

Interactive comment on “Irrigation enhances precipitation at the mountains downwind” by J. Jódar et al.

Anonymous Referee #2

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General comments

- The paper provides clear description of the area, irrigation land, wind direction, and subsequently the statistical analysis of precipitation trends. It shows statistically significant increase of precipitation due to irrigation.
- The argument given in the paper could have been stronger if preceded by theoretical analysis of land-atmosphere feedbacks mechanisms. How important is the moist soil (irrigation) in modifying the thermodynamics of the water column, and hence the precipitation in the area. How much additional water by evapotranspiration that triggered extra precipitation?

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- The discussion of the result should be supported with analysis of the most likely physical processes responsible for the change.

Specific comments

- P2, L 7 to 17, the comment that all AGCMs agree on increase precipitation because of irrigation is argued by some researchers. Despite the fact that far more studies and model experiments support positive moisture feedback, there exist some studies concluding opposite results, or at least do not support positive moisture climate feedback. Giorgi et al. (1996) in their numerical experiments over the Central United States for the two climatic extremes (1988 drought and 1993 flood) found that the effect of local recycling of evaporated moisture is not important as compared to the large-scale moisture fluxes and synoptic cyclonic activity. It is even concluded that a dry initial soil condition provides increased sensible heat flux, causing greater air buoyancy, enhancing convective systems and hence providing more precipitation (i.e., a negative moisture feedback process).
- Could the increase of precipitation be attributed to climate change? The analysis could have been stronger if such cc effects were first singled out.
- The discussion of the results could have been more interesting if the statistical result is supported by analysis of the feedback mechanisms, i.e. what actually happened? Is the increased precipitation attributed to more atmospheric moisture as supplied by evapotranspiration from irrigation field? How much is this compared to oceanic moisture flowing in the area? is it caused by changes occurred to the thermodynamic of the water column, i.e., more ET implies more energy to atmospheric boundary layer, and hence more chance for convective precipitation?

Typing errors P5, L19, Let consider change to Consider P6, L4, H0 respect to ... change to H0 with respect to

References Giorgi, F., Mearns, L.O., Shields, C. and Mayer, L.: 1996. 'A regional model

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study of the importance of local versus remote controls of the 1988 drought and the 1993 flood over the central United States', *J. Climate*, 9, 1150-1161.

Interactive comment on *Hydrol. Earth Syst. Sci. Discuss.*, 7, 3109, 2010.

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