

Interactive comment on “Carbonate “clumped” isotope signatures in aragonitic scleractinian and calcitic gorgonian deep-sea corals” by J. Kimball et al.

Anonymous Referee #1

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This article presents clumped isotope measurements in scleractinian and gorgonian deep-sea corals. The data are very interesting, but I think that the discussion needs to be rewritten. As it is, the discussion gives the feeling that gorgonian and scleractinian share identical processes of biomineralisation, which absolutely not the case. The discussion should be clearly separated between the two types of deep-sea corals. For example, as far as I know, calicoblastic cells were not detected in gorgonian corals, as well as ECF (see Noé and Dullo, 206). There are also a lot of imprecisions in the text.

A lot of references miss in the reference section: Dunbar and Wellington (1981), Came et al (2004), Eagle et al (2010), Dennis and Schrag (2010), Douglas et al (2014), Ghosh

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et al (2007), Gabitov et al (2012), Kimball et al (2014), McConnaughey (2003), Nielsen et al (2012), Petrizzo et al (2014), Saenger et al (2013), Swart et al (1991), Watson and Liang (1995), Watson (2004), Watkins et al (2013), Weber and Woodhead (1972), Thiagarajan et al (2013), Zeebe (1999).

Also some references in the reference section are not cited in the text: Bigeleisen and Mayer (1947), Ehrlich et al (2006), Jimenez-Lopez et al (2004), McCrea (1950), Noé et al (2008), O’Neil et al (1969), Urey (1947), Wang et al (2004)

19117-118: I think that it is not an ‘emerging’ approach anymore as it is now known for 10 years. 19118-114: what is the difference between aragonitic scleractinian corals and aragonitic deep-sea corals? 19118-117: Is there any aragonite in brachiopod shells? 19118-119: It is ‘Daëron’ instead of ‘Daeron’. Please correct. 19118-120: In the reference section, it is Petryshyn et al (2015). 19118-127: It is Wacker et al (2013) in the reference section. 19119-110: Is it Defliese et al 2015a or b? 19120-13: same remark 19120-111-14: please add references 19120-120: I am not sure that there are some d18O data for deep-sea corals in McConnaughey (1989a or b?; 2003). Please add references of Lutringer et al (2005), Rollion-Bard et al (2003, 2010). 19120-123: Please add the reference to Lutringer et al (2005). 19121-11: please remove one ‘Ghosh et al’

In this section, I found it very unclear what is attributed to gorgonian or scleractinian.

19122-16: Replace ‘was’ by ‘were’ 19122-127: What do you mean by ‘sufficient’? 19123-125: It is Henkes et al (2014) in the ref 19125-18-9: Is it in PDB? 19126-16: ‘Tables’ instead of ‘Table’. I am not sure that you have to refer to Table 3 here. 19126-12-13: R2 instead of R. It is not consistent with the rest of the paragraph. 19126-125: ‘Noé’ instead of ‘Noe’ 19130-14: AFF is not defined. 19132-13: Please add references. 19132-110: It is Roark et al (2005) in the ref. In this article, I did not see any d13C and/or d18O data. Please verify. Please add references to Lutringer et al (2005), Rollion-Bard et al (2003, 2010). Between the centres of calcification and fibres, in scleractinian corals, you can have these two end-members. So why do you write that the mixing would be between

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less extreme differences? Also, note that there are no COC in gorgonian corals.

Again, for this section, it would be clearer to separate the discussion between gorgonian and scleractinian corals.

19133-118: Is there any reference for the observation of calcicoblastic cells in gorgonian corals? Same remark concerning the scheme for the calcifying region. This model was developed for scleractinian corals, not for gorgonian.

19134-119: It is 'Mavromatis et al'. This article is only about fractionation factor for Mg-calcite. I do not see why it is cited here. 19135-14: Are you sure that brachiopod shells are aragonitic? 19135-124: Please add 'e.g.' before the list of references as a lot of studies deal with this aspect. Here McConnaughey is misspelled. Is it 1989a or b? Watson (2004), DePaolo (2011), Gabitov et al (2012) and Watkins et al (2013) study inorganic precipitations. Why are they cited here concerning the calcification processes in calcifying organisms?

19136-15: This model is for scleractinian corals! I am not convinced that you can apply it to gorgonian corals. 19136-112: Again McConnaughey is misspelled. 19136-117-18: Please add reference(s) 19136-128: Again McConnaughey is misspelled. 19137-11: It is also calculated/noted in Zeebe and Wolf-Gladrow (2001), Beck et al (2005) and Rollion-Bard et al (2011). Please add. 19137-18: It is 'Usdowski et al, 1991'. Please add reference to McCrea (1950) 19137-115-18: So how do you explain the kinetic effects for carbon isotopes if the exchanges are very rapid (please add ref) between DIC species? 19137-127: Please add references to Lutringer et al (2005), Rollion-Bard et al (2003, 2010).

Please note that the model of Adkins et al (2003) is not compatible with boron isotope data (see Blamart et al, 2007; Rollion-Bard et al, 2010).

19138-11: Correct McConnaughey and Rollion-Bard. Please add the models of Allison et al (2010) for zooxanthellate corals and the model of Rollion-Bard et al (2010)

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for deep-sea scleractinian corals. 19139-19: Ref? 19139-120: Again, please add references to Rollion-Bard et al (2003, 2010). See also the work of Brahmi et al (2012) concerning the different growth rates. 19139-129: Again McConnaughey is misspelled 19139-18: same remark 19139-18: It was already shown that the Adkins' model is not compatible with $\delta^{11}\text{B}$ data (see Rollion-Bard et al, 2010) 19140-126: Please add references 19141-11-3: Please add references 19141-112: Is it Ehrlich or Ehrlick? 19142-116: See the work of Furla et al (2000) 19142-119: See the work of Tambutté et al (1995) 19142-12: 'corals' instead of 'coral'

Between Figures 4 and 5, please use the same colors for the symbols. Figure 6: Precise if it is Defliese et al 2015a or b. Please add error bars. Figures 7, 8, 9: Please add error bars. Figure 9: Please enlarge the symbols. Figure 11: Please specify that this model is for scleractinian corals. For example, the data of Farmer et al (2015) are not in favor of an elevation of pH.

Interactive comment on Biogeosciences Discuss., 12, 19115, 2015.

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