Hydrology and Earth System Sciences Discussions

Interactive comment on "A simple groundwater scheme in the TRIP river routing model: global off-line evaluation against GRACE terrestrial water storage estimates and observed river discharges" by J.-P. Vergnes and B. Decharme

Anonymous Referee #1

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General comments:

This article presents the set up and assessment of a global hydrogeological model dedicated to be included in global climate model. The methodology is clear, and the assessment is quite complete, with the use of two different kinds of data: the river discharge and the terrerstrial water storage estimated from GRACE. Sensitivity to the global precipitation data set is also presented. This article is quite complete, well writ-

ten, and presents a quite important contribution, since it is one of the few (and perhaps the first) global hydrogeological models integrated in a surface scheme that is included in a global climate modelling. Therefore, I recommend accepting the article, with some minor corrections.

Details comments

Section 2: The Trip Model

- It could be interesting to present how the TRIPGW model compares with other global groundwater modellings. Indeed, I only know one such model, the Water-gap model (Alcamo et al., 2003) which is quite simplier in many aspects.

- Page 8219: line 10: Isn't W the river width, since L is the river Length?

  Section 3

  – Page 8220 Line 6: I suggest to add "the elevation of" before "each grid cell is computed as the mean value of the first decile of the actual 30 arcsec resolution topographic values within the grid cell, ranked in ascending order."

  – Page 8221 line 9: Is there just one category or several categories?

  – The extension of the aquifer is not easy to see on figure 1. Would it be possible to have some ideas of the surface covered by the aquifer, at least, on the basins listed in table 2?

Section 4.1 River Discharges

– Page 8224, line 14: It is not clear if the efficiency is computed on daily or monthly values, can you precise ?
– Figure 3 and last paragraph of page 8225: can you give provide the number of river gages by continents?
– Figure 4 and line 5 of page 8226: can you explain how the monthly anomanlies are computed? Is it the monthly riverflow minus the average riverflow (either simulated or observed)?

Section 4.3 Sensitivity to precipitation

Lines 6-7 page 8229 : "This shows that the groundwater scheme does not seems to be affected by the precipitation forcing": I would rather say that the impact of precipitations is larger than the impact of the water transfer simulation.

Section 5: Discussion

– I understood that the results were obtained without calibration, as the parameters are set according to a relationship with the rock type. This should be emphasize in this.
– Page 8233 lines 12-15: Again, I'm not sure that the groundwater model is not sensitive to the precipitation, but I think that the precipitation dominate the signal (see comment above).

Section 6 : Conclusions

P8234 line 5: I would rather write groundwater instead of it in the sentence "In the regions where the ratios are improved, it contributes storage for some of

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the surplus of water and improves the simulated mean annual river discharges, even though they are still over estimated. The simulated GRACE TWS are also improved with the new groundwater"

1   Reference

Alcamo, J., Döll, P., Henrichs, T., Kaspar, F., Lehner, B., Rösch, T., and Siebert, S.: Development and testing of the WaterGAP global model of water use and availability, Hydrol. Sci., 48,317–