

This study attempts to elucidate issues (both natural and induced by experimental design) that affect production of hydrogen peroxide in marine environments. The implications of this study may be very important to marine ROS researchers around the world, and as such the science presented is important.

The experiments in this study cover a wide variety of factors and each incubation had a slightly different set-up. While this allowed the authors to address many aspects of experimental design, it is difficult for the reader to keep track of everything that was done. Accordingly, it is very important for the authors to present an organized overview of all experiments. Table 2 is a good start on doing this but additional work should be done before publication.

As with any study that covers such a broad array of factors, care needs to be taken when trying to draw specific conclusions. In general, the authors did a good job of indicating where the impact of a particular factor was uncertain. The primary concern I have is with the impact of temporal variations in H₂O₂. The authors address diel cycling of H₂O₂ concentrations briefly in both the introduction and discussion sections, and even show a graph of diurnal variation in [H₂O₂] in figure 7. However, most of the temporal H₂O₂ graphs show only one data point per day, and there is no mention of what time of day measurements were taken. If the H₂O₂ was sampled at irregular times of day, that in and of itself could account for all of the fluctuations seen in the temporal graphs—which would negate any conclusions drawn regarding other factors' impact on H₂O₂ production. Publication should not occur until this issue is addressed in a more overt fashion.

- Line 26 typo: should be “mis-match”
- Line 46 The authors mention production as being primarily photochemical. However, there is substantial evidence of dark (most likely biological) production of ROS in the marine environment (see, for example, Vermilyea et. al., 2010, *Limnol. Oceanog.*; Hansard et al., 2010, *Deep Sea Res. J*). The authors bring this up in the discussion but there is no mention of it in the introduction. This seems like a substantial oversight.
- Line 71 The authors acknowledge that some community members do not have the ability to remove H₂O₂. It has also been shown that community members who do have the ability to remove H₂O₂ may not actively express this ability. (Morris et al., 2016, *J. Plankton Res.*) This paper is cited in the discussion, but it should also be addressed in the introduction.
- Line 80 Later in the paper, the authors discuss light as a significant factor in H₂O₂ production, yet it is not mentioned in the list of factors tested.
- Line 105 I did not find this table helpful. For example, the items in the table are organized (Table 1) differently than in the text, which made it confusing for the reader to use as an aid in keeping the different incubations straight. Much of the data can be found in Table 2, which is far better organized. I would expand Table 2 to incorporate additional data from Table 1.
- Line 110 Add info on glucose addition to the macronutrient data (or in a different row) so (Table 2) that all pertinent data on incubations is found in this table. Additionally, information on the ancillary experiments described in lines 159-184 should be added to Table 2.
- Line 195 There is no mention of when (i.e. what time of day) the H₂O₂ samples were taken.

Given the importance of diel cycles in H₂O₂ concentrations—the authors make note of this in line 544—this is a major oversight. If data points were taken at inconsistent times, that should be noted here as it would allow readers to better interpret the data.

Line 280
(Figure 3) There is no mention of what the error bars represent.

Line 380
(Figure 9) The authors discuss both H₂O₂ and cell counts for both Mediterranean and Grand Canaria locations. However, only cell counts are shown for GC. I think it would be best to redo this figure as a set of four graphs: two graphs (one for each location) for H₂O₂ concentration on the first row, and two graphs for bacterial abundance in the second row. This would more strongly contrast the difference between incubations with added nutrients and no added nutrients.