

Creep into the DEEPEND

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SEAMAIL™

FROM: DEEPEND Science Team
TO: DEEPEND Virtual Team Leaders
SUBJECT: How we identify animals with sound

Hi Virtual Science Team,

In my last Seamail, I talked about how we use sound to count animals. You might have wondered how we identify fish from squid, or different kinds of crustaceans. I thought I'd share how we take other measurements we make on the boat that help us figure out how many fish there are when the sound bounces back from the deep.

The acoustic system records the echoes that reflect off of fish (and other animals) in the water. But we need to know how to convert the echoes we measure to the number of fish. We can predict (using a lot of math) how much sound energy a fish will reflect. We need to know some information about the fish to put into our mathematical model. The really important things we need to know are: 1) How big is the fish? and 2) What is its density?

If you like math, you might know that: Density is the ratio of mass to volume. If you're not into math at that level yet, let me explain. Say you had two objects that were the same size like a basketball and a balloon. Which is heavier, a basketball or a balloon? Yes, the basketball is heavier or more dense. The balloon would be lighter or less dense. We measure the density of the animals to help us read the echoes.

In order to get this information, we take fish that have been collected in the net and we measure their height, their width, and their length -- like when you go to the doctor. The fish we collect are too small to put them on a scale to get their weight (and scales are hard to use on a moving boat), so in order to figure out their density, we put them in a jar of seawater. The animals are slightly denser (heavier) than the ocean; if they were the same density as the ocean, they'd be invisible to our acoustic system. So then we add a denser liquid until the fish are neutrally buoyant (floating in the middle of the jar), then we know the fish's density is the same as the mix of our two liquids.

With that information, we can take our acoustic measurements and estimate how many fish there are in the scattering layers!

Until next time,

Joe

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Creep into the DEEPEND Mission



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