Understanding Ocean and Coastal Acidification – NGSS Alignment

This module was developed to build data literacy, engaging students in increasingly sophisticated modes of understanding and manipulation of data. The original module was completed prior to the release of the Next Generation Science Standards (NGSS)* and has recently been adapted to incorporate some of the innovations described in the NGSS.

This document outlines the ways in which various levels of the module provide learning experiences that engage students in the three dimensions of the NGSS Framework while building towards competency in targeted performance expectations.

Driving Question: Levels of carbon dioxide in the atmosphere are rising, but what does this mean for the world ocean?

Targeted NGSS Performance Expectations – High School
Life Science > HS-LS2-5: Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. *Students build toward aspects of this standard by developing a model to illustrate predicted short and long-term changes in ocean pH. Student form explanations for short-term variations in pH using existing knowledge of photosynthesis and cellular respiration (Levels 1-3).* > HS-ESS3-5: Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems. *Students run interactive pH and aragonite saturation state models to predict how shell-building animals will be impacted given the conditions predicted for 2100. (Levels 3, 4, and 5).* > HS-ESS3-6: Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity *Students use interactive data maps, graphs and models to illustrate the impact of anthropogenic increases in atmospheric CO_2 on ocean chemistry, aragonite saturation state and populations of shell-building, marine organisms (Levels 3, 4, and 5).* **Chemistry** > HS-PS1-6: Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium. *Teachers could slightly modify the worksheet activities and/or the student presentations in Level 5 to allow opportunities for students to clearly specify how the net result of increased CO2 from human activities would cause a shift in the amount of products at equilibrium (Levels 3, 4, and 5).*