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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Evapotranspiration in the Amazon: spatial patterns, seasonality and recent trends in observations, reanalysis and CMIP models" *by* Jessica C. A. Baker et al.

Anonymous Referee #3

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General Comments: The authors compare the spatial patterns, seasonality, interannual variations, and trends of evapotranspiration (ET) estimates from several satellite products, reanalysis, and climate models with catchment scale mass balance ET and ET estimates from flux towers. ET is the largest flux from the land to the atmosphere. Despite its importance, estimates of ET are often highly uncertain. This uncertainty in ET estimates poses a real challenge in hydrological and land atmospheric studies at several scales. In this regard the authors are trying to address an important open question by analyzing the consistency and reliability of a few remotely sensed products and modeled ET fluxes. To do so, they compared these ET estimates with long-term catchment mass balance ET.

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Major comments My major concern is that the uncertainty in catchment mass balance ET that the authors correctly report (Fig 6b and 6c) encapsulates almost all model estimates of ET and remotely sensed ET products. Despite being well written and well structured, I doubt that the basic method of using catchment mass balance ET with such large uncertainty is suitable to evaluate the performance of ET products. Presenting correlations of modeled/estimated ET with catchment mass balance values as performance measures is questionable given the large uncertainties involved in catchment mass balance estimates. Therefore, it is not clear to me in what ways the current paper adds up to the currently reported literature on uncertainties in ET products (e.g. Mueller et al 2014) or in other words what is new here that we didn't know before? For example in Figure 6 b and c, almost all model estimates of ET falling within the uncertainty band of catchment-balance ET. Given such a large uncertainty, one cannot judge the suitability of any ET product.

My second major concern is that given the very coarse resolution of GRACE data (300 km, smoothed to 200 or 100 km), and the dependence of neighboring grid cells, how much GRACE signal adds value to the analysis? How large is the changes in storage as compared to the uncertainties of the other terms in the mass balance eq.?

Specific comments: Line 161-165: How large is the total bias at the spatial scales that is relevant to GRACE observations? Line 185-189: GRACE data contains three observations per month and reported as monthly data, same as runoff and precipitation in the current study. Not sure the need for interpolation here? Line 220, not sure if this arbitrary exclusion of observations is justifiable (specially for the year 2018). Please report (explanation/graph) in what ways including/excluding these points affect your results. Line 226-228: Please explain in what ways inclusion of these sites (pasture) would affect your analysis. Figure 4 and 7: Are these data points extracted for the grid cells where flux towers are located (given the symbols on the plot). In general in most figures it is hard to understand over which spatial scales the ET estimates are aggregated. Figure 8: For all panels please provide the uncertainty band (at least for

catchment mass balance ET). Line 555-560: This is all known and well reported in the literature. What is new? A general comment: Why analysis of long-term monthly values and not presenting monthly data for all products?

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