The relationship between intraseasonal tropical variability and ENSO in CMIP5.

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Intraseasonal tropical variability (ITV) is a major component of tropical Pacific coupled system. The dominant intraseasonal mode in tropics – the Madden-Julian Oscillation (MJO) and convectively coupled equatorial Rossby waves were in particular shown to be tightly related to ENSO through their relationship to episodes of westerlies that can trigger downwelling intraseasonal Kelvin waves, a precursor to El Niño onset. The ENSO/ITV relationship does not only have a marked seasonal dependence, it is also sensitive to state of the tropical Pacific, which has implication for ENSO seasonal forecasts. This raises concerns on how the ITV/ENSO relationship may change in the future climate. Here we use 23 models from CMIP5 to investigate the sensitivity of the ITV/ENSO seasonal dependence to global warming. As a first step, the models' skill in simulating ENSO diversity is assessed, which indicates that very few models are able to simulate realistically the statistics of the relative size of two types of El Niño. The characteristics of the ITV/ENSO relationship are then documented revealing that only five models simulate realistically some key aspects, in particular the phase lag between ITV peak activity and El Niño peak and longitude localization of maximum correlation between ITV and ENSO (Fig.1). These models are used to estimate the change in the ITV/ENSO relationship in a warming climate based on the RCP8.5 experiments.

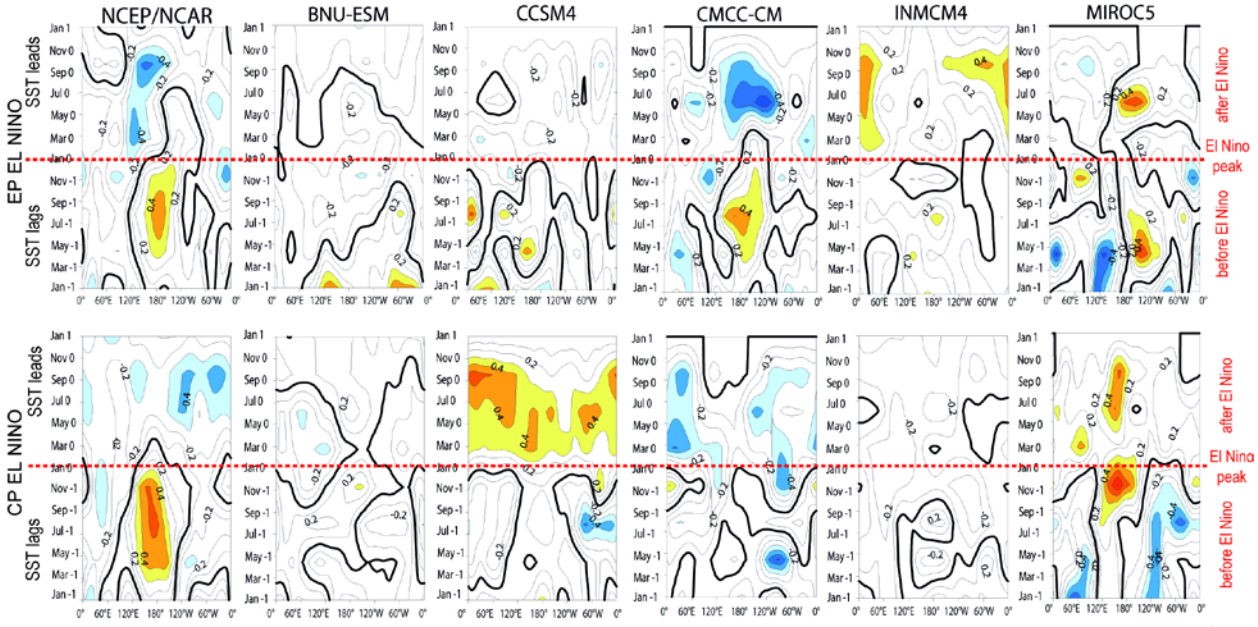

Fig.1. Time-longitude monthly lagged correlation of equatorial averaged (5°N–5°S) RMS of MJO filtered U850 and January EP (Top panel) and CP (Bottom panel) El Niño indices in NCEP/NCAR Reanalysis and 5 CMIP5 models. Contour interval is 0.1. Negative correlation ≤–0.3 is blue shaded, positive correlation ≥0.3 is orange shaded. The thick black line indicates the zero correlation line.