

From Monsoon Ocean to Ocean Monsoon – a Study of Interannual Variability of the Western North Pacific Monsoon

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Abstract

The western North Pacific monsoon (WNPM, 130~160E, 7.5~20N), an oceanic monsoon by nature, holds vital linkage between the Asian monsoon and ENSO system. The strength of WNPM is largely dictated by flow field over the South China Sea (SCS). It can be measured by a dynamical index, the JJA low-level zonal wind over the SCS. This SCS index is found closely related to the WNPM CMAP rainfall, the cross correlation coefficient reaches a lofty value 0.93 for period 1979~1995. On the contrary, the WNPM, which incubates numerous tropical cyclones, suffers poor relationship with in situ SST.

The SCS/WNPM air-sea complex exhibits the ability to store climatic memory, particularly during the NINO(0) winter to NINO(1) summer cycle for short ENSO episode. A group of 6 NINO cases (66, 73, 83, 88, 95, 98) were chosen to compose this particular half year cycle. The anomalous anticyclone over the WNP, stressed by Wang et al (2000, *J Climate* in press) in NINO(0) winter, alleviates the northeastern winter monsoon along coast. In NINO(1) spring the eastern Pacific SST anomaly becomes rapidly wilting whereas the anomalous anticyclone starts to adjust to local boundary condition. The WNP anticyclone anomaly migrates to cold SST in lower latitude and develops a vertical structure that of a baroclinic gravest mode. Its intensity keeps increasing even when the remote forcing dwindling. Evidently this spring warm water in the SCS and subtropical Pacific High ridge have been phase-locked in a coherent way. The heat stored in the SCS subsurface since winter will be brought into surface since the anomalous high is now superimposed by the seasonal SE flow, it leads to more stirring and positive sensible heat flux from air to sea. In NINO(1) summer the anomalous convection caused by warm SST anomaly induces easterly wind which, in turn, shifts the confluence zone toward west to the SCS and Indo-China peninsula, the WNPM is occupied by strong Subtropical Pacific high, hence a dry zone. The dry anomaly in the WNPM emits a teleconnection pattern, the Pacific-Japan pattern, a multi-belt structure alternating a dry zone in Yang-Tze region and a wet zone near Yellow River.