

INTERANNUAL VARIABILITY OF MEIYU RAINFALL AND TROPICAL SST DURING THE EAST ASIAN SUMMER MONSOON

C.-P. Chang and Yongsheng Zhang¹

Department of Meteorology, Naval Postgraduate School, Monterey, CA USA

Rainfall data of 1951-1996 are used to study the possible relationships between the interannual variability of the East Asian summer monsoon (May-August) rainfall and tropical SSTs. The SST anomalies (SSTA) over the Pacific and Indian Ocean between 30°S and 40°N are composited according to the rainfall anomalies over the middle and lower Yangtze River Valley (YRV), the southeastern coastal area of China (SEC), and Taiwan.

The equatorial East Pacific tends to be warm in the winter before a wet YRV season and cool in the following winter, indicating a tropical biennial oscillation (TBO). The sign switch occurs at different times between two interdecadal periods. In 1951-77, the switch occurs in early spring, while in 1978-96 it occurs in fall. Further partition of the data indicates that the TBO signal is primarily in the early summer (May-June). For the late summer (July-August), a wet YRV season tends to be associated with a warm equatorial East Pacific before, during and after the rainfall season. A consistent feature related to a wet YRV season for is a warm South China Sea concurrent with the summer rainfall. The relationship between the YRV rainfall and the SSTA in the East Pacific may be explained through an anomalous subtropical high in the western Pacific influenced by the SSTA. This subtropical high also appears to affect the South China Sea SST through surface Ekman convergence and possibly changes of wind speed.

The SEC composites are considerably different from the YRV results. The SSTA signals are less organized and often opposite between the two interdecadal periods, although in general a wet season is associated with cool SSTA in the central Pacific and the southern equatorial East Pacific. Thus, a warm southern equatorial East Pacific during the preceding winter may indicate a wet YRB but a dry SEC, although the confidence level for the latter forecast is considerably lower. For most cases, the South China Sea is also warm in June, the peak of the annual rainfall cycle.

Strong interdecadal changes in the SSTA and circulation patterns are also found when composited with respect to rainfall in Taiwan. These changes tend to oppose the changes in the YRV composites, and are more prominent in the early summer (May-June) during 1951-77 and in the late summer (July-August) during 1978-96.

¹ Permanent affiliation: Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing

Key words: Sea Surface Temperature Anomalies, East Asian monsoon, Interdecadal Variations