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Earth Surface Dynamics Discussions

Interactive comment on "Velocity and concentration profiles of saline and turbidity currents flowing in a straight channel under quasi-uniform conditions" *by* M. Stagnaro and M. Bolla Pittaluga

Anonymous Referee #1

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Review of "Velocity and concentration profiles of saline and turbidity currents flowing in a straight channel under quasi-uniform conditions"

By M. Stagnaro and M. Bolla Pittaluga

The manuscript presents an extensive experimental work focused on density currents (i.e., saline and turbidity currents). The experiments were conducted in a flume at the University of Genova, Italy. One or more experimental conditions, such as discharge, excess density, and bed roughness, were changed during the experiments. The au-

thors report observations and data collected during the experiments. While I find the manuscript interesting, the current text fails in acknowledging previous, and nearly-similar published research on the same topic. My specific comments are provided below.

1) There is an extensive body of literature that was neglected in the article. See for instance, work published between mid 80's to mid 90's by Gary Parker's research group and collaborators. Some articles are directly related to the experiments reported in the current manuscript. I encourage the authors to review the following papers:

a. Parker, G., Garcia, M., Fukushima, Y., and Yu, W. (1987). Experiments on turbidity currents over an erodible bed. J. of Hydraulic Research, 25, 123 – 147.

b. Garcia, M. (1994). Depositional turbidity currents laden with poorly sorted sediment. J. of Hydraulic Engineering, 120 (11), 1240 – 1263.

c. Garcia, M. (1985). Experimental study of turbidity currents. M.S., University of Minnesota.

d. Garcia, M. (1989). Depositing and eroding sediment-driven flows: Turbidity currents. Ph.D. University of Minnesota.

The authors should discuss similarities/differences between previous published experiments and their experiments.

2) Text below Eq. (2) indicates that "the upper limit of integration... as the height at which u = 0.3 U" Why?

3) Figure 5: Blue dots in the initial four profiles are consistently below the flow interface recorded during the experiments. The agreement between line and dots improves significantly in other profiles. The authors should discuss this point and provide a hypothesis for this particular behavior. Where was the submerged hydraulic jump in that experiment?

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4) Table 1: The article will benefit if the submerged-hydraulic jump locations are provided.

5) Figure 6 b: This plot is very similar to plots given in Figure 8a of reference a, and Figure 9a of reference b provided in point 1. The authors should include data from those references in the graph to compare the experiments.

6) Data is reported on specific discharge variation along the flume, no water entrainment equation is applied to enhance the analysis. This is inconsistent along the manuscript: an equation is used to estimate the head velocity. I suggest the authors use equation 20 (reference a, point 1).

7) Plot the interfaces in Figures 11a, 12 and 13a.

8) Figure 15: what is the cross-section? Same question for Figures 16 and 17.

9) Effect of excess density: The authors claim "in Fig. 16b the shape of the velocity profiles do not seem to be affected by this change" However (and near the bottom), profiles corresponding to S19 and S20 start around 0.9, while S18 starts with a value smaller than 0.6. Furthermore, S19 and S20 indicate a velocity reduction near the bed; S18 shows a continuous velocity increase in the same region. Why is that?

10) Effect of the densimetric Froude #: I agree with the statement related to the lack of change of the dimensionless shape of the velocity profile as function of Frd. However, this is only true in the density current's body. Outside that area, the variation described in Figure 17 is significant. This, in turn, could play a key role in water entrainment.

11) Finally, I found several small typos in the text. For instance: "in a cross sections", "is related two aspects", "damping", etc.

Interactive comment on Earth Surf. Dynam. Discuss., 1, 817, 2013.

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