EXPEDITION PROFILE

June 5-7, 2018 aboard DISCOVERY Yacht Mystique

The International SeaKeepers Society partnered with the University of Washington's Professor Charlie Eriksen, Research Engineer Kirk O'Donnell, and Ph.D. candidate Jake Steinberg to deploy Deepgliders from the DISCOVERY Yacht Mystique. This deployment will help show that Deepgliders can cost effectively replace more traditional mooring systems by taking the same oceanographic measurements, but for a fraction of the cost.

Deepgliders are buoyancy-driven, autonomous underwater vehicles (AUV's) which repeatedly glide from the surface to the sea floor and back. They follow a pre-determined path, taking measurement of salinity, temperature, and dissolved oxygen. With wings, a rudder, and an internal moveable battery, they glide through the water like a hang-glider, while maintaining a specified course. First, upon reaching the deployment site, a Deepglider is lowered into the water by its handling cradle by two field team members. Next, functionality of its acoustic transponder is checked via a hydrophone lowered over the side on a short cable. Then, the pilot (located typically in the office at University of Washington (UW) in Seattle – but can be anywhere in the world with an internet connection) commands the vehicle to take a short dive to about 45m depth. The pilot communicates with the field team and with the glider itself via a satellite communication network. When the glider returns to the surface after about half an hour, it sends its files to a base-station computer at UW for inspection by the pilot. If all records appear acceptable, the pilot informs the field team that they may leave the launch site. The Deepglider then autonomously guides itself to a target, sinking to the bottom on a diagonal trajectory till it reaches the ocean floor, resurfacing periodically to send data to a satellite, as well as its position. During flight, the glider is able to maintain its heading to reach its target location. It is important to note that Deepgliders have an operating depth of 6,000 meters.

The importance of Deepglider deployments is two-fold. First, Deepgliders operate at a substantially lower cost than arrays of deep-sea moorings. For example, the moorings used in the U.S.-U.K. RAPID-MOCHA array are heavily instrumented with temperature/salinity recorders and current meters distributed from near surface to near bottom in water up to 6km deep. These typically are recovered and replaced at 18-month intervals using a dedicated research vessel costing $30-40K per day to operate. By contrast, Deepgliders glide along sawtooth-shaped paths as they collect temperature, salinity, and dissolved oxygen measurements and an estimate of depth-averaged current from sea surface to sea floor for about $40K per year. Second, the scientific data collected and transmitted helps oceanographers learn more about the behavior of ocean currents, which exist because of the temperature/salinity differences in the water at different depths and latitudes. As climate change becomes an ever increasing threat, knowledge of our ocean currents can be an important indicator of its severity now and in the future.

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