

What Is a Sensor Web and How Has It Changed Ocean Exploration? Transcription

I will step back here with about the early exploration of the ocean because we've really changed our view of the ocean since the development of sensors, and spacecraft, and so on. Back in Ben Franklin's days, in the 1770s, they had the postal vessels going back and forth to England and the colonies, and they discovered major aspects of the ocean circulation. The Gulf Stream is a major ocean current off the east coast of the United States. They could get to England quicker by following the Gulf Stream, then if they wanted to get back to the colonies quickly they had to avoid the Gulf Stream. This is a major feature of the ocean circulation that pops up over history again and again at different ways of the observe it.

Next, you'll see a broader picture of the Atlantic circulation. Most of the ocean basins in the northern and southern hemispheres have a gyre of circulation, a cycle of currents. The western boundary has strong currents: the Gulf Stream, the Kuroshio in the Pacific, and so on. Then at the eastern boundary there are currents towards the equator, a return flow. For example these are the currents that Christopher Columbus took from Europe towards the Caribbean in 1492. He would have crossed through this red region which is where we are studying salinity in the Atlantic Ocean. This is our target area for salinity processes in the upper ocean regional study.

Just to recap with the Challenger, is that we can send a ship out to a small piece of the ocean and study it intently, or we can view it from space and get the broad picture. What's changed in the last decade is that we're able with all of our wonderful supercomputers and so on, is to combine the best of measuring the ocean from a ship with the best from space. I think of this as a Sensor Web that we are able to deploy in the ocean.

This next picture is sort of the concept of our Sensor Web, here with this purple region being the high salinity region in the Atlantic Ocean. You just saw it in the red box. If we want to go out and study an area like that, we can take a ship out; we can launch various sensors from the ship, gliders and floats. We can deploy moorings. We can take advantage of regular commercial shipping through this region, and instrument it for measurements of the ocean, and then we can use our satellites to measure various quantities at the surface of the ocean. The capability now is to use all of these kind of measurements together into a 4 dimensional picture of the ocean, how it varies at the surface and in depth over time.