

Interactive comment on “Ocean acidification: setting the record straight” by A. J. Andersson and F. T. Mackenzie

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Andersson and Mackenzie (2011) cite our talk on “Carbonate sediments on Antarctic shelves and implications for a mechanism to buffer Ocean Acidification in the Southern Ocean” at the ASLO Aquatic Sciences Meeting in San Juan, Puerto Rico, in February

C2056

2011 (Hauck et al., 2011) as an example for investigating possible buffering effects by CaCO₃ dissolution of shelf sediments.

We agree with the authors in their recommendations that the points “evidence of a buffer effect” (when the seawater is already undersaturated with respect to CaCO₃), “kinetics”, and “physical mixing” should be considered in studies addressing a possible buffer effect. We would like to add another step (Step Zero), which has to happen even before these considerations: proper quantification of how much CaCO₃ is available in the region considered and identification of the mineral composition (aragonite, calcite, magnesium rich calcites). This very first step is what we presented at the ASLO Meeting (Hauck et al., 2011).

We would also like to add that a discussion on the (global) buffering capacity of shallow carbonates as general as applied by Andersson et al. (2003) might not be applicable to all regions of the World Ocean as various relevant factors (mineral composition, physical mixing, temperature effects on thermodynamic equilibria and kinetics) may be different from the global mean in one specific region, e.g., Andersson et al. (2007) found an example where alkalinity accumulation occurs in Devil’s Hole, Bermuda.

Second, the authors (p. 6173, line 17ff) recommend to “keep in mind that most of the anthropogenic CO₂ absorbed by the oceans is taken up in the open ocean and is not available for dissolution of shallow-water carbonate phases unless the acidified water is upwelled and/or onwelled into coastal waters.” This is not the case in the Southern Ocean; here a large portion of the CO₂ is taken up along the shelf and only on the shelf anthropogenic CO₂ is able to penetrate down to depths of ca. 1000 m (Hauck et al., 2010; Arrigo et al., 2008).

The article of Loáiciga (2006) is ‘Based on inappropriate assumptions and erroneous thermodynamic calculations ...’ (see comment by Caldeira et al., 2007) and should not be cited without the comment by Caldeira et al. (2007), if at all. It is o.k. to criticize our work, however, we feel affronted by citing Loáiciga (2006) and Hauck et al. (2011) in

the same sentence.

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C2058

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C2059