**Climate
of the Past**
Open Access
Discussions

CPD

Interactive
comment

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

Anonymous Referee #1

Summary:

Dolman and Laepple present a R toolbox (SedProxy) aimed at forward-modeling the various processes contributing to the end signal measured from geochemical measurements on foraminiferal tests or alkenone ratios.

The toolbox can be used to assist in the interpretation of proxy records, perform parameter sensitivity analysis to optimize future study, and to generate pseudo-proxy records to test reconstruction methods.

The authors present four applications for the use of sedproxy, which clearly illustrate the needs to take forward modeling into account in the interpretation of paleoclimate proxy.

[Printer-friendly version](#)

[Discussion paper](#)

As mentioned by the authors, forward modeling is a necessary step toward Bayesian hierarchical modeling and data assimilation. sedproxy provides the foundation for a comprehensive model for sediment archived climate proxies.

Discussion:

Does the paper address relevant scientific questions within the scope of CP? Yes, the manuscript addresses the uncertainty associated with the interpretation of paleoclimate record.

Does the paper present novel concepts, ideas, tools, or data? Yes, the paper presents a new R toolbox for the forward modeling of marine sediment proxies, which is much needed.

Are substantial conclusions reached? Yes, the manuscript clearly illustrate how the use and need of forward modeling using four specific use cases that span the motivation of most paleoclimate studies.

Are the scientific methods and assumptions valid and clearly outlined? For the most part, yes. See specific and minor comments below to clarify some of the assumptions made in this paper.

Are the results sufficient to support the interpretations and conclusions? Yes

Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? Most definitely. I applaud the authors for giving concrete example, with code attached to reproduce their results in the main paper. It also makes comparison of the various functions easier. The applet is also easy to use and allows to compare the effects of tweaking the parameters quickly. The supplementary material contains an .RMD file, which allows to reproduce all the figures contain in the manuscript, while providing enough comments for anyone to follow the results.

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. See minor comments below.

Does the title clearly reflect the contents of the paper? Yes.

Does the abstract provide a concise and complete summary? Yes although I would suggest the authors add that sedproxy is an open-source software with open collaboration.

Is the overall presentation well structured and clear? Yes.

Is the language fluent and precise? Yes.

Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? Yes

Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? No.

Is the amount and quality of supplementary material appropriate? Most definitely. Contains the package and a .RMD file to reproduce the results presented in this paper. This file can also be used as a template for anyone who wishes to plot their own results from sedproxy.

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.

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? 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 modeling is to be able to take into consideration more complex calibration equations. Why not do this here?

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 paleothermometer or examples of downcore records.

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.

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

Interactive comment on Clim. Past Discuss., https://doi.org/10.5194/cp-2018-13, 2018.