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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Analytical and numerical study of the salinity intrusion in the Sebou river estuary (Morocco). Effect of the "Super Blood Moon" (total lunar eclipse) of 2015" *by* Soufiane Haddout et al.

Anonymous Referee #1

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This is a well-prepared and well-documented paper. Besides some minor editing that is required, the paper is well written. I presume the publisher will take care of the English editing and minor corrections. (just as a reminder, please make sure to replace dumping by damping in P.12, L29.

The case of analysing an extreme spring tide in an intensively used estuary is very relevant. It is definitely a cutting-edge case study. The study has been very well done, and it is based on a very detailed data set of intensive measurements. This makes this paper very interesting and relevant for HESS.

Although the analysis is clear in general, there is one thing that I don't understand, and which needs clarification and correction, as far as I'm concerned.

In Figure 10, and also in Table 5, we three moments in time for HWS, TA and LWS. This is strange, because at every cycle, there is only one moment of HWS, LWS and TA. Is this because the authors did not observe the moment of slack, but just derive it from the temporal observation of the salinity (as in Figure 6). But if that is so, than the maximum value corresponds to HWS, the minimum value to LWS and the time-average value to TA. There should not be multiple values. Also in Figure 10, I don't understand why the differences between the observations that are only 20 min apart are so large. In Figure 6 the maximum values of the salinity curves are rather flat. So the differences should not be large.

Maybe the authors determined the moment of HWS on the basis of the hydraulic model. But that would be wrong, since the hydraulic model may determine the moment of slack wrongly. The correct moments of slack, if not observed in the field should correspond with the maximum and minimum observed salinities.

Some minor comments:

If the hydraulic model is calibrated on the Roughness, then it is useless to present the composite equation for the Manning roughness (16).

Similarly, if the dynamic 1-D salt balance equation is calibrated on the Dispersion, then don't mention (19) in the paper. Moreover equation (19) is not at all appropriate for salt intrusion. It refers to rivers only. So eqs (16) and (19) should be removed from the paper.

Also use the same parameters throughout the paper. So if you use K_manning in one equation then don't use n in another.

Table 4: Interesting that you note that R_s is larger during neap. This was also observed earlier by Zhang et al., 2012.

Zhang, E., H. H. G. Savenije, S. L. ChenïijŇX. H. Mao, 2012. An analytical solution for tidal propagation in the Yangtze Estuary, China. Hydrol. Earth Syst. Sci., 16, 3327-3339.

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