Submission for Antarctic and Global Change Symposium

Symposium topic: Ice Sheet Mass Balance

Observations of West Antarctica Using Satellite Radar Interferometry

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European Remote Sensing Satellite tandem SAR data were acquired over West Antarctica during the latter part of 1995 and early 1996. The data, received at the US McMurdo Ground Station, were collected with a one day repeat between ERS-1 and ERS-2 observations. The short repeat time enables us to correlate the SAR data and create radar interferograms at these locations. The fringes on the interferograms are expressions of ice motion and topography.

The tandem interferometric observation we present is a strip, approximately 1500 km in length, which stretches from the Martin Peninsular and Getz Ice Shelf to the Ross Ice Shelf just west of Roosevelt Island. Interesting features along the strip include several ice streams on the Bakutis Coast flowing into the Getz Ice Shelf. One such ice stream is approximately 40 km in width with a velocity of approximately 150-200 m/a just north of its onset region. The center of the strip is dominated by the volcanoes on the Executive Committee Range. Further west, the motion fringes reflect the onset region of the ice streams flowing into the Siple Coast. Interferograms of the northeastern Ross Ice Shelf are centered over the Bay of Whales, where floating ice shearing around the margins of Roosevelt Island reconverges. Fringe patterns on Roosevelt island are dominated by local topography (500 m relief) and slow, diverging flow away from islands central, north south ridge. Fringes formed immediately around the base of the island are more complicated than those on the island or on the adjacent ice shelf. Apparently, topography associated with numerous small ice rises results in a series of closed fringe patterns embedded within a more constant phase field. Fringe patterns east of Roosevelt Island are explained by the flow of ice through the channel bounded by the Shirase Coast (400-500 m/year). The situation is more complicated westof Roosevelt Island. There, large rifts extend away from the Bay of Whales and slice through the ice shelf. Fringes. which largely represent isolines of one component of the ice flow vector change direction and fringe rate across the rifts. We speculate that the rotation of fringe lines of the ice block northwest of Roosevelt Island is due to the near decoupling of the block from the main ice flow and the greater influence of tidal flexture on the soon-to-be iceberg. Fringe rates are high in localized areas within the rift zones. We speculate that thin ice formed within the rifts is weakly coupled to the original ice only at the end points. Tides cause the thin ice to bend or flex like a canti-levered beam.