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Interactive comment on "Impact of carbonate saturation on large Caribbean benthic foraminifera assemblages" *by* Ana Martinez et al.

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Dear Referee #3,

Thank you for your useful input. Below we copy your comments and our response to them follows

In order to assess the impact of carbonate saturation on the assemblages of large benthic foraminifera in the Caribbean, Martinez et al. compare assemblages at low pH, low calcite saturation submarine spring sites with control sites of higher calcite saturation. This is an important question to tackle given that carbonate saturation will likely decrease in the future due to the increased impacts of ocean acidification. This is a unique experimental setup to take advantage of a natural location where these

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impacts can be studied. The authors find that at the low pH sites, there is a decrease in total benthic abundance, and increase in symbiont bearing species, and an increase in agglutinated species. Overall, non-symbiont bearing species may be more sensitive to the impacts of ocean acidification. The paper is well written and organized well, and I have only a couple of comments that I believe the authors can easily address.

We thank the reviewer for this nice summary of our paper she/he brings up similar concerns are the two other reviewers and we have addressed these issues in the new version.

Key points: (1) One of my main concerns with the study is that the authors are quick to dismiss that there may be other environmental differences between the submarine springs and the control sites, and perhaps too simplistically conclude that the carbonate saturation (and pH) differences are the main control on the foraminifera assemblage differences. For example, there are large salinity differences between the sites that I think warrants more discussion. Are there any differences in food sources, turbidity, depths, etc?

Reply: We have expanded the discussion on the confounding variables when working in natural settings. Specifically, we note that in selecting sites we tried as much as possible that the ojos and control sites will be as similar as possible in all other aspects (depth, substrate, light, currents, temperatures etc.) but the water carbonate chemistry. Salinity to some degree co-varies with the carbonate parameters but the difference in salinity is relatively small between the ojo water and the controls at the sites we selected. As noted in the response to the other 2 reviewers we expanded the explanation about salinity, mentioned the advantages and limitations of field work and noted that by comparing our results to those obtained in controlled laboratory experiments and at other locations we gain confidence in our conclusions.

(2) The authors choose to analyze the >250 micrometer fraction of sediment, but do not explain their choice for this. I think that by choosing this fraction, they may be omitting

smaller, important foraminifera from their analyses. One of the potential impacts of decreased carbonate saturation is that foraminifera may be smaller. So, it may be that by looking at this larger size fraction, they are missing foraminifera that may be smaller at the submarine spring sites but may still be present. It would be very helpful is the authors can repeat some analyses using a >150 micrometer fraction, for example.

Reply: We chose the >250 size fraction because it represents the adult foraminifera assemblage likely to be preserved in the sediment (Martin, 1986) since tropical benthic foraminifera are characterized by large sizes (Hallock, 1985). This fraction comprises 90% of the forams in our samples, probably due to the high mortality rates of juveniles (>95%, Hallock, 1985). We have now inserted this information in the text. See detailed response to reviewers 1 and 2.

Thanks for contributing to improve the manuscript

Adina

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