

Dear Professor John Huthnance,

Thank you very much for accepting our manuscript for publication in *Ocean Science*. We are grateful for your careful reading of the revised manuscript and for the helpful comments and suggestions.

We have addressed all of the requested technical corrections, and the corresponding changes have been incorporated into the final manuscript. Our responses to each of the comments are provided below, with the relevant changes made in the manuscript as indicated.

Detailed comments.

Editors Comment

Lines 129-131. I think you could “tidy” this sentence. The sites (not triangles) have the records. 60-100 implies > 40.

Response:

We have revised the sentence and Figure 1 caption to clarify that the sites, rather than the map symbols, have the long records, and to remove the redundant “>40 years” wording. The revised caption now reads:

“Figure 1. The six primary tide-gauge (TG) sites analysed in this study are shown in red. Supplementary TG sites, shown in blue, are located near the primary sites and are used to fill gaps or improve record quality where available. Belfast, Dublin Port, and Malin Head have long records spanning approximately 60–100 years and are indicated by red triangles.”

Editors Comment

Lines 675 to 678. This sentence is confusing. If the values are from “previous analyses” then the sources should be cited. However, the next sentence rather suggests that the estimates in lines 676-678 are yours and that the values in lines 679-681 with citations are the “previous analyses”.

Response:

We have revised the text to clarify that the modelled RSL rates of -0.08 mm yr^{-1} (1938–1961) and 0.07 mm yr^{-1} (1961–1980) are estimates from our reconstruction, rather than values from previous analyses. The historical estimates from Carter (1982) and Woodworth et al. (1999) are now clearly attributed to the respective sources. We have also revised the final

sentence to refer to “RSL change” rather than “RSL rise” to account for the negative historical rate reported by Carter (1982).

Supplement.

Editors Comment

Line 219. “phase” is not plotted.

Response:

We have removed the phase, which was inadvertently retained in the resubmitted manuscript, and have corrected this for clarity.

Editors Comment

Line 626. “effect of removing” → “result after removing” except that that is already implied in the previous line. “effect of removing” wants a comparison with the series before removing atmospheric pressure.

Response:

We have revised the caption in accordance with the editor’s advice. It now states: “Figure S13. Atmospheric pressure correction applied to Dublin Port. Top: Observed monthly mean water level versus atmospheric pressure anomaly, showing a negative correlation ($r = -0.613$, $p < 2.2 \times 10^{-16}$), consistent with an inverse-barometer response in which higher atmospheric pressure is associated with lower sea level. The fitted linear regression shows the observed relationship between atmospheric pressure anomaly and sea level. Bottom: Observed and atmosphere-corrected monthly mean water levels, showing the corrected series after removal of the estimated atmospheric-pressure contribution.”

Reviewer Comment

Please note that (as I understand it) the supplement will appear “as is” in the form of the .pdf file that you submit (in contrast with the main paper which will be re-formatted to OS style). Therefore you should take care to submit the supplement as you want it to appear.

Response

Agreed. From our review, we think this is now fine. As the supplement will not undergo

Agreed. We have carefully reviewed the supplement and have prepared the submitted PDF in

the form in which we would like it to appear. We do not anticipate that any further changes will be needed.

Additional minor corrections

We have informed the Editor of the changes required to correct a duplication error, including, for example, the Malin Head tide-gauge file. These corrections have resulted in changes to a number of numerical values and require the relevant plots to be rerun. The Editor has confirmed that these corrections should be regarded as changes requested by the Editor.

As the RSL analysis is interconnected, correcting the input data resulted in some numerical changes to the modelled estimates and associated figures, which have been updated accordingly. Small corresponding numerical adjustments were also required in the Model Validation section. These changes are a direct consequence of correcting the input data and do not involve any changes to the methodology or analysis approach. The overall results, interpretation, and conclusions of the study remain unchanged. Minor numerical and typographical corrections have also been made where necessary throughout the manuscript and Supplement, including corrections to monthly mean totals.

The sensitivity assessment of the 18.6-year nodal tidal cycle has been removed from the supplement, as this additional test was not required for the final analysis. Its removal does not affect the results, interpretation, or conclusions of the study.

At the end of the Supplement, we added a “References” list for clarity.

Figure 3c. The wording and Figure S3C have been revised to present the early-2000s Tivoli datum adjustment in a more concise, source-based form. The corresponding in-text citation and figure attribution have also been updated for consistency. This revision was made because permission to reproduce the original material could not be confirmed, and the source material contained a clear copyright notice. To avoid reproducing the original copyrighted presentation, the revised Figure S3C is an author-created schematic based on the National Tidal and Sea Level Facility (NTSLF) datum-conversion guidance and the relevant published datum relationship for Cobh. The underlying numerical datum adjustment and scientific interpretation are unchanged. Irish Water is retained in the text only as a supporting reference for the documented shared datum relationship between Cobh and Ringaskiddy.

Figure 11 has also been corrected. The previous version used a fixed credible-interval width, which did not fully represent the posterior uncertainty. For clarity, the updated plot uses the

six-site mean of the total RESLR modelled RSL, calculated within each posterior draw. All series are referenced to 1993 = 0, while the Ireland series retains its natural posterior uncertainty. This correction concerns the representation of the modelled uncertainty and does not involve a change to the underlying methodology or analysis.

The supplementary text relating to the early Dún Laoghaire-based segment and the associated Figure S14 have been removed to avoid redundancy with the preceding atmospheric-correction sensitivity analysis. This streamlines the supplementary material while retaining the key findings and relevant methodological limitations.

Please note that all supplementary figures have been included in the uploaded figures ZIP file. These are labelled sequentially as Figure_S1, Figure_S2, etc., where “S” denotes a supplementary figure.

Yours sincerely,

Patrick McLoughlin