全球降水観測計画（GPM）主衛星搭載二周波降水レーダ（DPR）による全球の雨滴粒径分布

Global Drop Size Distribution observed by Dual-frequency Precipitation Radar onboard Global Precipitation Measurement core satellite

*山地 萌果[1]、久保田 拓志[1]、濱田 篤[2]、高薮 縁[2]、沖 理子[1]
*Moeka Yamaji[1], Takuji Kubota[1], Atsushi Hamada[2], Yukari Takayabu[2], Riko Oki[1]

1. 宇宙航空研究開発機構、2. 東京大学 大気海洋研究所
1. Japan Aerospace Exploration Agency , 2. Atmosphere and Ocean Research Institute, the University of Tokyo

Precipitation is one of the most essential parameters in the Earth system. Many places in the world face water problems, such as water shortages and floods. Precipitation observation by rain gauges and ground radars cannot cover overall Earth’s surface, and are limited spatially and temporally. It is important for us to observe global rainfall by spaceborne sensors.
Following the success of the Tropical Rainfall Measuring Mission (TRMM) launched in 1997, Global Precipitation Measurement (GPM) core satellite was launched in 2014. GPM core satellite carries Dual-frequency Precipitation Radar (DPR), which consists of the Ku-band (13.6GHz) precipitation radar (KuPR) and the Ka-band (35.5GHz) precipitation radar (KaPR). DPR is expected to have better accuracy for precipitation estimation, relative to single-frequency radar (13.8GHz) used in TRMM, by measuring snow and light rain via high-sensitivity observations from the KaPR, and by providing drop size distribution (DSD) information based on the differential scattering properties of the two frequencies. Furthermore, owing to higher orbital inclination of GPM core satellite (65 degrees) than that of TRMM (35 degrees), DPR is the world’s first space-borne precipitation radar observing middle and higher latitudes area.
GPM/DPR level-2/3 (L2/L3) product provides information of the DSD, which is one of the factors that characterizes precipitation but is a main unknown factor of precipitation remote sensing.
Firstly, we confirm the climatology of particle diameter (Dm, [mm]) and particle number concentration (Nw, [m^{-3}]) for 2 years calculated by using GPM/DPR L3 product. Generally, it is found that Dm is larger over land than over the ocean and Nw shows an opposite trend to Dm. In addition, Dm in 20-40 degrees is slightly smaller than other latitudes over the ocean. It is also found that there are seasonal differences in some area, such as Amazon and mid-latitude area. This was consistent with Kozu et al. (2009).
In this study, we use L2 products to analyse in detail by comparing with rain rate. We are planning to apply to the DSD database for Global Satellite Mapping of Precipitation (GSMaP) algorithm in the future.

