

Interactive comment on “The regulation of coralline algal physiology, an *in-situ* study of *Corallina officinalis* (Corallinales, Rhodophyta)” by Christopher James Williamson et al.

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General Comments

The manuscript "The regulation of coralline algal physiology, an in-situ study of *Corallina officinalis* (Corallinales, Rhodophyta)" by Williamson et al. describes a unique in situ study that characterizes the diurnal and seasonal variability of the abiotic environment of rock pools containing the geniculate red coralline alga *Corallina officinalis*. The authors found strong seasonal variability in photosynthesis and calcification rates, and that *C. officinalis* was able to acquire inorganic carbon despite large fluctuations in tide pool carbonate chemistry. Additionally, they report that light calcification was strongly

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coupled to net photosynthesis, while dark calcification rates were strongly related to carbonate saturation of the seawater, but that dark calcification was possible over complete diurnal cycles. The data presented provide important information on the carbon concentrating mechanisms of *C. officinalis* physiology, abiotic and biological influences on calcification rates, and light and DIC availability and limitation over seasonal and diurnal cycles. The manuscript is well written, organized, and thorough. The statistical analysis and presentation of the data is strong. With minor revision, this manuscript will provide an important contribution to our knowledge of the physiology of the important ecosystem engineer *C. officinalis* and its ability to withstand strong environmental fluctuations, particularly those it may encounter under future climate change.

Specific Comments

Methods

Line 191: What is the NG_NIGHT-LIGHT treatment? Did the authors provide artificial illumination at night? Or do they consider moonlight = light and the chambers in opaque bags = dark during night conditions? Please make this more clear. Also, why is there no corresponding R_NIGHT-LIGHT?

Lines 230-232: How did the authors obtain the P-E curves? Did they pool the incubations from the different seasons and tidal emersion periods? I understood that in each season, the incubations were only done under two light conditions: light or dark. Since there seem to be 8 major groups of light intensities, I assume the authors used the mean PAR values from Fig. 2, but it's not completely clear.

Discussion

The opening paragraph seems more suited for a closing paragraph of the discussion. I would suggest removing the last sentence and simply stating that you further discuss how your results on production/respiration and calcification improve our understanding of the ecophysiology of *C. officinalis* within a larger perspective.

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Line 385: "Whilst inclusion of water temperature and carbonate chemistry into models did not improve predictive ability, co-variance between predictors may have hindered interpretation of their influence." This argument seems weak, since it contradicts the statement in lines 357-358 that "Addition of water temperature and/or carbonate chemistry...increased the goodness-of-fit...of the models to NG data..."

Figure 7: It is not clear where the irradiance measurements are from. Are they the mean values during each incubation, pooled from both seasons? See above comment for methods.

Technical Corrections Line 471 insert "neither" after "Although"

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