Ocean Science Discussions

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Reply on RC2

Amin Shoari Nejad et al.

Author comment on "A newly reconciled dataset for identifying sea level rise and variability in Dublin Bay" by Amin Shoari Nejad et al., Ocean Sci. Discuss., https://doi.org/10.5194/os-2021-92-AC2, 2022

Dear Dr. Bradley,

Many thanks for reviewing the paper. Your comments are appreciated. Below we go through and respond to the queries. We look forward to hearing from you shortly.

Kind regards,

Amin Shoari Nejad on behalf of all authors.

1: Section 4: 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.

Regarding your question as to why we didn't remove the atmospheric effects when modelling MSL using MLW in Section 3 of the paper, the answer is that our atmospheric dataset for Dublin port is limited to 1948 onwards whereas we wanted to train the model on the longer (and therefore more robust) data set from 1938 to 1977. If we were to first remove the atmospheric effects and then fit the model, we would have to remove 10 years of data (1938-1947). We did attempt this but found that it increases the uncertainty of the model predictions substantially. In fact, we tried two approaches: 1) removing the atmospheric effects from both MSL and MLW and then fitting the model on the data during 1948-1977, and 2) training the model for the period 1938-1977 without removing the atmospheric effects for re-creating MSL using MLW, and then removing atmospheric effects from MSL to calculate the SLR rates. We concluded that the second approach is superior because the extra training data resulted in lower uncertainty associated with the predicted values of the model. We will add a sentence to the paper clarifying why we used this period.

2: 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?

With regard to the question of why there is a difference between the reported satellite measurements and Dublin council rates mentioned in the introduction, the former is the open ocean rate near Ireland and the latter is specific to Dublin port which is subject to local factors. Differences are expected between the satellite observations and local tidal sites in studies such as these. Our final rates of change contextualise the rates of rise reported by DCC and previous authors. We will add a footnote to this paragraph so that future readers are not confused by this discrepancy.

Minor questions:

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 it would to mention this.

That is correct, the Bayesian model is used to correct for the possible drift. Thanks for your suggestion, we will clarify this in the introduction as it is done in the latter sections.

2: 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?

Thank you for your comment on Table 1. We will add a new column to that table including the available variables (MLW – MSL – MHW – MTL) for each dataset.

3: 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.

Thank you for your suggestion. We will change the title of Section 4 to "Rates of sea level rise at Dublin Port and nearby tide-gauges" to make the distinction.

Specific comments about figures

Comments on Table 1:

Regarding Table 1, we will add a datum column following your suggestion. 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.

About the inconsistency in dates specified in the text and the table, we apologize for the problem. There are some typos (e.g. 1978 should be 1987) that need to be fixed and some clarifications need to be made regarding why we used the data until 2017 while our dataset ends in 2019. We will fix these problems and make sure the text and the tables are consistent.

2: 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.

Thank you for pointing out to the problem with Figure 1, the labels need a swap between the Greene dataset and the Port Authority dataset. We will fix the table in our revised manuscript.

3: 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 (we don't have monthly data pre-1968), whereas 1938-2019 is the duration of the reconciled dataset with annual resolution. We will add a sentence to clarify this in the next version of the paper.

4: 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 mentioned in our previously submitted paper (the current one is the revised version) and we will further clarify this in our revised manuscript.