

Unraveling ENSO's Impact on Asia Monsoon and Implications for Climate Prediction

Fei-Fei Jin

University of Hawaii at Manoa

Abstract

Several mechanisms have been proposed to explain how ENSO may influence East Asia monsoon. Recently, We proposed that a key player is in fact a previously overlooked ENSO combination mode of Indo-Pacific climate variability generated by the interaction between the Western Pacific warm pool seasonal cycle and ENSO. This combination mode (C-mode) is characterized by near-annual and sub-annual timescales (combination tones) and contributes substantially to the observed low-level atmospheric circulation and precipitation anomalies in West-North Pacific (WNP) region. In fact, this C-mode is a part of more general ENSO frequency cascade as the result of the nonlinear interaction of ENSO with the annual cycle. This cascade effective transfer from the ENSO power from its interannual band to higher frequencies so to generate ENSO responses not only characterized by different timescales but also by unique circulation and rainfall patterns. This new dynamic theory provides insight into ENSO induced WNP circulation variability and thus ENSO's impact on Asian monsoon precipitation anomalies. Moreover, this concept can further generalized such that there are substantial ENSO associated intrannual/interseasonal frequencies in both summer and winter climate variability that is deterministic in its nature and hence as potentially predictable.