

The characteristics of precipitation and anvil cloud detected by GPM/DPR

*Koichi Toyoshima¹, Hitoshi Hirose², Atsushi Higuchi¹

1. Center for Environmental Remote Sensing, Chiba University, 2. JAXA EORC

The anvil cloud spreads thinly in the upper troposphere with deep convection. The upper clouds play an important role in the radiation budget of the earth, and in order to understand the characteristics of upper cloud using GPM. GPM dual frequency precipitation radar (DPR) is expected to detect a weak signal due to the anvil cloud because it has improved sensitivity compared to the PR of TRMM era. The purpose is to detect anvil clouds by GPM precipitation radar and clarify regional characteristics.

The data for this study is GPM/Ku and Ka band radar standard product version 6, the parameter is flag anvil, ZfactorCorrected, nearSurfaceRain. The study time period is March 2014 to December 2019.

From the results of the vertical structure using CFAD, signals (14 to 18 dBZ) weaker than 18 dBZ, which was the detection limit of TRMM/PR, were detected. In the central African continent where convection is active, the relative proportion of anvil clouds without rainfall is higher than that with anvil clouds with rainfall, suggesting that the anvil cloud is widespread. In the western Pacific Ocean, where the convective activity is high, the echo of mode is weaker and the altitude tends to be lower than that of the land in Africa. In the eastern Pacific Ocean where the short rainfall system is dominant, although the sample size was small, the echo intensity and mode were as high as the western Pacific Ocean. In the sea area, echoes are observed below 16 dBZ and below 5 km.

We also investigated the relationship between the echo top height and rainfall rate of adjacent rainfall samples and the anvil cloud profile. While there is a correspondence between the convection echo top height and the anvil cloud ice particle height, the anvil cloud profile does not depend on the intensity of adjacent rain samples.

In the presentation, we will introduce the evaluation of estimated precipitation products by Himawari-8 for precipitation that covered by anvil cloud.

Keywords: anvil cloud, precipitation, satellite, GPM/DPR