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Variation of the South China Sea Summer Monsoon onset

IMAKAWA, Shin^{1*} ; HIGUCHI, Atsushi²

¹Graduate School of Science, Chiba University, ²CEReS, Chiba University

In this study, we reveal factors of variation of the South China Sea Summer Monsoon(SCSSM) onset. The study area of South China Sea(SCS) is 5-15N, 110-120E. We use the data set of JRA-25/JCDAS, and, calculate the SCSSM onset date for 30 years, 1979-2008, defined as the zonal wind. In Kajikawa and Wang(2012), the authors point out an advance in the SCSSM onset date around 1993/94. Then, we divide the 30 years into 2 groups , before 1993(Prior) and after 1994(Later). Moreover, we pick out the advanced and delayed onset date for 3 years in each groups, after all, classify 30 years into 4 groups(Prior-Advanced, Prior-Delayed, Later-Advanced, Later-Delayed).

Focusing on time-changes of Sea Surface Temperature(SST), it is difference between Prior groups(P-A, P-D) and Later groups(L-A, L-D) for SST over the Philippine Sea(PS: 0-15N, 125-140E). The SST for Prior is higher about 0.5 degrees than that for Later. On the other hand, over the SCS, the SST is higher Advanced groups(P-A, L-A) than Delayed groups(A-D, L-D). This is reason why the strength of meridional surface wind over the SCS before April. Therefore, an effect of the SST to the SCSSM onset date is difference between over the SCS and over the PS. The SST over the SCS affect the annual variation of the SCSSM onset, and, the SST over the PS affect the 93/94 change.

The SCSSM onset is affected by a warming of the Tibetan Plateau(TP: 30-35N, 80-100E) too. In Ueda and Yasunari(1998), they reveal that the onset of summer monsoon over the Bay of Bengal and the SCS coincide with a time of rapidly increase in the thermal contrast the TP and surrounding ocean. We calculate the warming over the TP by a difference of geopotential height between 200hPa and 500hPa. Comparing the time-change of warming in 4 groups, we examine the difference of the period of rapidly warming over the TP in each groups. It is consider a relation between variation of the SCSSM onset and variation of the warming over the TP.

Then, we compare the anomaly of SCSSM onset date defined by the zonal wind, the anomaly of a time of rapidly warming over the TP, and, the anomaly of SST contrast between over the SCS and over the PS in April. As a results, the annual variation of SCSSM onset correlate clearly with the variation of the warming over the TP. Moreover, the low(high) SST difference in over the SCS and over the PS and the advanced(delayed) warming over the TP cause the advanced(delayed) SCSSM onset date.

Keywords: Asia, monsoon