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Dear Editors:

Thank you for your comments concerning our manuscript “An improved method for calculating regional crop water footprint based on hydrological process analysis”. We appreciate your comments and constructive suggestions very much, and they were valuable for improving the quality of our manuscript.

We have revised the manuscript in detail according to your comments. The revised portions are marked in red in the paper.

The main corrections in the paper and the responses to the editor comments are as follows:

Comment 1:

Section 4.4 "The influence on efficiency of irrigation system" as stated in the response letter to Referee#1 has become the first paragraph in section 4.3 "Strategies for adjusting the crop production water footprint" in the main manuscript. I'd like to ask the authors to rethink this shift and suggest to keep section 4.4 (on efficiencies) or to move this paragraph to the end of section 4.3.

Response:

Thank you for your comment. We have moved "The influence on efficiency of irrigation system" paragraph to the end of section 4.3 in the revised manuscript as your suggestion. The efficiency of irrigation system is one of the factors that affect the crop production water footprint.

The modified parts are as follows: (Page 23-24, line 414-438)

4.3 Strategies for adjusting the crop production water footprint

The water footprint of crop production is affected by crop species. Different crops have different water use characteristics and different growth periods. Therefore, adjusting the crop planting structure can change the water supply in the region (Fasakhodi et al., 2010), which in turn affects the water footprint of crop production. At the same time, changing the crop pattern, planting crops which growth periods are consistent with the precipitation period can increase the utilization of green water, reduce the consumption of blue water, and reduce the pressure on local water resources (Liu et al., 2018). This study found that in the HID, the growth period of sunflower is basically the same as the precipitation period. Consequently, expanding the planting area of sunflower can make better use of local precipitation resources and reduce the use of blue water.

Crop yield is an important factor affecting the water footprint of crop production. Selecting crop varieties with high yields and improving agricultural management measures play an important role in increasing crop yields. Sun et al. (2013b) found that improving agricultural management measures is an important factor to increase crop yield and reduce water footprint of crop production. Liu et al. (2014, 2015) discussed the water use situation and virtual water flow in Hetao Irrigation District and found that crop yield had an important impact on the water footprint of crop production, and with the increasing of crop yield per unit area, the water footprint of crop production had declined.

The efficiency of irrigation system is affected by the way of water transportation, the condition of canal system, the irrigation technology and so on. Therefore, the water use efficiency of the regional irrigation system can be improved by changing the water delivery method (from the channel to the pipeline) and the irrigation method (such as dropper, sprinkler and other advanced irrigation technologies). For the study area, the results show that more than half of the water resources were lost during the process of canal water transport and irrigation. Therefore, adopting anti-seepage measures to reduce the leakage of canal system, and adopting advanced irrigation technology to reduce the amount of irrigation water will help to reduce the water footprint of crop production in this region.

Comment 2:

Please use the same units when comparing your results with results from other studies.

Response:

Thank you for your comment. We have modified the units ("m^3 kg^{-1}" change to "m^3 t^{-1}") in the revised manuscript as your suggestion.

The modified parts are as follows:

Sun et al. (2013b) calculated the average water footprint of HID by using regional scale method and water balance principle and the result was 3910 m^3 t^{-1}. (Page 22-23, line 400-402)

Qin et al. (2016) calculated the water footprint of sunflower in Jilin province by using field scale method and found that the water footprint of sunflower in this area from 2006 to 2008 were 1280 m^3 t^{-1}, 1684 m^3 t^{-1} and 1726 m^3 t^{-1}, respectively, which was smaller than this study. (Page 23, line 404-406)

Thank you for your helpful suggestion regarding our manuscript. We have revised the manuscript

according to your comments carefully.

We appreciate the editors and reviewers' work.