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Interactive comment on “Light effects on the isotopic fractionation of skeletal oxygen and carbon in the cultured zooxanthellate coral, *Acropora*: implications for coral-growth rates” by A. Juillet-Leclerc and S. Reynaud

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Received and published: 25 January 2010

- about the experimental procedure : This technique is widely used in our lab for several years now, and the reproducibility is very good day after day. It is the reason why we have performed only one Pn measurement in this experiment.

- the assumption that surface extension as measured by area is equivalent to linear extension : Indeed it was not clearly explained in the first manuscript. Definitions of calcification, surface extension and thickening will be specified in the paragraph 2 and

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used systematically in the text.

2.4 Growth rates Calcification rate Corals were weighed using the buoyant-weight technique (Jokiel et al., 1978; Davies, 1989) at the beginning and at the end of the experiment. The calcification rate was measured using the following formula:

Where G is the calcification rate, n is the number of the culture days, P_n is the dry weight after n days of culture and P_0 is the initial dry weight. Such a value indicates the percentage of weight increase relative to the initial weight per day. Surface extension Measurements are performed on the skeleton formed on the glass slide (Marsh, 1970). Thus, the corresponding size increase is the surface occupied by the new-formed skeleton, receiving light perpendicularly. Thickening This is the addition of new aragonite filling-in porosity or strengthening skeletal structure without noticeable horizontal surface extension.

- the relationship between zooxanthellae distribution, density, rate of P_s , and skeletal deposition is unclear We shall attempt to better highlight the consistency existing between our results and other studies. Indeed, we did not quantified zooxanthellae density. Concerning the presence of algae preferentially on the sides rather than at the tip of the corallite, the opinion of the reader depends strongly of its background. For some biologists it is obvious that on the tip of the corallite algae could not tolerate an intense and direct light. In contrast, for biochemists, the incidence of light being direct on the top of the branches, the photochemistry is there maximum. We did not proof by ourselves that zooxanthellae were more abundant on the sides but there are a lot of consistent evidences. We are not sure that growth on the glass is really comparable with what is called “encrusting growth” in Gladfeleter (Coral Reefs, 2007). The pictures given in Juillet-Leclerc et al. 2009 showed that new skeleton was formed on the glass slide and new corallites appeared around the axial one (Plate 1d). We shall explain clearer that large surface extension presents new corallites, comparable to lateral corallites while thickened skeleton is lacking of these new corallites. We observe that when there are numerous new corallites surrounding the axial one, net

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photosynthesis is low and the opposite. This manuscript is strongly linked with the paper published in GCA, where we clearly explained that we distinguish the kinetic of the physical/chemical crystallization and the rates that we observe at macroscale. COC, having three dimensions are deposited following a prevailing axis while fibers are deposited in three dimensions. But we could not mix up what is visible on the nubbins and what may be observed at the scale of microstructures because the material analyzed is strongly inhomogeneous. We want to demonstrate that deposition of fibers are associated with high photosynthetic activity even supposing that the two processes (photosynthesis and calcification) are not occurring at the same location while it is not the case for COC, which are preferentially deposited without light. The evidences provided by revisiting our data demonstrated the link between photosynthesis, the isotopic signature and growth specificities. The conclusions concerning the role of the crystal deposition mechanisms and chemical properties are based on the synthesis of consistent demonstrations derived from approaches performed in different but complementary fields.

Interactive comment on Biogeosciences Discuss., 6, 10243, 2009.

BGD

6, C4141–C4143, 2010

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