Geophysical Research Abstracts
Vol. 21, EGU2019-526, 2019
EGU General Assembly 2019

ENSO complexity in event-to-event transitions

Jin-Yi Yu and Shih-Wei Fang
University of California-Irvine, Department of Earth System Science, Irvine, United States (jyyu@uci.edu)

Not all El Niño–Southern Oscillation (ENSO) events are the same. An El Niño (La Niña) event may be followed by a neutral state to result in an ENSO episode, by a La Niña (El Niño) event to result in an ENSO cycle, or by another El Niño (La Niña) event to result in a multi-year ENSO event. We develop a dynamical framework to study the source of ENSO complexity, which focuses on the seasonal footprinting (SF) and charged-discharged (CD) mechanisms. Both mechanisms are key coupling processes that affect how the ENSO onsets and evolves from one event to another. Using this framework, we find the SF mechanism in the extratropical Pacific works to increase ENSO complexity while the CD mechanism in the tropical Pacific acts to reduce the complexity.

A key reason why the SF mechanism can contribute to the ENSO complexity is related to the fact that the positive and negative phases of SF mechanism are asymmetric. They respond differently to the ENSO. The asymmetry enables the SF mechanism to produce different ENSO evolution (i.e. ENSO episodes, ENSO cycles, or multi-year ENSO) as well as El Niño-La Niña asymmetries. The reason why the positive and negative phases of SF mechanism are asymmetric will be discussed.