

## ***Interactive comment on “An approach for data-driven characterization of tide and current fluxes in coastal basins” by Elvira Armenio et al.***

### **Anonymous Referee #2**

Received and published: 16 October 2016

The manuscript of the article “An approach for data-driven characterization of tide and current fluxes in coastal basins” by Armenio et al., presents an interesting approach for the characterization of tide and current dynamics in semi-enclosed coastal basins through analysis of high-resolution field measurement datasets. Although applied to a specific case study for such a basin in the Gulf of Taranto (S. Italy), the proposed methodological framework does apply by extension to relevant attempts and sets the bases for a comprehensive analysis of tidal/current dynamics that would certainly be of interest for numerical modelling applications as well.

The content of this work falls within the scopes of the Journal. The manuscript is well-structured and the use of English is at a good level. Materials and methods are adequately presented; results are comprehensible and clearly laid out; discussion and conclusions are coherent to the presented results.

**Reply:** We would thank Referee #2 for his/her very positive comments on our paper and for his/her careful revision work, which certainly will improve our manuscript.

My recommendation is to accept the manuscript for publication in NHESS pending a few minor revisions, as noted in the following comments.

[Content]

- The authors could elaborate a bit more on the approximation of a uniform flow along the transversal axis of the channel (Page 5 / Lines: 15-16) and its effect (if any).

**Reply:** Actually, there was a misprint in the original paper and what we meant to write is ‘uniform flow along the longitudinal axis’. In fact, as written, we noted that transversal velocities are one order of magnitude smaller than the longitudinal ones and consequently could be disregarded. The correction was made.

- The authors could also elaborate on why the trend of Figure 9 was considered representative for the entire studied period (Page 8 / Line: 16).

**Reply:** The trend of the original Figure 9 was observed many times along the entire time series of both sea elevation and current velocity. For brevity, it was extrapolated only for a selected period. Following both the comment of Referee #2 and the suggestion of Referee #1, we decided to substitute the original Figure 9 with the revised one, in which the phase-averaged trends of both tide elevation and currents (at different depths) are shown. The recursive trend is evident, as well as the delay between peaks, as described in the original paper. The reciprocal behavior of tide and currents observed in the original Figure 9 is still confirmed, but the use of the phase averaging procedure guarantees that this behavior is recurring and representative of the whole period. A brief text was added in the revised paper, to explain this change.

- Elaboration is also needed on the calculation of the tidal asymmetry factor (Page 9 / Lines: 3-6); some details on the assumed “graded depth”, for example, would be beneficial for the comprehensibility of this factor’s importance in this work.

**Reply:** The used cross section was a trapezoidal one with side walls inclined of 25°. This was taken considering that the true channel section is not known, so we based our assumption on the information from the Military Marine. The sentence was modified in the revised paper, to be more clear.

[Presentation]

- The scale/size of the embedded figure in Fig.1 (top left) could be improved in order to make it more legible, especially regarding the characteristics of the navigable channel (this, judging by the Discussions manuscript and not being sure about the final production size of the specific figure).

**Reply:** We agree with Referee #2 and Figure 1 was completely modified, to better show the characteristics of the communicating channel

- Fig.2 should be redrawn and its caption revised in order to include a legend and reference, respectively, regarding the blue/cyan line in it, even though it is deduced that it represents longitudinal current velocities.

**Reply:** We agree with Referee #2 and modified Figure 2.

- The manuscript would benefit by a slight revision in the use of English. Although - as noted in the previous - the overall level is good throughout the paper, there are certain points at which grammatical/syntactical errors could be corrected in order to further polish the manuscript. Some examples are listed in the following; a general remark would be to limit the use of connecting words in consecutive sentences.

- Page 2 / Line: 3: “in general” instead of “generally” seems more proper; consider revising.

- Page 2 / Line: 4: “furthermore” instead of “further” seems more proper; consider revising.

- Page 2 / Line: 12: “also allows” instead of “allows also”; revision needed.

- Page 2 / Line: 24: “restricted coastal settings” instead of “coastal restricted settings” is syntactically correct; revision needed.

- Page 2 / Line: 26: “accompanying” maybe(?); consider revising.

- Page 3 / Line: 19: “on a local scale”; revision needed.

- Page 3 / Line: 31: “have been acquired” or “were being acquired” are grammatically correct (depending on the intended meaning); revision needed.

- Page 4 / Line: 1: the use of “also” here is redundant.

- Page 5 / Lines: 1-3: “also” is not positioned correctly within the sentence; if its structure was to remain intact, it could be moved after “were”.

- Page 6 / Line: 2: “confirmation” instead of “confirm”.

**Reply:** Ok, all suggested corrections referring to the use of English were done.

On a personal - non revision-related - note, I would also expect (as do the authors mention at some point) temperature and salinity variations between the connected water bodies and along the water column to explain much of the difference in top- / bottom- layer dynamics at the artificial channel. It would be very interesting to see a follow-up of this work examining this aspect as well.

**Reply:** As also written in our response to Referee #1 and Referee #3, due to additional funds, we are now arranging for the daily measurement of temperature and salinity by means of a CTD probe, along a vertical profile in the Navigable Channel. This could allow to detect a thermohaline gradient which could explain/justify the analyzed fluxes in more detail. We are confident that a further study in depth could be done on this topic, in future works.