Interdecadal change of the South China Sea summer monsoon onset

<u>Yoshiyuki Kajikawa</u>[†]; Bin Wang [†] Hydrospheric Atmospheric Research Center, Nagoya University, Japan Leading author: <u>ykaji@hyarc.nagoya-u.ac.jp</u>

A significant and abrupt interdecadal change in the onset of the South China Sea summer monsoon (SCSSM) onset was detected around 1993-1994. The climatological mean onset date during 1979-1993 appears around May 30th, whereas that during 1994-2008 is happened around May 14th. The mean SCSSM onset processes between the two epochs, 1979-1993 and 1994-2008, are also different. The relatively late onset during 1979-1993 is primarily associated with northward seasonal march of the ITCZ, whereas the advanced onset during 1994-2008 is affected by the enhanced northwestward moving tropical disturbances from the equatorial western Pacific. The possible factors for the interdecadal change of the SCSSM onset were also identified. Since no significant difference of the thermal pre-condition over the SCS was detected before the climatological mean onset, we mainly focused on the impact of the tropical disturbances as a trigger of the SCSSM onset. During 1994-2008, the intraseasonal variablity (ISV) activity over the western Pacific is more enhanced during April 15th - May 15th. This enhancement of the ISV activity is connected with that the arrival of the MJO over the SCS becomes earlier during 1994-2008. The number of tropical cyclones, which passed through the SCS and Philippine Sea during April 15th - May 15th in 1994-2008, is about doubled compared with those occurring during 1979-1993. Therefore, the enhancements of the ISV activity and tropical cyclone genesis after 1994 are major triggers for the advanced SCSSM onset. The enhanced ISV activity and tropical cyclone genesis are possibly affected by the significant sea surface warming over the western Pacific. The spatial pattern of the SST changes from 1980s to 2000s is similar to the horseshoe-shaped SST warming during La Nina events. In theory, the warm anomaly may induce a low-pressure anomaly to the west of the warming itself due to the excitation of ascending Rossby waves. This low-pressure anomaly connects to the low-level convergence, which possibly enhance the ISV activities as well as synoptic disturbances. The low-pressure anomaly also produces the effects of the weakening of the western north Pacific subtropical high. Thus, the interdecadal change of the SST warming can make the SCSSM onset advance. In additon, the interdecadal change of the SCSSM onset can impact the boreal spring and summer mean field over the western north Pacific monsoon and the East Asian monsoon. The State-of-the-Art model's performance to simulate this interdecadal change is also of great interest.