Hydrology and Earth System Sciences Discussions

Interactive
Comment

Interactive comment on "Parameter sensitivity to climate and landscape variability of a simple, lumped salt and water balance model" *by* M. A. Bari and K. R. J. Smettem

J. Götzinger (Referee)

Jens.Goetzinger@iws.uni-stuttgart.de

Received and published: 23 August 2005

General comments

'Parameter sensitivity to climate and landscape variability of a simple, lumped salt and water balance model' by M.A. Bari and K.R.J. Smettem describes the sensitivity analysis of a salt and water balance model. It presents the impact of a fixed change of 7 calibrated parameters on annual streamflow and salinity volume for a deforestation study catchment in south western Australia.

The paper presents interesting results but lacks structure and clarity in the explanation

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper

EGU

of the analysis and the conclusions. A vital part for understanding, the salt and water balance model itself, is explained in two other papers 'A daily water balance model for representing streamflow generation process following land use change' and 'A daily salt balance model for representing stream salinity generation process following land use change' by the same authors in the same and previous issue which is problematic because of the following reasons:

- The present paper can hardly be considered an independent publication.

- The added value of this third paper is relatively small.

Therefore the publication as one paper or two companion papers would have been more appropriate.

Specific comments

The text requires some reorganisation and grammatical correction. Some figures and conclusions should be revised:

The study presents a mere snapshot of the sensitivity of the model for one change, one catchment and one year. A detailed investigation and interpretation of the behaviour of the model using different parameter values is unfortunately missing. The title is misleading because the sensitivity to climate variability is not discussed at all, the model sensitivity to modified parameters is presented and no relation to landscape variability is mentioned.
Also the impact on model performance and the interdependence of the parameters is neglected. This would reveal helpful insights into the mathematical behaviour of the model and could help reducing the over parameterization that is suspected.

The model structure seems to be too complex relative to the little data that is available. The calibration success of the salt balance model is strongly related to the water balance model. Regarding the questions that still remain about the hydrological model a simpler approach would have been more suitable.

The calibration is not very well described. Specify which data in which resolution was used to calibrate wich parameters. Which preprocessing steps were done (averaging, interpolation)?

In section 5 results of daily model application are described but in section 6 and Table 4 the performance criteria are evaluated for monthly means. The sensitivity analysis is finally conducted using annual means. Decide on and then stick to one temporal resolution.

Section 4 and parts of section 7 should be joined together addressing explicitly the relation of parameters to landscape and land use characteristics. Section 7 should be a thorough discussion of the results.

Generally, the figures are not very well selected and of poor quality. Why do you present just those time periods? Specify which data was used for calibration! Especially the salinity simulations exhibit significant problems in modelling this process correctly on that scale. Comment!

The conclusions are very weak. What are your interpretations? What can you say about the model structure and the parameter values? And what are the conclusions for further studies, management of the catchments, measurement campaigns and the improvement of the model by these results?

Model complexity should also be related to the question that should be answered. Which conclusions do you want to draw from this study? How long will the salinity increase until a new balance is reached? How can these problems be prevented or remediated? What other effect does land use change have except increased recharge? What other types of land use change could you simulate with that model? Can the results be transfered to other catchments?

- page 1406 line 26: models are no 'ideal' representations they are rather crude simplifications of the natural processes

- page 1407: The current discusion about model uncertainty and therefore sensitivity is not reflected adequately in the introduction and throughout the study.

- page 1408: Where are the catchments located? Give some general information before describing the detailed characteristics of the area!

- 1410/25 and 1412/10ff: What is the spatial configuration of the model? Are the catchments represented by one or more hillslopes? How are the geometries and interfaces defined? What are the 'catchment fractions'?

- 1414/14ff: 1987 is described but Fig. 8. shows 1995

- 1418/7f: plots and diagrams are no performance criteria

- 1419: What is the advantage of the Explained Variance Coefficient over the Nash-Sutcliffe Efficiency? What is the 'mean of errors during the whole period'? Which errors?

- 1420/15: sensitivity analyses say nothing about model performance

- Table 5: Why do you use the relative sensitivity and not the absolute percent changes directly? If the relative change is constant for all parameters it is not necessary to use SR.

- Fig. 6 contains no relevant information.

- Fig. 9: The line should go through (1/1), the equation indicates clearly that the predictions are biased.

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper

EGU

Interactive
Comment

Technical corrections

page 1407 line 4: e.g.,
line 5: use observed 'data' instead of 'response'
line 9: Beven
line 12: use 'uncertainty' instead of 'errors', model structure should obviously not be wrong
p 1408 / l 22: 'in the order of'
1409/2: 'The selected...'
1411/6: 'reaches the soil'
1413/11: 'peak' or mean?
1414/2: 'lower than in the Lemon'
line 13: 'of both catchments'
l 15: 'peak flow'?
l 20: 'led to good'
l 24: 'criteria is described'
1417/16: 'adjusted for best fit'
1421/29: correct sentence!
1424/1: 'responsible for the'
l 23f: adsorption, etc. are physical processes
1442: streamflow is not shown in the figure.
Revise Figures 10, 11 and 12: The lines cannot be distinguished. Show observed data. State catchment in the caption.

Interactive comment on Hydrology and Earth System Sciences Discussions, 2, 1405, 2005.

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper

EGU