Constructing a Surface Mooring Transcription

Here's a photo of the surface buoy for the SPURS central mooring. It's very heavily instrumented at the surface with meteorological instruments that tell us about the exchange of properties like heat and freshwater between the ocean and the atmosphere. I'll talk a lot more about these instruments and what we're doing with them.

First I'd like to talk about this mooring and what it looks like, and how we deploy it. So a year ago at this time I was out in the SPURS region on the research vessel Knorr, and we deployed the mooring. It has this surface buoy that's about 10 feet in diameter, and it's about 15 feet tall; we'll see some more images. The buoy floats because of a kind of stack of foam disks like this. So there is this big square insert, and we have what we call a well that sits down in the square insert. Then there are two of these foam disks kind of sandwiched together with big metal plates at the top and bottom. It all gets assembled this way. There are long bolts running through the buoy holding it all together. This buoy is about from here near where the water line is about 15 ft. to the upper instruments.

Here's a photo of the deck of the Knorr shortly before we began deployment of the mooring. Here they are testing another instrument that we used in SPURS. This is a profiler that is operated by Lou St. Laurent, a scientist here at Woods Hole. Here's a photo of the buoy, again shortly before deployment. This is our NASA program manager who's really kind of spearheaded this SPURS program, and oversees the larger research effort here, and most of the physical oceanographic research that is done by NASA.

Here's a photo of the buoy going into the water. This buoy weighs about 5,000 pounds. The image is a little blurry here. There are about 5 different lines attached to this buoy that's being lifted by the ship's crane here. All of these lines are run through cleats. All of these people are trying to hold the buoy steady so it doesn't swing. There's really over $300,000 worth of instrumentation alone here in the buoy tower. At this point we're really nervous and trying not to break anything right at the start of a one year measurement program.

It was really calm during deployment, and we were fortunate for that. At other times during the year we measured 4 meter waves, so that's close to 20 ft. seas. We're happy we weren't experiencing that when we were trying to set this buoy in the water. It's quite a process getting it deployed.

So the first step is to put the buoy in the water, and we were looking at the starboard side of the ship. Now we're looking backwards at the port side of the ship. The buoy was put in the water with the mooring line attached, and its drifting around behind the ship, and now that mooring line is coming up through a block here in what we call the A-frame. The mooring line is coming here and it's attached to a winch that is just out of view here. This is a pretty slow process because we're clamping instruments onto the mooring line every meter or so. I'll show some drawings that kind of give you a sense of how many instruments there are. There are more than 60 individual instruments attached to the mooring beneath the surface, and more than a 100 instruments altogether. Right now the research vessel Endeavor is out in the SPURS region, and they just completed recovery of this mooring today.

I have a couple of short videos that show parts of this deployment. This is not actually the SPURS mooring deployment, this was an experiment we did in the Red Sea, but the mooring is nearly identical; the water was not as deep, but the buoy is nearly identical here. So it's being set into the water. It will drift around to the back of the ship. We try to maneuver the ship so that it's making way at about 1 or 2 knots and trailing the buoy out behind. So we've skipped over about 6 hours of work here to we're near the very bottom of the mooring.

These yellow spheres are actually glass balls encased in plastic. They provide buoyancy that holds the bottom part of the mooring near the anchor vertical so that the mooring doesn't get tangled on the anchor. You saw that anchor drop, that was a 200 kg anchor. The anchor for SPURS is about twice as large and twice as heavy. I'll talk more about how our mooring is designed. This is a very heavily instrumented mooring. We run simulations of the mooring design and determine that for the currents and the winds and waves at SPURS that we need to have this.