



Press Room

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MBARI researchers reach final stage of Wendy Schmidt Ocean Health XPRIZE

A team including two MBARI researchers has been selected for the final stage of a million-dollar ocean technology competition. [The Wendy Schmidt Ocean Health XPRIZE](#) has

offered two prizes of \$1 million each to science and engineering teams from around the world to create a pH sensor that accurately and affordably measures ocean acidification.



A variety of pH probes hang in the MBARI test tank during the second phase of the Wendy Schmidt Ocean Health XPRIZE competition. Image: Hans Jannasch (c) 2014 MBARI

Eighteen teams entered the first stage of the competition, which was held at MBARI in Fall 2014. On April 28, 2015, XPRIZE announced that five of these teams will travel to Hawaii for a final deep-sea trial. MBARI chemical oceanographer Ken Johnson and his lab are part of [Team DuraFET](#), one of the teams that will be competing in the last phase of competition.

Human activities send millions of tons of carbon dioxide into the air each year, as we burn coal and drive our cars. One quarter of that carbon dioxide dissolves into the

ocean, causing seawater to become more acidic. As the pH of seawater decreases, the shells of mollusks and hard corals will begin to break down. Even fish are not immune; shifts in pH can damage their health and change their behavior.

Currently, oceanographers don't have a cheap, reliable way to measure pH in the ocean. Processing water samples in the lab is expensive and time-consuming. Oceanographers need a sensor that can survive for months or years at the great pressures found on the deep seafloor.

The Wendy Schmidt Ocean Health XPRIZE aims to provide solutions to this problem. The contest has two purses: a \$1 million accuracy purse for the best performance (including the ability to function in the deep sea) and a \$1 million affordability purse for the most cost-effective and usable pH probe (which only has to work in shallow water).

During the first two phases of the competition, the probes needed to pass basic tests

for accuracy. First judges compared each probe's pH measurements to measurements made using the most precise lab instruments available. Next, the judges placed the probes in MBARI's 1.4-million-liter test tank for roughly two and a half months. During this time, the probes needed to continuously measure the tank's pH accurately without recalibration.

Probes from fourteen teams passed the initial tests at MBARI. In February 2015, these teams traveled to Seattle, where they placed their sensors in a tank near the Seattle Aquarium. As Puget Sound waters circulated through the tank, the sensors experienced fluctuating pH levels due to tides, winds, currents, and runoff. The Puget Sound water also carried algae and microscopic animals that could grow on the sensors and make them less effective.

Having passed the Seattle tests, sensors made by Team DuraFET and four other teams face a final deep-sea trial in May 2015, 160 kilometers (100 miles) off the northern coast of Oahu. During this six-day test, the sensors will measure ocean pH from the sea surface to 3,000 meters (almost 10,000 feet) below. Winners of both the accuracy and affordability prizes will be announced in July 2015.

Team DuraFET's three instruments all measure pH using chips made by Honeywell, Inc., but they use different pressure housings. Johnson helped design the housing for the MBARI Deep-Sea DuraFET specifically to handle the pressure of the deep sea, where MBARI does much of its work. In fact, MBARI is already using these probes for research. "Their data is flowing to the web right now," Johnson said.

If Team DuraFET wins one or both of the prizes, the team members plan to donate any prize money to help support the [Argo](#) array—thousands of drifting floats that measure the temperature of the world's oceans. Johnson has equipped some Argo floats with instruments to measure concentrations of nutrients, algae, oxygen, and pH. Team DuraFET hopes to allow more of the Argo floats to be outfitted with these upgraded measuring tools.

Members of Team DuraFET are MBARI's Ken Johnson, Hans Jannasch, and Luke Coletti as well as Sea-Bird Scientific, Scripps Institution of Oceanography at the University of California San Diego, and Honeywell, Inc.

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- XPRIZE Phase One and Two at [MBARI](#)
- Team [DuraFET](#)
- The Wendy Schmidt Ocean Health [XPRIZE](#)