

# 冠雪および海氷の雪氷学的パラメーターと 海氷内熱伝導フラックスの関係

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## Abstract

Sea-ice differs significantly in thickness, inner texture, thermal conductivity, snow-cover conditions, inner temperature gradient and so on according to its place of origin, consequently resulting in the great variability in inner heat flux. This work seeks to clarify the effect of the above parameters on the heat conductive process through observations in the Sea of Okhotsk, Lake Saroma, the Chukchi Sea and the Arctic Gyre of the Arctic Ocean north to Canada.

The density and thermal conductivity of thicker sea-ice like the Arctic sea-ice gradually increase from the bottom toward the surface, and both parameters exhibit a positive correlation.

Sea-ice is more or less accompanied by snow cover everywhere. However, the inner temperature of the upper ice layer is sensitive to the change in air temperature when the snow cover is less than 20cm thick. However, the effects of changes in the air temperature is ameliorated by snow cover, and the inner temperature does not exhibit a marked sensitivity when the snow cover is thicker than 40cm.

The snow cover at all sites lacked uniform depth, but this fact is very significant in estimating heat flux. We therefore observed the occurrence of snow-cover depth and derived a probability density function that was applied to estimate the interface temperature between snow-cover and sea-ice. The heat flux of the sea-ice in the Chukchi Sea was finally estimated to be 16% higher than that with a uniform depth of 20cm, the mean depth in the Chukchi Sea.

In order to estimate the heat flux correctly, we must know the heat process at the snow-cover surface. We therefore compared an observation of surface temperature between a mercury thermometer and an infrared radiometer and discussed it in terms of the atmospheric stability. We noticed that the latter exhibited  $1.5^{\circ}\text{C}$  lower temperature than the former, leading to the conclusion that the observation with the latter must be corrected by  $1.5^{\circ}\text{C}$  when used to construct an atmospheric stability diagram.