**Diagnostics of Intraseasonal Prediction Biases of the Asian Summer Monsoon by the NCEP Climate Forecast System**

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Biases of intraseasonal prediction of the Asian summer monsoon by the NCEP Climate Forecast System version 2 (CFSv2) are analyzed using output from CFSv2 ensemble hindcasts, the Climate Forecast System Reanalysis, and the Climate Prediction Center Merged Analysis of Precipitation. The period of analysis is May-September, from 1 January 1999 to 31 December 2009.

The intraseasonal forecast of monsoon shows apparent systematic biases, including the underestimations of the western Pacific subtropical high (WPSH) and the South Asian summer monsoon (SASM). However, the predictions with time leads up to two weeks capture the basic variation features of the Asian monsoon skillfully. Prediction biases are dependent not only on lead time but also on evolution stage of monsoon. A typical split time of major change in bias development appears in late June and middle July, when bias growth shows a significant change over the western tropical Pacific and the South Asian monsoon region.

At that split time of bias development, the WPSH begins its first northward jump and the surface temperature over the subtropical land to the north of Indian peninsula commences a transition from warm bias to cold bias. The shift of WPSH position and the transition of surface thermal bias show close relationships with the formation of bias centers in wind and precipitation fields. The rapid bias growth due to strong internal atmospheric variability for short-lead predictions seems to account for the weak WPSH and SASM in the model. At certain stages, particularly for longer-lead predictions, the transition of surface thermal biases might also play an important role in bias development in winds and precipitation, especially over the eastern tropical Indian Ocean and the South Asian monsoon region.