Clim. Past Discuss.,
https://doi.org/10.5194/cp-2018-13-AC1, 2018

Climate of the Past Discussions

Interactive comment on "Sedproxy: a forward model for sediment archived climate proxies" *by* Andrew M. Dolman and Thomas Laepple

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Received and published: 25 June 2018

Dear reviewer,

Thank you for taking the time to review our discussion paper. We thank you for the constructive comments and plan to make several important changes in response to your suggestions. We respond to your comments below and have included relevant portions of the review below (in blue italicised text).

"Do the authors give proper credit to related work and clearly indicate their own new/original contribution? For the most part, yes. Few citations are missing."

We will check thoroughly for missing citations and add these to the revised version.

"I would suggest the authors add [to the abstract] that sedproxy is an open-source software with open collaboration."

We will modify the abstract to make clear that sedproxy is open source and that contributions are welcome.

Specific Comments:

"The assumptions that sedproxy makes are presented in the last section of the manuscript. I would suggest moving them upfront to help the reader follow along."

We will list the assumptions earlier in the "implementation" section (section 3).

"The mathematical formulation of the transformation from Mg/Ca (and UK'37) to temperature is not clear in the text. Which calibration is being used? Can the user input one of their choice?"

In the version of sedproxy presented in the discussion paper we did not in fact deal at all with calibration or its uncertainty. We have now modified the code to allow an input climate signal to be converted from temperature to proxy units using either the Uk'37 calibration from Müller et al (1998), or (one of) the Mg/Ca to temperature calibrations from Anand et al (2003). Alternatively, the user can supply their own parameter values for the calibration slope and intercept or pre-convert the input climate signal. Uncertainty in the calibration can be examined by applying the calibration using parameters drawn from a bivariate distribution representing the uncertainty in the fitted slope and intercept parameters. We will update the manuscript and package documentation to give examples of this.

"On lines 13-14 (page 3), the authors talk about secondary influences on these proxies but they don't seem to be take into account in the forward model. One of the advantages of forward modelling is to be able to take into consideration more complex

calibration equations. Why not do this here?"

These kinds of secondary effect could be included with a user-supplied calibration function, but we think it is beyond the scope of this paper to actually suggest more advanced calibrations.

Minor Comments:

"The introduction is often lacking in proper citations. For instance, it's missing a citation on page 1, line 22 about the use of Mg/Ca as a paleo-thermometer or examples of down-core records."

We agree that it would be useful to the reader if more background references are provided and will do a thorough revision of the citations in the manuscript.

"Page 4, lines 10-11: dissolution effects may not be minimal and may be missed during cleaning/processing if SEM images were not taken. See the manuscript by Hertzberg and Schmidt, 2013, EPSL (doi: 10.1016/j.epsl.2013.09.0444). The authors should reword this comment and add this assumption to their list of assumptions and caveats."

We will expand our discussion of the possible effects of dissolution and add this to the assumptions, which will also be listed earlier in the manuscript.

"Move the discussion about INFAUNAL from section 8 to section 7."

We will discuss INFAUNAL in a revised version of section 7.

Once again we thank you for your comments,

Andrew Dolman.

References.

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Müller, P. J., Kirst, G., Ruhland, G., von Storch, I. and Rosell-Melé, A.: Calibration of the alkenone paleotemperature index U37K' based on core-tops from the eastern South Atlantic and the global ocean (60 N-60 S), Geochim. Cosmochim. Acta, 62(10), 1757–1772, doi:10.1016/S0016-7037(98)00097-0, 1998.

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