

Interactive comment on “Temperate carbonate cycling and water mass properties from intertidal to bathyal depths (Azores, N-Atlantic)” by M. Wisshak et al.

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Reply to Referee #1 (Wolfgang Schlager)

First of all we would like to express our sincere thanks to referee Wolfgang Schlager (WS) for his prompt and very positive review, and his valuable specific and technical comments.

WS suggests to clarify that the Azores "lie in the northeastern segment of the subtropical gyre" in order to emphasise that the archipelago is largely influenced by the strong Gulf-Stream as opposed to the much weaker neighbouring subpolar gyre. This suggestion is welcome and we will adopt the recommended phrasing.

C1799

WS encourages us to comment on the fact that the experimentally determined carbonate accretion rates in the Azores peak at 60 m whereas maxima in the tropics lie at 0-20 m. In addition WS raises the question whether shallow production in the Azores is actually higher but moved downslope by wave action, and he points out a potential bias in the tropical profile by colonial corals. We agree that it is well worth to extend the discussion by pointing out that accretion rates in the temperate Azores peak in deeper waters than in the tropical factory, and we strongly assume that this pattern holds true despite there is physical erosion in the shallow waters and downslope transport, not only because the latter process applies to both, the temperate and the tropical carbonate factories. What we have determined with the present experimental approach is the pure residual carbonate accretion rate and we already pointed out the fact that the actual carbonate production must be regarded higher in the shallow waters to compensate for the physical erosion by hydrodynamic force (3314 line 24 to 3315 line 2). The factor of the physical erosion alone does, however, most likely not explain the marked difference in carbonate accretion rates between the 60 m station and the 15 m station and particularly the intertidal station since the measured difference in accretion rates are 5 to even 1000 fold (the horizontal scale in Fig. 6 is logarithmic). Instead, the hydrodynamic force prohibits the development of more erect and inevitably more fragile epilithobionts that could promote a higher carbonate production in the first place, whereas in the tropics, colonial corals in concert with crustose rhodophytes and rapid marine cementation form a calcareous framework that is much more resistant to hydrodynamic force.

The few technical comments will be incorporated except for the reference to Schlagers' 2005 review volume which we actually were referring to (but it is nevertheless worth to complement the 2003 reference), and we prefer to retain the term "reach" instead of "interval" as the more appropriate term in the present context.

Interactive comment on Biogeosciences Discuss., 7, 3297, 2010.

C1800