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# Uncovering responses of zooplankton community to CO₂ acidification in Qatar coastal waters

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## ABSTRACT

The combustion of fossil fuels is pushing atmospheric concentrations of carbon dioxide ($CO_2$) to unprecedented levels. This rapid increase in atmospheric $CO_2$ is causing global changes, with noticeable increases in temperature, sea level rise and changes to marine carbon chemistry (i.e., Ocean Acidification - OA). The today average pH of ocean surface waters has already declined by 0.1 units from pre-industrial levels. According to the IPCC representative concentration pathways (RCPs), further declines in pH are predicted until the end of the century, varying between 0.14 units and 0.43 units. OA is irreversible on short time frames and previous studies have shown the potential impacts of ocean acidification on the physiology, reproduction, immunology and behavior of marine organisms, with effects already documented in multiple species and several regions of the world, although not in the Arabian Gulf. Nevertheless, the strong environmental variability of the Arabian Gulf presents good opportunities to study the potential impacts of future global change on marine ecosystems and to investigate the underlying mechanisms governing their resistance and adaptation to future environmental extremes. In this research we are targeting the response of zooplanktonic assemblages to OA, since these are commonly used as bioindicators of environmental and climate driven impact on marine ecosystems. The approach is mainly experimental, using controlled $CO_2$ perturbation experiments, done aboard the Qatar University research vessel "Janan". We are specifically investigating the response of zooplankton communities to relevant scenarios of seawater acidification by $CO_2$, in terms of assemblage composition and structure; respiration rates; and egg production rates. The first round of experiments was conducted during a 3 day cruise offshore from Doha (June 3−5, 2016); complemented with a second cruise and round of experiments (November 17−19, 2016). Results provide insightful information about zooplankton communities' responses to high $CO_2$ levels in seawater of the Arabian Gulf and contribute to a better understanding about the biogeochemistry of coastal marine areas in Qatar, and more broadly in the Arabian Gulf.

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