The Catalina Dynamic Ocean Chemistry Project

Craig Gelpi, Karen Norris and Jim Updike
Catalina Marine Society
Lake Balboa, California
craig@catalinamarinesociety.org

Abstract

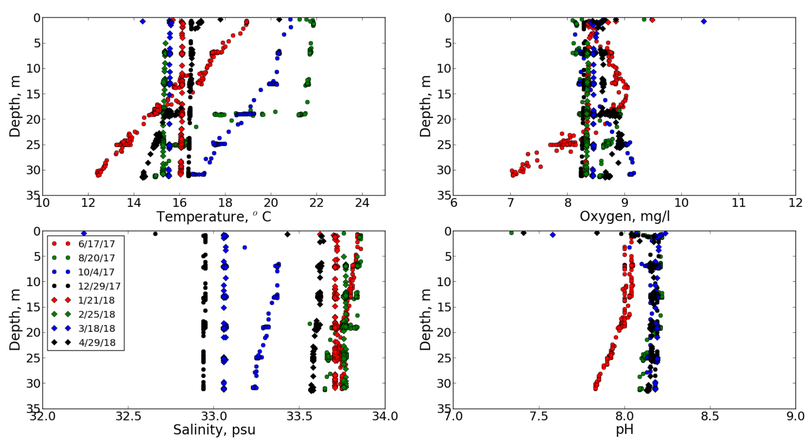
Being proactive in adjusting to climate change and ocean acidification requires understanding local conditions and how they may enhance or mitigate effects that are induced by global drivers, such as anthropogenic increases in atmospheric carbon dioxide. Santa Catalina is located in the center of the Southern California Bight and exhibits singular behavior in both ocean temperature and phytoplankton dynamics, suggesting that other ocean parameters may also vary uniquely at the island. The Catalina Marine Society is measuring ocean chemistry parameters at Catalina, including pH, dissolved oxygen, chlorophyll, temperature and conductivity, with the goal of discovering how these parameters change daily and seasonally. Data from the first nine months of the current measurement campaign at Avalon (8 depth profiles) are displayed, as well as those obtained from a multi-week deployment at Two Harbors, made during 2012. The 2012 campaign data indicates that changes in pH and oxygen are associated with internal waves that advect depth gradients in these parameters.

Measurements from kayak at Avalon Coast Guard buoy.

Trial run in Newport Harbor.

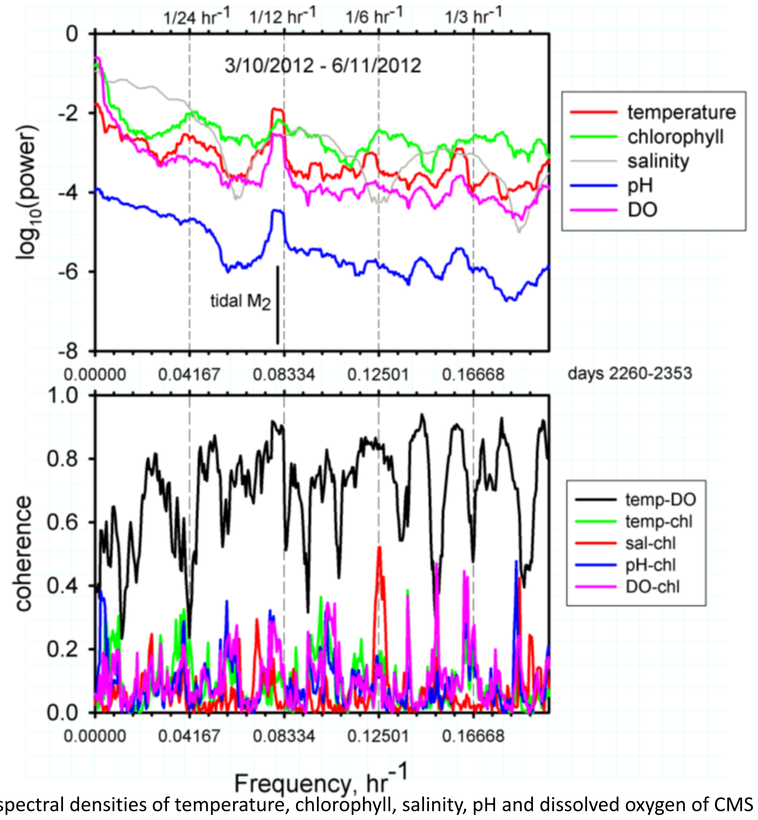
Locations of 2012 mooring measurements at Two Harbors and 2017-2018 kayak measurements at Avalon

Depth-profiling data



Salinity ±0.3 ppt, temperature ±0.01C, pH ±0.1, O_2 ±0.1 mg/L

Data from the depth profiling



Power spectral densities of temperature, chlorophyll, salinity, pH and dissolved oxygen of CMS measurements made at the Wrigley Marine Science Center reserve from April – May 2012.

Observations

From the mooring data, sampled every hour, we find that pH and dissolved oxygen vary with the temperature at the M2 tidal cycle, with the implication that internal waves excited by the semidiurnal tide, are advecting a depth gradient in these parameters.

The depth-profiling samples, occurring irregularly throughout the year do not show a statistically important variation over the seasons in pH. Only in one profile does the pH show a large change below 20 m. However, there are interesting variations in temperature and dissolved oxygen. A thermocline is maintained from June to October, producing changes in the dissolved oxygen.

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We are looking for volunteer student researchers! Enquire within.
information@catalinamarinesociety.org