Biogeosciences Discuss.,
doi:10.5194/bg-2017-38-RC1, 2017

Biogeosciences Discussions

Interactive comment on "Also tropical freshwater ostracods show a seasonal life cycle" *by* Juliane Meyer et al.

J. Holmes (Referee)

j.holmes@ucl.ac.uk

Received and published: 29 March 2017

Overview

Fossil non-marine ostracods are commonly used as sources of calcite for stable-isotope analyses. Although studies based on ostracod calcite are valuable, complications arising from vital offsets from isotopic equilibrium and uncertainties relating to the site and season of calcification can limit the value of such palaeo-isotope studies. Investigations into the modern isotope systematics of individual ostracod species, such as the one described here, are therefore of potential value and interest. This MS is concerned with the oxygen and carbon isotope analyses of specimens of the subtropical/tropical non-marine ostracod Cytheridella ilosvayi from surface-water sites in southern Florida, which also have been analysed for water chemistry and stable

isotope composition. Cytheridella ilosvayi is a fairly widespread Neotropical ostracod species, with potential for use in palaeo-isotope investigations. The MS presents an interesting dataset based on isotope analyses of modern collections of the species and its host water/DIC from sites in Southern Florida. These data are then used estimate the liklely calcification season of Cytheridella ilosvayi based on assumptions about seasonal changes in the inferred oxygen-isotope composition of calcium carbonate precipitated at isotopic equilibrium with the host water, and allowing for a positive offset from oxygen-isotope equilibrium based on a previous study. Despite the potential value of this work, I have a number of queries and concerns that I think need to be addressed before it can be considered for final publication.

Specific comments

Title. Southern Florida is subtropical, not tropical. The premise that the data can be used to argue that tropical ostracods show a seasonal lifecycle therefore needs to be re-evaluated and the title needs to be changed. The seasonal range of temperatures in Florida is quite large, for example, meaning that this might impact the timing of calcification of Cytheridella ilosvayi.

Abstract. The MS includes carbon isotopes, but these are hardly mentioned in the abstract.

Page 2 Line 22. Explain how carbon isotopes fit into the study.

Page 3-4 Section 2.1. You include much more detail about the sites than is needed for this paper. Some of the information could also be summarized in a table.

Page 5. Line 6. Here you refer to South Florida's climate as 'subtropical'

Page 7 Line 11. The 'bulked' samples, especially of 8 valves, will tend to cause averaging of the results and so reduce the variability. Previous studies investigating variability (e.g. Escobar et al., 2010 JOPL; Dixit et al., 2015, JOPL) have analyzed numerous single shells in order to assess variability. This point needs to be considered in the

discussion.

Page 10. Section 4.2. Modelling the equilibrium values in terms of the isotopic composition of rainfall and water temperature is unlikely to be realistic. On lines 11-13 on the next page, you state that enrichment of heavy isotopes is considered to be constant during the year. In the absence of data to support this statement, I do not think it can be regarded as valid. For example, Sachs (2002) (which you cite), states that 'The isotopic composition of Lake Starr and Halfmoon Lake varied seasonally (fig. 15), primarily in response to net precipitation (rainfall minus evaporation).' Admittedly these sites are from Central Florida, not Southern Florida: however, I still feel that you need to provide evidence to support your statement about seasonally-constant evaporation if you believe that this assumption is valid, or modify your discussion if you cannot support your statement.

Line 21. It is approximately 0.2 ‰ – the relationship is not linear. Also why cite Chivas et al. (1986) here? Why not cite the authors of the equation you use i.e. Kim and O'Neil (1997)?

Page 11 Line 26. Oxygen isotopes in your individual samples might be expected to show less variability than carbon isotopes because the latter are affected by small-scale microhabitat variations in the carbon-isotope composition of the DIC. The fact that you see the reverse could be argued to be linked to seasonal variations in evaporation, meaning that the actual water-isotope values vary more than you have modelled simply based on temperature and the isotopic composition of rainfall. In any case, comparing variability of carbon and oxygen is only really meaningful if you know the actual seasonal variation in water and DIC isotope values.

Page 12 Section 5.1. Much of the detail in this section can be cut as it is not really relevant to the main focus of the paper.

Page 13. Line 21. Doesn't this statement suggest that evaporation might also vary seasonally as well?

Page 14 Section 5.2 and figure 7. This is the key figure in the paper and it suggests to me that the specimens of Cytheridella ilosvayi may have calcified quite close to the sampling time – this would explain the fairly strong correlation between the measured isotope composition of the water and the DIC, and the isotopic composition of the ostracod shells.

Page 15-16 Line 33 (page 15) to line 2 (page 16). But surely this depends on the length of time over which the shells calcified. If they calcified over a short time in the season, then the degree of variability would be small even if site conditions changed seasonally. In addition, you need to consider the fact that you did not measure single shells (see my point above). This will have the effect of reducing the observed variability.

Page 16 Lines 11-12. I could not see evidence in the cited paper for a 1‰ range in lake water in Lake Okeechobee. For sure, there are a few datapoints from this lake in Figure 4 of Harvey and McCormick, but it is unclear whether these are representative of seasonal variations in the isotopic composition of Lake Okeechobee or are samples from different locations in the lake from one single sampling period. Also, by themselves, these data do not support the suggestion that the amount of evaporation of this lake is seasonally constant (see also my point above).

Page 17. Section 5.3. This method will only work if you can assume that the isotopic composition of water at each of your sites is closely coupled to the isotopic composition of rainfall. As noted above, you have very little evidence to support this. As I also note above, figure 7 is the key figure in the paper and it suggests to me that the specimens of Cytheridella ilosvayi may have calcified quite close to the sampling time. In this case, I wonder whether these theoretical calcite calculations are really very necessary.

Page 18. Lines 17-19. I am not convinced that this is valid, because your calculations of theoretic equilibrium calcite composition assume that you know the isotopic composition of the water at each site in detail, and I am not convinced that you do.

Line 34. Cytheridella ilosvayi may be a neotropical species, but Florida is a subtropical

locality and the seasonal variations in temperature, although certainly not as large as at higher latitudes, are not negligible. In any case, it is misleading to state that your work shows that 'tropical' ostracods show seasonality.

General comment. You emphasize oxygen-isotopes in your paper. Although the carbon-isotope results are referred to, your comments about these are more limited and speculative, not least because you have very little information about the variations in the carbon-isotope composition of the DIC. It would be useful to comment on the carbon-isotope data in a little more detail.

Summary evaluation

Although this is an interesting dataset and a potentially valuable contribution to the literature, the critical comments need to be addressed before it can be published.

Technical comments

Page 2 Line 3 and elsewhere. von Grafenstein (not Von) Line 10. No need to include the word 'stable' Page 5 Lines 2-4. What has happened here?

Interactive comment on Biogeosciences Discuss., doi:10.5194/bg-2017-38, 2017.