

Proc. NIPR Symp. Polar Meteorol. Glaciol., **11**, 249, 1997

PLASTIC DEFORMATION PROPERTIES OF GREENLAND
ICE CORE SAMPLES (ABSTRACT)

Hitoshi SHOJI¹, Hideki NARITA², Atsushi MIYAMOTO²,
Okitsugu WATANABE³, Henrik B. CLAUSEN⁴
and Josef KIPFSTUHL⁵

¹*Department of Civil Engineering, Kitami Institute of Technology,
165 Koen-cho, Kitami 090*

²*Institute of Low Temperature Science, Hokkaido University,
Kita-19, Nishi-8, Kita-ku, Sapporo 060*

³*National Institute of Polar Research, 9-10, Kaga 1-chome, Itabashi-ku, Tokyo 173*

⁴*Department of Geophysics, Niels Bohr Institute for Astronomy, Physics and
Geophysics, University of Copenhagen, Rockefeller Komplekset,
Juliane Maries Vej 30, DK-2100 Copenhagen Ø, Denmark*

⁵*Alfred-Wegener-Institut für Polar- und Meeresforschung,
Columbusstrasse, D-2850 Bremerhaven, Germany*

Mechanical property studies have been conducted on deep ice core samples to understand the flow dynamics of large polar ice sheets. Uniaxial compression tests were done both on the Dye 3 and GRIP ice core samples from Greenland. The stress axis is inclined 45 degree from core axis in order to have information on horizontal shear deformation behavior of an ice sheet. The results were analyzed by using an enhancement factor, E . C-axis orientation fabric is a dominant factor for E values and can be estimated from vertical compression strain (N. AZUMA and A. HIGASHI, 1985) if preferred orientation is developed by crystal rotation process without recrystallization. E values from Dye 3 and GRIP samples were plotted with normalized depth (=depth/ice thickness), which is a measure of vertical compression strain. Down to a depth around 60% of ice thickness, the E value stays constant around 1, and increases below that depth as expected from the single maximum fabric in deeper places. Below a depth around 70% of ice thickness, E exceeds about 10 and E of GRIP ice samples is higher than that of Dye 3 samples in general. This difference could be attributed to chemical impurity contents and/or ice stratigraphic features such as cloudy bands.

(Received January 20, 1997; Revised manuscript accepted January 27, 1997)