

Author Response to Reviewer Comments on **essd-2021-390**

Kim M. Cohen et al.

Author comment on "Last Interglacial sea-level data points from Northwest Europe" by Kim M. Cohen et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-390-AC1>, 2022

Author Comment response

We thank the two reviewers for their comments and their patience with our manuscript.

We apologize for the many inconsistencies in the original preprint, that was produced under pressure. We appreciate that the reviewers recognized the relevance, effort to capture full literature and geographical qualities.

We have used the comments to majorly edit and rearrange the text to provide a revised manuscript, that we will upload shortly. The revision has included moving some sections to an appendix. As part of this we have also developed version 2 of the WALIS database (amended online, and an export version uploaded as V2 in the Zenodo entry) with a few additional data points and clarifications.

Here we respond to the RC1 and RC2 comments.

RC1 first comment:

Use of transgression/highstand/regression interpretation of LIG RSL change:

- Thank you for the comments regarding our previous use of these terms. This has triggered major revision of the presentation, to fix some matters that could be misunderstood from the manuscript.
- Although the previous version gave the review the impression that we were 'working towards a transgression/highstand/regression interpretation of LIG RSL change', we can reassure this was not the case. This confusion arose from the fact that the North Sea part of the study area (Fig. 5) provides SLIP data from early, middle and late stages of the interglacial that come from chronostratigraphically and geographically separated positions in the overall fairly continuous basin fill. In the source papers, the SLIPs have been picked from high resolution documented subsurface deposits, that prior to deciding what observation would be a SLIP (or TL, or ML) had been collected as part of local mapping. That local mapping had involved lateral and vertical tracing and palaeoenvironmental characterization of various strata. This mapping included identifying submergence (vertically, sedimentologically and biostratigraphically) and transgression (from lateral tracing facies representing paleoenvironments) etc. In other words, original authors, and also we in our WALIS cataloguing efforts, worked from findings of 'transgression' in the classical sequence stratigraphy sense, and not towards

interpretation of transgression in the RSL sense. Our cataloging effort has mainly been on properly separating legacy sea-level points into those which are truly SLIPs, from those which are better regarded a Terr. (Upper) Limiting or a Marine (Lower) Limiting points and the assessment of the vertical position (see comment 2). If the impression was that we upscaled local to regional findings (country by country along the North Sea) to a global signal we regret this and regard it due to poor presentation for which we apologise. The paper intends to be simply a summary of data from the region as requested for the WALIS special issue: listing the classifications and methods, summarizing the cloud of data and stopping prior to interpretation as to the patterns and drivers of RSL.

- To address the reviewers concerns the manuscript now strongly reduces use of the terms transgression, highstand, regression throughout, making much clearer that we simply use these terms to describe the sedimentary sequences, rather than making inferences about the patterns of regional and global sea level. Similarly, we have removed these terms in the presentation of data in figure 5 and 6 and reclassified the data points (where chronological information allows) to early, middle and late LIG. However, we must stress this is within the context of the regional relative chronology and not global assessment of LIG climate/duration.

RC1 second comment:

Terminology, definitions, and illustrations

- This comment was also made in RC2. We have revised the beginning of this section, including a new Figure 2.
- Regarding the importance of the section/figures relative to Research History section: this section has now been moved to an appendix. Though this moves away from the structure of the special issue template, it is the sheer wealth of >100 years of research in this area means it made the main text very long. As a result, the revised manuscript now focuses earlier the indicator types and database entry.
- RWL is now correctly de-abbreviated. Mutual exclusivity of the SLIP types is now addressed at the beginning of the describing section (using a figure and a decision tree annex to table 3).
- Regarding particularities of recognising basal peats (in regional geological mapping, sedimentology) and working them up to basal-peat SLIP types (a later step of interpretation than the mapping): the section is edited, misrepresentations corrected. The listing in this paper does not intend to be a review of LIG SLIP indicator types and their Holocene parents/analogies. In our opinion, the basal peat indicator type has been described before in Holocene sea level databases and we reference sources in the text.
- Regarding the 'marine fauna' indicator type: The revision makes clear (a decision tree added as Table 3b), that we used this general indicator as a fall back option. Other indicator types also make use of 'marine fauna' information as part of the argumentation, but they have more contextual information.
- Regarding 'estuarine terraces': a new introduced cartoon figure should now further clarify this type. Recognizing Intertidal sedimentological signature and associated biota is key for this particular one. Whether that is in muddy or sandy settings is not of prime importance. Entries in the spreadsheets echo descriptions in the original literature.
- Regarding 'elevation' accuracy: We have modified Table 5 to fix referring to reading from a graph as reporting a measurement technique. For some older sites only graphical presentation in publications remain and therefore 'read from a cross-section' becomes the way the elevation data was entered in the database and is used by other papers in the special issue. We will forward the particular comments, also to % inaccuracy, to the WALIS database interface (Rovere et al. 2020). WALIS stores two vertical uncertainties: those of the present day vertical position of the indicator (Table 5), and those of the palaeo sea-level elevation of the SLIP (using the 'in formula' part of the indicator description). Only in the case that also Vertical Land Motion is

considered does the vertical uncertainty become age-attribution dependent. In a few cases (older literature) there are links between variable MTL and the expression of present day vertical position errors (often the same ones that are 'read from cross-section'). The setup of the WALIS is such that a tidal range has to be provided (upper and lower limit), separately from the vertical elevation. This is used in the calculation of the palaeo sea-level elevation and in the propagation of the uncertainty. A user can assess this on point-by-point basis, and decide to overrule deemed too small uncertainties. As for now, we have not modified our database entries in keeping with the WALIS structure.

RC1 third comment:

Lengthy portions of the text (notably Sections 2 and 5)

- Yes, we agree. We have majorly edited the text and moved some sections to an appendix. All specific comments of RC1 re more minor textural changes were implemented as part of this process.

RC2 first comment:

- This comment is also made in RC1 (their second comment).

Suggestion of a figure illustrating the SLIP types that outside NW Europe, in LIG contexts are rare:

- such a figure has been added (new Fig. 2 in revised manuscript)

RWL and IRs for sea-level indicator requiring explanation:

- the text on this has been edited. Closing lines 'as formulas' left as is, because specific to the WALIS database setup, and the concepts behind it are covered elsewhere (Rovere et al., 2016; 2020)

RC2 second comment:

- Lots of editing needed: We agreed and have acted. All specific comments of RC2 were implemented as part of the major revision.