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Two-types of El Niño simulated in climate model, its sensitivity to a physical parameterization

Yeon-Soo Jang (1), Jong-Seong Kug (1), Young-Ho Kim (1), and Dong-Hoon Kim (2)
(1) KORDI, Republic Of Korea (jys0926@kordi.re.kr), (2) Yonsei Univ., Republic Of Korea

Many recent studies showed that there is new type of El Niño event, which differs from the canonical type. They are divided into two types of El Niño events – one is the cold tougue (CT) El Niño, and the other is the warm pool (WP) El Niño. It is important to know how well current coupled GCMs simulate two-types of El Niño. In this study, we investigated a model fidelity in simulating two types of El Niño by changing physical parameter (tokioka parameter), which can control extent of deep convection. When deep convection is highly suppressed with large Tokioka parameter, it is found that the ENSO amplitude is increased Furthermore, we found that the model can simulate two-types of El Niño more distinctively. In the case of the CT El Niño, the location of the precipitation anomalies center is significantly shifted eastward with large Tokioka parameter. Because the model with large tokioka simulates wetter mean state over the eastern Pacific, it can lead to eastward shift of atmospheric feedback associated with anomalous eastern Pacific warming. Our study suggests that the mean precipitation over the eastern Pacific and resultant zonal location of atmospheric feedback associated with ENSO can be one of crucial component for simulating two-types of El Niño.