**Hydrology and
Earth System
Sciences**
Discussions

Interactive comment on "Simulating future salinity dynamics in a coastal marshland under different climate scenarios" *by* Julius Eberhard et al.

Anonymous Referee #1

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The authors Eberhard et al. used a one-dimensional SWAP model to predict the salinity variation in the next 100 years at a coastal marshland. Six climate conditions are considered in this prediction, the effect of rainfall and temperature on the salinity variation are investigated. This model still needs to be improved, model setup should be clarified and some figures should be improved. Currently, this study is too thin to publish on HESS. In my point of view, more simulations or models need to be added to this study until it is ready to be published.

1. The content or scientific significant is not enough. As the authors mentioned in Section 4, many factors may change in the future, only considering salt from deeper aquifer seems not well considered. I suggest adding more simulations based on this model. The effect of short term scenarios is a good idea, such as the storm surges

which authors mentioned in Section 1 or extreme long dry season. Also, sea level rise as a global concern should be considered.

2. Please stress the novelties of this study at the end of Section 1.

3. Page 4, Line 20-24, authors illustrate the boundary conditions. Please clarify the boundary conditions for salinity, how much salt comes from the bottom boundary?

4. Page 4, Line 33-34, authors used grain size distribution, organic carbon content, and bulk density to estimate three parameters. Please clarify how this estimation works, any equations used in this estimation. Authors can provide some supplementary of this estimation if necessary.

5. Page 6 and Page 7, authors illustrate the calibration and provide Fig 3 to prove a good fit between simulation results and observations. Please provide more details about this calibration. The calibration results should be quantified to make this calibration more persuasive to readers, using correlation coefficient or Nash–Sutcliffe coefficient or other methods to quantify the comparison between simulation and observation. In addition, I suggest briefly introduce the basic theory of PEST to make readers understand this process more clearly.

6. Page 6, Line 10-20, please provide more details about these six scenarios, such as what's the difference between SRES and RCP. These climate conditions are cited from other literature, but still need to illustrate in this study to make readers understand the predictions clearly.

7. Page 5, line 21, is this equation 2? Please mark clearly.

8. Table 1 is too simple to understand, the figure and table should be complete and informative itself. Please add more illustration in the title, and clarify what is Θr, Θs, and other symbols. Please amend it for other tables and figures.

9. Please improve or redraw Fig 1 a and b, the study site seems not clear. In Fig 1a, please use some color instead of the hatched area; mark that the small map on the left

corner is German. In Fig 1b, please adding elevation data in the study site. I am not sure what's the blue lines in the lake in Fig 1b, do these blue lines represent drains? Why there are so many drains in this former lake?

10. Figure 2, the plot of Totalized Rainfall to year, the winter rainfall sums should be Oct-Mar.