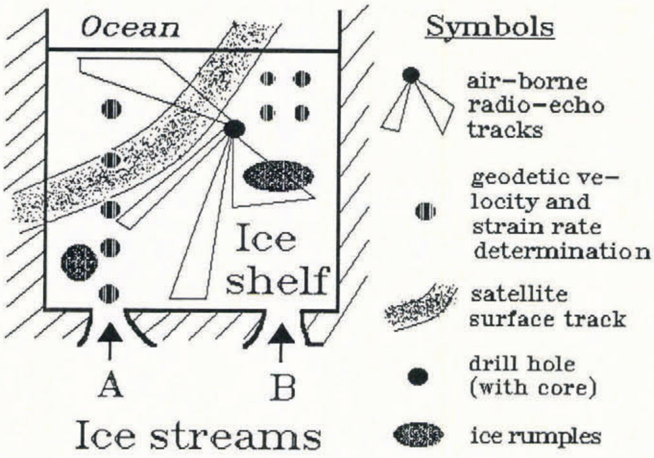

the basis of their ability to predict: (i) the long-term growth or decay of the ice shelf, (ii) the "current" state of mass balance, (iii) the "current" partitioning of ice-stream input, and (iv) the balance of forces acting on the grounding line, and the tendency of the balance to change with time.

A major aim of our study will be to point out how seriously the understanding of current ice-shelf dynamics and the ability to measure initial effects of global climatic changes (due to CO^2 warming) are hampered by: (i) inability to map accurately all the regions of ice-shelf grounding, and (ii) inability to distinguish the effects of short-term variability from long-term, large-scale trends. To simulate the effects of ice-shelf grounding and ice-stream-temporal fluctuations, we specify in our idealized simulations that: (i) several ice rumples occasionally appear or disappear, and (ii) ice-stream fluxes, which feed the imaginary ice shelf, fluctuate (arbitrarily) with periods of 300 years.

Since we assess the *Gedankenexperimente* in terms of their ability to detect long-term climatic trends, we run the ideal ice-shelf simulation forward in time until a statistically steady state is achieved (that is, all thickness and velocity patterns are stationary when averaged over the time-scale of fluctuation). At this point, we conduct the imaginary field programs in our study. Our main intention is to determine which *Gedankenexperiment* can best "see through" the short-term transient "noise" of the ideal ice-shelf evolution to detect the long-term condition of steady state.

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CRARY ICE RISE, ANTARCTICA: FORMED IN RESPONSE TO A SURGING ICE STREAM?

(Abstract)

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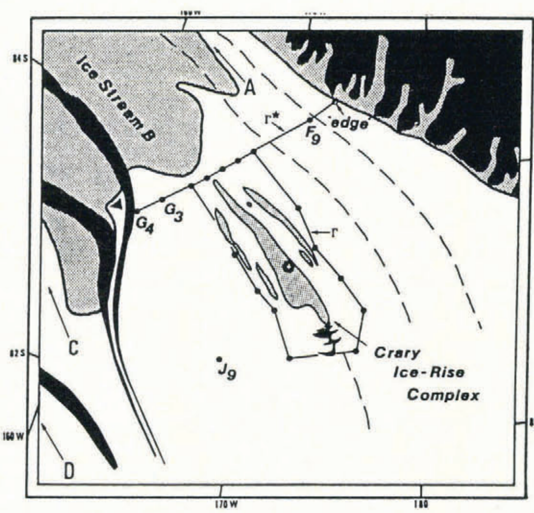
ABSTRACT

Field data is presented to support the hypothesis that Crary Ice Rise (on Ross Ice Shelf, Fig. 1) has substantially increased in area over the last 500 years, in response to ice advection through the mouth of Ice Stream B. The up-stream end of the ice rise is now surrounded by ice shelf that is currently thickening at 0.44 ± 0.06 m/year (under an assumed zero basal melting rate). This rate of thickening suggests that the ice rise's contribution to back-stress resistance of Ice Stream B's flow, presently calculated to be 50% of the total back stress, is growing in the course of time. We speculate that this current development of the ice rise is the precursor to the possible future stagnation of Ice Stream B. It is convenient to conceptualize a possible see-saw oscillation between ice-stream surging and ice-rise build-up.



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