Geophysical Research Abstracts
Vol. 14, EGU2012-7128, 2012
EGU General Assembly 2012

Comparison of Rainfall Characteristics and Convective Properties of Monsoon Precipitation Systems over South China and Yangtze-and-Huai River Basin

Y Luo (1), H Wang (1), R Zhang (1), W Qian (1), and Z Luo (2)

(1) State Key Laboratory of Severe Weather, Chinese Academy of Meteorological Sciences, Beijing 100081, China (yali@cams.cma.gov.cn), (2) Department of Earth and Atmospheric Sciences, and NOAA/CREST Center, City College, City University of New York, New York, New York, USA

Rainfall characteristics and convective properties of monsoon precipitation systems over the South China (SC) and the Yangtze-and-Huai River Basin (YHRB) are investigated by combining a gridded daily precipitation data product based on surface station observations, a Tropical Rainfall Measuring Mission dataset, the CloudSat and Cloud–Aerosol Lidar and Infrared Pathfinder Satellite Observations data products. Atmospheric aerosol amounts are inferred using a Moderate Resolution Imaging Spectroradiometer aerosol product.

Comparison between the two regions is made for their monsoon active periods to reveal variations of the monsoon precipitation systems along with the northward march of the East Asian summer monsoon rainbelt from the SC to the YHRB. Relative to the YHRB, precipitation systems over the SC occur more frequently, resulting in larger maxima of the monsoon rainfall accumulation, but the SC systems are convectively less intense which is linked to the contrasts in strength of low-level vortices and surface fronts between the two regions.

Contrasting among the pre-monsoon, monsoon active and break, and post-monsoon periods is also conducted for each region to unveil intraseasonal transitions of the precipitation systems, atmospheric conditions, and weather systems. Convective activities of the precipitation systems enhance progressively from the pre-monsoon to the monsoon and further to the post-monsoon period at both regions with more significant convection intensification from the pre-monsoon to the monsoon period at the YHRB, being largely in agreement with the intraseasonal variations of atmospheric thermodynamic conditions (convective available potential energy). From the pre-monsoon to the monsoon periods, the lightning flash rates decrease substantially at the SC, in contrast to the YHRB where the rates increase slightly. While aerosol loading is in favor of electrification during the pre-monsoon periods at both regions, the convective strength of the YHRB pre-monsoon is too weak to boost up lightning activity. The SC region, on the other hand, has more similar convective intensity from the pre-monsoon to the active monsoon, so aerosol effect stands out. Moreover, horizontal extents of precipitation systems are larger (smaller) on average during the monsoon active and pre-monsoon (post-monsoon and break) periods, which can be largely explained by the scale difference of the driving mechanisms: the precipitation storms are less controlled by large-scale weather systems (dynamically driven) but more by local instability due to solar heating (thermodynamically driven) during the post-monsoon and break periods.