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Hydrology and Earth System Sciences Discussions

Interactive comment on "The green, blue and grey water footprint of crops and derived crop products" *by* M. M. Mekonnen and A. Y. Hoekstra

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The authors wish to thank the reviewer for his valuable comments on our manuscript.

#1. We accept the reviewer's suggestion to add the spatial resolution of the reference evapotranspiration and precipitation.

#2. Right, the water footprint within the province, nation or a basin is the sum of all the water used to produce all the crops within the province, nation or a basin delineated area. Therefore it is synonymous to the 'water use' or 'consumptive water use'. We have given detailed definition of the water footprint in reply to Anonymous referee #1. We feel it would be redundant to repeat again here so please refer to the reply to Anonymous referee #1.

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We will add a paragraph on the definition of the water footprint in the introduction section.

#3. Comparing the blue water footprint with the spatiotemporal variability of blue water availability requires major work, and we feel it is beyond the scope of the current paper. As suggested in the conclusion part, it would be our next research work.

#4. We accept the reviewer's suggestion and would present regional pattern of water footprint for cereal crops as one group.

#5. Virtual water flows and water footprint of national consumption is beyond the scope of the current study.

#6. By-products such as oilseed cake have both a product and value fraction but residues such as bran of crops. But bran has a small product fraction only. We have assumed the value fractions of by-products to be close to nil. We accept the suggestion by the reviewer and would explain in the revised manuscript.

#7. Fodder crops (or 'managed grass' as they are called in the MICRA2000 database (Portmann et al., 2010)) include crops which are grown as a fodder crops: alfalfa, clover for forage, turnips for fodder, sweeds for fodder, and grasses for forage. Naturally grown grazing grass is not included in this category.

#8. The decision to use CROPWAT for the 20 minor crops was based on practical reasons. The 20 crops which were excluded from the grid analysis are very minor crops grown in few countries (or few grid cells) some in one or two countries. Besides, their contribution to the total water footprint is less than 0.5%. We felt using the CROPWAT requires less effort than running the whole model and further handling in ArcGIS. While using the CROPWAT, major crop growing areas were identified and climate data from these areas were used.

#9. In our model the applied irrigation is sufficient to meet the irrigation requirement as rightly observed by the reviewer. Thank you for pointing out the mistake in the

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explanation. We will rewrite the sentence.

Reference:

Portmann, F.T., Siebert, S. and Döll, P.: Mirca2000 - global monthly irrigated and rainfed crop areas around the year 2000: A new high-resolution data set for agricultural and hydrological modelling, Global Biogeochem. Cy., 24(1): GB1011, doi:10.1029/2008GB003435, 2010.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 763, 2011.