

## ***Interactive comment on “Salt intrusion in the Pungue estuary, Mozambique: effect of sand banks as a natural temporary salt intrusion barrier” by S. Graas and H. H. G. Savenije***

### **Anonymous Referee #2**

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General comment: The paper deals with an application of Savenije’s salt intrusion model to the case of Pungue estuary. The topic is interesting and relevant scientific (and practical) questions are addressed. The manuscript is well written. Taking advantage of the public and interactive review process, I must say that I agree with most of the comments raised by Referee 1, which recognize the scientific value of the paper and identify some aspects to be tackled in further detail. Thus I will not repeat them. In addition, I would stress the need to clarify the procedure for the calibration of the model. In fact, it is not evident from the description which parameters are calculated using predictive relationships and which are calibrated using collected data. As a

whole, I think that the paper deserves a publication after some revisions.

Specific comments:

1) It seems that Van den Burgh's coefficient  $K$  (by the way, please include a short description of the physical meaning of Van den Burgh's coefficient, which is not so well-known outside "estuarine" community) is calibrated (p. 2533, l. 12). However, it is not explained which data have been used for that: only geometrical or hydraulic data, or directly the salinity profiles? In both cases, which conditions (spring/neap tide, high/low water level) have been used?

2) The model just requires the mixing coefficient  $\alpha_0$ , defined by equation (6), but the Authors discuss the effect of varying the upstream water discharge  $Q_f$  (whose value seems to be estimated on the basis of some measurements). However, its effect can be completely included in  $\alpha_0$ . Which parameter is used when applying the model? directly  $\alpha_0$ , or  $Q_f$  and  $D_0$  separately? In the latter case, how  $D_0$  is estimated?

3) The tidal excursion  $E_0$  and the dispersion coefficient  $D_0$  at the mouth depend on the tidal velocity amplitude at the mouth  $v_0$ , which is not easy to measure. How did the Authors estimate it?

4) An exponential variation  $E$  of tidal excursion is assumed. Is it correct to argue that it corresponds to an exponential decreases of the tidal velocity amplitude  $v$  moving upstream? Moreover, how the convergence length  $e$  is calculated?

In summary, if the parameters have been calibrated independently of the salinity profiles, the model appears to be very robust and the application to the case of Pungue estuary very satisfactory. On the contrary, if the parameters are calibrated using the final data, the good fit might be mainly the result of the calibration itself.

Finally, I think it would be useful to include a table with a list of all the parameters used in the model.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 2523, 2008.

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