Change in TC Activity during the Break of the Western North Pacific Summer Monsoon in Early August

Ke Xu[1,2] and Riyu Lu[1]

[1] *State Key Laboratory of Numerical Modeling for Atmospheric Sciences and Geophysical Fluid Dynamics, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing 100029, China*

[2] *University of the Chinese Academy of Sciences, Beijing 100049, China*

This study identified a distinct monsoon break over the western North Pacific (WNP) by analyzing the subseasonal evolution of atmospheric convection and precipitation, and examined its modulation on the tropical cyclone (TC) activity. This WNP monsoon break is characterized by drastic convection suppression and rainfall reduction, which occurs climatologically in early August, subsequent to the monsoon onset in late July to the east of the Mariana Islands, and is followed by a second rainfall enhancement in mid-August. For about one-third years, the monsoon breaks are particularly predominant, during which the precipitation is even less than that before the monsoon onset. During the monsoon break, the TC occurrence remarkably decreases (increases) to the east of the Mariana Islands (to the southeast of Japan), which is closely related to the local anomalous mid-tropospheric downward (upward) motion and lower-tropospheric anticyclonic (cyclonic) circulation in comparison with the previous and subsequent convective periods in late July and mid-August. These changes of TC activity and the corresponding circulation during the monsoon break are more significant in the typical monsoon break years when the phenomenon of monsoon break is predominant. The reverse changes of TC activity to the east of the Mariana Islands and to the southeast of Japan during the monsoon break are closely associated with the out-of-phase subseasonal evolutions over these two regions from late July to mid-August, which are both greatly contributed by the 10–25-day oscillations. Finally, the roles of mid-latitude and tropical disturbances on the 10–25-day oscillations are also discussed.

Key words: western North Pacific summer monsoon, monsoon break, tropical cyclone