

June 2015 News Notes

Grottoli conducts coral research in Hawaii

Professor Grottoli (<http://u.osu.edu/grottoli.1/>) and her research team are at the Hawaii Institute of Marine Biology (<http://www.hawaii.edu/HIMB/>) in Hawaii this month studying corals. The Grottoli coral research team (photo at right) in Hawaii (from left to right): Rowan McLachlan (PhD student), Kerri Dobson (PhD student), Casey Saup (Undergraduate student), and Professor Andrea Grottoli. Following the second hottest month on record since the 1940s, water temperatures in the main Hawaiian Islands reached 30°C in October 2014. The result of this ~2°C increase above normal summer temperatures was a severe bleaching event across the entire length of the Hawaiian Archipelago. In Kāneʻohe Bay where the Hawaii Institute of Marine Biology is located, 75% of the dominant coral species bleached. Bleaching is a stress response in corals whereby they lose their symbiotic algal partners and turn white. Prolonged bleaching can lead to disease, decreases in coral growth and reproduction, and even death. In addition, rising atmospheric carbon dioxide concentrations are causing the oceans to become more acidic and potentially less hospitable to coral reefs. By the end of this century, seawater is predicted to be twice as acidic as it is today and bleaching events are expected to occur annually. Although tragic, the 2014 bleaching event in Hawaii provides a rare opportunity to experimentally test the ability of Hawaiian corals to recover from such events under the acidic ocean conditions expected in by the end of this century.



Grottoli research team (L-R): Rowan McLachlan, Casey Saup, Kerri Dobson, Andrea Grottoli

Grottoli's team, in collaboration with Dr. Rob Toonen's team at the University of Hawaii, are conducting experiments on bleached corals that were collected in November 2014 to measure the recovery rate of the bleached corals exposed to normal seawater to that of bleached corals exposed to more acidic seawater for one year. The first set of measurements were completed in November 2014. After 6 months, Grottoli and her team are back in Hawaii to assess the coral recovery (photos at right). So far, the experiment and measurements are going well. Observations of the corals reveal that one of the species is recovering very well, and the other suffered a lot of mortality, irrespective of ocean acidification. Further laboratory analyses will be conducted in Columbus to determine why one species is recovering and not the other. A final set of measurements will be made again in November 2015.

Results of this research will inform coral reef managers as to which species or reef regions are more resilient to global change conditions and better targets for protection. The results will be particularly relevant to management of the single largest conservation area under U.S. jurisdiction marine, the Papahānaumokuākea Marine National Monument and World Heritage site (<http://www.papahanaumokuakea.gov>). It will also provide critical data input for models used to project the persistence of reefs in the future. Educationally, the research is providing a dynamic learning and training environment for two PhD students and four undergraduate students in the School of Earth Sciences. This work is funded by the National Science Foundation.



Grottoli research team in the field (clockwise from top left): Rowan and Casey cleaning the experimental tanks, Professor Grottoli preparing brine shrimp hatchlings to feed the corals, *Porites compressa* coral fragment in a respirometry chamber, Kerri and Casey preparing the respirometry chambers for coral measurements.