EMS Annual Meeting Abstracts
Vol. 15, EMS2018-13-2, 2018

The seasonal relationship between intraseasonal tropical variability and ENSO in CMIP5

Tatiana Matveeva (1), Daria Gushchina (1), Boris Dewitte (2,3,4)

(1) Lomonosov Moscow State University, Faculty of Geography, Department of Meteorology and Climatology, Moscow, Russian Federation (matania.777@gmail.com), (2) Laboratoire d'Etudes en Géophysique et Océanographie Spatiale,Toulouse, France, (3) Centro de Estudios Avanzado en Zonas Áridas (CEAZA), Coquimbo, Chile, (4) Departamento de Biología, Facultad de Ciencias del Mar, Universidad Católica del Norte, Coquimbo, Chile

The El Niño Southern Oscillation (ENSO) is tightly linked to the intraseasonal tropical variability (ITV) that contributes to energise the deterministic ocean dynamics during the development of El Niño. Here the relationship between ITV and ENSO is assessed based on models from the Coupled Model Intercomparison Project (CMIP) phase 5 (CMIP5) taking into account the so-called diversity of ENSO, that is the existence of two types of events (Central Pacific versus Eastern Pacific El Niño). As a first step, the models' skill (23 CMIP5 models) in simulating ENSO diversity is assessed. The characteristics of the ITV are then documented revealing a large dispersion within an ensemble of 16 models. 11 models exhibit some skill in simulating the key aspects of the ITV for ENSO: the total variance along the equator, seasonal cycle and the characteristics of the propagation along the equator of the Madden-Julian oscillation (MJO) and convectively coupled equatorial Rossby waves (ER). 5 models that account realistically for both the two types of El Niño events and ITV characteristics are used for the further analysis of seasonal ITV/ENSO relationship. The results indicate a large dispersion among the models and an overall limited skill in accounting for the seasonal ITV/ENSO relationship. Implications of our results are discussed in lights of recent studies on the forcing mechanism of ENSO diversity. These models are used to estimate the change in the ITV/ENSO relationship in a warming climate based on the RCP8.5 experiments.
Further investigation is required to relate the statistical analysis of nature (additive versus multiplicative) of the atmospheric forcing to the mechanistic understanding of how the atmospheric forcing is modulated by mean state conditions. This would be critical for advancing on the physical interpretations of the statistical results based on the sensitivity of the CMIP models to global warming, such the doubling in the occurrence of extreme El Niño events in the future in response to greenhouse warming.

The study was supported by the Russian Foundation for Basic Research (grant No. 18-05-00767 "The role of ocean-atmosphere mean state changes in the El Nino decadal modulation").