Review of the manuscript:

The interprovincial green water flow in China and its tele-connected effects on socio-economy

Comments

The present manuscript provides an emblematic example of integrating green water flows at a sub-national level in water management strategies. It expands on recent studies that highlighted the socio-economic value of green water teleconnections. The topic is suitable for publication and of interest to the readership of EGUsphere.

I would recommend the publication of this paper after major revisions. In the following, there are some comments that the authors may want to consider when revising their manuscript. These revisions should enhance the manuscript's clarity and depth.

Specific comments:

Abstract:

Lines 15-16: Pay attention to verb consistency for better clarity and flow.
Lines 19-21: The dataset used for the analysis is not well introduced or explained. Provide a more detailed and concise explanation of the data used.
Line 22: Include the specific value of the average self-recycling ratio.
Lines 32-35: This passage is unclear. Consider rephrasing and supporting it with specific results.

Introduction:

Line 45: Consider adding additional references for the average global terrestrial moisture recycling ratio. Rockström (2023) cites Tuinenburg (2020), they are essentially the same reference.

Lines 60-61: Clarify the period of reference for the change mentioned. Specify when the change occurred and add recent references for support.

Lines 99-103: This section is unclear. Rephrase for better clarity.

General Comments:

The Introduction could benefit from clearer explanations of certain passages. Include a characterization of China's moisture recycling patterns, atmospheric circulation, and climatic seasonality to frame the phenomenon of moisture flows. For instance, compare the importance of moisture recycling in China to other regions globally.

Discuss the socio-economic background of the Chinese provinces involved. Highlight key socio-economic sectors and societal issues/characteristics of these regions.

Explain why analyzing green water flows at an inter-regional scale is significant, both generally and specifically for China.

Data and Methods:

General Comment: This section requires substantial improvements.

Structure: Separate the Data and Methods into two subsections. Move Figure 1 to the Methods subsection and provide detailed explanations in the caption.

Figure 1: The caption should be more detailed to enhance understanding.

Lines 127-138: Provide a more detailed explanation of the reconstruction of flows from the UTrack dataset. Clarify the processing with zonal statistics, possibly using equations or schemes for better comprehension.

Socio-economic Analysis: Since this is the core of the study, it needs a more in-depth analysis. Explain the significance of green water flows for the variables considered. How do they contribute to the services these variables represent?

Equation 1:

- Consider incorporating the areal extension of the provinces. Using population density instead of population, and expressing surface water resources per unit area, would be more appropriate. Similarly, express food production per area rather than gross food production. Use GDP per capita (GDP/P) instead of gross GDP.
- Address the role of irrigation and irrigation infrastructure in food production to avoid overestimating the contribution of green water flows. Differentiating between irrigated and rainfed productivity could be insightful.
- Include units of measure.

Equations 2 and 3:

The focus shifts to the consumption patterns of each province. However, Equation 1 deals with food production, which does not equate to food consumption. Food production in one province might be exported elsewhere. Clarify whether the study focuses on production, consumption, or both, and how these dynamics are analyzed.

General comment: Consider revising Equations 1,2 and 3 to enhance the rigour of the analysis.

Results:

Section 3.1:

Figure 2: The figure has great potential but needs improvements.

- Increase its size for better readability of numbers and histograms.

- Clarify the label of the right bar in the figure, caption, and text. Consider rephrasing for better understanding.

Lines 195-237: The discussion on PRR, DPR, and DSR contains a lot of information that is difficult to visualize. Consider creating a figure to represent these results to help the discussion of socio-economic implications.

Line 214: Provide a definition of westerly winds for a general audience. Also, it is the first time in the manuscript that atmospheric circulation is considered explicitly (see comment about the Introduction)

Section 3.2:

Suggest swapping the order with Section 3.1. The geographic visualization of flows in Section 3.2 aids in understanding the results presented in Section 3.1.

Section 3.3:

This section is well-written and interesting. However, given its significance to the analysis, consider expanding and providing more in-depth discussion.

Discussion:

Overall, this section is well-structured and written, but improvements are needed:

- Enlarge Figure 5 for greater clarity.
- Provide a deeper discussion on the uncertainty of tracked precipitation at the provincial level.
- Lines 429-431: The sentence “Our attempt... [..]” is redundant here and would be more appropriate at the end of the discussion.

General Comments for Discussion and Conclusions:

- Include a more in-depth description of the limitations of the socio-economic analysis to add value to these sections and the overall study.
- Discuss potential improvements for this type of socio-economic analysis.

- Since this study is presented as a starting example of integrating green water teleconnections into water management strategies for socio-economic applications, it would be beneficial to elaborate on additional steps needed to achieve this goal.
- Consider discussing other variables that could enhance the analysis of socio-economic implications.

Supplementary Figures and Tables are not cited, and thus integrated in the text. Please integrate them in the main text.