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Warm Pool and Cold Tongue El Niño Events as Simulated by the GFDL 2.1 Coupled GCM

Abstract

There is more than one type of El Niño to be found in the recent studies. One is the cold tongue (CT) El Niño, of which the sea surface temperature anomalies (SSTAs) are located on the eastern Pacific, and the other is the warm pool (WP) El Niño, of which SSTAs are located on the central Pacific. In this study, they analyzed and compared the differences of both CT and WP El Niño by using the long-term GFDL 2.1 CGCM simulation. They also conducted a budget analysis of the mixed layer temperature to explore the contribution to the dynamic and thermodynamic feedback between both types.

Through this model, researchers found the main differences in the spatial distribution and time evolution between these two El Niño events are the sea surface temperature anomalies and heat content anomalies. Due to the distinctive spatial distribution, the strength of discharge process is also distinct, leading to varying time evolution. For the CT El Niño, it shows the strong discharge process due to the dynamic feedback, especially thermocline feedback. This result in the occurrence of cold phase in the following year. In contrast, the net heat flux term in the WP El Niño plays more significant role owing to the weak discharge process. This allows the positive SSTAs to dampen slowly, and let the cold event rarely be induced.

Keywords

The Recharge – discharge oscillator

CT El Niño v.s. WP El Niño

Reference

Kug, J., J. Choi, S. An, F. Jin, and A. T. Wittenberg, 2010: Warm Pool and Cold Tongue El Niño Events as Simulated by the GFDL 2.1 Coupled GCM. *J. Climate*, **23**, 1226–1239, https://doi.org/10.1175/2009JCLI3293.1.