In-Situ Oceanographic Research Equipment Transcription

I want to give you at least a snapshot of the kinds of sensors that go into the Sensor Web. The in situ measurements are the measurements we actually have in the water. For example here is a surface drifter. They are satellite tracked, and we use those to measure the surface currents of the ocean. We can also measure the surface temperature and salinity. All this is transmitted via satellite. There are 1250 of these spread across the global ocean at any point in time. They give us a very clear picture of the surface circulation.

A different kind of instrument is the ARGO float. We use this to profile temperature, salinity, and sometimes other types of measurements in the upper 2 km. of the ocean. So that's about ½ of the average ocean depth. We park these down about 1000 km in the ocean. There are 3000 of these out in the ocean now. Every 10 days they pop up to the surface, and they measure the temperature and salinity on their way up and down; they would take them down to 2 km. and back up to the surface, and they would transmit their data via satellite.

We launched numbers of these during SPURS. Here they show what they look like in the laboratory as they are being put together. They have a pressure housing, these big yellow tubes to withstand the pressure at 2 km. depth in the ocean. They're powered by a battery power pack; that's this white package. Then they have sensors on the electronics for those are there at the top. You can see in the background they have these antennas and sensors on the top for transmitting data. They last about 5 years in the ocean. We've been collecting data with these for about 10 years now. So they've revolutionized our view of the ocean. Any one of these is almost like a whole Challenger expedition in one little package. You can imagine having 3000 of them going year-round, year in and year out in the ocean.

The next kind of package that we've developed in the last decade—we being the oceanographic community—is these Slocum electric gliders. They're able to get out in the ocean for about 2 months duration, and glide through the water column profiling in great detail with sensors temperature, salinity, velocity, biological properties, and also able to transmit them via satellite.

Another kind of glider is the Seaglider which has more capability to reach depth. This pink Seaglider # 189 was the star of our SPURS cruise in September. It was quite interesting how many web hits this glider got in my blog sessions. I think it was because I mentioned NASA and sexy in the same blog, so it got 1000s of hits for this sexy pink glider. It measures temperature and salinity. You can see the antenna on the top; it's how it transmits its data back when it comes back to the surface. It sticks that end up, and in a few minutes it can transmit its data back, and then head down to the depths to sample some more.

The newest technology that we have deployed out in the Atlantic was this Wave Glider which is a two piece instrument, with a surface kind of like a surfboard, attached to—it's almost like a weathervane. This kind of weathervane as it gets pulled up and down by the surface waves, it translates the vertical motion into horizontal motion. It drives the whole package forward at about 2 mph. That's

enough to overcome surface currents. You can actually drive these around. You can put sensors on both the top and the bottom, and measure the temperature and salinity in the upper ocean, which was something we were particularly interested in SPURS.

Finally, here is the centerpiece of our yearlong experiment in the Atlantic was to deploy a current meter mooring. This is the top of 5 km. of wires and instrument that were suspended below this surface float out there. It has meteorological measurements on the top, and then more than 80 instruments suspended below it. It's transmitting that upper ocean data and the meteorology back to us in real time.