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Geoscientific Model Development Discussions

Interactive comment on "An evaluation of current capabilities of modelling low-frequency climate variability" *by* Heikki Järvinen et al.

Anonymous Referee #1

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Review of "An evaluation of current capabilities of modelling low-frequency climate variability" by H. Järvinen et al.

This short study uses a recent statistical tool to explore interannual to decadal variability of near surface air temperature in 12 CMIP5 models.

Main comments: 1. The goal of this study unclear as it falls in between (1) a showcase of an advanced statistical tool (RMSSA) and (2) the evaluation of variability in CMIP5 models. Both goals have already been addressed at length in other publications and it is not clear what is new here. 2. The title seems to imply the second goal is pursued (model evaluation). Then it is unclear what the precise science question is. Why focus on these specific aspects of variability ? What implications for model use or development ? 3. The few lines that put in context model errors (p1/l19 to p2/l7) are quite weak

and provide an overly simplistic view of this complex problem. Also, why use only 12 models out of the 40+ CMIP5 model available ? 4. For ENSO time scale (and lower frequency), several studies have shown that a minimum of 200-300 years of simulation are necessary to obtain robust statistics (Wittenberg 2009 and Stevenson et al. 2010). This questions the use of historical simulations (140 years). 5. Spectra are not "objective" measures of model performance (nor any single metric, see IPCC AR5 Chap. 9) as error compensation can lead to the right statistics through the wrong balance of physical processes as shown in many studies. 6. The "subjective" discussions are quite vague, unhelpful and don't provide any perspective either compared to previous studies or for modelling groups. 7. Because of all these serious shortcomings, I recommend rejection of this manuscript.

References: Stevenson, S., Fox-Kemper, B., Jochum, M., Rajagopalan, B., & Yeager, S. G. (2010). ENSO Model Validation Using Wavelet Probability Analysis. Journal of Climate, 23(20), 5540–5547. doi:10.1175/2010JCLI3609.1 Wittenberg, A. T. (2009), Are historical records sufficient to constrain ENSO simulations?, Geophys. Res. Lett., 36, L12702, doi:10.1029/2009GL038710.

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