



Climatological studies on precipitation features and large-scale atmospheric fields on the heavy rainfall days in the eastern part of Japan from the Baiu to midsummer season

Kengo Matsumoto (1), Kuranoshin Kato (2), and Kazuo Otani (3)

(1) Graduate School of Natural Science and Technology, Okayama University, Okayama city, Japan (p52c7t96@s.okayama-u.ac.jp), (2) Graduate School of Education, Okayama University, Okayama city, Japan, (3) Graduate School of Natural Science and Technology, Okayama University, Okayama city, Japan (Present affiliation: TV Setouchi Broadcasting Co., LTD.)

In East Asia the significant subtropical frontal zone called the Meiyu (in China) / Baiu (in Japan) appears in early summer (just before the midsummer) and the huge rainfall is brought due to the frequent appearance of the “heavy rainfall days” (referred to as HRDs hereafter) mainly in that western part. On the other hand, large-scale fields around the front in eastern Japan is rather different from that in western Japan but the total precipitation in the eastern Japan is still considerable compared to that in the other midlatitude regions. Thus, it is also interesting to examine how the rainfall characteristics and large-scale atmospheric fields on HRDs (with more than 50 mm/day) in the eastern Japan in the mature stage of the Baiu season (16 June ~ 15 July), together with those in midsummer (1~31 August). Based on such scientific background, further analyses were performed in this study mainly with the daily and the hourly precipitation data and the NCEP/NCAR re-analysis data from 1971 to 2010, succeeding to our previous results (e.g., EGU2015).

As reported at EGU2014 and 2015, about half of HRDs at Tokyo (eastern Japan) were related to the typhoon even in the Baiu season. Interestingly, half of HRDs were characterized by the large contribution of moderate rain less than 10 mm/h. While, the precipitation on HRDs at Tokyo in midsummer was mainly brought by the intense rainfall with more than 10 mm/h, in association with the typhoons.

In the present study, we examined the composite meridional structure of the rainfall area along 140E. In the pattern only associated with a typhoons in the Baiu season (Pattern A), the heavy rainfall area (more than 50 mm/day) with large contribution of the intense rain (stronger than 10 mm/h) showed rather wide meridional extension. The area was characterized by the duration of the intermittent enhancement of the rainfall. In the pattern associated with a typhoon and a front (Pattern B), while the contribution ratio of the rainfall more than 10mm/h was large in the southern half of the heavy rainfall area, moderate rain with less than 10 mm/h contributed greatly to the total rainfall in the northern half. In Patter B, that heavy rainfall area was located just in the area with strong low-level warm advection around the Baiu front to the east of the typhoon. The warm advection near the heavy rainfall area was also found in Pattern A, the heavy rainfall occurred just on the southwest of the large advection.

It is noted that, although the very warm humid air can intrude northward by the strong S-ly wind to the east of the typhoon in both Pattern A and B, the low-level baroclinicity around the eastern Japan was stronger in Pattern B. In midsummer, the similar situations to while the “Pattern B”-like situation was not seen. This might be greatly reflected by the seasonal change in the southern boundary of the Okhotsk air mass from the Baiu to midsummer and we will also examine that in the future.