

Interactive comment on “Impact of climate evolution and land use changes on water yield in the Ebro basin” by J. I. López-Moreno et al.

Anonymous Referee #1

Received and published: 7 June 2010

Overall impression:

This is a well-written manuscript that deals with an important and not yet well-examined subject, namely the relative impact of land use changes as compared to changes in climate. The methods presented are relatively generic but sound and up-to-date, and they are used in an innovative way for the case-study of a Mediterranean basin, on the basis of an extensive dataset for climate and runoff. Methodological questions – such as the influence of dams and the use of a single RCM output instead of an ensemble – are answered by the authors, and the assumptions seem defensible.

Moreover, the manuscript highlights that the Pyrenees will become even more important for water supply in the future, which is highly relevant for water resources manage-

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ment and planning. The methods are also applicable to other regions and can be seen as a basis for starting further investigations that deal more explicitly with the processes involved – the authors might add a few words on this in the discussion in the sense of an outlook.

The manuscript is of interest for a broader audience and well within the scope of HESS.

Detail comments:

- P2655 L13 "large scale atmospheric patterns": maybe add which ones
- P2655 L24 ff: A recent paper by López and Justribó (2010) highlighted the upstream-downstream relations in the Ebro basin with detailed figures.
- P2657 L2 ff: How are the temperature and precipitation stations distributed over altitude? With view to the pervasive altitude bias in gauging networks, this would be an interesting point.
- P2657 L5: "In terms of climate data there is a reasonable spatial coverage with respect to hydrological observations across the entire Ebro basin": Sentence not quite clear – climate or hydrological?
- P2657 L27: One of the methods for making trend analyses was interpolating the data to a 1 km² grid. Given that Daly's PRISM interpolation scheme was used, this is defensible. The authors should, however, make a more explicit note that this procedure enables them to make analyses for individual catchments, as opposed to a more conventional analysis of station values.
- P2659 L16: "A1B" (like it says on P2663 L18) instead of "A1B1"?
- P2660 L4 ff: This paragraph could be a little better organised.
- P2660 L21: Is there a significant altitude trend in warming? (If the data and methods are sufficient for making a statement, that is.)

- P2661 L13-15: How does the observed behaviour in rainfall-snowfall ratio compare to the observed behaviour of temperature?
- P2662 L2 "exhibited the greatest explained variance, being this punctually reduced in gauging": What does "this" refer to? The sentence is hard to grasp.
- P2662 L11 / L12: Give r-squared always either as fraction or as percentage.
- P2668 L6 "land cover monitoring networks": Can the authors be more specific in terms of what is required? For example, is remote sensing sufficient?
- Figures 4, 5 and 6: Is it possible to include a measure of significance? (There only seems to be the strength and direction of the trend indicated.)

Reference:

López, R., Justribó, C. (2010), The hydrological significance of mountains: a regional case study, the Ebro River basin, northeast Iberian Peninsula, *Hydrological Sciences Journal*, 55 (2), 223–233, doi:10.1080/02626660903546126.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 2651, 2010.