

Kobayashi T., M. Nomura, A. Adachi, S. Sugimoto, N. Takahashi, and H. Hirakuchi, 2021: Retrieval of attenuation profiles from the GPM dual-frequency radar observations. *J. Meteor. Soc. Japan*, 99, 603-620.

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**Plain Language Summary:** A new method retrieving attenuation profiles using a Dual-Frequency Precipitation Radar equipped on the Global Precipitation Mission (GPM) is proposed. The method utilizes the differential frequency ratio (DFR), which is the difference in the measured reflectivity in the log scale between Ka and Ku bands. The range variations of relative values of differential attenuation between two frequencies are estimated and can be used for identifying hydrometeor types. Simulations indicate that estimated attenuation profiles agree with the shape of theoretical ones for rain, melted snow. The method was applied to identify rain and dry snow regions in the GPM measurements. High and low correlation coefficients between attenuated part of DFR and radar range were observed for rain and dry snow, respectively.

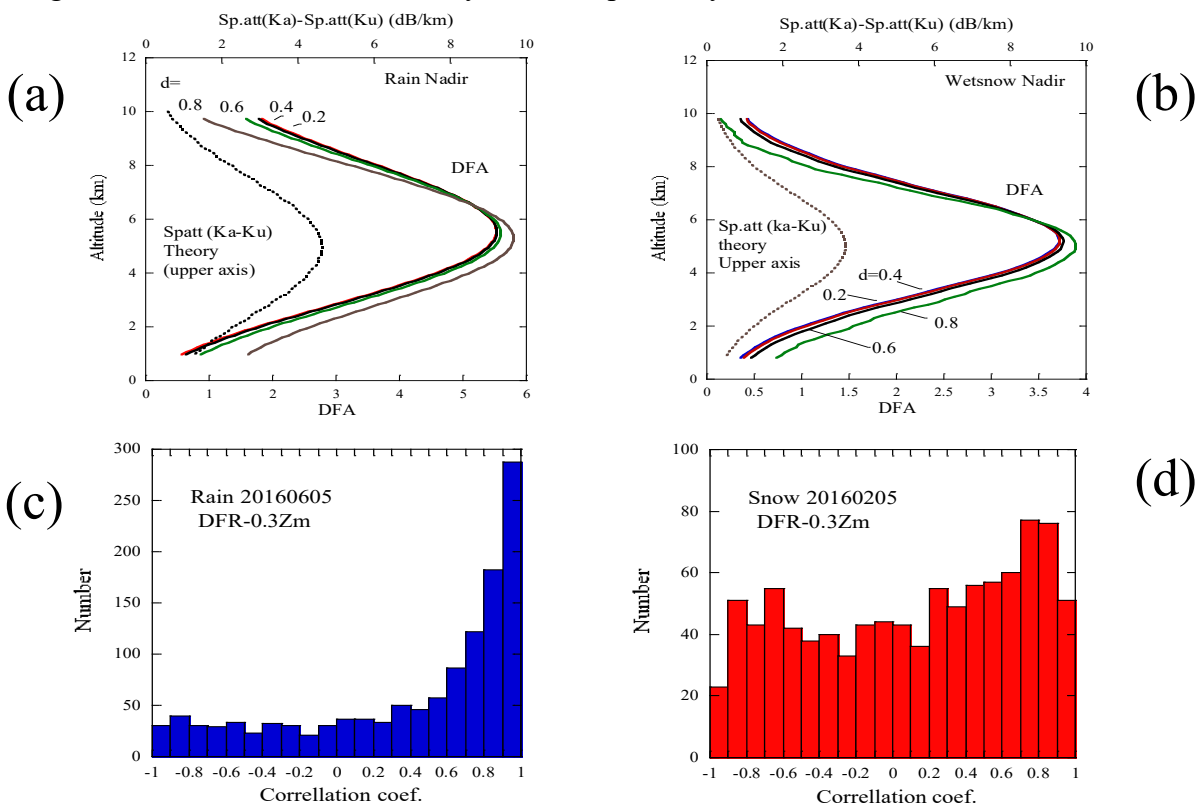


Fig. 1 (a) Estimated attenuation profiles and theoretical one for rain and (b) wet snow, (c) measured frequency histograms of the correlation coefficients for rain and (d) snow.

- A new method retrieving attenuation profiles using a Dual-Frequency Precipitation Radar equipped on the GPM is proposed and applied to identify precipitation type.
- The method was evaluated using numerical simulations and measurements.
- A technique to estimate the ratio of total attenuations of the melting layer to attenuation below the melting layer is also presented.