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Interferometric SAR Studies of Rapid and Variable Ice Motion

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Ncw techniques for measuring ice flow velocity are proving to be of fundamental importance to improved understanding fast glacial flow. Over the last four years satellite radar interferometry (SRI) has emerged as a remarkable new technique for glaciological remote sensing. With this technique it is possible to make wide-area, high-resolution (i.e., 40-80 m) measurements of both ice flow velocity and surface topography.

SRI techniques allow uniformly sampled measurements of velocity and topography to be made over even the most featureless parts of outlet glaciers and their drainages. This capability is particularly useful for studying ice motion in the relatively crevasse-free regions at the transition to fast flow. We are using ERS imagery to study the ice flow in the northeast Greenland ice stream with little surface control required.

The ability to take frequent "snapshots" of the velocity field make SRI an exceptional tool for the study of seasonal or episodic variations in flow speed. With its extreme sensitivity to vertical displacement, interferometric techniques can also be used to locate grounding-line positions to within a few dozen meters.

All SRI glaciological observations to date have been made using the ERS- 1 /2 synthetic apert ure radars. While interferometric observations have been made at many sites in Greenland and Antarctica, only a minute percentage of the existing glaciologicaly relevant data have been processed. Existing coverage includes nearly all of Greenland and much of Antarctica above 79" S. Future SAR missions promise even larger and more significant data sets. With this wealth of new data comes the challenge of devising new methodologies for moving from the study of sparsely sampled point measurements to the analysis of densely sampled fields.

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10.1 (by Session Chair Ted Scambos)

11. None,