Bistatic radar case studies from Antarctica and Greenland

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Englacial absorption of radar waves varies as a function of ice temperature and impurity content. Direct measurements of these properties are costly and time consuming, making geophysical methods for determining characteristics of the ice increasingly attractive. We examine a set of 5 common-midpoint (CMP) surveys to determine the local attenuation profiles for Kamb Ice Stream, the Whillans Ice Plain, the Whillans Grounding Zone, and the Northeast Greenland Ice Stream (NEGIS). These surveys were conducted between 2004 and 2012, using a 3 MHz radar system with dipole antennae. The results of the CMP analyses are then compared against attenuation rates estimated using a common offset profile, and once validated, we explore the possibility of using attenuation rates to infer ice properties. A borehole derived thermal profile is used to calibrate our analysis at the Whillans Ice Plain field site. If this method proves successful, it will provide a fast, low-cost means of gathering information about the thermal and chemical structure of the ice. Precise attenuation measurements are also crucial to the interpretation of reflection amplitudes in common-offset radar surveys; however, independent measures of attenuation are rarely used to correct these data. Our work suggests a way to determine those attenuation rates, thus improving our ability to make inferences about basal and internal properties from the large scale, common-offset surveys collected in Antarctica and Greenland.

Changes in WAIS from observations (*The Times They are a-Changin')*