Geophysical Research Abstracts
Vol. 17, EGU2015-1584-1, 2015
EGU General Assembly 2015

A further Study of ENSO Rectification: Results from an OGCM with a Seasonal Cycle

Lijuan Hua, Yongqiang Yu, and Dezheng Sun
China (hualj@mail.iap.ac.cn)

The potential role that rectification of ENSO plays as a viable mechanism to generate climate anomalies on the decadal and longer time-scales demands a thorough study of this process. In this paper, rectification of ENSO was studied using an Ocean GCM that has a realistic seasonal cycle. In addition to conducting a pair of forced ocean GCM experiments with and without ENSO fluctuations as done in a previous study, we have also conducted a forced experiment with the sign of wind anomalies reversed, with the goal of clarifying the role of the asymmetry in the wind forcing and more generally to better understand the nonlinear dynamics responsible for the rectification. We find that the rectification effect of ENSO is to cool western Pacific warm-pool, warm the eastern equatorial Pacific.

We further find that when the sign of the wind stress anomalies is reversed, the impact of the rectification on the mean state remains almost unchanged. This lack of change is further explained by noting that the upper ocean temperature and velocity anomalies (t',u',v',w') are found to respond to the wind stress anomalies linearly except for the strongest El Niño years. Thus the correlation between t' and (u',v',w') (and thus the nonlinear dynamical heating NDH) remains the same when the sign of the wind stress anomalies is reversed. Indeed, the spatial patterns of nonlinear dynamical heating (NDH) in all four seasons is found to resemble the rectified effect of ENSO in the mean temperature field in the respective seasons, indicating the critical role of NDH in the rectification.