



The Role of Intraseasonal Atmosphere Variability in ENSO Generation in Future Climate

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The intraseasonal tropical variability (ITV) is a general component of the atmospheric circulation in the tropics, particularly, it plays the main role in the formation of El Niño-Southern Oscillation (ENSO). The ENSO is the general mode of interannual climate variability. It appears in two kinds of large-scale sea surface temperature (SST) anomalies in the equatorial Pacific Ocean: East Pacific (EP) El Niño (named also Canonical El Niño) characterized by anomalous warming in the eastern Pacific, and Central Pacific (CP) El Niño (so-called El Niño Modoki) with maximum SST anomalous in the center of the Pacific Ocean [Kao and Yu, 2009; Kug et al., 2009]. The ability of CMIP5 coupled ocean-atmosphere general circulation models (CGCMs) to simulate two flavors of El Niño is estimated using Empirical orthogonal functions (EOFs) analysis of SST anomalies fields (Experiment Pi-Control), in this study we assessed 20 CGCMs. Spatial distribution of the first mode (EOF 1) represents SST anomalies field structure of EP El Niño and the second mode (EOF 2) is analogue of SST anomalies spatial distribution during CP El Niño [Ashok et al., 2007]. To identify intensity and frequency ENSO we also considered both NINO₃ and NINO₄ SST indices. NINO₃ and NINO₄ regions have been defined based on EOF-analysis (EOF 1 and EOF 2, resp.). It's shown that only several models were able to simulate two kinds of ENSO.

Then we tested chosen CGCMs' ability to correct simulation of ITV components. For identification ITV components in the tropical troposphere we applied double space-time Fourier analysis to zonal wind at 850 hPa (U850), following the method of WK99 [Wheler and Kiladis, 1999]. Then we defined wave activity and analyzed spatial pattern of the waves and relationship between the waves and ENSO. Besides, it is shown that the ITV characteristics are altered during different flavors of ENSO [Gushchina and Dewitte, 2012].

In [Yeh et al., 2009] it has been established that the ratio between EP and CP El Niño changes under projected climate changes scenarios from the CMIP5 [Yeh et al., 2009]. Thus, relationship ITV/ENSO could be changed. Understanding the changes in mechanisms of ITV/ENSO interaction in a changing climate is a broad scientific task.

Then best CGCMs have been used to study the modification of ITV/ENSO interaction in various climate change RCP (Representative Concentration Pathway) scenarios. As a result, we have analyzed evolution of ITV/ENSO relationship for two types of El Niño events.

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