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ICE-CORING AT MIZUHO STATION, ANTARCTICA, AND CORE ANALYSES: A CONTRIBUTION FROM THE GLACIOLOGICAL RESEARCH PROGRAM IN EAST DRONNING MAUD LAND, ANTARCTICA

by

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ABSTRACT

Between May 1983 and July 1984 glaciological parties of the 24th and 25th Japanese Antarctic Research Expeditions (JARE-24 and 25) carried out ice-core drilling using a thermal drill, down to 700.5 m depth at Mizuho Station (70°41'53"S, 44°19'54"E), as a part of the Glaciological Research Program in east Dronning Maud Land, Antarctica.

The thermal drill, 3.9 m long and capable of taking a core 1.5 m long and 130 mm in diameter, is an improved version of a drill used by JARE-15 in 1975. The most important improvement was the monitoring system during drilling, for which a micro-computer was fitted in the drill. By using this system, such accidents as heater burn-out, tank overflow and failure of water suction would immediately be brought to our attention. The drilling speed was about 1.6 m/h, when the optimum output was 3.6 kW. The core recovery rate was above 99%.

The core quality was good down to a depth of 80 m. Between 80 and 120 m, cracks were found at intervals of 0.15–0.5 m, and horizontal cracks were found continuously at intervals of 0.01 m or less.

Immediately after the core was pulled, the stratigraphy was observed and bulk density was measured. A dust band, presumably volcanic particles, was seen at only 500.2 m depth during stratigraphic observation. The following analyses were carried out at Mizuho Station within a month of recovery:

(1) Density determination by the hydrostatic method.
(2) Measurement of total gas content.
(3) Thin-section analyses, including observation of cracking around air bubbles and the crystalline texture, and ice-fabric studies.

The 700.5 m core has been brought to Japan, and the following analyses are now under way:

(1) Oxygen-isotope ratio.
(2) Concentration of microparticles.
(3) Electric conductivity.
(4) Chemistry of soluble impurities.