

Sea Ice Age, Thickness and Deformation from Synthetic Aperture Radar Imagery

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The RADARSAT synthetic aperture radar is currently providing large scale coverage of the Arctic sea ice cover on a 3-day basis with its wide-swath ScanSAR mode. We are processing these data sets into geophysical fields of ice deformation, ice thickness and ice age. The direct observations we extract from the sequential SAR imagery are Lagrangian ice motion of points on the ice cover and records of the backscatter histograms within areas enclosed by polygons defined by these points (cells). The vertices of these cells are tracked from fall freeze-up to the onset of melt in the spring. In the winter, we interpret a local increase in cell area as the addition of open water or thin ice; ridging or rafting decreases the cell area. The age of the new areas in each cell are kept as entries in an ice age histogram. Ice thickness is estimated using ice age and the cumulative freezing-degree days experienced by the thin ice in each cell. We use the backscatter record to estimate the dates of melt onset in the spring and freeze up in the fall. Open water fraction is estimated in the summer.

We have produced the ice deformation, thickness and age observations from two months of 3-day maps of the Arctic Ocean from early November through mid January. Here, we describe this dataset and their use for studies of the sea ice cover. These data products and a description of their format are available at a website at the Jet Propulsion Laboratory (<http://www-radar.jpl.nasa.gov/rgps>).

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