

Interactive comment on “Regional effects of vegetation restoration on water yield across the Loess Plateau, China” by X. M. Feng et al.

Anonymous Referee #2

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The authors present a paper on the effect of vegetation restoration in the framework of the Grain for Green (GFG) project in the time period 1999–2007 using a statistical model to calculate evapotranspiration and water yield. The model is developed, calibrated and evaluated for the entire Chinese Loess Plateau. They compare their model estimated to MODIS satellite and watershed ET determined from gauge stations. Using the model validated in 10 catchments with a total of 67 years of data the authors are confident enough to apply the model to estimate the hydrological effect of the GFG induced land cover change. The general trend is a decrease in water yield across the Plateau. I think the subject of the paper is of great interest for the readership of HESS and I support a publication, however there some minor issues, which require clarification. Firstly, the way the authors try to disentangle the effect of climate change

C2218

from the effect of land cover change by running the model with the climate of the year 1999 (p12 l 1–10). I think the authors need to be quite careful here. My first question would be how representative is the year 1999 in terms of the general climate and the years 2000–2007. It might be 1999 is rather dry or wet and/or temperature is different from the long term mean. In this case the study would only identify the effect of the diversion from normality the year 1999 would present. I would suggest discussing this in detail. This holds also true for the spatial and temporal distribution of temperature and most importantly precipitation, as the latter one seems to be the key driver (p14, l 14). The representativeness issue is also true for the catchment used to calibrate and validate the model. The dataset is split into subsets of 36 for calibration and 10 others for validation. It would be good if the authors could present could justify the choice of the particular catchments. I am also a bit puzzled about the role of the Eddy data. Judging from the abstract and the paper they seemed to be the basis for the model development. But there are no tables or graphs to show how the data compared with the model. It looks like they were not used to validate as the model was only compared to watershed ET and MODIS. Some clarification would be useful. For the comparison with the MODIS ET it would be important to discuss the climatic data used for MODIS in more detail. At page 12 l15–20 the authors say MODIS ET is only 75% of precipitation. The question is which precipitation, the one from the interpolated stations used for their model or the one associated to the climate data (reanalysis) used for MODIS AET. I also certainly miss a uncertainty estimation for the parameter of the regression model and the resulting uncertainty in the results. Right now it is not clear to me if any of the results are significant. There are no error/uncertainty bars at any of the graphs. Some more minor comments: Page 14/l16–17 it is unclear if it should read increase rather than decrease as stated Page 16 l3 is seems the SWAT model was used in the study area. This is in contrast to the statement in the introduction, that there are no models applicable for the area. I would appreciate some word why they did not use SWAT.

I would also recommend to look into Falloon and Betts (2009) and Wattenbach et al.

C2219

(2007)

Falloon, P., and Betts, R.: Climate impacts on european agriculture and water management in the context of adaptation and mitigation-the importance of an integrated approach, *Science of the Total Environment*, 2009. Wattenbach, M., Zebisch, M., Hattermann, F., Gottschalk, P., Goemann, H., Kreins, P., Badeck, F., Lasch, P., Suckow, F., and Wechsung, F.: Hydrological impact assessment of afforestation and change in tree-species composition - a regional case study for the federal state of brandenburg (germany), *Journal of Hydrology*, 346, 1-17, 10.1016/j.jhydrol.2007.08.005, 2007.

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