

EGU24-3424, updated on 20 May 2024

<https://doi.org/10.5194/egusphere-egu24-3424>

EGU General Assembly 2024

© Author(s) 2024. This work is distributed under the Creative Commons Attribution 4.0 License.



Monsoon Break over the South China Sea during Summer: Statistical Features and Associated Atmospheric Anomalies

Minghao Bi^{1,2}, Ke Xu¹, and Riyu Lu^{1,2}

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

²College of Earth and Planetary Sciences, University of Chinese Academy of Sciences, Beijing, China

This study identifies break events of the South China Sea (SCS) summer monsoon (SCSSM) based on 42 years of data from 1979 to 2020, and investigates their statistical characteristics and associated atmospheric anomalies. A total of 214 break events are identified by examining the convection evolution during each monsoon season. It is found that most events occur between June and September and show a roughly even distribution. Short-lived events (3–7 days) are more frequent, accounting for about two thirds of total events, with the residual one third for long-lived events (8–24 days).

The SCSSM break is featured by drastic variations in various atmospheric variables. Particularly, the convection and precipitation change from anomalous enhancement in adjoining periods to a substantial suppression during the break, with the differences being more than 60 W m^{-2} for outgoing longwave radiation (OLR) and 10 mm d^{-1} for precipitation. This convection/precipitation suppression is accompanied by an anomalous anticyclone in the lower troposphere, corresponding to a remarkable westward retreat of the monsoon trough from the Philippine Sea to the Indochina Peninsula, which reduces the transportation of water vapor into the SCS. Besides, the pseudo-equivalent potential temperature (θ_{se}) declines sharply, mainly attributable to the local specific humidity reduction caused by downward dry advection. Furthermore, it is found that the suppressed convection and anomalous anticyclone responsible for the monsoon break form near the equatorial western Pacific and then propagate northwestward to the SCS.