Response of Mediterranean temperate and cold-water corals to ocean acidification

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Atmospheric CO_2 in coming centuries is likely to reach levels last seen millions of years ago with significant impacts on climate and ecosystems. One of the main global stressors threatening today's oceans is ocean acidification, which occurs due to the absorption of this greenhouse gas in seawater and has already acidified the oceans by about 0.1 pH units since preindustrial times. The Mediterranean Sea has certain characteristics that make it especially sensitive and vulnerable to changes in atmospheric CO_2 and this gradual acidification. A first estimation of seawater acidification identified a pH decrease of up to 0.14 units since preindustrial times in the western Mediterranean Sea, which is of higher magnitude than the global surface ocean decrease. This progressive transition has the potential to affect marine ecosystems in many ways, and it is generally agreed that calcifying organisms will have more difficulties to grow. To better understand the magnitude of this problematic it is important to know the ranges of variability of pH and other related parameters in seawater at different time scales. This knowledge is crucial, for instance, to establish levels of pH tolerance for marine organisms. In this talk, we will first briefly review the different reconstructions of paleo-pH that have been produced so far in the global oceans, obtained by studying suitable archives of paleoclimatic information, such as corals. We will then move to show the results from mid- to long-term manipulative experiments in which several species of Mediterranean temperate and cold-water corals were exposed at pH values expected for the year 2100 at the purpose designed experimental aquarium facilities of Institut de Ciències del Mar.