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Biogeosciences Discussions

Interactive comment on "Relating historical vegetation cover to aridity index patterns in the greater desert region of northern China: Implications to planned and existing restoration projects" *by* Yanying Shao et al.

Anonymous Referee #1

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After some reflection and as a follow-up to my earlier comments regarding the manuscript, "Relating historical vegetation cover to aridity index patterns in the greater desert region of northern China: Implications to planned and existing restoration projects", I pose several questions for the authors' to consider in their revision of the manuscript. In general, I still feel the manuscript has plenty to contribute to the scientific literature, but I believe some of the key parts of the paper could be improved. I believe that some of these questions/comments may help to elevate the quality of the manuscript. Some general questions: 1. What are the merits of the research? Is the merging of AI calculations with space-borne evidence of vegetation change novel

here? What about the usage of convergent cross mapping? Are the results of the analysis supported by prior studies of this kind? The authors should highlight them in the discussion. 2. In terms of convergent cross mapping and the lack of feedback between AI and NDVI, does this support the current state of knowledge about the relationship between these two variables? The authors should try to expand/elaborate on the extent that this may or may not be true. The proposed reason of spatial resolution coarseness may be right, but is this understanding supported by the scientific literature? Corroborative evidence in the existing literature would help firm this explanation as a possibility; so, more insight on this issue is needed in the discussion part. 3. The statements regarding existing and planned re-vegetation projects. Is there any evidence within the desert belt at the field level that supports some of the conclusions reached in the manuscript, i.e., wetting and vegetation improvement in the west and drying and vegetation decline in the east. Field-based evidence showing some of these trends would help solidify the paper. 4. According to Regional Climate Model or Global Climate Model projections for N China, are the expectations for western (wetting) and eastern (drying) N China borne out in their future climate projections for the region. The reason why I ask is because the study as you know is based on historical trends; is there any expectation that these trends will continue into the future? An evaluation of modelled trends for the area would help firm up the importance of past trends in describing the potential risk of future climate changes to the persistence of existing and planned re-vegetation projects. If there are no expectations that these trends will continue, what is the value of the current research regarding existing and future projects. In the manuscript, the authors state that the trends will continue. Is this supported in the scientific literature and/or climate change projections for the region?

Specific questions: 1. Page 5, line 10. How are the numbers of "m" and "tk" calculated? The authors should give more explanation. 2. Page 5, line 19. The method of convergent cross mapping is well addressed, but the application of the method in this study is not explained clearly. For example, how the samples were collected? 3. Page 20, Fig. 7. Based on Figs. 6 and 7, the temporal change of NDVI mainly appears in

the climate transition from desert to steppe. The authors should address this in greater detail.

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