J. F. Wehmiller review of Muhs: MIS 5e sea-level history along the Pacific Coast of North America

Review begun Oct. 25, 2021

Comments are inserted at appropriate positions in the guidelines below; reviewer comments are in italics.

Review guidelines – step by step

For future reuse and reinterpretation, it is mandatory for the user to be assured about research data quality. It is the aim of ESSD to provide quality assessment for data sets which are already included in permanent repositories.

Thus, when reviewing a paper in ESSD, we would like you to review not just the manuscript but, more importantly, the data set itself. For your guidance, a step-by-step review approach is suggested:

1. **Read the manuscript**: are the data and methods presented new? Is there any potential of the data being useful in the future? Are methods and materials described in sufficient detail? Are any references/citations to other data sets or articles missing or inappropriate?

   Is the article itself appropriate to support the publication of a data set?

   Wehmiller (italics used here and following for comments):

   This is an extremely comprehensive manuscript, both in terms of text and the data set(s) that is summarizes. Aside from some minor editorial comments in the text (in the form of pdf "sticky notes") I have no recommendations for changes. It is very noteworthy that, in spite of the wealth of information presented by Muhs, there are so many places along the Pacific where the data simply do not permit an "absolute" assignment of a "last interglacial age" to a specific terrace. The quthor does an excellent job of summarizing the state of our knowledge and also the uncertainties about the age assignments. Muhs has also done an excellent job of reviewing the history of marine terrace studies along the entire coastline – a remarkable accomplishment, perhaps more than would be expected for an atlas focused on MIS 5e.

   *I note, however, that I have reviewed the "WALIS spreadsheet" that is associated with the manuscript and have made **many** comments about entries in this spreadsheet. My version of the spreadsheet is attached. More on this in following sections. This will likely require some discussions between the authors and WALIS colleagues.*

2. **Check the data quality**: is the data set accessible via the given identifier? Is the data set complete? Are error estimates and sources of errors given (and discussed in the article)? Are the accuracy, calibration, processing, etc. state of the art? Are common standards used for comparison?

   Is the data set significant – unique, useful, and complete?

   The data tables created by Muhs (S1, S2, S3) are accurate and consistent with the manuscript. The "WALIS spreadsheet, however, is inaccurate or confusing in many places. It is an attempt to "force" a lot of old data into a set of expectations that can only be met with great difficulty, given the methods available at the time of sample collection and analysis. There are entries in this spreadsheet that are best left to the original publications, and I question the value of entering some methodological data for certain samples but not entering comparable data for other samples. For consistency, it should be all or none. I have made numerous comments in the AAR section of the spreadsheet, as I personally was involved in analyzing many of the samples listed in that spreadsheet. Consequently, I know better than anyone else the subtleties of the method(s) and the associated results.

3. **Consider article and data set**: are there any inconsistencies within these, implausible assertions or data, or noticeable problems which would suggest the data are erroneous (or worse). If possible, apply tests (e.g. statistics). Unusual formats or other circumstances which impede such tests in your discipline may raise suspicion.

   Is the data set itself of high quality?

   I have reviewed S2 and was actually involved in multiple discussions with the author prior to the preparation of S2. It is a fair and accurate summary of a large amount of data, and it appears to be consistent with the manuscript itself. Both are organized in a consistent geographic manner that is easy to follow.

   The "WALIS spreadsheet" for the AAR data has many entries that are inaccurate or misleading. Comments are inserted where needed, but there may be other revisions when the author and WALIS colleagues review my comments.

4. **Check the presentation quality**: is the data set usable in its current format and size? Are the formal metadata appropriate? **Check the publication**: is the length of the article appropriate? Is the overall structure of the article well structured and clear? Is the language consistent and precise? Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? Are figures and tables correct and of high quality?

   The article is definitely well structured and easy to follow, as it proceeds from north to south; tables S1-S3 follow this structure as well. The manuscript is long, primarily because it has to discuss ALL the possible MIS 5 sites, even though many of them are only qualitatively data (or not dated at all). This need arises because so many

sites are of the potential MIS 5e age, but their ages cannot be constrained to the precision expected in the WALIS project.

Is the data set publication, as submitted, of high quality?

The dataset as presented in S1, S2, and S3 is clear, well explained and of high quality. It is easily citable in the current format. The data in the WALIS spreadsheet (S2) is potentially confusing, inconsistent or ambiguous – it attempts to include values for all D/L results from every sample, with I recommend not even trying to include all the AAR data in this spreadsheet and simply refer readers to the original manuscripts. In some cases the original manuscript(s) are referred to, but not in others. This inconstancy would confuse potential users. The authors of those manuscripts would presumably have the insights to report what they feel are the most reliable results.

Finally: By reading the article and downloading the data set, would you be able to understand and (re-)use the data set in the future?

The data in S1, S2, and S3 are useful. The AAR data in the "WALIS spreadsheet" are not useful and any user would have to resort the primary literature.

Rating

Reviewers are asked to decide how well the respective data sets presented by an article and the article itself meet the following criteria (rated 1–4, excellent–poor):

Significance

Is there any potential of the data being useful? This is clearly the most important decision. There are at least three sub-criteria to evaluate:

- **Uniqueness**: it should not be possible to replicate the experiment or observation on a routine basis. Thus, any data set on a variable supposed or suspected to reflect changes in the Earth system deserves to be considered unique. This is also the case for cost-intensive data sets which will not be replicated due to financial reasons. A new or improved method should not be trivial or obvious.
- **Usefulness**: it should be plausible that the data, alone or in combination with other data sets, can be used in future interpretations, for the comparison to model output or to verify other experiments or observations. Other possible uses mentioned by the authors will be considered.

- **Completeness**: a data set or collection must not be split intentionally, for example, to increase the possible number of publications. It should contain all data that can be reviewed without unnecessary increase of workload and can be reused in another context by a reader.

I rate the data quality as #1 for each of the above criteria – data as presented in S1, S2, and S3. The WALIS spreadsheet (attached) is ranked as #3 or #4… it needs a lot of work.

Data quality

The data must be presented readily and accessible for inspection and analysis to make the reviewer's task possible. Even if a data set submitted is the first ever published (on a parameter, in a region, etc.), its claimed accuracy, the instrumentation employed, and methods of processing should reflect the "state of the art" or "best practices". Considering all conditions and influences presented in the article, these claims and factors must be mutually consistent. The reviewer will then apply his or her expert knowledge and operational experience in the specific field to perform tests (e.g. statistical tests) and cast judgement on whether the claimed findings and its factors – individually and as a whole – are plausible and do not contain detectable faults.

As noted in the "WALIS spreadsheet" and elsewhere, I have personally been involved in the analysis of many of the AAR samples reported in S2 and the WALIS spreadsheet. Therefore, I am quite familiar with the data and the form in which it is presented. I conferred with the author regarding the production his data table S2. I feel that the WALIS spreadsheet needs a large amount of work to correct errors, improves references, and make the entries internally consistent. I am willing to consult with the author(s) as needed.

Presentation quality

Long articles are not expected. Regarding the style, the aim is to develop stereotypical wording so that unambiguous meaning can be expressed and understood without much effort. The article should express clearly what has been found, where, when, and how. The article text and references should contain all information necessary to evaluate all claims about the data set or collection, whether the claims are explicitly written down in the article, or implicit, through the data being published or their metadata. The authors should point to suitable software or services for simple visualization and analysis, keeping in mind that neither the reviewer nor the casual "reader" will install or pay for it.

The manuscript is indeed long, but its length is necessary because of the long history of the work and the comprehensive nature of the discussion and review of the literature. The author has been the major player in the past three decades of Pacific coast geochronology and draws upon his lengthy involvement in this work.

Access review, peer review, and interactive public discussion (ESSDD)

Manuscripts submitted to ESSD at first undergo a rapid access review by the topical editor (initial manuscript evaluation), which is not meant to be a full scientific review but to identify and sort out manuscripts with obvious major deficiencies in view of the above principal evaluation criteria.

If they are not immediately rejected, they will be posted on the Earth System Science Data Discussions (ESSDD) website, the discussion forum of ESSD, where they are subject to full peer review and interactive public discussion.

Peer-review completion (ESSD)

At the end of the interactive public discussion, the authors may make their final response and submit a revised manuscript. Based on the referee comments, other relevant comments, and the authors' response in the public discussion, the revised manuscript is re-evaluated and rated by the topical editor. If rated **excellent** or **good** in all of the principal criteria and specific aspects listed above, it will normally be accepted for publication in ESSD. Additional advice from the referees in the evaluation and rating of the revised manuscript will be requested by the topical editor if the public discussion in ESSDD is not sufficiently conclusive.

This reviewer rates the overall manuscript as excellent.