# Tropical cyclone- and monsoon-induced rainfall variability over southern China

November 28 2016

Southern China (SC) belongs to the East Asian summer monsoon region. Climatological rainfall over SC has two peaks, one appearing in April-June and the other in August-September. These peaks are mainly associated with the summer monsoon and the passage of tropical cyclones (TCs), respectively. TCs forming in the South China Sea (SCS) contributed to an increase in SC summer rainfall around 1993. In Taiwan, tropical cyclone-induced precipitation ($P_{TC}$) and summer monsoon-induced precipitation ($P_{SM}$) tend to vary inversely on both interdecadal and interannual time scales. Although SC and Taiwan are situated at almost the same latitude, scientists from Sun Yat-Sen University and South China Sea Institute of Oceanology pointed out that the relationship over SC between $P_{TC}$ and $P_{SM}$ is different from that in Taiwan. The results are published in *Atmospheric and Oceanic Science Letters*.

The spatial patterns of the first interannual mode are uniform in sign over SC, with positive anomalies for $P_{TC}$ and negative anomalies for $P_{SM}$. The background of an increase in cyclonic vorticity, an increase in RH, and a decrease in vertical wind shear over the South China Sea (SCS)-western north Pacific (WNP) provides favorable conditions for more TC genesis. The positive equatorial central Pacific SST anomaly and negative North Indian Ocean SST anomaly contribute to the anomalous cyclone over the SCS-WNP, which causes decreasing $P_{SM}$ in SC together with an anomalous anticyclone over eastern China-Japan.

By contrast, the interdecadal eigenvectors feature uniform patterns with

positive anomalies for both $P_{TC}$ and $P_{SM}$. During the preceding winter and spring after the early 1990s, a positive western Pacific SST anomaly can result in tropical Indian Ocean (TIO) SST warming through vertical circulation. Then, the positive TIO SST anomaly triggers an anomalous WNP anticyclone and contributes to the interdecadal increase in SC $P_{SM}$ in the succeeding summer. The increase in $P_{TC}$ over SC is related to more TCs forming in the SCS. These results lend greater insight into the variability of SC summer rainfall through separating total rainfall into $P_{TC}$ and $P_{SM}$.

**More information:** Jie-Peng CHEN et al, Relationship over southern China between the summer rainfall induced by tropical cyclones and that by monsoon, *Atmospheric and Oceanic Science Letters* (2016). DOI: 10.1080/16742834.2017.1248756

Provided by Chinese Academy of Sciences