ON THE ESTIMATION OF PRECIPITATION RATE BY A NEW ANALYTICAL METHOD FOR THE METEOROLOGICAL RADAR ECHO (1) (ABSTRACT)

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A vertical pointing radar was installed at Syowa Station, Antarctica, in 1988. Estimations of precipitation from a single frequency radar echo data require additional information, because radar echo from precipitation depends on precipitation rate at each altitude, types and sizes of snowflakes. Konishi et al. (H. Konishi *et al.*: Proc. NIPR Symp. Polar Meteorol. Glaciol., **5**, 90, 1992) have tried to estimate precipitation using a new radar reflective factor (Z)-precipitation rate (R) relationship.

We have studied the feasibility of another approach to estimate precipitation, this case snowfall, using a vertical profile of snow particles. Assumption of snow particle types is introduced using temperature data at each altitude from radiosonde observations. If the type of snow particle is know, most parameters to calculate radar echo-falling velocity, water content, and dielectric constant of snow particles, can be estimated (A. Nishitsuji *et al.*: Trans. IEEE, **J66-B**, 1163, 1983). Remaining unknown factors are size distribution of snow particles and snowfall rate at each altitude.

According to our calculations using observed radar echo data and some simple size distributions, snowfall rates are dramatically changed by size distribution function. We will determine the size distribution near the ground using snowflake data which were taken by a video camera at Syowa Station, and assume a size distribution model at each altitude to estimate precipitation at Syowa Station. Then we will check whether our model is consistent with other observations, for example by microwave radiometer.

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