

Interactive comment on “Recent evolution of China’s virtual water trade: analysis of selected crops and considerations for policy” by J. Shi et al.

Anonymous Referee #1

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The manuscript investigates China’s virtual water trade. The authors find that China is a net virtual water importer. Most of its imports are from countries in North and South America, while most of its exports are towards Asian and African countries. Because crop production in both North and South America have in general higher water use efficiencies than Asian and African countries, China’s virtual water trade overall contributes to a more efficient water use for crop production. Overall there has been an increase in China’s virtual water imports over the last 27 years. These results are interesting, though not extremely innovative, in that the analysis reported in this paper partly mimics previous studies by Dalin et al (PNAS, 2012) and Carr et al. (GRL, 2012). The

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main difference with respect to those earlier contributions is that the authors concentrate on China's trade with the rest of the world. This detailed analysis on China's case is interesting because of the major political, economical, and demographic changes that have occurred in this country for the last few decades. These changes are having major effects on global food and water security. Therefore, I consider this paper interesting and suitable for publication. There are, however, some points that need to be addressed:

1) The introduction is long and provides a somewhat disorganized review of previous research on virtual water trade. I suggest that the authors re-write or re-organized the introduction in a way that it sets the stage for the research questions that will be addressed in this paper. They should first provide the background that leads to those questions, and, then, clearly state the objectives of their study.

2) Methods: section 2.4 is overly long; it uses many acronyms and equations that are probably not necessary. The reader would easily get lost. It is much easier to say that each traded crop has its own country-specific and crop specific virtual water "content" (VWC). Trade between two countries is calculated by multiplying the VWC by the traded amounts and adding the values obtained for all the traded crops. It is obvious what virtual water imports and exports are and there is no need to define them. You can just define the net import and the difference between VW imports and VW exports. My impression is that the reader would easily get lost in subscripts, sums, and all those acronyms. For example is VWI the same as VWB?

3) Results: I think the results on network topology, strength vs degree relations, etc. are not well integrated with the other results, do not contribute to explaining/interpreting China's trade, and are not novel [see Carr et al. (2012, here mistakenly cited as 2013b, in press) and Dalin et al., (2012)]. I would eliminate all these results from the paper and concentrate on the spatiotemporal patterns of China's VW trade. For instance, section 3.3 (lines 15-23) provides information on network properties and their scaling laws that are very well established and have already been reported in the literature.

4) Discussion: I would eliminate the section 4.3. I don't see the point of ending the manuscript with a discussion on what has not been included in the manuscript "due to data and time limitations".

Minor points: a) P. 11614, line 2: please, delete "unconsciously"

b) P. 11615 line 19: Please, delete "was the first to use". Carr et al (GRL, 2012) was published at the same time. Please, correct this reference in the reference list (publication year: 2012).

c) P. 11618, Line 25: I would refer to climate fluctuations instead of "fluctuation in weather regime".

d) P. 11619: line 3: I am not convinced that "virtual Water Content" is a good way to call the VW cost of a commodity. "Content" could give the impression that VW is physically contained in the commodity. However, if this is the way it is commonly called in the literature, I am fine with this expression.

e) P. 11619 lines 15-17: this sentence states something obvious and could be deleted

f) P. 11621. Line25-26: this last sentence could be deleted because it is not very informative.

g) P. 11622: top paragraph: the text here could be shortened. Lines 7-11 could be rewritten as "Grain crops account for 97% of all VW imports". Lines 16-18 could be deleted. The difference between total and average should be clarified.

h) Line 21: "source" could be replaced by "trade partner"

i) Line 25: I would replace ", even if less significantly" with "and smaller in volume"

j) Line 27: "...been important trade partners for China's exports".

k) Line 28: "has become"

l) P. 11623: Lines 4-13: here you could be more concise: you keep repeating that

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China imports from a small number of countries and exports to a much greater number of countries.

m) Lines 14-22: I would remove this analysis and discussion of scaling properties in network structure.

n) Line 28 What is the “absolute” deviation?

o) P.11625. Lines 19-28 could also be deleted.

p) P. 11626: Lines 25-29: this part needs to be explained better. There is the need for a reference to support the statement about the low production cost of soybean. The idea of water savings also needs to be clarified. The water saved in China goes back to the USA or Brazil.

q) P. 11627: line 14. The authors mention here “pollution”. Pollution should not have any direct effect on water quantity.

r) Section 4.3: I would eliminate this section

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