**Hydrology and
Earth System
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Discussions**

Interactive
Comment

Interactive comment on "Assessment of conceptual model uncertainty for the regional aquifer Pampa del Tamarugal – North Chile" *by* R. Rojas et al.

Anonymous Referee #2

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General comments

The paper presents a case study showing applications of multimodel analysis to the PAT aquifer in Chile. A number of models have been developed over the years for the aquifer under analysis and they vary for number of layers, recharge representations, etc. The authors consider the various models developed and use the methodology developed by Rojas et al. (2008) to test the performances of the different models. The weakness that I see in the technique used to evaluate the models and their relative posterior model probability is the fact that there is not penalty factor accounting for

adding too many parameters. So the models with the highest number of parameters, as expected, have the highest posterior model probability. I will make the point also in the specific comments, but I would strongly suggest to make a simple and fast test of the performances of the different models using a statistic which account for the number of parameters added (the simplest I have in mind is AIC or AICc). A similar test would allow the authors to eventually make their conclusion stronger or to reevaluate them based on the new findings. I think that with some changes the paper should be considered for publications because the field of multimodel analysis lack of presentation of practical applications.

More specific comments A general comment on the structure: I suggest to rework on section 5 (mainly 5.4 and 5.5) and make the explanations of the different results easier to understand by mean of bullet list, or analysis by area, or any other way that authors feel appropriate.

pag. 5885, 1-5: the recharge seems to be the key issue for the model representations. It will be explained later, but it would be useful to have at this point of the different recharges. pag 5885, 7: what's the implication of neglecting that recharge? It will be presented later, but it is of interest here. pag. 5886, 15-20: which are exactly the observations used? pag. 5887, 10-15: no flows observations in the calibration set? How this affects the calibration results in terms of nonuniqueness? pag. 5888, 15-20: no penalty for too many parameters with respect to the number of observations? pag. 5892: 10-13: explain pag. 5898: 23-28: did you run any sensitivity analysis on the selected parameters? Did you see parameter correlations problems? Also models M2 have a much bigger numbers of parameters and I am not sure about having a successfull calibration of those models having only heads observations. pag.5904, 19-23: this conclusion may be driven by my concern on the numbers of parameters. Also table 4 shows that none of the models is really showing a significantly higher model posterior probability. pag. 5911-5912: most of the conclusion can be revisited after making a test with a measure which accounts for number of parameters. Overall,

considering the results obtained, which model would you select for future simulation and prediction?

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 5881, 2009.