Hydrol. Earth Syst. Sci. Discuss., 8, C2236–C2238, 2011
www.hydrol-earth-syst-sci-discuss.net/8/C2236/2011/

Hydrology and Earth System Sciences Discussions

Interactive comment on "A combined field and modeling study of groundwater flow in a tidal marsh" *by* Yuqiang Xia and Hailong Li

P Bauer-Gottwein (Referee)

pbg@env.dtu.dk

Received and published: 17 June 2011

Summary

This study presents results from a combined field and modeling study of salt marsh eco-hydrology in China. Interest in eco-hydrological processes and effects has been increasing over the past years, so this study should be of relatively broad international interest. However, I have some substantial concerns as listed in the review comments below and I also think that the study would benefit enormously if concentration data and/or flux data were included in the model calibration. Overall, I think this article requires major revision before it can be accepted for final publication.

Review Comments

1. The authors postulate that the difference in vegetation cover between the mangrove transect and the bald transect is due to the absence of lateral freshwater recharge under the bald transect. This hypothesis is plausible; however, the manuscript does not provide hard evidence for this hypothesis beyond the good fit between simulated and observed hydraulic heads. Salinity data from the high permeability zone and/or seepage fluxes along the groundwater/surface water interface would provide much stronger support and are easy to collect in this shallow groundwater system as far as I can see. Once concentration data is available, it can be used for the calibration of the variable-density groundwater model, which will result in a much more robust and reliable model.

2. From my point of view, the presentation of the findings is fairly unbalanced. While a lot of detail is given on the hydrogeological field work and groundwater simulation, the eco-hydrological coupling mechanisms are only summarily discussed and not quantitatively simulated. However the novel aspects of this study clearly are related to the eco-hydrological phenomena, while the hydrogeologic field work and modeling is standard. I suggest the authors rebalance both the presentation and possibly also the modeling.

3. Eco-hydrological feedback mechanisms (e.g. phytotoxicity, transpiration stream concentration factor) can be incorporated into the quantitative simulations (e.g. Bauer et al., 2006, Bauer-Gottwein et al., 2008). It would be very interesting to see salt and water balances for the two transect as simulated in such an approach. In my view, the modeling of the land surface boundary is over-simplified in this study. Precipitation and evapotranspiration may be important processes in this system and have an influence on subsurface flow and concentration patterns.

Details

1. Page 5129, Line 16-23: This paragraph describes an electronic dipper system, which is a standard technology in hydrogeology. This paragraph can be deleted.

2. Page 5133, Line 1: Replace permeability by hydraulic conductivity. Permeability has units of m2.

3. Figure 11: It should be made clear in the caption that the flow rates are not field observations but extracted from the numerical simulation. There is a typo in “Inflow” in the figure.

4. Tables 1 and 2 should include hydraulic heads as recorded in the field. Hydraulic head data are qualitatively described on page 5131 ff but should also be presented, either in tabular or graphical format.

References

Bauer, P., R. Held, S. Zimmermann, F. Linn and W. Kinzelbach, 2006: Coupled flow and salinity transport modelling in semi-arid environments: The Shashe River Valley, Botswana. Journal of Hydrology 316(1-4): 163-183.

Bauer-Gottwein, P., Rasmussen, N.F., Feificova, D. and Trapp, S., 2008: Phytotoxicity of salt and plant salt uptake: Modeling eco-hydrological feedback mechanisms. Water Resources Research, 44: W04418.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 5123, 2011.