

## ***Interactive comment on “Does consideration of water routing affect simulated water and carbon dynamics in terrestrial ecosystems?” by G. Tang et al.***

### **Anonymous Referee #3**

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The paper addresses relevant scientific questions in regards to the representation of routing within process based hydrologic models. The paper is very clearly written and the figures informative. The authors have begun to explore the questions of the impact of spatial variability on watershed functioning.

Comments: Direction of flow routing: Is base/return flow routed based on topographic gradients or does some fraction of runoff enter all downslope neighbors?

Initial conditions: It is not clear if each scenario was spun up individually or if the same initial condition was used for both scenarios. The supplementary data only shows the

C7550

equilibrium states of one simulation. If the same initial condition has been used it would not be possible to evaluate what observed changes are due to routing, and what changes are due to the initialization.

Section 2.5: the authors have chosen to evaluate the model over the period 1994–1995. The reasoning behind this decision was that the COOP station data was most consistent over this period. Considering both simulation scenarios are being forced by the same climate time series, inconsistencies in the forcings would be expressed in both simulations and could be accounted for during comparative analysis of the two scenarios. Additionally, examining the supplementary data, there does seem to be significant variability in the land surface response over the forcing data set period (most highlighted by the LAI). Examining the impact of routing during periods of low LAI versus periods of high LAI would perhaps indicate regimes over this climate record where water limitation drives the land surface response versus energy limitation. Perhaps a discussion of what the inconsistencies in the forcing data sets would help justify this decision.

Table 2: The water table and saturation deficit have altered with the routing case results in less water being stored on the landscape. Additional water balance components would be useful (ie stream flow and base flow) in order to close the water budget. The supplementary data does indicate that mean base flow over the evaluation period is significantly different between the two scenarios. The simulated LAI would also be beneficial to add to this table.

Section 4.5: To aid this discussion the RA and RH equations would be useful.

Figure 2: All y labels are SF, two should be BF

Table 1: Can the active zone depth be greater than the soil depth?

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 12537, 2013.

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