Session: C1 Poster: M231B

## Impact of tropical cyclones in the West North Pacific and South China Sea on the Asian monsoon rainfall during the pre-monsoon, monsoon and post-monsoon season

Subramaniam Moten[†]; Siva Shangari Govindan; Jeong Yik Diong
[†] Malaysian Meteorological Department, Malaysia
Leading author: subra@met.gov.my

The Western North Pacific (WNP) and South China Sea (SCS) basin is the most active region for tropical cyclone occurrences globally and they have a great impact on the rainfall distribution over the entire Asian monsoon region. In this study we investigate the impact of tropical cyclones on the rainfall for the Asian Monsoon region covering 10$^{o}$S to 40$^{o}$N and 70$^{o}$E to 150$^{o}$E for three seasons; pre-monsoon (March to May), monsoon (June to August) and post-monsoon (September to November) for a 30 year period from 1979 to 2008. TC data are obtained from the achieves of the Regional Specialized Meteorological Center (RSMC), Tokyo and the rainfall data used in this study is the APHRODITE data, gridded at 0.25 degree resolution covering the land mass. Gridded reanalysis atmospheric data at 1.25-degree resolution from the Japan Meteorological Agency have also being used to examine the anomalous atmospheric forcing during the active, normal and less active phases of TC activity on the rainfall distribution for the region concerned. An average of 27 TC occur annually over this basin with an annual average of 88 TC days. TC activity, based on the number of days with TCs having tropical storm intensity or higher shows the most active months are between July and October, peaking in August or September. Each season is categorized as being active, normal or less active based on the total number of TC days for the respective season. For each of the seasons contrasting rainfall anomaly patterns are observed between the 3 phases of TC activity. During the monsoon season (June to August) where most of the Asian region receives much of its rainfall, contrasting rainfall anomaly patterns are observed between the less active and active phase. The most notable being Indochina, the Philippines, coastal areas of Southern China and north central India recording much below normal rainfall during the less active phase and above normal rainfall during the active phase. It is the opposite for central China and north and south India. Similar opposite patterns is also being observed during the pre-monsoon season, however during this season south of the equator and southeastern China receive less rainfall during the normal phase. Similarly, during the post-monsoon season, nearly opposite rainfall anomaly patterns are being observed between the active and less active phase. However, most notable during this season is that during the normal phase of TC activity nearly the whole region record negative anomalies, except over India. Prominent among the synoptic and planetary scale features that dynamically drive the regional circulation patterns that causes the observed anomalies during the three phases are the strengthened relative vorticity over the TC region in the lower troposphere brought by the enhanced cyclonic circulation as evidenced from the streamfunction analysis. Forced moisture convergence that contributes to the variations in diabatic heating over the WNP and SCS during different phases and seasons causes major shifts in the upper level divergent circulations for the different phases of TC activity. This strongly influences the sub-tropical easterly jet of the upper troposphere, contributing to the strengthening or weakening of the lower troposphere westerly wind regime and moisture transport.