

Interactive comment on “Climate change impacts on snow water availability in the Euphrates-Tigris basin” by M. Özdoğan

Anonymous Referee #2

Received and published: 10 June 2011

Review of: Climate change impacts on snow water availability in the Euphrates-Tigris basin
Author: M. Ozdogan

Summary: The manuscript presents a useful and well-reasoned analysis of potential climate change impacts on seasonal snowpack in the Euphrates-Tigris basin. A multi-model ensemble of GCMs is employed to provide forcing data for an advanced hydrological model. Both the multi-model ensemble technique (with appropriate downscaling) and the implementation of the VIC hydrological model represent appropriate applications of methodologies that are well-represented in the climate change literature. The paper’s application of these techniques to the problem of changing snow pack in the Euphrates-Tigris represents an original and quite welcome contribution to

the literature. The paper will be of interest to the climate change impacts community, and particularly to those concerned with water resources in this transboundary river system. I recommend that it be accepted pending minor revisions.

Major comment:

I fully appreciate the difficulty of performing in situ validation of modeled SWE estimates in this part of the world. Given this difficulty, however, it would be valuable if the author could provide one or more evaluations of other hydrologic variables against available in situ data, in order to assess the performance of VIC w.r.t. simulation of the overall water balance. A comparison of VIC streamflow with gauged runoff would be one option.

Additionally, this reviewer would appreciate seeing a table or figure that evaluates the downscaled meteorological fields against available in situ station data. My confidence in the model's results under both present and future climate would be enhanced if we could see that the approach for estimating local meteorology is robust.

Minor comments:

Abstract, L12: suggest "high-impact A2 climate change scenario" rather than "aggressive A2 climate change scenario."

p. 3634, L2-3: A reduction in snow pack doesn't necessarily mean a significant reduction in water downstream. The largest impact is a change in seasonality, which would have implications for storage requirements and dam operation. The issue is addressed nicely in the discussion, so the author might rephrase here accordingly.

p. 3638-9: Please clarify how VIC elevation bands were applied. It seems that NCEP fields were downscaled to 1/8 degree using elevation correction and a bilinear interpolation. Does VIC introduce further subgrid variability, or was this the extent of downscaling?

p. 3640, L16: Do I understand correctly that this approach assumes stationarity in sub-monthly variability? If so, please note the assumption. If not, please indicate how

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non-stationarity is taken into account.

p. 3644, L5: why are only 12 out of 13 shown? If this is simply a space constraint, then you might remove the statement from the text and simply note it in the legend of the figure (perhaps explaining that you dropped one model b/c it's so similar to another model). If you've removed an outlier, then please explain the rationale.

p. 3645 L12: I find this sentence confusing. Is the point that accumulation, which occurs primarily in Dec-Jan, is more impacted by climate change than residual melt, which has a larger impact on April SWE? Please clarify.

p. 3645 L 24: Please explain the absence of model consensus in April. Is this a temperature effect? A precipitation effect? Is it simply b/c there's very little snow in April?

Figure 5: Please clarify what we're seeing in the top panel. If it's a monthly MODIS product, then why does snow cover vary with each 8 day interval?

Figures: It would be helpful to have at least one change figure that shows the absolute changes in SWE, not just percentages, in order for the reader to evaluate the actual impact of model uncertainty w.r.t. water resources. Figure 4 provides some guide in this respect, but it is difficult to read monthly values off of that plot with precision.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 3631, 2011.

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