Dear Professor Huthnance,

Many thanks for considering our paper titled 'A newly reconciled data set for identifying sea level rise and variability in Dublin Bay'. We have revised the manuscript following the referee's comments (listed on the next page) and tried addressing all of the queries during the discussion period.

We hope that you now find the paper suitable for publication. If you have any further queries please do not hesitate to get in contact with me.

Yours sincerely,

Amin Shoari Nejad

**Comments from Prof. Woodworth:**

> One major comment is that there is no technical information or history provided on each gauge.

We added a new table (table-4 in the revised manuscript) including the history of the gauges at Dublin Port.

> A second comment is that Table 1 is missing a line?

We fixed the table 1 to incldue all the necessary information.

> A third commment is that on line 1 of the abstract it says the new composite record for Dublin will be for 1938-2016, but from Table 1 we see there is Dublin data to 2019. It looks like the 2016 constraint comes from Newlyn and Brest data being only to 2016 (Table 3). That may have been the case when the first draft of this paper was written but there are data to 2019 for both now so the new Dublin record could go to 2019.

Lines 94-97 in the revised manuscript explain why we removed data post 2016.

> A fourth comment relates to the regressions at lines 116 and 140. I think the former is fair enough (although see the additional reference mentioned below). The point is that the MLW will contain a nodal component mostly due to changes in the tide (the roughly 3.7 percent of the M2 tide) and also a small nodal component in MSL. It will also have a perigean component due to the tide. So ok. But the latter is not so reasonable. MSL will have a nodal component (seeWoodworth, 2012) but it will be very small. So, instead of determining the true nodal amount, your fit over 38 years will simply pick out noise from the much larger interannual variability in the ocean circulation. In addition, there is no tidal basis for including a perigean component in a parameterisation of MSL. So I think this equation is not

> reasonable. Anyway, you don't discuss the determined beta2-5. So I would also make a simple regression with beta0 and beta1 and check if those parameters are similar to what you have here then use them instead. (If they are different then you have a problem).

We fitted the model again, both with and without the perigean, and the results changed only slightly. We removed the perigean in the revised manuscript and adjusted all the assoicated figures as a result of this change.

We tried addressing all of the minor comments mentioned by Prof. Woodworth and all of the associated changes are highlighted in the submitted "track-changes" file.

**Comments from Dr. Bradley:**

> Prior to calculating the MSL rates line 140 states " yearly MSL from Brest and Newlyn .. removed atmospheric effects following". If to use the MSL from Brest +Newlyn the atmospheric effects need to be removed; why was this not removed in Section 3 when estimating the Mean sea level for Dublin Port.

We explained why we chose this approach in lines 137-138 of the revised manuscript.

> Section 5 and Section 6: Unless the journal requires both discussion and conclusion section: these could be combined as "Discussion +Conclusions" In the introduction the authors refer to the difference between satellite observations (line, 23 " sea level rising at a rate of 2-3 mm/yr), Dublin City council rate (line 30: reports a 6-7 mm/yr SLR between years 2000-2016) and the rate from previous published studies. Could the authors refer to these differences in the discussion or conclusions. Why are the satellite records different, for example?

If the editor believes that there is no problem with merging the Discussion and Conclusion sections, we have no objection to follow the reviewer's suggestion.

Regarding the rates, in line 23 of the revised manuscript we emphaised that satellite observations are associated with the open ocean rate.

1:Section 1: Line 34-40 “find problems with the MHW measurements which indicate a drift over time” From reading section 3, I assume this “drift correction” was calculated using the Bayesian multivariate linear regression. I think I would to mention this.

We added a sentence (lines 37-38 in the revised manuscript) clarifying this issue.

Data collection for Dublin Port: Line 45 - 66. We complied MHW... and, where available, mean sea level for Dublin Port. Do all five datasets have data for MHW, MLW, MTL and MSL? If not, could you add to table 1 which do/do not. From Figure 1, I assume they all provide MHW, but which ones do not record MSL?

In the revised manuscript, we added a new colomn to Table -1 called ”Variables” including the requested information.

Section 4: Perhaps rename “rates of sea level rise at Dublin Port and nearby tide-gauges”. Just to make it clearer the differences of this section to Section 3.

In the revised manuscript, we renamed the section 4 to “rates of sea level rise at Dublin Port and nearby tide-gauges”.

Can you add a column for the different datums used for each of the datasets, prior to processing? On line 76 “Difficulties in merging the Dublin Port datasets arose from the differing datum definitions” It would be helpful to have Table 1 and Table 2 combined - This is useful to compare the different durations of each record. Also can you check the range of each data record through the paper as the text and table often do not match or are consistent. -Port Authority Annual: duration: 1938-1977. Line 46: “ refer to as 1938 to 1988” -Port Authority Monthly: duration 1978-1988: Lines 45- 50. “The Monthly Port Authority data for the period 1987-2001”. Is this combined with the first

> dataset refer to in as Port Authority Annual -Harbourmaster: duration: 2002-2009. Line 56: "data supplied by the PMSL for the period 2001-2009". -NTGN: duration: 2006-2019. Line 60: "data for the period 2006-2017"

In the revised manuscript, we added a datumn colomn to Table-1. However, we think combining Table-1 and Table-2 could cause some confusion because the two tables have different purposes. The first one is describing the various data sources used to create a reconciled dataset for Dublin port whereas the second one is introducing the other datasets from other locations that we used to validate the reconciled Dublin port dataset.

We fixed the Table-1 and changed the text accordingly to make sure everything is consistent.

> Figure1: The length of the records shown do not correspond to the length of the records in Table.1. For example: Port Authority (blue) 1968 to 2011? This may be a plotting problem or the resolution of the figure.

Figure 1 is fixed in the revised manuscript and is now consistent with the information given in Table-1.

> Line 89: "we now use our newly merged dataset (..) MSL and MHW from 1938 and 2019. As you refer to the period 1938 - 2019, why is Figure1 showing the MHW from 1968 to 2019?

Figure 1 is trying to illustrate the consistency among the monthly values of different datasets used for the reconciliation whereas 1938-2019 is the duration of the reconciled dataset with annual resolution. We don't have monthly data pre-1968 and we clarified this in line 84 of the revised manuscript.

> Table 2 and Figure 3: Can you clarify why the time axis is only to 2017 (but the records extend to 2019?)

We decided to remove the data post 2016 because of its poor quality. This is clarified in our revised manuscript (Lines 94-97).