



A statistical study on rain characteristics of tropical cyclones using TRMM satellite data

Chie Yokoyama (1), Yukari N. Takayabu (1,2)

1. Center for Climate System Research, the University of Tokyo, Chiba, JAPAN,
(yokoyama@ccsr.u-tokyo.ac.jp, Fax: +81-4-7136-4375, Phone: +81-4-7136-4402) (2)
Japan Agency for Marine-Earth Science and Technology, Yokosuka, JAPAN

In this study, we analyze Tropical Rainfall Measuring Mission (TRMM) data to statistically quantify 3-dimensional rain characteristics of tropical cyclones (TCs) from December 1997 to December 2003. TCs are divided into 4 maximum intensity classes and 3 stages such as developing, mature, and decaying stage.

First, the rain characteristics of TCs are compared with those of equatorial (10°N-10°S) mean. Both TCs and the equatorial mean consist of convective area and large stratiform area. But stronger rain is observed in TCs both for convective and stratiform rain. At the same time, stratiform rain substantially contributes to total amount of TC rainfall. The stratiform rain ratio (SRR) of TCs is 54 % in average and larger than the equatorial oceanic mean (44 %). We also analyze radial rain characteristics of TCs. According to the rain characteristics, we could identify region 0-60 km from the center as 'the inner core', and 60-500 km as 'the rainband'. In the inner core, SRR is small, and the flash rate is large, which indicate the vigor of convective activity. Contrastingly in the rainband, SRR is always greater than 44 %, and rain-yield per flash is relatively large, which means it rains efficiently although convective activity is moderate.

The conclusion of this study is that rain characteristics of TCs are listed in the very end of tropical oceanic organized rain systems such as cloud clusters, in terms of the organization levels, and the stronger TCs are their extremes.

At last, the rainfall contribution of TCs to total annual rainfall between 35°N-35°S is estimated. TCs account for about 3 ± 0.2 % of the rain in this latitudinal region. We can utilize such statistical quantity, in order to validate the general circulation models in terms of the performance of TCs rainfall.