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

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The authors present results from a coupled sediment – transport and hydrodynamic model for the Adriatic Sea, where the hydrodynamic model includes buoyancy, winds, and tides. The model is applied to the Eurostrataform field season of 2002, capitalizing on the availability of field data for comparison to model estimates.

The paper reproduces effort discussed in my paper (Harris et al. 2008), in terms of the domain, the approximate resolution, the time period, and processes included. I did not complete a full review, but offer suggestions with the goal of helping the authors improve this interesting manuscript. I have read the author's response to a previous review and see that some of these points were already raised and addressed, and look forward to seeing the final manuscript.

Sincerely, Courtney Harris, Virginia Institute of Marine Sciences

1. The comparison of the model to the earlier ones of Wang and Pinardi, and Bever's ROMS model seems appropriate, but the ROMS model described in Harris et al. (2008) should also be discussed. Ideas for discussion:

a. The models differ in several choices (settling velocity, seabed sediment distribution, input terms), more so than in the processes included or the forcing used. These choices then influenced the our respective choices of parameters such as the erosion rate parameter.

b. Settling velocity: I tend to choose larger settling velocities (1mm/s, 0.1mm/s) because these tend to match near-bed records of suspended sediment and data from the plume from Paul Hill, Tim Milligan and colleagues. The authors tend to choose smaller settling velocities (0.1 mm/s and 0.01 mm/s).

c. Another difference seems to be sediment input from the numerous small mountainous rivers that drain the Appenine Mountains. Comparing the dispersal of Appenine sediments to that of the Po River sediments was a major focus of our effort. Based on model results and rating curves, we assumed that these smaller rivers, collectively, deliver about twice as much sediment to the margin as the larger Po River (section 3.1; Table 1 of Harris et al., 2008). Your sources, however, attribute 70% of the sediment discharge to the Po.

d. Likewise, it is unclear what is used for freshwater input – how are the smaller rivers included? Groundwater from the Croatian coast?

e. The models differ in how the initial sediment bed was configured, and the properties of the seabed sediment. I used higher settling velocity for a sand component and based the initial distribution on maps and data (my figure 4). If your analysis of sediment dispersal includes the seabed material, you should discuss the sensitivity of your calculations to the simplifications.

f. In terms of the results, it seems that one of the biggest differences is that during Bora forcing, the ROMS models produced sediment transport toward the northeast, entrained in the northern Adriatic gyre. I am not sure why the POM model did not produce that feature. Perhaps it is because of the lower resolution atmospheric forcing?

2. The use of Traykovski's data, and his framework for identifying transport events as high-concentration and dilute-suspension is very useful in this analysis. The paper did not, however, use the full suite of Eurostrataform data, for example the authors should be familiar with the 2007 special issue of Continental Shelf Research.

a. On page 1406 (line 5) the authors state that they are unaware of erodibility data, see Stevens et al. 2007, Continental Shelf Research.

b. Papers regarding settling velocity are also in this volume by Milligan, Mikkelson, along with Fox, et al. (2004).

3. Finally, the paper closes with a statement of future directions for this modeling effort, including adding bed consolidation and an active layer thickness. Because the ROMS CSTMS model either includes these, or has versions under development I offer these comments:

a. ROMS' active layer thickness is discussed in (Warner et al. 2008).

b. Recent efforts have developed a bed consolidation model (Sanford, 2008; papers by my group: Rinehimer et al. 2008; Fall, et al. 2014).

c. The conclusions also note that POM was unable to reproduce the high concentration suspensions and suggests adding sediment density to the equation of state. My group has used this feature in ROMS for a site offshore of New Zealand (Bever et al. 2014; Moriarty et al. 2014). However, the vertical resolution typical of a ROMS or POM implementation would be too coarse to represent a wave supported gravity flows. Instead an approach like Traykovski et al. (2007) or Scully et al. (2008) would be needed that either has very high vertical resolution (<cm) or is depth-integrated for the wave

boundary layer. For the Eel Shelf, we put Traykovski's model underneath a POM-type model (EcomSED, Harris et al. 2005).

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