

Interactive comment on “Relationships between bottom water carbonate saturation and element/Ca ratios in coretop samples of the benthic foraminifera *Oridorsalis umbonatus*” by C. F. Dawber and A. Tripathi

E. Hathorne

ehathorne@geomar.de

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This discussion paper presents a very interesting data set and is well written. However, there are some comparisons with existing data that would improve the paper. One reviewer already pointed out the omission of the B/Ca data from Rae et al. (2011) EPSL 302, 403, and Brown et al. (2011), EPSL 310, 360. In the response to the reviews of the Climate of the Past discussion paper (<http://www.clim-past-discuss.net/7/C2740/2012/cpd-7-C2740-2012.pdf>), Dawber and Tripathi suggest the Brown dataset may not be accurate because of variable Ca concentrations in their

C354

samples. Although having constant Ca concentrations in samples and standards is clearly the most precise method, variable Ca concentrations are unlikely to account for the differences between the Brown dataset and the data presented here. Comparison of the Brown data for other species with those of Yu and Elderfield (2007) suggests the Brown data are reliable and not offset from previous work.

Other specific comments:

1485 line 23: Co is missing the +

1491 line 3: The cross plots shown in Figure 2 are interesting but not discussed. Given the previous investigation of the temperature dependence of Mg/Li ratios by Bryan and Marchitto (2008) it would be nice to see what the Mg/Li ratios look like for these samples. In the bottom two plots of figure 2 the equation has Li/Ca instead of Sr/Ca as the x term.

1492 line 21-24: It is true that more inorganic partition experiments are required but the work of Marriott et al. (2004a) EPSL 222, 615, has not been cited. Those authors conducted inorganic calcite precipitation experiments with a “pH stat” type apparatus and found Li incorporation to be strongly temperature dependent, especially at low temperatures approaching those of the deep-sea.

1492 line 24-27: Like the reviewers I found Figures 3-5 not straightforward. If like one reviewer suggested the discussion is focussed on each element/Ca ratio separately then all the previous benthic foraminiferal Li/Ca data could be clearly compared with the new data. The findings of Bryan and Marchitto (2008) are in direct contrast to those of Lear and Rosenthal (2006) and the present study and this could be shown more clearly. Bryan and Marchitto (2008) found Li/Ca in 5 benthic species decreases with DCO₃²⁻ (and temperature) but this is difficult to see from figures 3 and 5. Can the incorporation mechanisms be so different for those species and *O. umbonatus* or are there other important environmental controls? Given the core locations and Li/Ca data are in the papers, the data for *Uvigerina* from Marriott et al. (2004b) Chem. Geol. 212,

C355

5, and the *C. wuellerstorfi* data from Hall and Chan (2004) could also be compared.

1496 line 2-4: Hathorne et al. (2009) *Paleocenography* 24, PA4204, show the Li and B content is higher in the higher Mg/Ca layers of *Globorotalia* shells from a sediment trap. Raitzsch et al. (2011) *Geology* 39, 1039, show opposite ontogenic trends for B/Ca and Mg/Ca in *P. wuellerstorfi*, but the processes controlling trace element heterogeneity between different calcite layers and between different chambers could be different.

1496: line 6-8: This is a very interesting observation but perhaps the mechanism behind this could be discussed? Relatively little Sr/Ca variability has been observed within the shells of low Mg calcite foraminifera (e.g. Anand and Elderfield, 2005).

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