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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Understanding coastal wetland conditions and futures by closing their hydrologic balance: the case of Gialova lagoon, Greece" *by* Stefano Manzoni et al.

Anonymous Referee #1

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General comments

The authors investigate salt dynamics in a lagoon, and the effects of climatic changes and water management on salt concentration. They present a clumped model for water and salt mass balance, that when constrained by environmental measurements (precipitation, evaporation) and measurements of water height and concentration, yield estimates of important fluxes between the lagoon and its surroundings (sea, groundwater, etc). The authors use this framework to investigate the fate of the lagoon under future scenarios (increased temperature, less rain), and what would be the required restoration strategies to maintain ecosystem functionality.

The paper is well written and well argued. The methods are sound, and the results are interesting. I enjoyed reading this paper, and I would recommend its publication. Here follow a few comments I would like the authors to address prior to publication.

Specific comments

Lines 125-126. The parenthesis (C_G) seems to be misplaced. "the salt mass is obtained as the product of salt concentration (C_G) and water depth (h) in the Gialova lagoon."

Line 167-170. This is confusing. You must know the value of h for the first day of measurement, only then you can update h for every time step. From section 2.3.1 we learn that the Northern sensor measures water depth variation, not water depth, but that comes much later in the paper. Please restructure these sentences, convey first that you only measure Delta h/ Delta t, but since you know h from the first day, you can update its value at every time step. Avoid using "absolute value", since it can also mean the function abs(-3)=|-3|=3, it took me a while to realize that "absolute" is used here to contrast "relative", which would be "Delta h".

Lines 175-182. I had to read a few times to understand that once you solve eqs 10 and 11 for the available data, you now use Qfresh (modified), dh/dt, and other data to solve eqs 5 and 6. Ultimately you want C_G from eq 6, and for that you need Qsalt from eq 5. At first I got the impression you were solving a differential equation ("solve in forward mode", line 176), but it seems to be an algebraic relation only. In short, you should restructure this paragraph, it is confusing.

In section 3.2 you first refer to figures 6a and 7a (effects of reduced precipitation), and only then to figures 6b and 7b (managed freshwater). Consider regrouping these 4 panels in the same way you did in the text, figure 6 about the effects of reduced precipitation, and figure 7 about managed freshwater. Consider also labelling the different curves in figures 6 and 7 with C0 through C3 directly on the graphs. If the result is not too cluttered, this would enhance readability.

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