Ocean Sci. Discuss., 11, C710–C712, 2014
www.ocean-sci-discuss.net/11/C710/2014/

Ocean Science
Discussions
Open Access

Interactive comment on "Numerical modelling of sediment transport in the Adriatic Sea" *by* A. Guarnieri et al.

Anonymous Referee #2

Received and published: 12 August 2014

This paper presents the results of a 3D baroclinic circulation model and coupled sediment transport model for the Adriatic Sea. The topic is interesting and most parts of the paper were clear to me. However, the paper needs a thorough revision. The following points should be addressed in a new version of the manuscript.

- It didn't became very clear to me what this study adds to the existing knowledge/literature. There are some contrasting findings with other papers, but the reasons why the results are different are not thoroughly studied. The authors should make very clear what their focus and main research questions are, what other studies have already found, what is still unknown, and what they want to add to our understanding of sediment transport in the Adriatic Sea.

- A more in depth analysis of the different sediment transport mechanisms in the Adri-

atic Sea could be performed. Transport seems to be largely determined by the wind-driven flows that transport locally eroded sediment. But, for example, what's the role of buoyancy driven flows compared to the wind-driven flows? and do tides transport any sediment averaged over long periods of time? Which role do the rivers play in the long term sedimentation rates? What's the role of the many small rivers compared to the Po river? Where is the coarse sediment deposited and where the fines? Etc...

- It seems strange to me that the prescribed sediment flux of the Po river is not continuous. There is a sudden increase at Qw=3500 mˆ3/s.

- The model validation should be improved. There is only a qualitative comparison of observations and model results. At the WHOI station modeled and observed flows should be compared, especially for the HC and DS periods. At least a RMS error and correlation coefficient can be specified for those periods, or any other metric that suits. This can also be done for the depth-integrated sediment transport. The model seems to have longer periods with high sediment concentrations than the data. That will certainly impact modeled transport.

- In some cases the authors now refer to other papers for a comparison and the reader has to look up another plot and compare it. By producing a table with measures that indicate the quality of the model results it is easier for the reader to have an idea on the model-data comparison.

- More arguments are needed for the choice of the two sediment fractions. Is this based on observations or only based studies by Wang et al.? The modeled vertical profiles of sediment concentration are too well-mixed compared to observations, indicating that eddy diffusivity is overpredicted by the model or that the fall velocity of the sediment was too small. Related to this, the authors state they calibrated the erodibility coefficient of sediment but they do not explain how they exactly did this. Using a different fall velocity of the sediment will result in different values of the erodibility coefficient. so more explanation on the calibration of the sediment transport model is needed.

- Aren't there any observations of the typical grain size at the bottom of the Adriatic Sea? This will result in an improved initial condition for the sediment fraction at the bottom. Now it is assumed that both fractions are homogeneously distributed over the entire shelf, which is probably not the case. This means that the sediment distribution on the bottom layer is still adapting and not in steady state yet. This has large implications for the modeled sediment transport patterns. The sensitivity of the model results to initial conditions should be studied.

- Why is the cumulative sediment transport in cross-shore direction more gradual than the alongshore sediment transport, which is more intermittent, while the cross-shore flows don't seem to be so gradual (Figure 7)?

- The text should be checked thoroughly on English grammar, typos and awkward phrasing.

Interactive comment on Ocean Sci. Discuss., 11, 1391, 2014.