STRUCTURAL ANALYSES OF ICE OBTAINED FROM THE METEORITE ICE FIELD AROUND THE SØR RONDANE MOUNTAINS (ABSTRACT)

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Structural analyses of ice obtained from the bare ice surface around the Sør Rondane Mountains, where more than 2000 meteorites were collected, were carried out. Ice fabrics, cracks, and crystals in the samples were investigated to determine the strain accumulated in ice along their particle paths, and to determine the stress/strain configuration of the ice sheet around the mountains standing in the ice sheet.

In the area which is near the side wall of the mountains, single maximum fabric pattern was observed, and the axis of single maximum lay roughly perpendicular to the flow line. It is deduced from the observation results that the ice sheet is widely subjected to vertical shear strain there. Shear strain is caused due to shear stress between ice flow and side wall of the nunatak.

In Nansenisen which is up-stream from the mountains, it was found that observed fabric patterns could be classified into two types. One is single maximum pattern and the axis of single maximum lies in the longitudinal direction. The other is great circle girdle pattern, and the girdles are on the horizontal plane. Great circle girdle patterns were observed in the area where high concentration of moraines and meteorites was observed. Since only similar two types of fabric have ever been observed in other meteorite ice fields, each type is a principal fabric patterns in the meteorite ice field. This means there are two principal types of stress/strain configuration there. Configuration of accumulated strain in ice was deduced. The meaning of such strain related to the concentration mechanism of meteorites and moraines is discussed.

(Received January 31, 1990)

VARIATIONS OF OXYGEN ISOTOPIC COMPOSITION AND DISTRIBUTION OF CONTINENTAL ICE IN THE LAST ICE AGE. (II) MASSIVE GROUND ICE BODY IN ARCTIC CANADA (ABSTRACT)

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Massive ground ice bodies are seen in the Canadian Arctic. The origins and formation processes of the ice bodies remain in need of research. So, I am studying a massive ground ice body in Mackenzie Delta, N.W.T., Canada, on the basis of a hypothesis that it is a relict ice body of the Laurentide ice sheet. If so, a massive ground ice body should provide important information about oxygen isotopic composition of the Laurentide ice sheet.

Dating of the ice body must supply an important key in clarifying its origin and formation processes. Radiocarbon dates of the sediments found in the core samples obtained throughout the massive ice body were first determined by accelerator mass spectrometry. The sediments

taken from the core at depths around the midpoint and bottom of the ice body were dated at 14270 and 17070 years B.P., respectively. The dates of reworked till overlying the ice body and of twigs found in the till layer were >23000 and <10000 years B.P., respectively. Therefore the massive ice is considered to have been formed before 10000 years B.P. and, accordingly, to be not segregated ice origin but buried ice origin.

On the other hand, oxygen isotopic composition and pollen content show a decreasing trend from the bottom to top of the ice body. Correlation between these trends and the determined dates indicates that the massive ice body was not formed in Mackenzie Delta but had moved from south of the delta before 10000 years B.P.; namely, it is a relict ice body of the Laurentide ice sheet.

(*Received April 12, 1990*)

AN APPARENT 1-YEAR LAG RELATIONSHIP OF HEAVY SNOW YEARS BETWEEN EURASIA AND NORTH AMERICA (ABSTRACT)

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The purpose of this study is to investigate the interannual variability of winter snow cover in the Northern Hemisphere, using the satellite-derived monthly snow cover data from 1967 to 1987. The data were supplied in digitized form by the National Oceanic and Atmospheric Administration/National Environmental Satellite Data Information Service (NOAA/NESDIS).

An empirical orthogonal function (EOF) analysis is done to see the typical pattern of snow cover variations during winter. The first component of the EOF (EOF1), which represents about 40% of the total variance, shows concurrent snow cover patterns between Eurasia and North America. The score of the EOF1 is similar to the time series of winter snow cover in the Northern Hemisphere. The second component of the EOF (EOF2), which represents over 20% of the total variance, shows a seesaw pattern between the eastern and western parts of Eurasia and North America. This EOF2 shows the importance of subcontinental-scale snow variation.

I examined time series of mean snow cover for key regions of the Northern Hemisphere to investigate variations depicted in the EOF patterns in more detail. We selected two key regions which represent continental-scale snow variation. One is the eastern part of Eurasia and the other is the western part of North America. The time series of the two key regions show an apparent 1-year lag relationship of heavy snow cover years; winters with extensive snow cover over Eurasia tend to be followed by extensive snow cover over North America during the succeeding winters.

(*Received October 20, 1989*)