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“Field-based electrochemical sensors to monitor marine carbonate fluctuations in coastal systems”

Since the industrial revolution, the oceans have absorbed about 1/3 of the fossil fuel CO2 released into the atmosphere. While this has reduced the effect of anthropogenic emissions on climate change, it has also led to significant changes in seawater chemistry, including a reduction in seawater pH. This process, known as ocean acidification, has reduced the amount of carbonate available for calcifying organisms, such as oysters and clams, to build their calcium carbonate shells and skeletons. However, there is large scale variation in the pH and carbonate concentration by ocean basin and region. In addition, seasonal and daily cycles can be much larger than the expected near-term changes due to ocean acidification. However, current methods of monitoring marine carbonate concentrations are inadequate for obtaining fine spatial- and time-scale data. Our lab is developing new methods for field-based measurements of carbonate in coastal environments. These low-cost electrochemical sensors are designed to monitor carbonate for up to two weeks, allowing us to study the fine-scale variations in carbonate chemistry. They will be incorporated into our ongoing research in order to better predict regional responses to ocean acidification.