used in this study extends from the surface to the middle mesosphere at about 70 km. First, the temperature change during the polar night is studied. For a clear atmosphere, the surface temperature of which is calculated from the radiation heat budget, temperature decreases uniformly with respect to height except for the first 20 days. The decrease rate becomes very small as temperature becomes low, and hence even the lowest temperature at the surface cannot reach 100 K for the polar night. When the surface temperature is prescribed to have the climatological value, the temperature in the stratosphere and mesosphere decreases in a similar way. However, there appears a relatively high temperature region from about 150 mb to 30 mb. This is because CO_2 and O_3 absorb longwave radiation from the warm surface.

Second, the temperature change is studied after the sun reappears. It is found that according to the intensity of warming, the stratosphere can be separated into 3 regions: upper ($P<$ 10 mb), middle (10 mb$<P<$100 mb), lower (100 mb$<P$). The temperature in the upper and middle stratosphere is restored to the climatological value in a rather short time, 1 to 2 months. On the other hand, the temperature in the lower stratosphere rises far more slowly and remains much lower than the climatological value. This suggests that the dynamical warming plays a crucial role in the lower stratosphere.

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CLOUD DISTRIBUTION AROUND SYOWA STATION BY NOAA AVHRR (ABSTRACT)

Takashi YAMANOUCHI

National Institute of Polar Research, 9-10, Kaga 1-chome, Itabashi-ku, Tokyo 173

Cloud distributions are analyzed from AVHRR data of the NOAA satellite received at Syowa Station (69°00′S, 39°35′E), Antarctica. Satellite observations of clouds and sea ice are major components of the Japanese program of Antarctic Climate Research. Algorithms to derive cloud amount using the brightness temperature differences between infrared channels 3 (3.7 μm) and 4 (11 μm), 4 and 5 (12 μm) are assessed by comparing to the manual cloud amount and the downward longwave radiation at the ground surface. Cloud amounts obtained from the brightness temperature difference between channels 3 and 4 in summer (month) agree with the manual cloud amounts at the surface (correlation coefficient $r\approx0.88$) and highly correlate to the downward longwave fluxes ($r\approx0.95$). Cloud amounts from channels 4 and 5 show rough agreements with the surface cloud amounts throughout the year. The brightness temperature difference of thick cloud overlaps that of clear area and the temperature dependence of clear pixels accompanies some uncertainties which makes the cloud detection uncertain.

Characteristics of cloud distributions around Syowa Station of 500 km scale are examined for two months. Cloud amount was higher than 0.5 over sea and sea ice, and was less than or equal to about 0.3 over the inland snow field, in both July and December. The average brightness temperature itself varies only within 12 K in summer within the area; however, the variance differs greatly according to the region and was largest at the coast. In winter, the average brightness temperature varied 30 K, from 220 to 250 K, and the correlation between the brightness temperature and cloud amount became low.

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