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

Anonymous Referee #2

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This article is very interesting because it measures for the first time the calcium carbonate balance along a bathymetric transect in a temperate environment. Measurements of carbonate bioerosion (bio-degradation) and accretion (bio-construction) are particular important in a time of global climate change, in particular with increasing ocean acidification. Data presented on water mass properties, especially the carbonate system variables, are very valuable to understand present and future trends in carbonate cycling. I recommend that this manuscript be accepted with revisions. The authors have some conceptual and clarity issues to deal with, but overall this is a solid effort at characterizing the carbonate cycling along a bathymetrical transect in the Azores.

Specific comments:

Faial and Pico are the only islands in the Azores that are united by a shelf (see Tempera 2009). Oceanographic patterns in the area are characterized by strong currents induced by tidal waves as they meet the shoaling and complex topography that surrounds the islands. Unpublished data indicates that the larger scale currents intensively interact with the complex seafloor topography in the area to produce sub-mesoscale oceanographic phenomena including narrow jets, trapped currents and localized upwelling (Ana Martins, pers. com.). Therefore, the water mass properties (e.g. nutrient concentrations, DIC) are likely not to be representative of the Azores region. As such, I would suggest specifying in the title the area where the study took place – Faial Channel. In addition, the authors should acknowledge in their discussion of the nutrient data that the sampling took place only during the month of September, and therefore does not account for the seasonal variability of these parameters, which is characteristic for temperate environments.

Tempera, F. 2009. Benthic Habitats of the Extended Faial Island Shelf and their Relationship to Geologic, Oceanographic and Infralittoral Biologic Features. Ph.D. thesis. University of St. Andrews. 348 pp. (http://hdl.handle.net/10023/726)

The methodology used for objective 1, "general habitat characteristics in the southern Faial Channel" is not part of the material and methods section. The authors should refer the method used for characterizing the typical calcareous epibionts found along the bathymetric transect. What was the size of the area surveyed for this characterization? Did the authors collect or photographed organisms for taxonomic identification? Did the authors identified the organisms themselves or sent it to an expert?

Page 3301, lines 5-8 In Figure 1 the authors show experimental substrates such as mollusc shells and Iceland spar that are not mentioned in the methods section. You should either mention the presence of these substrates in the methods section, and that their analyses will be the subjected of another paper; or remove it from the dia-

gram. Otherwise it will be confusing for the reader.

Page 3302, line 3 – Specify which weather conditions (sunny, cloudy, rainy?)

Page 3303, lines 14-26 The authors should specifically mention here, or in section 2.1, that all plates (PVC and limestone) were dried and weighed before the experiment. While this may be implicit in their description of the accretion rate estimates, it is unclear for the bioerosion estimates. The "weight difference of the limestone plates before and after careful removal of all encrusting calcareous epibionts" (lines 24-26) is not the bioerosion rate, it is accretion of the calcareous epibionts in the erosion plates. The bioerosion rate is difference of weight loss of the plate (before-after the experiment) and the accretion rate in the same plate.

Page 3306, line 3 – the reason for the offset between Lafon et al. (2004) and the data presented here could be related to inter-annual variability (for example see data presented in Tempera 2009).

Page 3310-3311, section 3.7, "carbonate bioerosion and accretion rates" – The authors should support their interpretation of the results with proper statistical analysis of data. For example, in order to state that "... bioerosion rates decreased exponentially with water depth" (lines 9-10), you have to provide statistical evidence that you data fits an exponential decay model. Likewise, the authors should provide statistical proof for their interpretations of bioerosion rates decreasing with time of exposure; differences in bioerosion/accretion rates between the two plate orientations and with depth. The standard deviations are quite high in some cases; therefore it is not clear to me that the means are statistically different. You should also present mean bioerosion/accretion rates with standard deviations (or standard errors) in text.

Page 3311, lines 24-25 – Please explain what you mean by "a stronger relative method-ological error".

Page 3312, lines 13-14 – Commonly referred by whom? Give references

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Page 3315, lines 3-14 - This paragraph should be part o the material and methods section. This is the mathematical model applied for the estimation of the carbonate budget.

Page 3315, line 25 –Bioerosion studies in the Bahamas by Kiene et al (1995) and Vo-gel et al (2000) suggest that the type of substrate is an important factor determining bioerosion rates by microborers. These studies report highest microbioerosion rates in micritic limestone when compared with other substrates (mollusc shells, calcite crys-tals). How well do the limestone plates used for the bioerosion estimates in the present paper represent the natural substrates available for bioerosion at the study sites? Are the limestone plates more easily/more difficult to bore than the natural substrates? Does this lead to overestimation or underestimation of bioerosion rates?

Kiene WE, Radtke G, Gektidis M, Golubic S, Vogel K (1995) Factors controlling the distribution of microborers in Bahamian reef environments. In: Schumacher H, Kiene WE, Dullo WC (eds) Factors controlling Holocene reef growth: an interdisciplinary ap-proach. Facies 32:174–188

Vogel K, Gektidis M, Golubic S, Kiene WE, Radtke G (2000) Experimental studies on microbial bioerosion at Lee Stocking Island, Bahamas and One Tree Island, Great Bar-rier Reef, Australia: implications for paleoecological reconstructions. Lethaia 33:190–204

Technical corrections are marked in the manuscript, which is attached.

Please also note the supplement to this comment:
http://www.biogeosciences-discuss.net/7/C1677/2010/bgd-7-C1677-2010-supplement.pdf

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