

Comments from editor:

Dear Authors,

Thanks for proceeding with us with your paper.

Going over your replies to the reviewers comments I see the following as a major weakness of the paper:

The new interesting and important text you added emphasized that unlike Syria, Turkey invested much in irrigation and water supply to the agricultural sector, although it is unclear if this included the Khabur basin region? Figure 7.e shows the gap between the two countries already started in 2003 and increases to high values already before the war (2011). It may raise a more general point for you to consider: that the underinvestment in irrigation in the Syrian agricultural sector led to the unrest and the war. It will be interesting if this can be shown using the RS technique. As Khabur region is a small fraction of the Syrian agricultural land, I would suggest to expand this to larger parts of the country and back it up with independent information on irrigated land/water amount changes in Syria before the war.

Note please, according to Fig. 7.a, the larger and massive cropland area (dark blue) in the Syrian side is in the right side of the study area. When comparing fig' 7.a. (2005) with b. (2019), it is clear that the drastic land cover change is at that same area. Maybe, you need to concentrate the changes in this blue region?

According to Fig. 7.b the difference there is very dramatic, unlike the data in fig' 7.c.

Fig's d & E are suggesting that the image (Fig b) is from the summer (is it right?) and thus hint to lack of irrigation due to the unrest – isn't it?

Looking forward for the new version.

Hope this find you in a good health. Kind regards, Eyal

REPLY: Dear Editor, thank you very much for your in-depth thinking, which has given us a lot of inspiration.

1. Indeed, we do not know the details in Khabur basin of the Turkey side, and we only can assume that in a stable country, the general trends (increasing or decreasing) in agriculture investments of different region are consistent. It's beyond our ability to fully understand what's going on in this area.

2. Irrigation data is difficult to obtain and there is no mature technology yet (Meier et al., 2018). A recent released irrigation dataset developed by Nagaraj et al. (2021). As illustrated by Figure r1, irrigated cropland in Syria appears to have continued to decline. However, some of the recovery in 2015 compared to 2010 seems inexplicable. We also examined some areas of China with well-known irrigation changes and found some unreasonable results using this dataset. This suggests that the data extracted from changes in irrigation are currently very unreliable. Therefore, we did not use this dataset in the paper. Unfortunately, FAO based data is only updated to 2005 (as shown in fig.7a). Meanwhile, the map (picture) from google earth is for

illustrative purpose only (synthesized from different satellites at different times, Figure r2-3), which cannot be applied on the quantitative analysis.

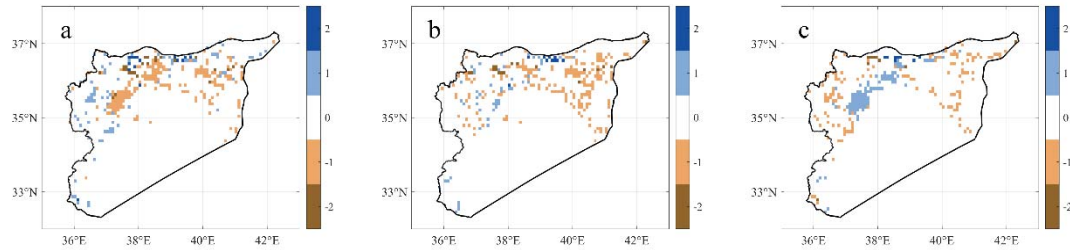


Figure r1, the changes of irrigation status in Syria. Three types are defined: 0 – 2 represents no irrigation, medium irrigation and high irrigation. The changes were calculated by the differences which cover a range of -2 to 2. A positive number represents an increase in irrigation, a negative number represents a decrease in irrigation. a) the changes between 2010-2001; b) the changes between 2015-2001; c) the changes between 2015-2001.



Figure r2, image from google earth web of the Syria side. It says: date 2019/7/15 CNES/Airbus



Figure r3, image from google earth web of the Turkey side. It says: date 2019/11/11
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3. There is a very critical assumption on the paired analysis. The two regions should have identical climate conditions (control the climate driven part), therefore, generally a divide plain is relatively ideal. As illustrated in Figure r4, the whole region is too large in length. Meanwhile, the corresponding north side is a mountainous area, therefore, a comparative study cannot be carried out. This area appears to be Kurdish-controlled, and I don't know exactly what's going on.



Figure r4, A map of northern Syria taken from Google Earth. The yellow line represents a distance of 217 km.

4. The emergence of social unrest is an extremely complex social problem, which is beyond the scope of this paper. Particularly, the same phenomena and evidence can be interpreted politically in diametrically opposite ways. From a scientific point of view, it can neither be experimentally confirmed nor quantified. However, the scientific logic of the impact of human activities on the ecosystem itself is clear and definite. Meanwhile, further reading is suggested with a latest paper which titled “Civil war hinders crop production and threatens food security in Syria”.

I must honestly say that the analysis can only be done on a national scale at the moment. It is a pity that I am unable to actually investigate and find out the details about the area, all through news and related reports. Sorry for not fully answering your concerns.

The details of the revision are in the track change manuscript, and we are very grateful to the reviewers for their comments and the editors' work.

References:

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- Nagaraj, D., Proust, E., Todeschini, A., Rulli, M. C., & D'Odorico, P. (2021). A new dataset of global irrigation areas from 2001 to 2015. *Advances in Water Resources*, 152, 103910.
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