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## ***Interactive comment on “A discrepancy in precipitable water among reanalyses and the impact of forcing dataset on downscaling in the tropics” by H. G. Takahashi et al.***

### **Anonymous Referee #2**

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Comments on “A discrepancy in PW among reanalysis and the impact of forcing dataset on downscaling in the tropics”

General comment

Both the title and the abstract indicate the two components of the work. On one hand an inter-comparison among 7 reanalyses and on the other the analysis of the impact they have on downscaling for the tropical regions. However through the manuscript the first is presented in qualitative terms as a description while the second is poorly analysed. From the documentation of the reanalyses and several papers it is well known that each of them have important biases (whether dry or wet). It is not surprising then to

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find that a drier/wetter than normal reanalysis may produce a drier/wetter than 'normal' simulation. This 'result' is in fact commented all over the manuscript. We know it is important as we know that the biases are there. However this is not substantially a result of pure scientific interest. What may be of interest is the reason of the biases themselves and how they do produce biases in the simulation and therefore provide a proper quantification of the biases in the simulations. Precipitable water is fundamental for precipitation, mainly in the tropics where we know modeling is quite complex and most of global water vapour is trapped in the lower troposphere. But the analysis provided required a bigger effort. The issue the authors aim to tackle is of interest because of the importance of precipitation and the difficulties of modelling in the tropics. Now regarding the impact of the biases in downscaling, in the manuscript a detailed analysis which may support the importance of the study is missing and much more work is required in order to make it publishable. A recommendation is to consider the two problems aimed to be analysed in the manuscript separately and work on a complete and detailed study of the biases of precipitable water in the reanalyses based on the features of each with its correspondent statistical analysis. Then tackle the problem of the impact of the discrepancies on downscaling, notice that you may be interested in considering SST too as it is strongly related with PW in the tropics and is a main forcing of mesoscale modelling. Spell check suggested.

Specific comments

Section 2:

How were the domains defined? Why did you select July 1998 for your simulations? Notice that the 1997/1998 ENSO cycle has been found to be associated with intense precipitation variations in some regions. How may the particular conditions of the selected analysis period influence your results? The effect of ENSO for the analysis domain for Jul 1998 should be indicated.

It should be useful to include a table with the features of the reanalyses and more

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importantly with an indication of how each compute PW

How about the uncertainties and biases of the NVAP data? How do they may influence the comparisons?

You neglect cumulus convective parameterization because of its 'unrealistic' representation of precipitation but we know very well how important is cumulus convection in the tropics. How you assumption of neglecting it may influence the results of the simulations?

A table with the description of the model and parameterizations may be useful too. Moreover, under which assumptions you have chosen the used parameterizations?

### Section 3

The results are presented basically as a description, your analysis may be improved to provide a proper quantitative analysis of biases and uncertainties. Such results may be of interest of another type of journal, perhaps a technical note report on biases in reanalyses may be worth. Notice that some papers on differences among reanalyses for other variables have been published (see references recommended at the end)

Are you comparing different time spans?

Wet/Dry biases in the simulations are clearly linked to biases in the reanalyses. Furthermore you are not dealing with the effect of these biases in the simulations beyond indicating that the biases are reflected in the simulations.

Regarding your 'suggested result' in page 23769 line 22: is it domain dependent? How do we link active precipitation with precipitable water?

Some reference that may be of interest for the authors:

Alexander Chernokulsky and Igor I. Mokhov, Climatology of Total Cloudiness in the Arctic: An Intercomparison of Observations and Reanalyses, *Advances in Meteorology*, vol. 2012, Article ID 542093, 15 pages, 2012. doi:10.1155/2012/542093

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Bromwich, D. H., R. L. Fogt, K. I. Hodges, and J. E. Walsh (2007), A tropospheric assessment of the ERA-40, NCEP, and JRA-25 global reanalyses in the polar regions, *J. Geophys. Res.*, 112, D10111, doi:10.1029/2006JD007859

Chuang, H., X. Huang, and K. Minschwaner (2010), Interannual variations of tropical upper tropospheric humidity and tropical rainy-region SST: Comparisons between models, reanalyses, and observations, *J. Geophys. Res.*, 115, D21125, doi:10.1029/2010JD014205.

Grabowski, W. W. and Moncrieff, M. W. (2004), Moisture-convection feedback in the tropics. *Q.J.R. Meteorol. Soc.*, 130: 3081-3104. doi:10.1256/qj.03.135

Hodges, K. I., R. W. Lee, L. Bengtsson, 2011: A Comparison of Extratropical Cyclones in Recent Reanalyses ERA-Interim, NASA MERRA, NCEP CFSR, and JRA-25. *J. Climate*, 24, 4888-4906.

Huang, R, Zhang, R, Zhang, Q (2000) The 1997/98 ENSO cycle and its impact on summer climate anomalies in East Asia. *Adv Atmos Sci* 17: 348-362

Jiang, Xianan, and Coauthors, 2011: Vertical Diabatic Heating Structure of the MJO: Intercomparison between Recent Reanalyses and TRMM Estimates. *Mon. Wea. Rev.*, 139, 3208-3223. doi: <http://dx.doi.org/10.1175/2011MWR3636.1>

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Interactive comment on Atmos. Chem. Phys. Discuss., 12, 23759, 2012.

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