

Interactive comment on “Responses of snowmelt runoff to climatic change in an inland river basin, Northwestern China, over the past 50a” by J. Wang et al.

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Thanks for the comments and suggestions. The following is our reply, 1) Many others have published papers on this same topic. Statements about climate change ongoing in this area are not backed up by any test of statistical significance, only plots are provided which are not conclusive in any way. The use of the Snowmelt Runoff Model has been done before.

Authors' Reply: Climate change is a common and important issue over the world. Although there are many similar studies on it, we thought it is needed and instructive to analyze the snowmelt runoff response to climate change at a regional scale. We will

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improve the statistical analysis. On the other hand, the discharge from the upper Heihe basin is the most important water resources for the middle and lower reaches, so water resources management is essential. The knowledge and information about responses of discharge to climate change, is needed for reservoirs build and water regulation in this region. In addition, the water allocation plan of the Heihe River is important to local ecological condition and economy. All above require a better understanding of responses of snowmelt runoff to climatic change. We thought this study is needed and important.

2) The authors state that the algorithms of MODIS snow products need to be improved in their region. I suggest that the authors themselves must do this and not wait for others to do this for them. The raw MODIS data are available and they could develop a technique that could be used more effectively in their region.

Authors' Reply: Snowcover is the important resources of spring discharges in snow-covered regions, and is also the major input to SRM model. In the article, we developed a new method to map snow cover from MODIS 09 surface reflectance data in upstream of Heihe River basin. The new method is also based on the NDSI index method. However, there are two important improvements in the new method than NSIDC MODIS snow cover product. The new method considered the effects of topography, and an improved Civco model was used to eliminate terrain effect. In addition, the credible region NDSI threshold value be established for mapping the MODIS snow cover area by comparison with Landsat-ETM+ images and MODIS data. Results shows the improved snow cover product is more accurate than data from NSIDC. Compared with those previous climate change studies using SRM, we paid more attention on the snowcover change. As the review pointed out, further improvement is needed on the snow cover mapping method, and analysis of snowcover change to discharge should be studied in more details. We thought snowcover mapping and its improvement is our important and creative job in this study, and we are modifying the manuscript as the suggestions.

3) I do not think the authors have actually developed a proper climate scenario. As an

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example of this, they use a precipitation change of 2X which means that the precipitation is increased by 100%. Climate change studies around the world have indicated that precipitation would increase or decrease by 5-20% at the most.

Authors' Reply: Thanks for your suggestion, a 2 times increase of precipitation is not impossible actually, we will replace it by a proper scenario.

4)The manuscript has many spelling, grammar, and omission errors throughout the text.

Authors' Reply: We are correcting these grammars and spelling errors.

Please also note the supplement to this comment:

<http://www.hydrol-earth-syst-sci-discuss.net/7/C787/2010/hessd-7-C787-2010-supplement.pdf>

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 493, 2010.