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Hydrology and Earth System Sciences
Discussions

Interactive comment on "ERA-Interim/Land: a global land water resources dataset" *by* G. Balsamo et al.

Anonymous Referee #3

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The authors have done a great job and produced a global water resource dataset based on ERA-interim platform. They have shown us several significant progresses in the land surface simulation of ERA-Interim/Land, including an improved soil hydrology, a new snow scheme, and a revised bare-soil evaporation and inclusion of vegetation seasonality. There are so many interesting points for me. They have collected ground measurements to verify the performance of the new model scheme from aspects of land fluxes, soil moisture, river discharge, and albedo. As a user of ECMWF reanalysis dataset, I am glad to hear that ongoing research efforts are being carried out to merge the described methodology into future ECMWF reanalysis data. This work is also interesting to a lot of HESS readers and should be welcomed for publication in HESS. In addition, I have some minor comments. Please see the following.

1. In Abstract, the author announced that 'ERA-interim/Land is a global land-surface dataset covering the period 1979-2010 and describing the evolution of soil and snow pack', however, I found that only soil moisture/temperature and snow variables are included on the website of ERA Interim/LAND. I am confused especially about the words 'a global land –surface dataset'. I understand that a land-surface dataset could include turbulent latent and sensible heat fluxes, soil temperature and moisture, albedo etc. However, when I check ERA-interim/Land from http://apps.ecmwf.int/datasets/, I found soil moisture, soil temperature, but without turbulent fluxes. The turbulent fluxes are as important as soil moisture for climate change and water balance studies. The authors have verified ERA-Interim/Land turbulent fluxes with better performance. The RMSE result in Fig. 5 does show that ERA-interim/Land has a better performance than ERA-Interim at most flux stations. So my question is why haven't ECMWF provide a list of the land surface fluxes produced by new land surface scheme of ERA-interim/Land?

2. GPCP has a spatial resolution of 2.5 x 2.5 degree grid size, which is coarser than ERA-Interim precipitation dataset. First question is about the difference in the spatial resolution. Why GPCP is considered, not other high resolution dataset of precipitation, such as TRMM, GPCC? Secondly, I am wondering what's the benefits of using coarser spatial resolution data of precipitation, especially when relating to heat fluxes in Fig. 5, river discharge in Fig. 6. Because they have also improved the parameterization scheme in the land surface model, so how do they define whether the improvements in Fig. 5 and Fig. 6 is due to or related to GPCP-rescaled precipitation, or updating of bare ground evaporation, or revised soil hydrology?

3. The authors said 'ERA-Interim/Land preserves closure of the water balance', due to they have calibrated ERA-Interim/Land precipitation with GPCP, is the water still balanced after the calibration?

4. The authors just show root mean square error in Fig. 5. However other statistical variables are not included. How about the correlation coefficient and mean bias? Why didn't they plot a taylor diagram for the turbulent fluxes same as soil moisture in fig.10?

5. Fig. 7 is again really interesting to me. Besides, I have downloaded ERA-Interim/Land soil moisture over the Tibetan Plateau, and discovered that the soil moisture of ERA-Interim/Land is better than ERA-Interim over the bare soil of Tibetan Plateau. Please see Fig. 1 below. This also supports the author's conclusion, however, whether the turbulent fluxes have a similar behavior still needs more works to be continued.

Fig.1 Comparison of ERA-interim/Land, and ERA-interim against soil moisture measurement network over the Tibetan Plateau (Su et al. 2011)

6. I don't really understand the sentence 'This method "calibrates" the monthly precipitation amount addressing the issue of non-conservation typical of data assimilation systems,' does it mean non-conservation for water and energy? ERA-interim also employs data assimilation systems. Can we say ERA-interim has non-conservation of water and energy? The authors said that ERA-interim/Land preserves closure of the water balance in Abstract? So don't they contradict each other?

Reference:

Su, Z., Wen, J., Dente, L., van der Velde, R., Wang, L., Ma, Y., Yang, K., & Hu, Z. (2011). The Tibetan Plateau observatory of plateau scale soil moisture and soil temperature (Tibet-Obs) for quantifying uncertainties in coarse resolution satellite and model products. Hydrol. Earth Syst. Sci., 15, 2303-2316

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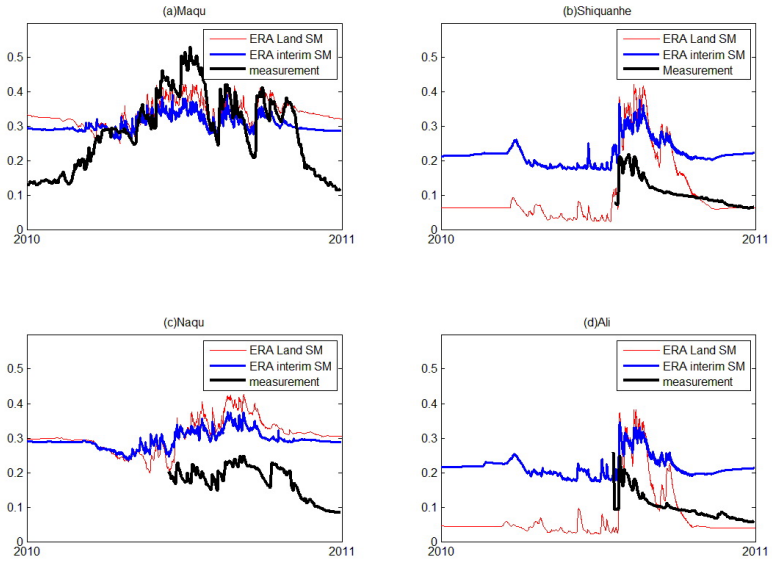

Fig. 1.