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Hydrology and Earth System Sciences Discussions

Interactive comment on "Hydrologic effects of land and water management in North America and Asia: 1700–1992" *by* I. Haddeland et al.

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We appreciate the comments. In order to do this study, we are dependent on models and datasets suitable for continental-scale simulations. The VIC model has previously been used extensively in large-scale hydrologic modeling (see also comments to S.Siebert), and it has previously been shown that the model is able to simulate the hydrological processes adequately at this scale. Some references describing these modeling studies will be included in a revised paper.

As for the potential vegetation data and cropland data (both from the SAGE database), the accuracy and applicability of the datasets are thoroughly discussed in the paper by Ramankutty and Foley. We did consider the vegetation from the HYDE database (available at http://www.mnp.nl/hyde/introduction/), which also includes information on his-

torical changes in pasture areas in addition to changes in cropland areas. This dataset was however not used, since the version available at the time this study was performed only included one vegetation type within one 0.5 degree grid cell (the datasets from SAGE were available at 5 minutes resolution, i.e. several vegetation types exist within each 0.5 degree grid cell). However, we are aware that the land use changes in the period 1700 - 1990 given in the HYDE dataset are more significant than in the SAGE dataset, and we do make it clear in the paper that we only take into account land areas converted to cropland. However, we agree that a comparison to other available datasets is appropriate, and we will include such a discussion (see also comment to S.Siebert).

The irrigated areas from Siebert et al. are discussed in a paper published in 2005 (Siebert et al., 2005: Development and validation of the global map of irrigation areas, HESS, 9,535-547), and this should have been mentioned in the paper discussed here. We will include it in a revised version of the paper (see also comment to S.Siebert).

The meteorological data (precipitation and temperature) are based on observations. , and a paragraph discussing the model forcings, and how these data differ from other global datasets, and possible impacts on the results, will be included in a revised version of the paper.

We agree that the period simulated should have been mentioned earlier, e.g. in Section 2.2 Study areas and input data.

The implications of the results for river basin management can be discussed on a general level, e.g. a paragraph describing the general implications of replacing forest by croplands, and the hydrologic effects of irrigation.

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Interactive Comment