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Effects of Intraseasonal Oscillation on South China Sea Summer Monsoon Onset

Hui Wang (1), Fei Liu (1), Bin Wang (2), and Tim Li (2)

(1) Earth System Modeling Center and Climate Dynamics Research Center, Nanjing University of Information Science & Technology, Nanjing 210044, China, (2) Department of Atmospheric Sciences and Atmosphere-Ocean Research Center, University of Hawaii at Manoa, Honolulu, HI 96822, USA

Understanding of South China Sea (SCS) summer monsoon (SCSSM) onset response to tropical intraseasonal oscillation (ISO) is critical for extended-range prediction of SCSSM onset. In this study, we investigate the effect of ISO on SCSSM onset for the period of 1980–2013. The 34 onset cases are classified into three groups, early onsets around May 6th, normal onsets around May 21st and late onsets around June 8th, and the late onsets are even later than the Indian monsoon onsets. Before each onset, the SCS experiences a dry ISO phase to precondition the convective energy due to the easterly wind anomalies of the wet ISO phase over the tropical Indian Ocean for the group of early onsets, over the southern Bay of Bengal monsoon region for the group of normal onsets and over the southern Indian monsoon region for the group of late onsets. After each onset, the SCSSM is supported by the westerly wind anomalies of the dry ISO phase over these associated regions. Each early SCSSM onset is triggered by the northwestward propagating Rossby wave of the wet ISO in the western Pacific which comes from the Indian Ocean. For each normal (late) onset, the SCSSM is triggered by synoptic-scale low-level westerlies in conjunction with seasonal low-level westerlies when the wet ISO moves to the northern Bay of Bengal region (Indian monsoon region), since this convection to the north of 10ºN cannot excite the easterly wind anomalies of the Kelvin wave responses over the SCS to suppress the convection. The mechanisms explaining the mean state-controlled ISO-SCSSM onset relationship are also discussed.