

Interactive comment on “Attribution of satellite observed vegetation trends in a hyper-arid region of the Heihe River Basin, Central Asia” by Y. Wang et al.

Anonymous Referee #1

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General comments

The manuscript “Attribution of satellite observed vegetation trends in a hyper-arid region of the Heihe River Basin, Central Asia” by Wang et al. focuses on the method of distinguishing between changes in NDVI due to prosperity changes in desert vegetation or changes in irrigation schemes. While I appreciate the author’s efforts to assess their method regarding sensitivity to distinct rainfall databases, I doubt that the manuscript can be considered as research article according to HESS’ manuscript types, unless results are discussed in the context of other studies with similar or contrasting results and in the context of climate and land use. In this regard, the authors

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seem to lower the expectations of the reader towards the goal of the study from (i) a general assessment of the suitability of remote sensing imagery (title) to (ii) the impact of climate change on vegetation cover (abstract) and, eventually, (iii) a case study for Central Asia (introduction). As long as the authors don’t elaborate on any possible implications regarding management of land use (vegetation and water resources), their method remains meaningless and could possibly (at the discretion of the Editor) be considered as technical note if much more detailed technical information is provided.

Evaluation criteria

Does the paper address relevant scientific questions within the scope of HESS?

Yes

Does the paper present novel concepts, ideas, tools, or data?

Yes

Are substantial conclusions reached?

No. See specific comments.

Are the scientific methods and assumptions valid and clearly outlined?

Yes.

Are the results sufficient to support the interpretations and conclusions?

There is a lack of interpretations regarding implications for ecosystem management. See specific comments.

Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)?

Yes.

Do the authors give proper credit to related work and clearly indicate their own

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new/original contribution?

It is unclear whether similar work has been done before.

Does the title clearly reflect the contents of the paper?

No. See specific comments.

Does the abstract provide a concise and complete summary?

Yes, except for the aim of the study.

Is the overall presentation well structured and clear?

Yes.

Is the language fluent and precise?

Yes, but tense issues occur throughout the paper. See specific comments.

Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? Not always. See specific comments.

Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated?

No.

Are the number and quality of references appropriate?

Yes, with a few exceptions in the introduction. Major revision of the discussion is required. See specific comments.

Is the amount and quality of supplementary material appropriate?

Yes.

Specific comments

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Throughout the paper there are tense issues, particularly with regard to the presentation of methods (Section 2) and results (Section 3), which should always be written in past tense rather than present or future tense. Further, some inconsistencies occur with regard to equations and sub-headers.

Title: The title is too vague given that the paper only uses NDVI based on MODIS rather than a range of other "satellite observed vegetation trends".

P1529L5-7 and P1532L10-13: While the abstract suggests assessing the "trend of fractional green vegetation cover to climate change and to human activity", the last paragraph of the introduction lowers the bar to "a component due to greening (browning) of the deserts and a second component due to changes in irrigation". I see how irrigation is a human activity. What I don't see is how climate change fits into the picture. Since the paper doesn't consider any trends in climate changes (neither in the past nor in the future) I assume the authors refer to climate or weather variability rather than change.

P1531L11-17: References are required for each of the possible causes of vegetation changes.

P1532L6-7: What are the management implications for the two distinct scenarios? This should be discussed in detail in Section 4.

P1535L11: Elaborate on the "trial and error" approach to conclude that areas with NDVI > 0.1 are irrigated. At this stage this approach is too arbitrary to be considered as scientifically sound.

P1535L20 and P1536L11: Equations (1) and (2) refer to the same variable (fv), yet they are different. Change variable names to make the equations unique.

P1536L11 and L15: Equations (2) and (3) refer the same variable and should be re-named as (2a) and (2b).

P1537L24: Be consistent with the terminology. You refer to fv as "foliage cover",

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whereas in other parts of the paper f_v is referred to as “fractional vegetation cover” (e.g., P1535L18).

P1538L9 and L21: Sections 3.2 and 3.2.2 are entitled the same.

P1538L17-18: Language issue: “The most sensitive factor is relative variations in the fractional irrigated area”. Please reword.

P1541L4-6: This finding has to be discussed in the context of other studies with similar or contrasting results in the context of climate and land use.

P1541L7: Refer to f_D as non-irrigated areas in the discussion to make it easier for the reader to understand (and to avoid re-browsing the methods section).

P1541L7-8: Discuss why this result was “as expected in such an arid region”.

P1541L17-28: Discuss these and further studies in the context of your findings rather than just listing them.

P1541L28-29: Elaborate on the “larger regional setting”.

Fig. 1a: Language issue: “Climatology Precipitation. Please reword.

Fig. 1c: Please indicate where this part of the basin is located in Fig. 1b.

Fig. 4: Scale issue: Values for f_l appear to be much smaller than values of the other graphs, yet f_l is in the range of 16-19%, whereas the other graphs range between 2 and 5%.

Fig. 8: I assume that GPCP rainfall was used XP? Also, refer to Fig. S2 for other sources of rainfall observations.

Technical comments

P1532L24: “non-mountain regions” . . . flatlands?

Fig. 3: In the legend, use the same line style as for the graphs (dotted, dashed, etc.).

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Fig. 4, caption: What does the number 3 in “(f_D , 3 left scale)” refer to?

Fig. 8: Typo in “vegetaion”.

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