

Creep into the DEEPEND

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FROM: DEEPEND Science Team
TO: DEEPEND Virtual Team Leaders
SUBJECT: Watching the ups and downs of the sea using sound

Hi Virtual Science Team,

My name is Joe Warren. I count animals and I do it using sound. After reading that, your first thought might be, "Cool!" Your second and third thoughts might be, "Why and how?"

Let's start with the why. If you wanted to count how many fish were in an aquarium tank, which of your senses-- sight, taste, touch, hearing, or smell-- would you use?

Most of us would say sight (our eyes). That would work. But what if I asked you to count the fish in the tank at night with no lights on. Then it would be much more difficult.

The only light in the ocean is from the sun and moon. That light can only travel so far. Once you get a couple of soccer fields deep, the ocean is dark. Though it is dark 24/7, we know that many animals live in the deep. To understand this important ecosystem, we need to know how many animals live in the dark sea and where they live.

How do I count the animals? The technology I use to "see" in the deep sea is called an "echosounder." The echosounder uses sound to see. An echosounder works like the echolocation of a dolphin or bat.

Like a dolphin's echolocation, the echosounder sends out a beam of sound. When the sound hits something, it echoes or bounces back.

A dolphin uses the returning sounds to find food or its way in the dark sea. With echolocation the dolphin can determine how far away something is, how fast it is moving, which way it's moving, and so much more.

How does the echosounder work? We transmit a short pulse of sound. It's so short it sounds like a "snap." The sound travels down toward the ocean bottom. Like a dolphin, we listen for

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echoes as the sound bounces off objects in the water column. We measure how long it takes for the echo to return to us.

From that echo we can determine how deep the fish are located. Usually, the strongest echo comes from the seafloor, but if there are marine animals, they'll produce echoes as well.

Many ocean animals live deeper when the sunrises. Then when the sun sets, they swim up toward the surface. This is daily up and down movement is called, ***vertical migration***. Vertical migration happens every day all over the world, making it the largest migration on Earth. During the day, these animals are very deep in the ocean (about a half mile below the surface). Using our echosounder, we can watch these animals move up and down in the ocean.

I've attached a couple photos for you of the echosounder, our lab aboard the ship, and one of the pictures of the deep created by our echosounder. It's an example of what we see when the sound bounces back.

As you'll see, the time is noted along the bottom. The depth on the left. Find 6:30 p.m. then draw your finger up to find the fish (indicated in red colors). What depth is that? Now, follow the fish through time, to 8 p.m. As the sunsets and it gets darker, do they move up or down?

I have a couple questions for you? Scientists like me often have to work with engineers to create technology to study ocean animals. You can't just buy it at a store. As part of the DEEPEND Science Team, what other technology could you use, adapt, or invent to count and follow ocean animals in the deep? Can you draw, create, or describe this technology? If you'd like to share your ideas with us, we'd love to see them! Why do you think it is important that we follow and count fish, squid, and crustaceans?

Thanks for joining us.

Joe

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Creep into the DEEPEND Mission

