



## **L-band InSAR Penetration Depth Experiment, North Slope Alaska**

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Since the first spacecraft-based synthetic aperture radar (SAR) mission NASA's SEASAT in 1978 radars have been flown in Low Earth Orbit (LEO) by other national space agencies including the Canadian Space Agency, European Space Agency, India Space Research Organization and the Japanese Aerospace Exploration Agency. Improvements in electronics, miniaturization and production have allowed for the deployment of SAR systems on aircraft for usage in agriculture, hazards assessment, land-use management and planning, meteorology, oceanography and surveillance. LEO SAR systems still provide a range of needful and timely information on large and small-scale weather conditions like those found across the Arctic where ground-base weather radars currently provide limited coverage. For investigators of solid-earth deformation attention must be given to the atmosphere on Interferometric SAR (InSAR) by aircraft and spacecraft multi-pass operations. Because radar has the capability to penetrate earth materials at frequencies from the P- to X-band attention must be given to the frequency dependent penetration depth and volume scattering. This is the focus of our new research project: to test the penetration depth of L-band SAR/InSAR by aircraft and spacecraft systems at a test site in Arctic Alaska using multi-frequency analysis and progressive burial of radar mesh-reflectors at measured depths below tundra while monitoring environmental conditions. Knowledge of the L-band penetration depth on lowland Arctic tundra is necessary to constrain analysis of carbon mass balance and hazardous conditions arising from permafrost degradation and thaw, surface heave and subsidence and thermokarst formation at local and regional scales.