Review of J. Jódar, J. Carrera, and A. Cruz. Irrigation enhances precipitation at the mountains downwind, Hydrol. Earth Syst. Sci. Discuss., 7, 3109–3127, 2010

General comments

Scientific Significance: Good
The paper presents novel data and analysis that adds to the very scarce observational evidence of irrigation induced rainfall enhancements

Scientific Quality: Good
The methods used are mostly sound though some methodological issues can be improved or at least be better explained (e.g. criterion for classification of stations - comment 3 below) and some conclusions need better substantiation (e.g. contribution of small vs large evens to observed trends – comment 8 below).

Presentation Quality: Good
The paper is concise and to the point, English is mostly good and also figures and table are of good quality. Abstract covers all relevant results and conclusions, though it remains qualitative where some quantitative details could also be mentioned. Some relevant details of the analysis are missing (e.g. significance level used in the tests; comments 4/5 below).

Specific comments

1. p3113, line 2: "irrigation started in 1963": was that immediately over the full 121000 ha or was there a gradual expansion over a number of years? If the latter is the case the classification before/after irrigation might be adapted to get a clearer signal

2. p3113, line16: "Irrigated agriculture had been traditionally practised for hundred of years". If so, then how is before/after irrigation defined ? Where is the cut in the data set

3. p3113: the criteria for the choice of the reference stations seems very ambiguous. It seems to be that a station qualifies as 'reference' when it is not in the mountains. I would suggest the additional criterion that it should also be upwind of the irrigated area. Then
- for ULV choosing L as reference seems unjustified as it is downwind *and* in the mountains
- for LG also stations h and j are not in the mountains but they area downwind though

4. p3115, line 8 and following can be omitted as indeed the t-test is a very well known test. It suffices to say something like "We tested whether the means of ΔP, Δr and ΔP_{min} differ statistically between the periods before and after the irrigation started using a standard t-test (refs) and a 95% confidence level". Pleas do mention this threshold value for P_c/t_c as it is missing in the present paper.

5. p3116, line 7. What significance level? (see previous comment)

6. p3122 tables 1 and 2: "NB and NA stand for the number of meteorological stations with available data used in the analysis before and after the Irrigation Transition Period, respectively." should read (I assume) something like: "NB and NA stand for the number of months of available data for this meteorological station used in the analysis before and after the Irrigation Transition Period, respectively" .

7. p3116, line 25 or in section 4 Conclusions: how do the summertime trends related to the total summertime precipitation, i. e. magnitude of $(P_{after} - P_{before}) / P_{before}$? Is that a substabtial amount ? Is that relevant for rain fed summer crops? Combining the table with fig 2 one sees that for ULV ΔP is 8.5, 5.4 and 1.1mm (table 1) on totals of about 20, 4 and 5mm respectively (fig2 left), implying changes of approx 40, 100 and 20% respectively!

8. p3117, line 17 and following: Here conclusions are drawn too easily in my opinion: "This result indicates that the positive variation in ΔP during the summer results from a net increase in ΔP_{min} rather than sporadic large rainfall episodes." We cannot tell this from the table as ΔP is given in absolute mm and ΔP_{min} in relative percentages. E.g. is the average ΔP_{min} for downwind stations in June in table 1 of 8.3% a substantial fraction of the 8.5mm ΔP*?* I cannot easily tell therefore I need also ΔP_{min} in absolute numbers, either in the table or just for the overall summer differences in the text.

9. p3118, first paragraph and tables 1 and 2: are the mean increments averaged over all stations not significant or not tested ? If the first is true the conclusions need to be down graded. If the latter then please add this information.

10. p3118, second paragraph. These rainfall increase may not lead to enhance runoff but they may be important for the productivity of rain fed natural vegetation or crops. May be the authors can say something on this

11. p3119, line2-3 see comment 8 above

Technical comments

1. p3113, line 7 and line 19: please use 10^6 m^3 instead of hm^3

2. p3117, line 13: "larger" must be "smaller"

3. p3126 fig 3 caption please add code letter to station names (Badajoz-K and Barcarrota-A) to facilitate easy reference to the map in fig 1. Same in p3114 line 9 and 10 and other instances.

4. At some places small English grammar errors occur. Please check the whole document carefully. Examples (not comprehensive):
p3113, line16: "practised" should be "practiced"
p3113, line 17/18 this sentence has no verb…
p3116, line 19: replace "than" with "as"
etc