HESSD

Interactive
comment

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

Anonymous Referee #2

Received and published: 27 February 2019

Eberhard et al. evaluated the salinity dynamics in the coastal marshland using the one-dimensional SWAP model, and then simulate its future impacts with a group of GCMs under climate change scenarios. The authors also quantitatively estimated the salinity in each scenario and evaluated the seasonal sensitivities of salinity trends. In general, the science is novel, and the paper is well written. However, I'm not quite convinced by the SWAP model application in this specific study, and more details are required to demonstrate the model accuracy. I recommend a major revision, or even reject considering the time needed for improving this paper. Here are some of my comments.

A detailed introduction of marshland salinization is missing, as the authors only generally discussed the seawater intrusion and salinization. Why marshland salinization is

important to study? What are the science questions and difficulties in modeling marshland salinization? More parameter information is required, for example, how is the heterogeneity of marshland being solved in the 1D SWAP model? How is the groundwater level simulated in the model, as SWAP only solves the flow in the soil? Did you simulate the horizontal water flux? In general, I'm not convinced by the modeling capability of 1D SWAP model to accurately simulate salinization in the marshland. It's not clear how salinization is simulated in the model. Usually, seawater intrusion in the aquifer is simulated by a coupled variable-density flow and solute transport processes, or equivalent freshwater head calculated by the salinity and the depth of aquifer. Did you consider this? Anyway, I didn't find how salinization is simulated in this paper. The subsection 2.4 calibration and 3.1 calibrations are confusing. The results are not sufficiently discussed. For example, what's the initial condition did you use? And, it seems salinity is measured at soil layer/unconfined layer, and simply diluted by the rain water? Is salinity in the confined layer a boundary condition? How is it determined? How do bottom flux and drainage flue being calculated? The parameters being perturbed in the scenario runs are not clear. I assume temperature and rainfall are obvious, but did you change the radiation? Does the potential sea level rise being considered? If sea level does not rise, how does wetter climate increase salinity? More explanations are required.