Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2017-679-RC1, 2018

Hydrology and Earth System Sciences
Discussions
Open Access
EGU

Interactive comment on "Predicting groundwater recharge for varying landcover and climate conditions: – a global meta-study" *by* Chinchu Mohan et al.

Anonymous Referee #1

Received and published: 17 January 2018

The paper determines the most important factors controlling groundwater recharge rate, and uses a statistical model to estimate groundwater recharge globally. The work includes the creation of a global database of recharge estimates from 715 sites reported in past studies. Using a multimodel approach, the compiled database is used to create an empirical model to predict groundwater recharge at 0.5 degree resolution. The work is of interest and suitable for this journal as it deals with a relevant topic, and has the potential to contribute to future work involving large-scale hydrological phenomena by providing reasonable estimates of groundwater recharge using fewer computational resources. Overall, the writing quality of the paper is good. The transparency of the database compiled is particularly noteworthy. The paper, however, would benefit

Printer-friendly version

Discussion paper

from some revisions. In particular, the results section was at times difficult to follow. Also, some of the figures are unclear and should be modified before publication. For this reason, I suggest the editor consider the revisions suggested below prior to making a decision on this manuscript.

Specific Comments:

Line 78: The fact that the FAO estimates are limited/unreliable is mentioned twice in the paper. How so? It would useful to delve deeper into the limitations of the FAO methodology to help the readers. Lines 123-130 highlights the rationale for selecting the explanatory factors in this study. Were any relevant factors excluded due to data/other constraints? Line 341-343: What was the Vopt for the top 10 models? Are the predictors shown in Table 3 equivalent to Vopt? Vopt could also be labelled on Figure 5 to make it clear. Line 366: How did the models with R2 = 0.56 differ from the top 3 models shown in figure 5 which have a R2 of $\sim$0.42? Line 371-372: It might be useful to add these tests to a supplemental document Figures 3, 6 and 7 are not very clear. Increasing the size of axis text/legend would help. Figure 7 appears stretched. Line 385-413: The procedure to calculate the recharge values shown in Figures 8-11 is not very clear. Was one of the 'better' models used to calculate the map? Or, were all the 'better' models used and then averaged? Please clarify. It would also be useful to have a table that has the regression coefficients for selected models that includes the R2 values. Figure 11 compares the model estimated mean annual groundwater recharge for different countries with the FAO estimates. It would be pertinent to see if the countries that are most deviant from the 1:1 line are ones that didn't have study sites (out of the 715) used in the analysis. Line 412 and Line 480: Given that the FAO method is unreliable, how does the country-wide model results compare with estimates from complex hydrological models like PCR-GlobWB and WaterGAP? This is fairly important as it would help solidify the results obtained in the study. Line 455-467: While this paragraph discusses the influence of vegetation on recharge, the results fail to illustrate this influence. Please clarify how this influence was observed in the results.

Printer-friendly version

Discussion paper

Technical Corrections: Figure 5 is a multi-part figure and should be labelled a),b), c) The legends in Figures 8 and 10 are difficult to see Line 643-645: Citation format not consistent

---

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2017-679, 2017.

Printer-friendly version

Discussion paper