Ocean Science Discussions

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Reply on RC1

David T. Pugh et al.

Author comment on "Mean sea level and tidal change in Ireland since 1842: a case study of Cork" by David T. Pugh et al., Ocean Sci. Discuss.,
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Response to Review by Dr Martha Marcos

Responses in italics

This manuscript succeeds in providing information on long term changes on tides and mean sea levels at Cork using only a short set of data recovered from historical archives in combination with modern sea level observations. Many details are provided on the data collection and on the corrections applied to make old and new data comparable. This is the core of the paper. Once this is achieved and the remaining uncertainties are estimated, the analyses of tidal changes and mean sea level trends are straightforward. Results are consistent with other works that point at only small (and local) changes in tides over the past 200 years and with earlier estimates of mean sea level trends in the region. I think this work deserves publication and I am looking forward to seeing the comprehensive study that the authors are planning to carry out at many more sites around Ireland.

We would like to thank Dr Marcos for the review of our manuscript and encouragement for the wider project.

I provide below a list of questions and suggestions, followed by some typos:

Sections 1, 2: I think it would be useful for the reader to summarise the information on stations and periods to facilitate the reading, together with Figure 1. It is easy to get lost in the text otherwise.

We have added some annotation to the map caption: Passage West (June-Aug 1842, June–July 2019), Roberts Cove (Jan–June 1973), Ballycotton (Oct 2010–present), Cobh (1906), Currach Club (Jun 2019–present), Ringaskiddy (Jan 2012–present). This information is repeated in Table 3.

Lines 134-135: how are 5-min readings converted into hourly? one value every hour has been kept and the other 5-min values disregarded, or have they been averaged?

We have rewritten line 135 to clarify:" We have digitised the hand-written ledgers, taking only values on the hour, which is adequate resolution for tidal work, and then made an analysis using software which can work with 19th century data."

Page 6, 1st: if sea level is measured using a pressure gauge, then atmospheric pressure is probably also recorded. Air pressure observations are then mentioned in line 295.

Atmospheric pressure is implicity recorded as part of the pressure data (there was no explicit second measurement of air pressure). None of these air pressure variations are significant at these latitudes at tidal frequencies, they do not affect the astronomical tidal analyses

Section 4.1.1: Figure 4 shows, according to the caption, the seasonal cycle of the M2 modulation due to MA2 and MB2, but the text (line 190) refers to non-astronomical effects, which is contradictory.
The reviewer comments about astronomical and non-astronomical parts of ~MA~2 and MB2 are correct and the text is muddled. We have removed "astronomic" in line 181, and "non-astronomical" in line 192.

Line 216: estimation of the magnitude of the nodal modulation of M2 based on other sites. Are these listed somewhere?
They are listed in line 205. In line 218 "…sites (Woodworth et al, 1991; Araujo 2005). We have repeated the references for clarity.

Line 233: what are these uncertainties ? according to the text after them, seems to refer to interannual variability, but is it not specified.
Yes, interannual variability considered here. We have clarified with "In assessing the tidal uncertainties, any tidal value measured over a short period may differ from the longer-term average because of real variations, such as natural interannual variability, and measurement errors. To consider interannual variability, we to look at Ringaskiddy 2012-2019".

Line 295: see my comment above on the air pressures...
Dealt with above.

Lines 476-478: this seems a bit speculative since the 27 cm are an averaged value. It would make more sense to compare with closest stations (averaged or not)
Unfortunately, no analysis of Irish stations exist over the relevant time period so we believe that the Hogarth et al. number from Britain is the best to compare with.

Typos:
Line 147: is this reference to figure mistaken? Maybe figure 3...
Line 231: "we to look"
Lines 429-430: these two sentences are repetitive
Lines 473-475: please use the same number of digits, for consistency. Line 476: 40.2 cm
Reference Dwyer is incomplete
Reference Hogarth (2021) is already published Reference Horsburgh (2020) doi is missing
We would like to thank Dr Marcos for these typos and reference issues, all of which have been corrected in the revised version.