

Ocean Sci. Discuss., referee comment RC1
<https://doi.org/10.5194/os-2021-92-RC1>, 2021
© Author(s) 2021. This work is distributed under
the Creative Commons Attribution 4.0 License.

Comment on os-2021-92

Philip Woodworth (Referee)

Referee 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-RC1>, 2021

18 October 2021

Comments on 'A newly reconciled data set for identifying sea level rise and variability in Dublin Bay' by Nejad et al. (OSD)

This paper attempts to derive a long-term MSL record for Dublin Port, dealing with technical problems in the record, validating the newly-obtained time series with data from two other records in Ireland and from Newlyn and Brest. It is an interesting exercise in trying to make sense of historical data, and I have no objection to its eventual publication. However, I do have some major and minor comments I would like to see attended to.

One major comment is that there is no technical information or history provided on each gauge (leaving aside Newlyn and Brest). Presumably Howth and Arklow are radar gauges? But also I would like to see a table (perhaps not part of Table 1) which shows what type of gauge was used at Dublin for which years. Presumably in the earlier years it was a float gauge, replaced by a pressure sensor, or I would have thought a series of pressure sensors as they tend not to last long.

The analysis of this paper hangs on the theory that the the pressure sensor(s) used in recent years at Dublin was fairly reliable at low waters but imprecise for high waters. So, when was the pressure sensor installed? If possible, what calibration method was used to level it in such

that

low waters were accurate? And why were high waters less reliable? - the only thing I can think of

is that the wrong density (and maybe gravity) was assumed. If possible, what manufacturer was it? Was it

an absolute or differential sensor? There is none of this sort of documentary background in the paper

to support the authors' working theory that a major change took place in 1976. Also 1976 for me seems

rather early for a pressure sensor being used, which means the change point happened during the float

gauge era, and so would have had nothing to do with pressure sensors. Your theory at the moment hangs

entirely on the change point results (Fig A1) and would be much stronger with some additional evidence.

A second comment is that Table 1 is missing a line? From the text, I would think it should look like:

1. Port Authority Annual 1938-1977 Annual Woodworth et al. (1991) HW+LW
2. ditto 1978-1988 ditto ditto
3. Port Authority Monthly 1987-2001 ditto
4. Harbourmaster ditto
5. NTGN ditto
6. Greene HW only

A third comment 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.

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 (see Woodworth, 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).

Minor comments:

22 - ... for them, while Camaro ... state ...

32 - given that

35 - We find that the datums of Dublin's ..

36 - and thus need further consideration. In addition,

38 - drop 'other'. Problems with datums are not atmospheric

45 - 2018, but Table 1 suggests 2019?

50 - ... (LAT) which is xx cm below/above Poolbeg Datum. [I think that is about 200 mm?]

51 - this monthly data set is not in Table 1 (see above)? The second entry says monthly but that is the second part of the PA Annual data set (Woodworth et al. 1991 data) and that is annual. Anyhow, can you check all this?

53 - automatic comparison and checking of the ..

54 - it would be worth saying there is only 2 years overlap between this data and that of

the PA Annual.

57 - 2001-2009 but Table 1 says 2002-2009

60 - 2006-2017 but Table 1 says 2006-2019

62 - All NTGN data are defined relative to ODM and LAT. (presumably)

70 - each day. These ..

71 - metres. Data post-1998 had already been digitised ... intervals prior to the present analysis, while for the post-2004 data the sampling frequency increased to 1 minute intervals.

I'm sure this ok although what you are trying to explain are columns in some excel sheet? Maybe check if it reads ok again. Also (line 72) you might explain that sometimes you won't have two high waters when the second one falls into the adjacent day.

Table 1 - see my comments above. I think an additional column saying 'HW and LW' or 'HW only' would be useful

80 - There is found to be a systematic .. dataset presumably due .. [presumably because do you know that for sure? i.e. did they round in one way?]

81 - shows monthly MHW from the Port ..

84 - datasets, each expressed with respect to LAT.

88-91 - should these lines be better in section 2 as they are describing adjustments made.

I didn't understand the sentence at lines 90-91 which seemed tountament to replacing one with another.

prior to 2003 (Table 1) ..

92 - only tabulated MTL (i.e. the combination of MHW and MLW) is available for some years instead of MSL. Therefore, MTL needs to be converted to MSL to be consistent throughout.

96-97 - I'd drop the sentence 'The recordings'

Figure 3 - see above. This can be extended to 2019?

101 - drop 'of the issue'

.. malfunction of the Dublin tide gauge ...

next line - the reader will want to know why the discrepancy is proportional to depth - see above. I think you need an extra paragraph at least.

109 - sentence 'According'. Please write this more fully.

114 - ... an intercept, a term proportional to annual MLW

116 (Haigh et al., 2011; Woodworth, 2012). The two latter terms will primarily contribute to the astronomical tidal component of MLW.

The reference is:

Woodworth, P.L. 2012. A note on the nodal tide in sea level records. Journal of Coastal Research, 28, 316-323, doi:10.2112/JCOASTRES-D-11A-00023.1.

124 - and the original

129 - and exhibits a relatively .. to MSL. You then need a sentence to say how you now interpret the information in Figure 3.

133 - what do you mean by atmospheric effects? If you mean simply the inverse barometer then say so. If it is more complicated in trying to account for winds then say that also.

... We first removed the inverse barometer effect on sea level at each site following ...

140 - see my comments about this equation above.

145 - has a mean

152 - earlier periods (i.e. pre-1953) are ..

153 - and are consistent

words 'and where lower'. This is obvious isn't it? I drop this.

157 - you mean Glacial Isostatic Adjustment (GIA) so reword:

.. are in regions of uplift due to Glacial Isostatic Adjustment (GIA) ...

159 .. greater consistency of the local sea level rates with the global figure is to be expected (reference).

163 - It doesn't matter for this paper and don't change anything but I don't particularly

buy this. Ireland may be on the edge of the Atlantic but Dublin isn't particularly and in fact Newlyn and Brest are closer to the gyre (see for example, Woodworth, P.L., Pouvreau, N. and Woppelmann, G. 2010. The gyre-scale circulation of the North Atlantic and sea level at Brest. Ocean Science, 6, 185-190, doi:www.ocean-sci.net/6/185/2010/.)

But one reference you could include is to the fact that interannual variations along the European coastline are very similar, whether due to the gyre or long-shore processes or whatever, see for example Figure 11 of:

Calafat, F.M., Chambers, D.P. and Tsimplis, M.N. 2012. Mechanisms of decadal sea level variability in the eastern North Atlantic and the Mediterranean Sea. Journal of Geophysical Research, 117, C09022, doi:10.1029/2012JC008285.

196 etc. - you should define statistical terms like N, Uni etc. for the general reader.

200 - the model output as such is not shown in Figure A1, simply the difference Dublin minus Newlyn from which the model decides 1976 is a change point. And should that be difference and not absolute difference?
I agree something seems to happen around 1976, but it would be good to have an explanation
why - see above

References - you provide a doi for the first one but not others. Pugh et al. can be updated.