



Interferometry of the Rutford Ice Stream

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The Rutford Ice Stream, West Antarctica, has been examined using interferometry, a technique which uses the phase difference between successive Synthetic Aperture Radar (SAR) satellite images to show displacement and topography. Interferograms produced for 1992, 1994 and 1996 show a central pinning point corresponding to a subglacial topographic high in the BEDMAP dataset, and areas between the pinning point and the shear margins with a high fringe rate extending some 20 km upstream.

Differential interferometry using multiple SAR scenes of the same frame allows separation of topography and displacement in the line-of-sight direction of the satellite and shows that these features have associated changes in topography, indicating vertical motion of the ice stream. The most likely explanation for this is the seven metre tidal range at the grounding line identified from gravimeter and tiltmeter data, significantly greater than the 1-2 metres usual for West Antarctica.

A tidal model was used to calculate the difference in tidal height and phase between image acquisition time of each interferometric pair. Increasing changes in tidal height correspond to a higher fringe rate either side of the pinning point, although the length of the affected area does not change. However, the interferogram with the least change in tidal height between scenes lacked evidence of this vertical motion entirely. The Rutford Ice Stream would therefore appear to have a grounding zone tens of kilometres wide either side of a fixed pinning point, rather than a static and clearly defined grounding line.