

Measurements of basal change properties from repeat radar measurements

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Processes at the base of glaciers and ice sheets are important for controlling their flow speed and direction, as well as for affecting changes in those properties over time. Some of these properties are relatively stable over time and space, and some can change rapidly. For example, ice shelf basal melt is on the order of meters per year; sediment erosion and deposition varies from nil to meters per year.

Techniques for measuring these properties are many and varied. Here I report on radar methods, with emphasis on phase-sensitive high-resolution measurements of the bed. We made radar measurements over multiple sites on Whillans Ice Stream, Kamb Ice Stream, and the Ross Ice Shelf to compare and contrast bed conditions. These measurements were repeated after a two- and four-week interval to monitor change. The radar system used was a broad band multichannel array system optimized for high spatial resolution. Bed reflection phase is compared to internal-horizon phase to estimate change in bed properties. Work was conducted (and repeated) along long traverse lines allowing for measuring spatial and temporal variations in changes in bed conditions.