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Interactive comment on "Symbiosis increases coral tolerance to ocean acidification" *by* S. Ohki et al.

Anonymous Referee #1

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This manuscript reports the results of two experiments designed to explore the effects of OA on the calcification of newly settled corals as well as branches of coral colonies. The effects are tested with aquaria receiving seawater equilibrated with CO2 mixed to simulate past, present, and future atmospheric conditions. The results are used to support the important conclusion that symbiosis can reduce the effects of OA on very young corals.

This is an important study with results that many will find interesting and which will stimulate further research. There are several changes that I would recommend before this submission is finalized:

1. P 7015, L 26. A lot of work has emerged since the review of Atkinson and Cuet 2008, and now there are few people doing these kinds of studies with the addition of

acid and base. Most people use CO2.

2. The light levels for these experiments (75 μmol/m2/s) are extremely low and some discussion of this issue is required. As the corals were collected from the reef flat, the parents probably would receive about $\sim$1800 μmol/m2/s and therefore the low light level is not ecologically relevant, unless the claim can be made that the recruits grow in dark places.

3. Is there any information on the genetic identity of the Symbiodinium used in the study? Infection with heterologous algae raises some difficulties in evaluating the generality of the statements in this paper. Hopefully the type of symbionts in Tridacna are the same as those found in Acropora. Also, what features were seen with the dissecting microscope that indicated the symbiosis was established? It would be nice if there was histology to show the association.

4. Expressing growth of the branches as a % change makes it difficult to evaluate net deposition of CaCO3 and to compare to previous work. It would be far batter to express the change in weight as change in dry weight and then standardize to a measure of the surface area of the corals (actual area or biomass).

5. Some discussion of the 58% mortality rate of the corals is critical. Clearly something was wrong with the incubation conditions and this could easily have affected the outcome of the experiments.

6. Data analysis. Some discussion of the effects of pseudoreplication on the primary polyp work is required. For the branch analysis, I believe both tank (the nested effect) and colony (selected haphazardly) should be treated in the ANOVA as random effects.

7. Page 7020, L 13 – not clear what "substrate medium" means.

8. The interpretation of Fv/Fv needs to be revised to be more conservative. The important work of Susanna Enriquez would be most helpful in this regard. Fv/Fm provides a very fine-resolution analysis of how PSII is functioning and the efficiency

with which it harvests light and turns it into ATP and reducing agents of use in the Dark Reactions. Excluding any effect of photosynthesis on calcification because Fv/Fm was constant is a bit premature. Likewise the statements regarding photosynthesis in Acropora – effects on PSII do not (necessarily) translate linearly to C fixation.

9. Page 7021, L 11. Arguably there has been evidence that zoox promote calcification in corals for nearly $\frac{1}{2}$ a century. The key part is how they are/might be doing this.

10. Page 7022, L 10. This statement significantly oversteps what the present data can show. Given the limitations described above, this statement cannot be supported. At the very least, it cannot be written as fact, rather ".. these results suggest that recruitment might be effect, etc.."

11. Page 7022, L30. The results here do not suggest OA has been on going for 200 y.

Interactive comment on Biogeosciences Discuss., 10, 7013, 2013.