A statistical comparison of precipitation feature characteristics over land and oceans utilizing the GPM DPR data

*小野 茉莉花[1]、高薮 縁[1]
*Marika Ono[1], Yukari Takayabu[1]

1. 東京大学　大気海洋研究所
1. Atmosphere and Ocean Research Institute, the University of Tokyo

The relationship between tropical (30N-30S) and extratropical (30N-65N, 30S-65S) precipitation feature characteristics and the environment, such as an atmospheric moisture field, is analyzed focusing on a comparison over land and oceans using the GPM (Global Precipitation Measurement) DPR (Dual-frequency Precipitation Rader) data.
The difference between over land and the oceans is observed in terms of the relation between daily column relative humidity (CRH) derived from ERA-interim data and precipitation feature characteristics obtained from the GPM DPR. Over tropical oceans, volumetric precipitation and stratiform precipitation area of precipitation features rapidly increase with CRH, as reported in previous studies. Over tropical land, on the other hand, volumetric precipitation of precipitation feature has a peak at around CRH 0.7.
In terms of the relationship to CRH, we also analyzed tropical and extratropical precipitation feature characteristics. Over tropical oceans, a class of well-organized precipitation systems observed in the highly humid environment has the largest contribution to total precipitation. In contrast, highly convective precipitation systems observed in moderately humid conditions substantially contribute to total precipitation over land.
Over land, it is considered that the heated land surface during daytime is likely to prepare more unstable lower troposphere and thicker mixed layer compared to the case over ocean. Such unstable conditions can lead to the initiation of convective clouds. Therefore regional analysis about environment has been conducted from the perspective of a comparison in various CRH conditions and seasons. In the Amazon, for example, precipitation features observed in moderately humid conditions are dominant in the premonsoon season. In addition, lower troposphere is in most unstable condition in Amazonian premonsoon season. It is suggested that relatively lower humid conditions seasonally coexist with more unstable conditions. This result implies a possibility that the peak in volumetric precipitation of precipitation features at moderate CRH is associated with convective systems developed in such unstable conditions.
In mid-latitude regions, the different results between over land and over oceans are also observed. Over extratropical oceans, volumetric precipitation and stratiform precipitation area of precipitation features also increase with CRH as over tropical oceans. However, the relationship is relatively linear over extratropical oceans in contrast to an exponential growth observed over tropical oceans. It is possibly attributed to the difference in dominant precipitation mechanism between tropics and mid-latitude regions. Over extratropical land, volumetric precipitation of precipitation features has a peak at around CRH 0.55-0.65. This result over extratropical land is similar to that over tropical land. This agreement of results can be explained by the fact that highly convective systems greatly contribute to total precipitation over both land regions.

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