**Hydrology and
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Interactive comment on "A global dataset of the extent of irrigated land from 1900 to 2005" *by* S. Siebert et al.

Anonymous Referee #1

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Review HESS-2014-476

General comments

The authors present a new and innovative piece of work with a global dataset of land equipped for irrigation from 1900 to 2005. This is in my opinion an important and very useful piece of work, especially in the light of current global change research with an increasing need of IAMs, GCM's, etc for historical spatial irrigation and rice estimates because of their relevance for GHG emission estimates. Also, they provide a very elaborate and detailed description, together with large Supplements with assumptions and references used, excellent!

Specific comments

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The manuscript highlights the main issues regarding to irrigation matters, the sheer of lack of data, and they try to explain in a transparent manner of how they dealt with these issues (downscaling, using trends of neighbors, interpolation, etc). They also acknowledge the fact that in many countries historical estimates simply do refer to 'irrigated land', leaving it open whether it is land equipped for irrigation or actual irrigated land, and this can lead to substantial under- and/or overestimates. The authors state that it is tough to compare with independent material. Although this is recognized, it still seems a bit strange that only for western USA other independent maps could be found. Surely there must be maps for other parts in the world, Europe, India, China? For example, they refer in section 2.3.1, 2nd paragraph to maps from Achtnich, Framji, Higsmith and Whitbeck and further on the page to 'previous studies from Puma and Cook, Wisser, Yoshikawa' without telling to what regions/countries this applies.

The authors use the following leading principles (which do make sense to me), but are very hard to check whether they are in fact true:

- Use of aridity-index as proxy for irrigated or rainfed rice areas determination - Logical order of historical irrigation : took most likely place at place where current irrigation takes place as well, cropland more likely to be irrigated than pasture, and pasture is more likely irrigated than non-agric land.

In some cases they state that the estimated area of irrigated land is greater than the historical estimates of HYDE. Subsequently, they adjust their estimates. I would like to point out that the estimates of HYDE are also rather uncertain in some areas for some time periods, thus this could mean that the authors estimate for irrigated land can be true after all. However, they correctly address the uncertainties attached to this method in section 4.4. and also issue a warning about the use of this dataset.

Further small remarks

Figure 1. I do like this graph! Very nice way of visualizing which (data-) source they have used for each time period. Figure 2,3: ok Figure 4 - 8 are very small, need to

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zoom in quite a lot, on paper it's not readable. Figure 5. ok Figure 6. Is ok, nice comparison. Figure 7. Representing the difference between using sub-national data and national scaling. It seems an obvious thing to do so, no? But leave it as it is, it's quite illuminating to see the spatial difference. Figure 8. ok Figure B1: ok (why change into B1 and B2?, why not figure 9 and 10?) Figure B2: I'm having a hard time to understand this figure. Difference to mean? what mean?

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 13207, 2014.