Hydrology and
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Discussions

Interactive comment on "Global patterns of annual actual evapotranspiration with land-cover type: knowledge gained from a new observation-based database" *by* S. M. Ambrose and S. M. Sterling

Anonymous Referee #1

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General Comments:

This paper analyses the global patterns of annual evapotranspiration dependent on land cover types. It uses a new observation based datebase (GETA 2.0) and applies the "linear effective mixed model" methodology to estimate point information to unobserved locations at a global scale and 5'-spatial resolution. Results and subsequent analysis reveal interesting insight into LC specific patterns and changes that are in my opinion an interesting and relevant topic that could be of importance for potential HESS readers and should be published. However, before final approval and publishing in HESS I would suggest (and like to see) a few topics/questions addressed that I have

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Interactive Discussion

Discussion Paper

listed in the following:

I have one comment about the issue of spatial resolution: The GETA 2.0 database provides point information, the climate forcings and therefore predictor variables from NCC are available at 1° resolution. The LC rasters have a 5' resolution. So in fact the LMMing is in principle providing 1° estimates, but that are disaggregated by the 5' LC rasters (with the problem described at p12110 L16-27, but that is o.k.). I think this aspect is important (as is stated by the authors,) but I feel it should be included as a statement/information more dominantly also in the abstract and conclusion part. In the model development of LMM it is said (p12110 L14ff), that the BIC is chosen as a "goodness-of –fit" criteria. Should this be done in a cross-validation framework as well? Have you compared LMM with other techniques (again I would do this in a cross validation framework) ?

From my knowledge LMM (at least as it is implemented in R) will estimate all coefficient of the model (equation 1) simultaneously, so why are you deviding ET_obs values into groups of LC types, again at least in the R implementation you just provide a dataset where locations/measurements have a certain LC (hope we talk about the same technique!). Will the GETA 2.0 database be available after publication? Also, are there sources where the NCC data and the LC raster are avail from? Would be excellent if yes and good to know what the sources are.

At p12113 L22 you mention the discrepancies between the Jung etal. (2010) and your findings concerning wetland and surrounding tropical forest ET. I have no exact numbers but I cannot fully follow your arguments. Tropical forest as well evaporate large amounts of interception water that are not captured by NEE either. What are the number of concrete stations in tropical forest and wetland from where these findings are derived? Concerning the discussion of ET change with change in LC – is there any station in GETA 2.0 where a concrete LC has occurred and where that change might actually be seen?

Specific Comments: P12105 L23f: LC changes alter water availability. I would agree with the first three ways but irrigation is only an indirect consequence!?

P12107 L03ff: Is there a reference and/or Web-Site for the GETA 2.0 database (except supplement B)?

P12107 L19ff: Raster maps of LC are mentioned, are they publicly available to individual researchers/institutions? Or is there only the Sterling & Ducharne (2008) reference?

P12108 L12ff: Authors mention the problem of dominant grassland location of meteorological stations in the NCC data base. Very good to mention this, but with regard to the analysis that follows, is this a problem? An additional comment here would be very helpful.

P12111L17ff: What is "sufficient spatial coverage"?

P12129Fig.1: axis labels!?

P12130Fig.2: please add labels and the scaling factor *10-4 to the axis!

P12133Fig.5: what is A what B?

Sup_A: Abbreviation used in Supplement A should be explained in the caption, independent of its usage in the text.

Sup_B: In Supplement B it is not clear which year the mean yearly ET rate is related to, an additional column for this information should be provided .

Please also note the supplement to this comment:
http://www.hydrol-earth-syst-sci-discuss.net/11/C6003/2015/hessd-11-C6003-2015-supplement.pdf

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 12103, 2014.