

Automatic Near Surface Estimation from Radar Imagery

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The Center for Remote Sensing of Ice Sheets has developed radars for NASA's Operation Ice Bridge field campaigns in order to map near-surface internal layers for estimating the accumulation rate. In snow and ice, internal layers are created by changes in the ambient conditions at the time of deposition, and represent contrasts in density, electrical conductivity, and ice crystal orientation. By identifying and tracing internal layers in radar images of the Antarctic snow cover, these layers can be used to measure snow accumulation over time. Scientists have manually traced layers in large data volumes, and it requires time-consuming sparse hand-selection and interpolating between the selections to save time. An automated algorithm will allow for studying more images and developing models to reconstruct and forecast ice sheet dynamics.

We have developed an approach for automatically estimating near surface layers in snow radar echograms using a computer vision technique, specifically active contours. Our approach involves the identification and selection of internal layers. Results are evaluated and presented using the metrics of time requirements and accuracy.