10.9 A METHOD FOR ESTIMATE OF RANGE VARIATION OF ATTENUATION FROM DUAL FREQUENCY RADAR AND DUAL POLARIZATION RADAR

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Attenuations of precipitation are closely related to microphysical properties of precipitation. Attenuations, however, has been rarely used for retrieval of precipitation properties. The attenuation of Dry snow is generally small. While for rain, large attenuations appear. We can, therefore, classify rain and snow from attenuation properties.

We have developed a method to estimate the range variation of the attenuation from the dual-frequency precipitation radar (DPR) equipped on the Global Precipitation Mission (MAD). We have also developed a similar method to estimate the range variation of the attenuation from a dual polarization radar (MAP).

In the method of MAD, we used the dual frequency ratio (DFR) which is defined as a ratio of the equivalent radar reflectivity at Ku-band and at Ka-band. The DFR monotonically increases with radar range for rain because of the difference in attenuation between Ku and Ka-band. While for dry snow, the DFR should be constant for homogeneous snow range region because of less attenuation of snow. Thus, we can estimate attenuation from degree to which the DFR varies with radar range.

In the method of MAP, we used Ze and Kdp. The values of Ze affected by attenuation. While the values of Kdp do not affected by attenuation. From the range variation of Ze and Kdp, we can estimate the range variation of attenuation.

The both method have been applied to the ground-based radar observations operated at Ka and c-band. Results show that the both methods were in good agreement. The radar reflectivity and Kdp for snow, however, are still unclear because of its complicated shapes. To make clear of the effects of shape of snow on the methods, we made radar simulations for snow of realistic shape by using the scattering data base and examined the above two methods.