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Hydrology and Earth System Sciences Discussions

Interactive comment on "Virtual water trade flows and savings under climate change" *by* M. Konar et al.

Anonymous Referee #2

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The topic of the paper is interesting and important but there are a number of issues that make the analysis vulnerable to criticism. In general, it is not clear what the paper adds to the existing literature.

1) The authors provide no references to the previous literature. This is somewhat surprising since first papers were published several years ago. A number of those studies are based on a CGE modelling framework (for a review see Dudu and Chumi, 2008) others use optimization models (e.g. Fader et al., 2011) or input-output methodologies (e.g. Antonelli et al., 2012). Some of those have looked at the impact of climate change (Calzadilla et al., 2011).

2) The concept of virtual water used in the analysis considers only direct (final) water usage, ignoring many indirect (intermediate) uses as input to production. Also, recent

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studies have shown that it is important to distinguish between different types of water (green or blue water).

3) The GTAP model is used but water is not included as a factor of production.

4) The authors consider only three agricultural sectors but the GTAP database would allow for a much more disaggregated analysis.

5) It is not clear why the authors base their analysis on a CGE model. The projections for 2030 consider changes in the productivity in the three agricultural sectors but ignore changes in all other sectors of the economy. A partial equilibrium model, like the IFPRI model, would have been sufficient for such an analysis.

Antonelli et al. (2012) Systemic Input-Output Computation of Green and Blue Virtual Water 'Flows' with an Illustration for the Mediterranean Region, Water Resource Management 26: 4133-4146

Calzadilla, A., K. Rehdanz and R.S.J. Tol (2011) Trade Liberalisation and Climate Change: A CGE Analysis of the Impacts on Global Agriculture, Water 3: 526-550.

Dudu, H. and S. Chumi (2008) Economics of Irrigation Water Management: A Literature Survey with Focus on Partial and General Equilibrium Models, Policy research working paper 4556, World Bank: Washington, DC.

Fader, M., Gerten, D., Thammer, M., Heinke, J., Lotze-Campen, H., Lucht, W. and W. Cramer (2011) Internal and external green-blue agricultural water footprints of nations, and related water and land savings through trade, Hydrol. Earth Syst. Sci. 15: 1641-1660.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 67, 2013.