SHIFTED COASTAL COMMUNITIES AND ECOSYSTEM FUNCTIONS IN A WARMED AND ACIDIFIED OCEAN

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Ocean acidification and warming are causing profound changes to the marine environment. Previous studies mostly tested the short-term physiological response of species to these drivers, while long-term responses of communities, ecosystems and their functions have seldom been investigated. In this study the effect of warming and acidification on the structure and function of coastal benthic communities was investigated in two consecutive 5 month seasonal experiments using a benthic mesocosm ('benthocosm'). Where, temperature and pH were offset from ambient diel variability according to the business-as-usual scenario for the end of the 21st century (RCP 8.5: warming +3ºC, pH -0.4), and an additional cooling treatment (-2ºC) was applied to simulate the regional temperature three decades ago. At the beginning of each experiment, dominant representatives of the Eastern Mediterranean subtidal reef were collected and transplanted to the benthocosm tanks. Continuous flow of non-filtered coastal waters supplied larvae of new species into the benthocosm tanks throughout the experiments. Changes in species composition, biodiversity, growth and recruitment, community photosynthesis, respiration, and calcification were monitored throughout each experiment.

The results indicate that species richness and biodiversity were not significantly affected by temperature and pH, while species composition differed considerably between treatments. Where, warming increased the abundance of calcifying and non-indigenous species. Under low pH conditions, non-calcifying epiphytic algal growth increased, negatively affecting basiphytic algae when combined with warming. Invertebrate epifauna increased under warm and/or acidified conditions. Community function rates were greater under cold and acidified treatments. Warming in winter reduced the organic carbon sequestration capacity of the benthic community, while during the summer treatment the benthic community exhibited a heterotrophic balance. These results indicate that future conditions in the Eastern Levantine Basin will be more hospitable to non-indigenous carbonate producing organisms and the carbon sequestration of benthic communities will shift from organic to inorganic.