**Hydrology and
Earth System
Sciences**

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Discussions

Interactive comment on "Integrated assessment of future potential global change scenarios and their hydrological impacts in coastal aquifers. A new tool to analyse management alternatives under uncertainty in the Plana Oropesa-Torreblanca aquifer" *by* David Pulido-Velazquez et al.

Anonymous Referee #1

Received and published: 12 June 2017

This paper defines a framework for assessing the effects of CC, LULC and SLR on a coastal aquifer where problems of saltwater intrusion are detected. Climate change models are integrated with LULC, SLR and double-density groundwater flow models in order to define future strategies for integrated water management in the study area.

The approach is ambitious and valid scientifically. Many models, however, are introduced but not clearly explained. Some models are described with excessive jargon

and others are barely defined and no reference is given (modified etr). As a result, the paper has a black box kind of content, which makes it very difficult to evaluate. I suggest that the authors upload some additional information that relates to the different models and steps they did in their work.

Another confusing point is the use of the acronym GC, GCi, GC1, GC2, etc. which are never correctly explained. The authors use also inconsistencies in defining concentration and relating it to density (density 1025 Kg/m3; salinity 1035 g/l), which can cause serious problems in the double-density models. It is not clear if in the models they use chloride concentration or salinity. Also the porosity used seems very small compared to the permeability detected in the aquifer. Another point that the authors do not address is the connection between the carbonate basement and the detritic aquifer.

Section 3.1.1 This section requires better explanation of the modeling (lines 20-30).

I find the correlation between observed and modeled hydraulic head and salinity very poor. Can the authors explain on which basis the results of the models are acceptable as a predictive tool?

The discussion and conclusion sections are very short and poorly quantitative and fail to point out how this kind of modeling can be used in integrated coastal water management. The authors should elaborate on their results and say explicitly how this knowledge can be used in an integrated water management framework of a coastal zone. Give also explicit examples of how this can be done.

Some specific points about the figures:

Figure 1: Vertical scale is missing in the figure. Not discussed in the text is the relationship between the carbonate rocks and the detritic aquifer. No explanation of the lithotype in the geologic time scale legend is given. There are too many eastings and northings in the map. Define them only at the corners of the figure. Confusing the color grey used for the aquifer and the Mediterrenean Sea.

Figure 2: The CORINE database is not mentioned in the text.

Figure 3: The overlap does not allow to distinguish well the data from the two watersheds. Also the choice of color is poor. Maybe use the same color for the same watershed.

Figure 4: It is not clear what sectors 1, 2 and 3 refer to in the text.

Figure 5: Please give also some information about the fact that you are presenting climate models data. This caption is not sufficient to understand what kind of data are presented.

Figure 6: See my note above. Also here some more information is needed. At least give the time frame for the climate change models.

Figure 7: I would have presented this figure much earlier on in the paper.

Figure 8: In wells 6, 23, 20, 8, and 21 there is a large difference between observed and modeled hydraulic head data. This, in a coastal context is not a good thing, because it makes the results of the double-density flow model unreliable. I think that the authors should address this large variability and explain how their flow model is still acceptable in view of this poor correlation.

Figure 8: I find the correlation between observed and modeled salinity very poor also here. Can the authors explain on which basis the results of the models are acceptable as a predictive tool.

Figure 9: It would be nice to separate the inflow from the outflow in this graph, so that it is clear the variation in the total yearly budget (you can do this by using the same color for inflows and different data point symbols; and a different color for outflows . with different data symbols).

Figure 11: Specify data are at monthly level.

Figure 12: See my note for Figure 9.

Figure 13: x axis should be "water budget components". Please specify a little bit better what the different CG's are. Hm3 / year is not a standard flow unit. Please specify.

Figure 14: A few words about well locations in the text would be helpful. Also, sometimes you talk about salinity and sometimes about chloride concentration. They are not the same thing. Could you please explain in the text what concentrations unit you are using and why?

I have attached a file with detailed requests for explanation in the text, some english corrections and suggestions. I hope this is helpful.

Please also note the supplement to this comment:
http://www.hydrol-earth-syst-sci-discuss.net/hess-2017-262/hess-2017-262-RC1-supplement.pdf

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2017-262, 2017.