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Hydrology and Earth System Sciences Discussions

Interactive comment on "An application of GLEAM to estimating global evaporation" *by* D. G. Miralles et al.

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We appreciate the interest of dr. Fisher in our work. We address his comments below.

Regarding the Question: The majority of the input data is at 0.25 degrees resolution. We agree that it is not ideal to have the radiation data at 1 degree resolution and the final resolution of the evaporation product at 0.25 degrees. Nevertheless, in our opinion the gain from keeping in the detail from the fields that are available at 0.25 degrees (i.e. a more detailed final product) outweighs the loss which would be incurred if we smoothed everything to one degree to match the radiation resolution. For this reason we decided to apply the Shepard's Method to downscale the net radiation data to 0.25 degrees.

Note also that, the second most important input – the precipitation – has a resolution of 0.07 degrees. Moreover, the scale of variation of these two important inputs is also different. While radiation varies rather little at the 0.25 to 1 degree scale (and is constrained by the radiation at the top of the atmosphere), rainfall, on the other hand, is far more spatially variable and is unconstrained.

This issue must remain a matter of opinion, because we cannot see a way of substantiating this argument without having the radiation data at 0.25 degrees - and of course if we did have those data the argument would be unnecessary.

Regarding the Note: On page 3 of the paper "An application of GLEAM to estimating global evaporation" we do state that we are using "a data-driven (rather than model-driven) approach as described by Miralles et al. (2010b)". By this we mean the design philosophy outlined in that paper: we want to maximise the use of remote sensing data, and have looked for a model which can be run with the available data, rather than looked for data that could be used to run a particular model.

We agree that all models can be described as "data-driven"; what we wanted to point out is that our emphasis is on making good use of the existing satellite data, not on finding the data that suits a rigid, pre-defined modelling scheme. We however believe that, due to its location in the manuscript, that sentence may be misleading – it comes right after we mention the existence of other satellite-based approaches (like Fisher et al., 2008). When we claim that GLEAM is "data-driven" rather than "model-driven", by model-driven we are not necessarily referring to those satellite-based approaches. We will correct this in the next version.

Models such as GLEAM are best described as "physics-based"; this is how we have described it in other lines in the manuscript (in Abstract and Introduction). In that sense GLEAM is "data-driven" (rather than "model-driven") and "physics-based' (rather than "empirically-based").

Regarding the Observation: We had considered publishing a single paper, but decided that the result would be an over-long, difficult-to-read manuscript. In our opinion, it is better to publish two separate shorter papers. The papers are distinctly different: one on the derivation and validation of the methodology; one on its application and analysis of results. The second paper focuses on global ET and the main ET drivers, showing how GLEAM functions at a global scale and how ET responds on radiation, soil moisture and precipitation forcing.

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