

Interactive comment on “Groundwater use for irrigation – a global inventory” by S. Siebert et al.

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This is an excellent article on an extremely important topic as pointed out in the first sentence of the abstract: irrigation accounts for 70% of groundwater freshwater withdrawals and 90% of consumptive water use. Therefore, if we are going to manage water sustainably we need to better understand the source of irrigation water. This paper addresses an extremely important scientific question.

This paper presents new data that will be very valuable to the hydrologic and agronomic community.

The authors have spent a lot of effort to document the sources of data, which is very important for use of these data. The paper is well written and the supplementary material is very valuable.

C1713

There are a lot of acronyms used in the paper and it might be helpful to put them together in a table.

The naming of regions in the paper is not internally consistent and does not follow general usage: e.g. northern America North America etc.

I did a check for US data. The Supplement S2-V3 lists 27,913,872 ha as the AEI for US and lists Siebert et al. (2005) as the source of the data. However, this is not an original source and the original source is not provided in the 2005 reference. The FRIS data (Farm and Ranch Irrigation Survey, not Farm and Range Irrigation Survey as in Supplement) are used to estimate the fraction that is based on groundwater. It would be best to use the same data source for the AEI, which is 22383699 ha for 2002, rather than 27,913,872 ha. In the Supplement 1, the authors indicate that:

We further downscaled these statistics by using county-level data on irrigation water extraction from ground- and surface water (USGS, 2005; USGS, 1998) by assuming that the ratio between irrigated areas from ground- and surface water was similar to the ratio between groundwater use and surface water use for irrigation.

The ratio between groundwater use and surface water use for irrigation based on 2000 data is 58% surface water and 42% groundwater (Hutson et al., 2004). The ratio from the data in Supplement S2-V3 is 69% groundwater, 41% surface water, almost the reverse of Hutson et al. (2004). The values of AAI for groundwater and surface water correspond to those from FRIS for 2002. The USGS and FRIS data do not seem to correspond. It would be good if the authors would comment on this. I may not be using the same data as were used in this paper but I tried to follow what was provided in the Supplementary Material.

p. 3, L. 67-68, Shiklomanov et al. (2000) is generally referenced as the primary source for irrigation accounting for 70% of fresh water withdrawal and 90% of consumptive use.

C1714

It is very interesting that there is such correspondence between the results of Burke (2002) and the current analysis relative to area irrigated with groundwater.

p. 4, L. 92- 97, It would be good to include some information on the spatial resolution of the satellite based product of Thenkabail et al. (2009). I think the percentages of surface water, groundwater and conjunctive use water for irrigation from Thenkabail should be checked. It seems that groundwater should be a much higher percentage.

P. 4, L. 122-123: I presume the inventory will be available on the Aquastat web site when this paper is published. ...it may be better to state that "is available" rather than "will become available".

P. 1, L. 24-25; P. 10, L. 282: The US is discussed in many parts of the paper; however, none of the tables within the paper list the US separately. It might be helpful if they did. I understand that the data are in the supplementary material.

P. 11, L. 305: what is meant by "localized irrigation"? ? drip irrigation?

P. 13, L. 380: The Ogallala aquifer is part of the High Plains aquifer. It would probably be best to indicate the High Plains aquifer, particularly in Texas and Kansas.

P. 13, L. 393: What is meant by "from own estimates" i.e. this study?

P. 14, L. 403-406: need more detailed references for these data beyond census source listed in figure caption.

P. 16, L. 490 – 491: In California Central Valley, surface water is used in preference to groundwater. Faunt, C. C., Ed. (2009). Groundwater availability of the Central Valley Aquifer, California. USGS Prof. Paper 1766, 173 p.

P. 17, L. 512: "with more favourite climate conditions" should be "with more favourable climate conditions"

Reference Hutson, S. S., N. L. Barber, et al. (2004). "Estimated use of water in the United States in 2000." U.S. Geol. Surv. Circular 1268.

C1715

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C1716