ABSTRACTS OF PAPERS ON RECENT WORK PRESENTED
AT THE SYMPOSIUM

FABRIC IN ICE SHEETS: DEVELOPMENT AND PREDICTION
(Abstract)

by

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C-axis fabrics in ice sheets provide a record of
deformational history and control the rate of current
deformation. Fabrics are developed by grain rotation at low
strain-rates and temperatures, and by recrystallization at
higher strain-rates and temperatures. In ice sheets
categorized by longitudinal extension and vertical
compression, basal shear, parallel flow, and divergent flow
cause c-axes to rotate toward the vertical axis; rotation is
faster parallel to flow than transverse to flow in basal shear
and parallel flow, but it is independent of azimuth in
divergent flow. Convergent flow causes c-axes to rotate
toward a vertical plane transverse to flow. Cumulative
strain, ice hardness, and stress state can be estimated from
measured fabric patterns. Alternatively, fabric patterns can
be predicted from observed surface strain-rates. Such
predictions are confirmed by fabrics determined seismically
on Ice Stream B, Antarctica, as well as by comparison with
directly measured fabrics from other sites.

A paper reporting much of this work has been

REFERENCE

Alley, R.B. 1988. Fabrics in polar ice sheets: development
and prediction. Science, 240(4851), 493-495.

THE SEDIMENTARY SIGNATURE OF DEFORMING GLACIER BEDS
IN THE ROSS EMBAYMENT, ANTARCTICA
(Abstract)

by


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Interpretation of seismic and glaciological data from the
UpB camp on Ice Stream B, West Antarctica, suggests that
the ice stream moves largely by deformation occurring
within a meters thick, subglacial till layer resting
unconformably on older sediments. The hypothesis that the
bed of Ice Stream B has been deforming at least since the
post-Wisconsinan sea-level rise implies that a "till delta"
probably tens of meters thick and tens of kilometers long
has been deposited at the grounding line; recent geophysical
measurements (Shabtaie and Bentley, 1987; Blankenship and
others, 1989) have provided evidence for the existence of
this feature.

Significant sea-level fall would cause increased coupling
between ice and till over the head of this delta, leading to
erosion there, deposition at the grounding line, and
conveyor-belt advance of the delta. The bathymetry of the
Ross Sea suggests that this process would continue to the
edge of the continental shelf for likely glacial maximum
sea-level fall, leading to development of a low-profile,
till-lubricated ice sheet. Subsequent sea-level rise would
cause grounding-line retreat, leaving a meters thick, uniform
till resting unconformably on older sediments. The modern
Ross Sea is characterized by a regional angular uncon-
formity, the Ross Sea unconformity, overlain by a
meters thick, homogeneous diamicton that many investigators
consider to be a till of Plio-Pleistocene age (e.g., Anderson
and others, 1980), although both the age and depositional
environment are debated. We hypothesize that the Ross Sea
unconformity and overlying deposits record the extension of
the UpB deforming till to the edge of the continental shelf
during Wisconsinan (and earlier) sea-level low stands.

A paper reporting much of this work has been
accepted for publication in Marine Geology (Alley and
others, in press).