

Radar Measurements and Results from the WAIS Core Site

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We developed an ultra wideband very high-frequency (VHF) radar (120-300 MHz) for simultaneously measuring ice thickness, mapping internal layers at depth and imaging the ice-bed interface, and an ultra high-frequency (UHF) ultra-wideband radar (500-2000 MHz) for fine-resolution mapping of near-surface internal layers. We operated the VHF radar at the center frequency of 150 MHz with a bandwidth of 20 MHz in conjunction with the UHF radar to collect data to a 30-km by 10-km region that overlapped the West Antarctic Ice Sheet (WAIS) Divide drill site and the WAIS ice divide. We reduced the system bandwidth to obtain the high sensitivity required to overcome much large attenuation loss than anticipated. The results show ice thickness varying from about 3100 m to about 3500 m. Also, the strength of the bottom echo is seen to fluctuate by more than 30 dB along the traverse. The strong specular returns are from wet and smooth areas, and weak returns are from rough areas with ice frozen to the bed. We mapped internal layers to a depth of about 3000 m with the VHF radar. To the best of our knowledge this is first ever mapping of layers deeper than about 2500 m.

We will provide a brief overview of the radars and show sample results from the WAIS core site.