NOAA/AOML Sea Gliders Collaboration

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LONG-TERM GOALS

Our long-term goal is to continue the collaborative efforts with NOAA/AOML in the deployments, recoveries and refurbishments of SeaGliders in the region. Our efforts, in the operational aspect of the glider program, represents a substantial contribution towards the main goal of the sea glider project which is to better our understanding of the air-sea interactions during hurricane force winds. The project effectively adds sea gliders to CARICOOS network of observing assets. These are a highly valuable open ocean data source for a wide range of oceanographic applications. Among other applications, we use of sea glider data for skill assessment and validation of numerical models in the CARICOOS region.

MILESTONES / OBJECTIVES

Third quarter (January 1st – March 31st):

Upgrades:

- SG609 – Software Update, change from CT Sail to GPCTD (conversion of the temperature and salinity sensors handle to a flow-through pumped system).
- SG610 – Modem and Compass replacement.

Do a complete refurbishment of the following NOAA/AOML sea gliders: SG609, SG610 and SG630. The refurbishment excersice was used as part of the training Patricia Chardón.

Deploy 2 or possibly 4 sea gliders (SG609, SG610, SG630 and SGXXX [New]) by early 2017.

Fourth quarter (April 1st – June 30th):

Recover said deployed sea gliders, refurbish them and have them ready for the hurricane season.

WORK COMPLETED

2016-12-05: Started the refurbishment on SG609 and SG630, did data backup, overall cleanup and disassembly of parts that need to be shipped back to Kongsberg (Manufacturer of the Sea Gliders) for replacement.

2016-12-08: Shipped the following parts to Kongsberg for refurbishment: Roll motor of SG609, fluorometer and VBD system of SG630.

2016-12-27: Continued with the refurbishment of SG610 and replaced the GPS to an upgraded version.

2016-12-29: Self-tests, modem and GPS tests were performed on SG610.

2017-01-26: Started the replacement of Modem and GPS on SG610.

2017-01-27: During the assembly part of the refurbishment of SG609 an oil leak was found in the VBD system. The part was shipped to Kongsberg for testing and fixing.

2017-02-03: After the receiving the VBD system of SG630 from Kongsberg the refurbishment continued.

2017-02-24: SG610 started giving GPS problems; these were later fixed with an update of the current glider software. Self-tests and communication tests were performed.

2017-03-03: Shipped a cradle to AOML in Miami.

2017-03-06: Pre-deployment preparation procedures and tests completed for SG610 and SG630.

2017-03-07: Deployment of NOAA/AOML SG610 and SG630 ~8 nautical miles south of La Parguera, Lajas, P.R.

2017-03-11: Emergency recovery of NOAA/AOML SG630 ~30 nautical miles south of Cabo Rojo, P.R. Started giving errors within the VBD system on March 10, 2017, just 4 days after deployment. Very similar to what happened to the lost glider (SG617). SG610 was also recovered ~20 nautical miles south of Guánica.

2017-03-22: Conference Call with Gustavo Goni and AOML team about what to do with SG630 and how to go forward with preparing for the Hurricane Season Mission. Quick solution for the SG630 problem is to go back (with all gliders) to CT Sail sensor instead of the GPCTD flow-thru.

2017-04-17: Received a CT Sail from way of AOML to install on SG610 and take out the GPCTD.

2017-04-27: Shipped SG630 (with Lithium Metal Batteries inside equipment) to Kongsberg for inspection of the problem at sea and fixing. It was sent without changing or opening it.

2017-05-10: Shipped SG609 and SG610 without batteries to AOML for CT Sail installation and refurbishment.

2017-05-23: Shipped two sets of Lithium Metal Batteries to AOML for use on SG609 and SG610.

MAJOR OUTCOMES

The SG630 failure at sea event made us change all AOML/CARICOOS gliders back to the CT Sail sensor. It was clear early that the problem emanated from a failure or bug in the communications between the GPCTD and the VBD systems, since these problems arrived with the use of the GPCTD it was decided to go back to the original CT (non-pumped). Another lesson learned from this experience was the requirement of training and certification of HAZMAT packaging, placarding, labeling and shipping of Lithium Metal Batteries both within and outside the equipment.

Workshop: CARICOOS Graduate Student Luis Pomales and Director of the Physical Oceanography Division in AOML Dr. Gustavo Goni, participated in the 1st U.S. Underwater Glider Workshop in January 18-19, 2017 at the INFINITY Science Center, Pearlington, MS.

RELATED PROJECTS

Following the "*CARICOOS-NOAA AOML GLIDER SURVEYS WARM WATER "BLOB" IN THE CARICOOS REGION*" letter of intent CARICOOS-NOAA/AOML Sea Glider data has been used to survey warm water "blobs" within the CARICOOS region, with the objective of giving the NOAA Coral Reef Watch (CRW) Sea Surface Temperature Anomaly (SSTA) 5 km near-real time global satellite product, globally used to monitor coral bleaching thermal stress, a three dimensional context by measuring temperature with sea gliders and then estimating the temperature anomalies from the climatological values (World Ocean Atlas 2013, version 2) within the upper-layer open ocean. The objective is to explore the vertical extent of the temperature anomalies shown on the sea surface temperature anomaly satellite data by the NOAA Coral Reef Watch in order to use it as a warning system identifying the vertical reach of possible coral bleaching. To access the developed product click the following link: http://www.caricoos.org/gliders/sg609.

WORK PLAN FOR UPCOMING PERFORMANCE PERIOD (June 1, 2017 – Nov 30, 2017)

First quarter (July 1st – September 30st):

Pre-deployment preparation of SG609, SG610, SG630 and SGXXX [New].

Deployment of SG609 and SG630 off La Parguera, Lajas, P.R., and SG610 and SGXXX off San Juan, P.R.

Second quarter (October 1st – December 31th):

Recover said deployed sea gliders, refurbish them and have them ready for the regular season.

A new glider (SGYYY) is expected by the end of the year.

PUBLICATIONS & PRODUCTS

Poster: CARICOOS General Assembly 2017, Rincón, PR, April 2017. Link here: http://about.caricoos.org/wp-content/uploads/2017/05/Poster_Pomales1_gliders_CARICOOS_Assembly2017.pdf

Publication: Dong et al. (2017), Impact of Assimilating Underwater Glider Data on Hurricane Gonzalo (2014) Forecasts. Weather Forecasting, 32, 1143-1159, Doi:10.1175/WAF-D-16-0182.1. Link here: http://journals.ametsoc.org/doi/pdf/10.1175/WAF-D-16-0182.1

Product on CARICOOS webpage (currently off because there are no sea gliders on the water) illustrates the anomalous temperature along the sea glider dive track by computing the difference in temperature measured by the sea gliders against the monthly climatological World Ocean Atlas 2013 2nd revision temperature data. On this product CARICOOS is exploring the vertical extent of the temperature anomalies shown on the sea surface temperature anomaly satellite data by the NOAA Coral Reef Watch. Here is the link to the product: http://www.caricoos.org/gliders/sg609

The CARICOOS gliders page will be available once the sea gliders are on the water again during late July 2017.