

Endurance Record for Autonomous Underwater Vehicle



During a mission in the Northeast Pacific, Seaglider 144 propelled itself for 292 days, covering 5,528km (3,435 miles) through the water, more than half the pole to equator distance (or about the distance between Boston and Paris). The scientific objectives of the mission were to continuously sample ocean properties, including salinity, temperature, density, dissolved oxygen concentration (by two methods), chlorophyll-a, and turbidity to 1000 metres depth in repeat surveys of the environs of Ocean Station P (50W).

Operating independently, without any intervention from its operators for repair or cleaning, Seaglider 144 averaged a speed of just over .75km per hour (0.5mph), stopping for only a few minutes about every 9 hours to send back its data via satellite. During this mission it

got the gasoline equivalent of over 30,000 miles/ gallon from its high-energy Lithium batteries.

"We're very pleased with this new endurance and the data collected" says Dr. Charles Eriksen, University of Washington professor of Oceanography, and the owner of Seaglider 144. Ocean Station P is the site of one of the longest time series of ocean variability and is critical for studying ocean-atmosphere interactions, carbon uptake, and ocean acidification. Study at the site has been supported by the National Science Foundation, the National Oceanic and Atmospheric Administration (NOAA), and the Department of Fisheries and Oceans, Canada. Seaglider 144's mission began at Station P in June 2009 and continued there through late January 2010 when it began its 1300km transit to a location about 120 miles off the coast of Vancouver Island where it was recovered by a chartered sport fishing boat on 4th April.

Recently, iRobot tested a modification (Patent Pending) to the Seaglider design that enables efficient operation in shallow waters as well as deep without any system reconfiguration. This development enables researchers to study shallow water and deep water during the same deployment, allowing scientist to study areas like the drop off across the continental shelf and the phenomena that occur at this transition. The graphs below summarise Salinity and Temperature data collected by an iRobot Seaglider in the Pioneer Array, about 80 miles south of Nantucket. This Seaglider performed an unbroken chain of dives spanning the continental shelf to the open ocean. Two years ago, UW licensed the Seaglider for commercial production to iRobot Corporation of Bedford, MA. According to Eriksen and others at UW, enhancements to the Seaglider design being tested now by iRobot should extend its endurance and range even further. "We expect Seaglider endurance to exceed a year in the near future."

The Seaglider achieves minimum power consumption and maximum efficiency by propelling itself by effecting buoyancy to provide thrust for descent and ascent through the ocean. The small shift in buoyancy coupled with a small shift of the vehicle's center of gravity and a stable, low-drag, hydrodynamic shape enables the Seaglider to effortlessly dive and glide while activating sensors at pilot designated intervals to collect data.

Seagliders can be operated for a mere couple hundred dollars a day versus traditional methods that cost 10's of thousands of dollars a day. It can be deployed around the world, navigated to any area of interest and piloted by any web enabled device, while gathering and reporting data in near real-time. Advanced design and engineering enables long duration data gathering missions of nearly 10 months at sea that cover thousands of nautical miles. The 1KA Seaglider employs state-of-the-art oceanographic instrumentation and the global Iridium satellite constellation to precisely measure and report a multitude of data, including temperature and conductivity as a function of depth, dissolved oxygen concentrations, ocean current variation, backscatter and multiple trophic level biomass.

The iRobot 1KA Seaglider and other products are to be displayed in Booth 412 at Ocean Tech Expo, Newport, RI, 23th to 25th May 2010.