

RELATION BETWEEN THE SPECIAL RADAR ECHO FROM
WITHIN THE ICE SHEET AND THE CONFIGURATION
OF THE GROUND (I) (ABSTRACT)

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It has been considered very difficult to analyze radar echos except for those of standard form. In this work we have attempted to estimate ground structures under an ice sheet using non-standard radar echos.

We determined the standard radar echo from the thick ice sheet and ground of the Antarctic Continent under it, and succeeded in simulating nonstandard radar echos.

We have calculated the discrepancy from a standard radar echo by a simulation method, and estimated the influence of cracks and of the temperature profile within the ice sheet, volcanic ash and meteorites in the ice sheet, and shape and water content of the boundary between ice sheet and ground of the Antarctic Continent.

As the gradients of temperature and density of the ice sheet are very small, the radar echo is not influenced by these within an ice sheet up to at 350–600 m thick.

We succeeded in estimating the shape, temperature and roughness of the ground under the ice sheet.

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REPORT ON ANTARCTIC CLIMATE RESEARCH OBSERVATIONS
BY THE 28TH JAPANESE ANTARCTIC RESEARCH
EXPEDITION (ABSTRACT)

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The five years program on Antarctic Climate Research (ACR) has been started by the 28th Japanese Antarctic Research Expedition (JARE). The main subjects are (I) interannual variation of Antarctic atmosphere, and (II) air-sea ice interaction. In the 28th expedition, the stress was placed on the former and the following observations were made mainly around Syowa

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Station (69°00'S, 39°35'E).

I. Interannual variation of Antarctic atmosphere

- 1) Radiation and cloud distribution
 - . Satellite observation (NOAA HRPT data receiving and processing of AVHRR data)
 - . Radiation measurement (shortwave, longwave and microwave; surface, airborne, sonde)
- 2) Extension of meteorological observing area
 - . Surface synoptic observation at Asuka Camp (71°32'S, 24°08'E, 965 m a.s.l.)
 - . Establishment of automatic weather station at Mizuho Station (70°42'S, 44°20'E, 2230 m a.s.l.) and S18 point (69°02'S, 40°07'E, 620 m a.s.l.)
- 3) Monitoring of minor constituents
 - . CO₂ continuous measurement by NDIR
 - . Air sampling (surface, airborne)
 - . Total ozone by Dobson spectrophotometer and vertical profile by sonde
 - . Aerosol sampling on research ship "SHIRASE"

II. Air-Sea ice interaction

- . Airborne microwave (19 GHz) measurements of ice sheet and sea ice as a ground truth of satellite observation
- . Sea ice distribution by the AVHRR data

For details, refer to T. YAMANOUCHI and H. TAKABE (*Antarct. Rec.*, **32**, 53, 1989).

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SEASONAL VARIATION OF SNOW COVER OVER THE NORTHERN HEMISPHERE: PROGRESSION OF SNOWMELT (ABSTRACT)

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Seasonal variation of snow cover over the Northern Hemisphere is examined. The NOAA/NESDIS weekly snow cover data for the 14-year period from 1973 to 1986 are used. The data set is a digitized version of NOAA/NESDIS snow cover charts, which in turn are based on manual analysis of visible imageries taken by NOAA and other satellites. The data set tell whether each of 89 × 89 grid boxes on a polar stereographic map is covered with snow or not.

We analyzed the progression of snowmelt in spring. By "the week of snowmelt" (for a certain grid box and a certain year), we mean the week just after the one when snow cover is last observed within the period between No. 1 (early January) and week No. 30 (late July). Fourteen-year mean and interannual standard deviation of the week number of snowmelt are calculated and mapped.

The part of continents where snow cover usually exists until March can be classified into "plain" areas and "mountain" areas. In "plain" areas, in many-year average, snowmelt proceeds rather smoothly from south to north at a speed of 10 degrees latitude per month. In addition, a general trend in the progress of snowmelt from west to east is superposed in the European/Western Siberian as well as North American plain areas. Some irregularities in propagation are found. For example, across the Ural Mountains, snowmelt occurs about one