. The implications of the results on the scientific use of InSAR data over snow/ice terrain are discussed.

E. Rignot, K. Echelmeyer, and W.B. Krabill, "Penetration depth of interferometric synthetic-aperture radar signals in snow and ice," *Geophys. Res. Lett.*, 28(18), 3501-3504.