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

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This is my review of ' An approach for data-driven characterization of tide and current fluxes in coastal basins ' by Elvira Armenio, Francesca De Serio, Michele Mossa, submitted to NHESS. This is the second version of the paper. The first version was reviewed by the Editor.

The authors used a set of recorded data to identify the main physical processes which drive the coastal site "Mar Piccolo", in the inner part of the Ionian Sea. This basin is joined to open-sea by means of one artificial channel and one natural channel. The goal was to assess the relative strength of tides, wave and currents measured simultaneously, inferring on shallow water basin dynamics. Measurements were made only in the artificial channel.

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Current velocities were extracted from selected phases along the tidal period which allowed to compute correlations between tides and currents. Current measurements were made at different depths of the channel, and interesting up-flow/down-flow asymmetries were found with hysteresis-like behaviors, with different delayed dynamics at different depths.

This work brings new interest to the coastal hydrological community, relatively to the understanding of the input/output dynamics of shallow-water semi-enclosed basins, at local scales. Data are of high quality, recorded continuously during three months, thus bringing a nice data-set useful for the water dynamics, sediment transport, and pollution spreading understanding. This work is of high quality, and i think that the paper could be published without modification. I draw some minor remarks here after:

My own opinion is that the water density difference between Mar Grande water (heavier water due to cold temperature and high salinity) on one side and Mar Piccolo water (lighter water due to warm temperature and low salinity) on the other side, is the main process that could explain all the observed differences between the upper layer dynamics of the channel and the bottom layer one. As the authors suggested it in their discussions and conclusions, an intensive and long-time experiment on salinity and temperatures at different depths is now required to better understand the thermohaline circulation.

No measurements were made in the natural channel, which is 3 times larger than the artificial channel. An open question is now what could be the dynamics in this channel. Does the authors think that the depth-dependent phase-lag between tides and currents is the same? (for example longer duration of the flood at the bottom and longer duration of the ebb at the surface ..)

Figure 9 is a nice example of the depth-dependent tide/current interaction that occurred on 24.11.2015. It should be good later on (future work . . .) to make the same plots, but phase-averaged over the whole period. The phase-averaged current (I mean current

averaged respectively to the tide phase) will kill the noise level, and probably a good and quantitative average-lag between current and tide will appear more clearly at all the different depths.

equation (2) : tide components: may be add in the text that O1 is the principal lunar diurnal, K1 is the lunisolar diurnal, M2 is the principal lunar semidiurnal and K2 is the principal solar semidiurnal. - figure 9 : put in the legend that blue line is the longitudinal current velocity.

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