

Interactive comment on “The influence of temperature and seawater carbonate saturation state on ^{13}C - ^{18}O bond ordering in bivalve mollusks” by R. A. Eagle et al.

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This paper provides a new set of clumped isotope data from molluscs, some of them grown under controlled conditions, and some being natural specimens collected from localities with a good temperature control. These data are then used to create a new temperature calibration for clumped isotopes. The conclusion of the paper is that, at least for mollusks, the slope of the T-dependence of clumped isotopes is much shallower than that of Ghosh et al. 2006 that was confirmed by Tripathi et al. 2010). The authors then discuss in detail possible reasons for this discrepancy. In addition, the influence of cleaning procedures, carbonate saturation state and calcite vs. aragonitic

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taxa are also evaluated. It is also very valuable that the authors provide recalculated data in the Reference Frame of Dennis et al. 2010) for the previously published calibration studies coming from the Caltech lab. The data are of very good quality and the description of the culturing and the characterization of the temperatures of at which the wild specimens lived are very careful. Thus this is a very valuable dataset definitely worth publishing. The main problem I have is that I am not convinced that this dataset is really significantly different from the data of the Ghosh and Tripathi calibrations, as concluded by the authors. Indeed when analyzed alone the obtained regression has a much shallower slope than the more extensive Tripathi dataset. However, when plotted all together in the same diagram, (Figure 1, plotted from the data given in the tables and supplementary information), we observe that most new data overlap very well with the Tripathi dataset, with only a one cultured and two natural samples sample at 10°C and two field samples at 0°C that have a significantly lower D47 and a couple of samples with higher D47 at 25°C. All other samples, however are essentially within the scatter of the Tripathi data (Fig 1). When all data are plotted together, (figure 2) we obtain a temperature dependence of 0.0476‰°C which is lower than the Tripathi et al. study but still higher than what is obtained by the mollusk data alone. Also this figure does not clearly show the presence of two different data populations.

Considering that the scatter in the data from Mollusks is quite large, as seen in the dataset in this paper for the samples between about 15 and 25°C but also in the recent paper of Henkes et al. 2013 (GCA, 106, 307-325.), I think that the possibility that these new data just confirm the previous calibration of the CALTECH lab should be discussed in the text. The study of Henkes et al 2013 should be cited in this paper. Figures 3 and 4b should be redrawn with the data included, and not only with the regression line and the confidence intervals. This would be more useful to highlight that fact that these datasets may not be so different.

In conclusion, this paper presents new and interesting data on clumped isotopes in mollusks, including tests on the possible effect of sample cleaning, carbonate satu-

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ration and mineralogy, that should definitely be published. However, the data analysis and discussion should include the option that this dataset actually more consistent with the previous calibrations than the authors imply in their conclusions.

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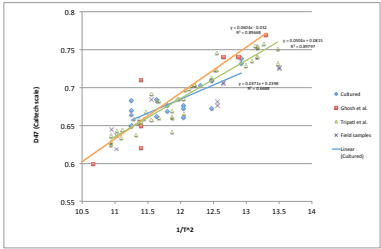


Figure 1 plot of the four datasets discussed in this paper.

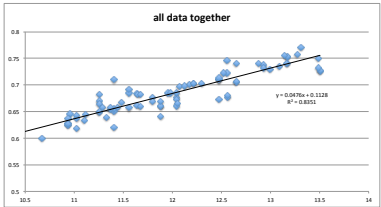


Figure 2: Plot of all data together

Fig. 1. Replotted data in the Caltech scale

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