

## IMPACT OF SST ANOMALY ON THE INTERANNUAL VARIATION OF TROPICAL STORM ACTIVITY IN THE WESTERN NORTH PACIFIC BASIN

**Wilbur Y. Chen**  
Climate Prediction Center,  
NCEP/NWS/NOAA  
5200 Auth Road, Washington DC, 20233  
wd51wc@sun1.wwb.noaa.gov

The interannual variations of tropical storminess are very prominent and have attracted many investigations. The WMO's recent publication on "Global Perspectives on Tropical Cyclones" (1995 WMO TD No. 693) summarizes the recent advances in this challenging subject. Among the list of assessments, it states that a) "there is no well-accepted, closed theory of formation" of tropical cyclones, and b) there is a "lack of any strong relationship between cyclone numbers and in situ SSTs". Our recent investigation shows evidence that such an association does indeed exist, not only on interannual but also on decadal time scales. Furthermore, the vertical wind shear has been widely accepted as a discriminator of the tropical cyclone frequency but with little observational evidence, as pointed out by the above-mentioned WMO studies as well as Zehr's 1992 report. Our recent study suggest that the vertical shear anomaly can be a very effective discriminator for half of the storm activities

Similar to the recent work of Mike Chen et al. (MWR 1998), we investigate the interannual variations of storminess for JJA and SON seasons, separately. However, forty eight years (1950-1997, instead of 18 years) of SST and tropical storm data were examined. Correlation maps of number of storm days and global SST, stream functions at 200 and 850 mb, and vertical shear of the horizontal winds are heavily consulted. The major findings are:

- 1) For the SON seasons, the tropical storms prevailing over the area east of 132.5 E (denoted by ETCs) and those of west of this longitude (WTCs) are associated with distinct physical processes. The ETCs are strongly associated with the interannual variations of SST anomalies located at south of the Hawaii region (Eq-20N & 140-180W, notably different from the equatorial El Nino/La Nina SST anomalies). Associated with these SST anomalies, there are coherent variations of upper and lower level global-scale atmospheric circulation anomalies, resulting in a strong correlation of vertical shear anomalies and ETCs, with 0.7 correlation stretching from 140-180E & 7.5-17.5N, where the ETCs are generally located.
- 2) On the other hand, the WTCs are associated with the anomalies of monsoon westerly, not much correlation with upper level flow is found. A strong correlation with in situ SST anomaly (maritime continent region) is also observed.
- 3) For the JJA tropical storms and typhoons, the large scale controlling influences are mostly the same for the ETCs and WTCs. The anomalies of the monsoon westerly exert the strongest influence. The extension/retraction of the monsoon troughs have some moderate (0.4, not strong) correlation with SST anomalies over the Nino3 region. In this regard, similar migration of summer monsoon trough has been reported by Mike Chen et al. (1998).

As evidenced by the above results, the interannual variations of the tropical storm activity are associated with SST anomalies at both subtropical and tropical latitudes. The slow evolution of SST anomaly offers potential predictability of the storminess on interannual time scales.