Modeling the effects of ocean acidification and rise in sea surface temperature in coral reefs in Panama

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Abstract

Recent studies quantifying the effects of climate change and anthropogenic carbon dioxide emissions on the oceans predict an unfavorable future for coral reefs. Ocean acidification—the decrease in ocean pH as a result of carbon dioxide absorption by the oceans—along with the rise of sea surface temperature are two of the main threats to coral reefs globally, both of which are expected to worsen through the course of the century. However, these effects are not uniformly distributed in the oceans nor do they affect all coral species similarly. Coral reefs of the Eastern Tropical Pacific survive in naturally lower pH waters and are exposed to steep temperature gradients, and therefore can provide insight on the possible future state of other reef systems. This study examines coral cover in the reefs of Coiba National Park in Panama. It integrates the current taxonomic and species-specific research with the regional and global trends of increased temperature and acidification to predict the change in cover of coral reefs of Coiba. I present the results of a survey conducted in January 2017 of 10 sites throughout the Coiba National Park that determined the mean percent coral cover, which already shows a decline in total cover compared to 2004. These data were also used with the Coral Mortality and Bleaching Output model (COMBO) to estimate the change in mean coral cover by the end of the century. The results from three IPCC emissions scenarios suggest that the reefs of Coiba will maintain their ecological function only under the lowest emissions scenario.