

MARINE SCIENCE TOOLS – THE SIPPER

Professor: Teresa Greely, Ph.D

The SIPPER was developed here at the Center for Ocean Technology in response to the needs of some of the plankton biologists actually needing greater resolution of the data of the types of animals that were in the ocean where they were studying. They weren't able to see enough changes and responses to environmental conditions, and they needed higher-resolution in data. And so the engineers here designed a system that combined a high-speed camera with a light source and a towing package designed by mechanical engineers to come up with a solution for this.

SIPPER offers a number of advantages over traditional methods used to categorize the plankton in the ocean, in that when we analyze the images, we get an analysis of every organism that we image. The organisms are left in the ocean after we do it. We don't have to bring them back to the lab to count them. And the most important thing about SIPPER is that half of the organisms that we analyze are soft-bodied organisms, such as baby squid and other things like that, larval lobsters, that are destroyed in conventional net tow and so are never accounted for.

The way SIPPER operates is it is towed through the water behind the ship at a speed of just a few knots. And water enters a sampling tube and flows past a camera, where we take up to 20,000 images of the organism as it flows through the water tube. Those images are then recreated in a long mosaic, which is fed into a piece of software which can categorize and analyze the assemblage, so that we know exactly what is in the water column, what is there.

The use of SIPPER can also be coupled with the nutrient analysis that we were doing with our previous assessment. For instance, measuring the nutrient concentrations in response to a dust event, we could use SIPPER side-by-side with it and tow it in the area where the dust event occurs and analyze the response of the zooplankton and phytoplankton community to the changing levels of the nutrients that we measured by the SEAS instrument. So we could get a complete picture of what was going on before, during, and after an event. And we could get with a fine, detailed picture of what types of zooplankton were responding and how they were responding to the various changes in the nutrient concentrations that we measured with SEAS. So we're able to couple the chemical and biological systems of the ocean and get a much clearer picture of what's going on in these oceanic processes.