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Interactive comment on "The relationship between intraseasonal tropical variability and ENSO simulated by the CMIP5" *by* Tatiana Matveeva and Daria Gushchina

Anonymous Referee #1

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This is a straightforward manuscript: Signals of ENSO and tropical intraseasonal variability (ITV) in 23 CMIP5 models are compared and their possible relationship evaluated. The authors identified 16 models that reproduced two types of El Nino events, 5 that produced critical properties of ITV contributions to ENSO, and 4 that reproduced the MJO and equatorial Rossby waves. They concluded that only these latter 4 can be used to investigate the connection between ITV and ENSO in future climate.

These results are interesting and useful. The manuscript can be accepted for publication in GMD after some clarification and improvement. I recommend a major revision which I outline below.

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Discussion paper

1. There are some technical issues that need to be addressed. The band-pass filtering of zonal wavenumber k = 1 – 3 for the MJO and k = -1 – -8 for the Rossby wave are inappropriate for model simulations. According to Hayashi (1979), only the part of the eastward power that is incoherent with its equivalent westward power represents true eastward propagating signals. The coherence part represents stationary of standing signals. So using k = 1 – 3 to represent the MJO and k = -1 – -8 to represent the Rossby wave would exaggerate the propagating signals. In observations, the east-west equivalent signals are weak, so this practice is ok. For model simulations, such east-west equivalent signals are strong, the potential coherence part is great and this practice is problematic. The regression results from Jiang et al (2015, Fig. 3) clearly show the dominant stationary signals in many model simulations. The band-pass filtering method used in this current study would mistakenly extract propagating signals from these simulations when there is none.

2. Discussions of the results are mostly qualitative and subjective, heavily relying on visual impression. Suggest use quantitative measures to compare models and between models and observations.

3. Significance level of 90% is lower than commonly used 95% in modern literatures. Suggest use this high standard.

4. Using U850 to define the MJO and Rossby wave might be problematic. There are obviously other perturbations in the same frequency band of the Rossby wave (Fig. 3). Why not use precipitation as everyone else did? This would yield results that can be directly compared to others.

5. Some missing literature citations should be added:

Hendon et al. (2007) for seasonally varying relationship between MJO activity and the ENSO cycle Kessler et al. (1995) for MJO inducing the oceanic Kelvin wave in the Western Pacific Zhang and Gottschalck (2002) for MJO as a precursor of El Nino.

References:

Hayashi, Y. 1979: A generalized method of resolving transient disturbances into standing and traveling waves by space-time spectral analysis. J. Atmos. Sci., 36, 1017-1029.

Hendon, H.H., Wheeler, M.C. and Zhang, C., 2007. Seasonal dependence of the MJO–ENSO relationship. Journal of Climate, 20(3), pp.531-543.

Jiang, X., et al. (2015), Vertical structure and physical processes of the Madden-Julian oscillation: Exploring key model physics in climate simulations, J. Geophys. Res. Atmos., 120(10), 4718-4748, doi: Doi 10.1002/2014jd022375.

Kessler, W. S., M. J. McPhaden, K. M. Weickmann, 1995: Forcing of intraseasonal Kelvin waves in the equatorial Pacific. J. Geophys. Res., 100, 10 613–10 631.

Zhang, C., and J. Gottschalck, 2002: SST anomalies of ENSO and the Madden-Julian Oscillation in the equatorial Pacific. J. Climate, 15, 2429-2445.

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