Hydrol. Earth Syst. Sci. Discuss., 6, C2586–C2588, 2009
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Hydrology and Earth System Sciences Discussions

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

Anonymous Referee #1

Received and published: 12 November 2009

General comments

This paper is a field application of the methodology presented by Rojas et al (2008). The authors consider the PAT aquifer (Chile). The aim of this manuscript is to assess the uncertainty in groundwater flow modelling of this aquifer. I do not see novel theoretical aspects. The authors should explicitly acknowledge this. There is nothing wrong, of course. The point is that the application example should have reasonable complexity to allow generalization of some of the results or highlighting some interesting points. Anyway I consider that the paper under review is worthy to be published after moderate

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revisions of some points remaining unclear.

Specific comments

Pag 5891 line 9-15 It appears that your posterior model weights do not account for the number of parameters of the model. If the integrated likelihood and the prior probability of two models are equal your method assigns the same posterior model weight. I believe that in this case the model with less number of parameter should be preferred in according with the principle of parsimony. Is this correct? The authos should comment on this.

Pag 5899 line 12 The authors describe the cell size of the models. I suggest to write explicitly if the models are three-dimensional and report the thickness of the cell in 1-layer and 2-layers models. The authors should state if they performed any sensitivity analysis to the cell size and if not show that their cell sizes are adequate for the problem at hand.

Line 24 To improve the clarity of the paper I suggest to add more information about the 42 observed heads. Do the hydraulic head measurements belong to the aquifer Q3 or Q4? What are the minimum and the maximum value that you observed? On which basis do you assume that the standard deviation of observed heads is 10 m?

Pag 5905 line 23 Could you explain better what you mean by 'syntetic piezometers'? To improve the method reliability I suggest to leave out of the calibration process some point of the dataset D. In this way you could do a real validation instead of a pseudo-validation that you did. It would be more interesting to show how the mean of the full BMA prediction, conditioned on available information, reproduce measured values at a set of validation points, the measurements laying or not within the corresponding envelops of uncertainties.

Pag 5906 line 2 In Table 5 the authors report only the head variances at observation wells. I suggest the authors to report also the observed heads and the full BMA pre-

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diction with the corresponding envelops of uncertainties at these points. Of course it is possible to see the observed heads in Figure 7, but it is difficult to see if the observed head lies within the envelops of uncertainties of the estimated one. In Table 6 the authors consider points where the observed data are not available and report the head variances. In these points, that they called 'syntetic piezometers', the variance could be very small or very large but they could not know how the estimated head is close to the observed one. I suggest the authors to give a physical explanation of the results that they show here. Moreover, how the information about the variance can be used from an applicative point of view?

Pag 5912 line 3 The point number 4 is related to the point number 1. I suggest the authors to merge the two conclusions or to write them in two points which come one right after the other.

Line 18 The authors conclude that the relevance of conceptual model uncertainty is more significant for spatial data not included as conditioning points. I believe that this statement is not a major conclusion and I would suggest not to highlight it. I think that this conclusion can not be deduced on the basis of the example shown (e.g. if you choose other 'pseudo-validation' points closest to the conditioning points it could happen that you do not appraise any difference between different conceptual models, is this correct?).

Technical correction

Pag 5912 line 26 Substitute 'or the predictive variance' with 'of the predictive variance'.

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