SEAMAIL™

FROM: DEEPEND Science Team
TO: DEEPEND Virtual Team Leaders
SUBJECT: Physical Oceanography and DEEPEND, Team Optics

Hello Virtual Science Team,

My name is David English. I am part of Team Optics. We study or try to assess the physical environment during the DEEPEND cruises. Much of the DEEPEND research is studying the creatures that live in the deep sea. My team studies physical oceanography. Understanding the ocean itself is essential for the DEEPEND Team to understand the animals, their migrations and more.

We study physical oceanography because it determines important conditions, constraints, and changes that living things prefer or avoid, and adapt to or cannot survive. It also helps us understand the properties of matter and the change of energy present in the sea. Understanding the environment helps biologists understand the natural history of the animals.

I'm interested in the vertical and horizontal variations of temperature, salinity, density, and plankton in the water. I am particularly interested in the transmission and reflection of light within the water.

While measuring physical conditions may seem simple in a lab, it takes cooperative individual efforts and a variety of skills to make measurements at sea. To understand the ocean we measure light, temperature, salinity, and more. Sometimes we take measurements from a ship and sometimes from space! Here are just a few kinds of technology we use to do our research:

Gliders: Sometimes we place our measuring instruments onto vehicles, such as gliders. The gliders travel for days or weeks independently from the ship.

CTD: The CTD is an important instrument that measures conductivity, temperature, and pressure. The CTD shows us how the water's salinity and temperature change as it descends through the water.

Satellite: Sometimes we use measurements made from ocean-viewing satellites to estimate how the measurements made at sea might be different in other areas or times. Satellite

imagery can be used to identify and monitor changes in sea surface temperature and color spatial features.

Computer modeling: I combine multiple (ocean color) satellite images of the DEEPEND study area into a picture, and send that picture to researchers on the ship to help them decide where they want to sample. This photos is an example ocean color image in which the clearest waters are dark blue, the surface waters with more phytoplankton are green, and those with lots of plankton or other particles are yellow or red.

Radiometer: At sea, we measure the amounts and colors of light reflected out of the sea surface using a handheld radiometer. We compare these measurements with values measured by ocean color satellites as they pass high over the ship.

Other technology: We also use instruments that shine beams of colored light into the water, so we can see how light is absorbed or scattered. The instruments that make these measurements contain complex electronics and optics, yet they must work in a corrosive environment (saltwater) and endure drastic changes in temperature and pressure.

The ocean is an incredible, dynamic ecosystem we are just beginning to understand. The glider is sending more data, so I had better get back to the lab. Thank you for joining us.

David

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Creep into the DEEPEND Mission