

DYNAMICAL BEHAVIOUR OF THE ICE SHEET ON MIZUHO PLATEAU, EAST ANTARCTICA

(Abstract)

by

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The Japanese Antarctic Research Expedition (JARE) has continued glaciological work in the Mizuho Plateau, East Antarctica. We have already reported that the ice sheet in Mizuho Plateau, which flows into Shirase Glacier and is classified as a fast-moving outlet glacier was thinning at a rate of about 70 cm/year, and the profile of the basal shear stress along the central flow line was similar to that of surging glaciers.

A new 5 year glaciological programme in Mizuho Plateau and East Dronning Maud Land which started in 1981 is now being carried out, and we have obtained new results as follows:

(1) The ice sheet in the down-stream region where the ice elevation is lower than about 2400 m is thinning, based upon data for horizontal and vertical flow velocity, strain-rate, slope of the ice surface, accumulation rate, and densification of the snow.

(2) $\delta^{18}\text{O}$ analysis of deep ice cores obtained at Mizuho Station (elevation of 2240 m) and point G2 (elevation of 1730 m) shows that $\delta^{18}\text{O}$ increased about 2000 years ago at Mizuho Station and about 400 years ago at point G2. If we

can assume that the increase in $\delta^{18}\text{O}$ is caused by the ice-sheet thinning, this result means that the ice-sheet thinning propagates to an up-stream area.

(3) The result of radio echo-sounding on Mizuho Plateau suggests that the base of the ice sheet in the down-stream region is wet. Based upon three-dimensional numerical modelling, the calculated bottom temperature shows that the ice temperature at the base of the ice sheet in the glacier down-stream is higher than the melting point and that the ice base is also wet. These results support the result described in (1), since the basal sliding due to a wet base causes ice-sheet thinning as suggested by our previous studies.

Summarizing these results, a possible explanation of ice-sheet variation on Mizuho Plateau is as follows: the thinning of the ice sheet caused by the basal sliding due to melting of the ice base began at Shirase Glacier and has been expanding to an up-stream area to reach the present state. A simple calculation, using flow velocities, shows that the thinning began at Shirase Glacier about 1500–2000 years ago.