



**NOAA Teacher at Sea  
Justin Czarka  
Onboard NOAA Ship *McArthur II*  
August 10 – 19, 2009**

**NOAA Teacher at Sea: Justin Czarka**

NOAA Ship *McArthur II* (link: <http://www.moc.noaa.gov/mt/>)

Track the *McArthur II* online at <http://shiptracker.noaa.gov/default.aspx>.

Mission: Hydrographic and Plankton Survey

Geographical area of cruise: North Pacific Ocean from San Francisco, CA to Seattle, WA

Date: August 15, 2009

**Weather data from the Bridge**

Sunrise: 6:29 a.m. Sunset: 20:33 (8:33 p.m.)

Weather: patchy mist

Sky: partly to mostly cloudy

Wind direction and speed: north-northwest 15-20 knots (kt), gust to 25 kt

Visibility: unrestricted to 1-3 nautical miles in mist

Waves: northwest 6-9 feet

Air Temperature: 18°C high, 12°C low/ Water Temperature: 17.5°C

**Science and Technology Log**

Today we made it out to 200 miles off the Oregon Coast; the farthest out we will go. The depth of the ocean is 2867 meters (9,406 feet). It is pretty interesting to imagine that we are on the summit of a nearly 10,000-foot mountain right now! Last night the CTD was deployed 1,000 meters (3,281 feet). Even at this depth, the pressure is immense (see photo, page one). When taking the CTD down to this depth, certain sensors are removed from the rosette (the white frame to which the CTD instruments are attached) to prevent them from being damaged.

The crew aboard the *McArthur II* is such an informative group. Many possess a strong insight into NOAA's research mission. Today I spoke with Kevin Lackey, Deck Utility man. He spoke to me about the cruises he has been on with NOAA, particularly about the effects of bioaccumulation that have been studied.

Bioaccumulation is when an organism intakes a substance, oftentimes from a food source, that deposits in the organism at increasing levels over time. While sometimes an intentional response from an organism, with regards to toxins, this bioaccumulation can lead to



**This picture shows what happens to an 8 fluid ounce Styrofoam cup after experiencing water pressure at 1,000 meters down. The colorful cup was sent down attached to the CTD.**

detrimental effects. For example, an organism (animal or plant) A on the food web experiences bioaccumulation of a toxin over time. Imagine organism B targeting organism A as a food source. Organism B will accumulate concentrated levels of the toxin. Then, when organism B becomes a food source for organism C, the effects of the toxins are further magnified. This has serious effects on the ocean ecosystem, and consequently on the human population, who rely on the ocean as a food source.



**Justin Czarka taking observational notes while aboard the *McArthur II*. These notes preserve the knowledge gained from the NOAA officers and crew, as well as the researchers**

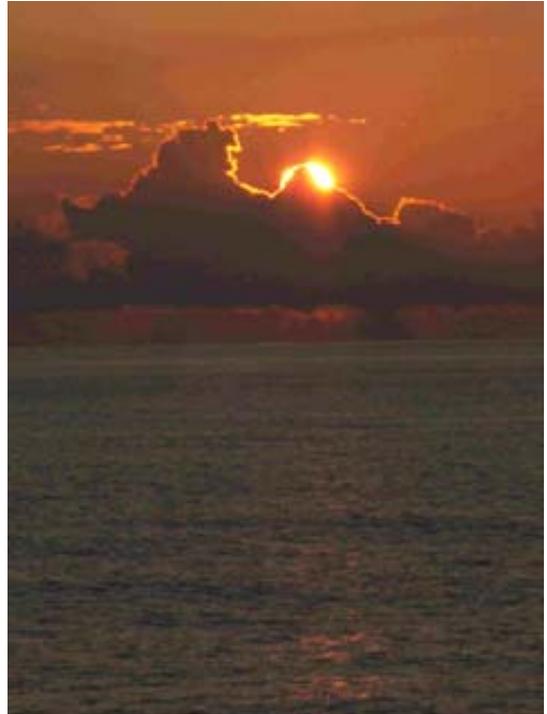
While aboard the *McArthur II*, Morgaine McKibben, a graduate student at Oregon State University (OSU), shared with me her research into harmful algal blooms (HABs), which potentially lead to bioaccumulation. Certain algae (small plants) accumulate toxins that can be harmful, especially during a “bloom.” She is collecting water samples from the CTD, as well as deploying a HAB net, which skims the ocean surface while the

ship is moving to collect algae samples. She is utilizing the data in order to create a model to solve the problem of what underlying conditions cause the algae blooms to become toxic, since they are not always as such.

### **Personal Log**

The weather has cleared up allowing grand ocean vistas—a 360° panorama of various blues depending on depth, nutrients, clouds overhead, and so forth. At first glance, it just looks blue. But as you gaze out, you see variance. A little green here, some whitecaps over there. As the ship moves on, the colors change. Wildlife appears, whether it is a flock of birds, kelp floating by, or an escort of pacific white-sided dolphins. I wondered if the ocean would become monotonous over the course of the eleven days at sea. Yet the opposite has happened. I have become more fascinated with this blue water.

It was interesting today to notice how we went back in time. Two nights ago the sun had set at 20:03 (8:03 p.m.) But because we went so far out to sea, last night the sunset had changed to 20:33 (8:33 p.m.). While this happens on land as well, it never occurred to me in such striking details until out to sea.



**Sunset over the Pacific Ocean from the flying bridge off the coast of Heceta Head, Oregon (N 43°59, W 124°35) a half hour later than two nights ago!**

### **Animals Seen from the Flying Bridge (highest deck on the ship)**

- Rhinoceros Auklet (closely related to puffins)
- Whale (breaching)
- Common Murres
- Western Gull
- Hybrid Gull
  - We are at a location off the coast of Oregon where different species interbreed.
- Leech's Storm Petrel
  - Mike Force, the cruise's bird and marine mammal observer, found the bird aboard the ship by in an overflow tank. It will be rereleased.

### **Did You Know?**

NOAA has a web page with information especially for students? Visit:

<http://www.education.noaa.gov/students.html>