We would like to thank Reviewers 1 and 2 for the useful insights provided through their evaluation. Their comments have greatly helped us to improve the quality of both the manuscript (MS) and dataset.

Reply to Reviewer #1

We have fixed all inconveniences related to data access and format. Also, the data quality control has been largely improved, in particular (but not only) with the inclusion of a time-consistency check (ADP data) and additional flags. May be the major negative comment of Reviewer 1 concerns the extent of useful probe records, in particular salinity ones which were seen as highly questionable. We don't agree with this opinion which suffers from the lack of description of the hydrodynamic processes acting at the Guadiana and of dam operations in the submitted manuscript. For example, in his example Reviewer 1 considers that there is no useful river discharge data, while in fact, the discharge at that time was nearly zero (as indicated by the data) due to water retention in the Alqueva reservoir during most of the dry year 2012. Also, the large range of variability of salinity data relates to the high sensitivity of the estuary to reduced changes in river discharge. These aspects were not satisfactorily addressed in the previous version of the manuscript. We have consequently added new figures, tables and text sections to explain these variations, and to show that useful data extent more than the threshold limit of 6 months fixed by Reviewer 1. We have also substituted the Ponte Quintos hydrographic station with Pedrogão station (located 10 km upstream) in order to have continuous useful discharge data. Please see our response to specific comments below (see also, the authors' changes in manuscript):

Replies to issues and recommendations:

1) Time stamps and recording intervals - we need a uniform ISO time format across all files. We need all data reduced or reprocessed to a standard 1 hour data frequency.

All files have now a uniform time format. However, we don't agree that all data should be at 1 hr interval; this would result in a loss of information. Please note that potential users might not be necessarily interested in all the combined parameters. For example, some users might be more interested with the ADP data at 15 min interval to study tidal processes. Our objective is to provide data that will be useful for a maximum of users.

2) Data errors and data flags - having worked with this subset of data I have zero confidence in the data quality procedures applied to this data. First, we encounter two separate validity indicators: 1 and 0 flags in the ADP files but /designators in the water quality data. Second, the authors seem to have accepted, in the case of ADP data, some software-generated or generic data quality assessments (beam amplitude, beam noise, beam strength) without any

actual informed data analysis. They have reliable bottom pressure from which to determine water depth so they could apply differential flags or corrections based on water depth for the upper bins? Across multiple bins they could do nearest in time or nearest in space checks? Most of the ADP data that I eliminated due to 0 flags looked in fact quite reasonable and consistent (but of course I avoided bins with high error rates). Still it seems that the authors could do a smarter situational error estimate rather than simply using machine parameters. For the water quality data I removed everything flagged with '/' and many of those data looked quite bad, especially unrealistically and erroneously high. But meanwhile, as my analysis shows, the salinity data look highly questionable throughout but carry no error or uncertainty designators. Overall I think the authors have accepted default sensor-based and software-based error detection algorithms without any informed analysis based on this deployment in this situation.

The quality procedure has been largely reviewed and hopefully improved, thanks to the reviewer comments.

For ADP data, an additional flag now indicates the upper bins which are out of water or affected by reflection at the surface boundary. This check was performed based on pressure records and signal amplitude. Also, we have changed the thresholds of the signal-to-noise ratio and standard deviation in order to validate reasonable data (that were invalidated before). Then, we performed a time check for consistency of invalid data. This check was done though the comparison of predicted values (based on a M2 fit) with observations (taking care that this was performed during low river flow conditions). The data that successfully passed the test are now flagged as "accepted". At last, we ran a moving average to discard data spikes.

For probe data, an additional flag indicates ambiguous data. We don't agree that salinity data are highly questionable. The large variations of this parameter are induced by a strong sensitivity of the estuary to small changes in the river discharge and tidal mixing, related to its narrow, long and shallow morphology. First, during low freshwater inflow conditions, the estuary is well-mixed at spring tide and partly-stratified at neap tide. Hence, surface salinity tends to drop at neaps due to advection of fresher/lighter water near the surface. Second (and more importantly), the discharge from the Alqueva dam was nearly zero for prolonged periods of time, for example during most of the dry year 2012. During these periods, the range of salinity variations is reduced (25-37 PSU). For other periods, an "ecological" flow of ~50 m3/s is constantly released from the dam during months. As a result, the range of salinity variations becomes 15-37 PSU, hence the large variations observed along the time-series. At last, salinity varies from 0 to 37, during flood events, in relation to the tidal migration (upstream/downstream) of a salt wedge with the tide. We have added a new figure (Fig. 5) and a new text section (4 – data overview) to explain better the parameters variability at both the seasonal and tidal time-scales.

3) Overall data return - Accepting biofouling, sediment contamination, data logger failures, broken electrical connections, adverse weather, engineering changes, malicious disruptions, power failures, bad calibrations - all the real-world factors of environmental monitoring in a shallow and exposed estuary - one could assume that over 6 years of calendar time and perhaps 4 or 4.5 years of deployment time that one achieved a data return of 50%. If we accept the abnormal salinity patterns identified in my analyses as indicators of bad data, then a quick perusal of Figure 2 suggests perhaps very few periods of successful data returns. Even ignoring salinity we seem to have very long periods of far less than 50% return. Or perhaps better returns, but we really can't tell! We need a full data availability data quality time series indicator for all data sources (water quality, ADP and discharge) on one uniform and readable time sequence. Figure 2 provides no assistance whatsoever in this regard. We need this for three reasons! First, to help the authors show overall success rather than predominant failure. Second, to give users a view of the overall data stream so that they can easily find the useful sections. And third, so that the authors can extract a subset of data from one of the 'good' periods and prepare a figure or figures, much better than mine, to actually show the quality of the data. In addition we need some summary statistics: overall measurement time periods, overall possible combined (ADP, water quality and discharge) output, actual output. For that task I issue again my null hypothesis challenge: disprove the null hypothesis that the combined data sets contain no more than 6 useful (the authors can develop their own definition or definitions of useful) months of data. Disprove that and improve the quality assessments and then we could have useful -very useful - data.

We found these comments very useful. One new table (5) and 2 new figures (2 and 3) were added to help the reader to assess the availability of useful data, based on time-series visualisations and statistics. The MS has been amended accordingly, in particular (but not only) with the addition of a new section describing the extent of useful data (Section 4). At the end, the minimum cumulative time of valid records is 1.9 years (pH). All parameters (from the probe and ADP) are valid during 6.5 months. However, it should be noted that ambiguous probe data are not considered here, even though they can be useful for data analysis, as exemplified in sect.4b and Figure 5. In any case, the extent of useful combined data is more than 6 months. It should also be noted that the dataset is not useful only if all parameters are considered. For example, some researchers might consider only ADP data (3.8 years of useful records) or surface (probe) - bed (ADP) temperature (2.9 years of valid records).

Figures:

The time axes for the water quality (a) and velocity (b) panels in Figure 2 do not coincide.
Figure 2 labels far too small to read.
Figure 2 ADP not useful, no net flow?

ACP does not resolve estuarine circulation, in at depth and out at surface?
For the extracted segment below, column integrated Vnorth shows -0.03 m/s with high SD and range of +1 to -1. Bottom two bins show much smaller net southward with about the same min and max. Two upper bins with valid data show stronger southward flow with min (south) distinctly large than max (north). In plot, near bottom bins show closer to net zero flow while surface shows southward displacement.

Text does not use ISO dates while files do.

Figure 2 (now Figure 4) has been largely modified; all the graphs have now the same time axis.

We are not sure to understand the comments: "ADP no net flow?" and "ADP does not resolve estuarine circulation". The tidal signal should be removed in order to obtain the "net flow" (or residual flow). This is easily done by applying a low-pass filter with period of 40 hr, for example. The filtered data would indeed show the setup of an estuarine circulation at neap tides only, as the estuary is well-mixed at spring tides. This pattern has been the subject of an article published in Estuaries and Coasts (see Garel & Ferreira 2013). However, the objective of the figure is to display the extent of the data rather than specific estuarine processes.

Author's changes in manuscript

The English expression has been revised and polished; some trivial details were discarded while other important information was added. The organisation of the MS has been largely revised, with the addition of new sections. Given the large amount of modification through the text, we provide a .pdf version (without table and figure) where all changes are indicated in red (see "MS*_ChangesRed").

<u>The main changes along the text are:</u>

Section 3 (Data records and validation process) has been largely reworked. It now includes a description of the ADP, probe and river discharge records. Also, the validation process has been updated to include the new methods used for quality control. At last, sub-section 3.3 addresses the availability of useful probe and ADP data.

A new section 4 intends to make clear the variability of the measured parameters at both the seasonal and tidal time scales. We believe that such a description was lacking from the original MS. Note that for tidal variability, we have selected a period with ambiguous salinity data to show that these data can have coherent variations despite some high maximum values due to calibration inaccuracy.

The new section 5 gives information about data access, datafiles organisation, flags and missing values.

Tables:

All tables were revised, and 3 new tables were added:

Table 2 indicates the dates of probe maintenance. This information was previously included in the dataset. We prefer to discard it, since none of the reviewers mentioned its utility.

Table 3 indicates the range of variation of the measured parameters according to various seasons (summer –winter) and river discharge conditions.

Table 5 reports statistics of useful ADP and probe data.

Figures:

All figures except Figure 1 were modified. 2 figures were added.

- The new Figure 2 displays the availability of good ADP and probe data. Accepted and ambiguous data are also reported.

- The new Figure 3 reports the duration of valid combined ADP and probe parameters.

- The new Figure 4 shows the whole probe time series data (with dates of maintenance). ADP and river discharge data are also reported. Seasonal variability of the data is addressed based on this figure.

- The new Figure 5 presents a subset of the recorded parameters in order to discuss their variability at the tidal time-scale.