

## **Progress Report for 2011 Unidata Equipment Award**

### **"Upgrade of Existing Hardware to Facilitate Processing and Distribution of Large Oceanographic and Environmental Datasets from the Rutgers University Coastal Ocean Observation Laboratory"**

**April, 27, 2012**

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Using the funds from our 2011 Unidata Equipment Award, the Rutgers University Coastal Ocean Observation Lab purchased 2 Dell PowerEdge 610 servers in July 2012. This first server, equipped with 96GB of RAM, replaced the previously outdated compute server we use to acquire and process real-time datasets. These datasets are acquired from 2 direct broadcast satellite dishes, 36 high-frequency radar systems for measuring surface ocean currents and our fleet (>20) of autonomous underwater vehicles (**AUVs**). These assets form the operational backbone of the **Mid-Atlantic Regional Association Coastal Ocean Observing System (MARACOOS)**, which is part of the NOAA Integrated Ocean Observing System (**IOOS**). The new compute server has greatly increased our ability to automate to process, merge and distribute these datasets.

In particular, we have recently implemented an optimal interpolation scheme to create hourly surface current maps of the Mid-Atlantic Bight. The 36 radar stations operate on difference transmit frequencies, which result in different ranges and grid resolutions, ranging from 6km grids out to 150km offshore to 1km grids in Raritan Bay/New York Harbor, Delaware Bay and Chesapeake Bay. The dedicated computing power has made it possible to merge the raw radial datasets from each type of system and create high-resolution current maps every hour. The resulting datasets are used as inputs for regional **ROMS**, **WRF** and **SAROPS** (US Coast Guard Search and Rescue Optimal Planning System) models and as planning tools for the New Jersey Board of Public Utilities offshore energy planning efforts. We also create and distribute real-time imagery of sea-surface temperature maps overlaid with the current maps. This imagery is created using the NCAR Command Language (**NCL**) and is available at <http://marine.rutgers.edu/cool/maracoos/imagery>. Rutgers University undergraduates regularly use these datasets and imagery in class research projects and we believe that these types of products greatly increase their ability to quantify and understand oceanographic processes.

In 2011, the RU-COOL **AUV** glider operations team deployed 36 gliders in the Southern Ocean, Mid-Atlantic Bight, Atlantic Basin, California and the Ross Sea. With the number of deployments steadily increasing every year, the new compute server has expanded our capabilities to acquire and process these datasets in real-time and make imagery available to the public (<http://marine.rutgers.edu/cool/auvs>). Our processing requirements will continue to increase over the coming years, but we have not yet outgrown the processing resources that this machine provides.

The second server purchased with these funds has been deployed as a dedicated web server, hosting a variety of research, educational and outreach websites. We also moved our **THREDDS** server to this machine (<http://tds.marine.rutgers.edu/thredds>) and currently provide satellite observations, surface current fields, **AUV** datasets and model runs. The aggregation power that **THREDDS** provides for these types of datasets is invaluable; however, we are continually working to overcome issues we're seeing when aggregating these large time-series products. We have been working with members of the Unidata **THREDDS** team to resolve these issues and are confident that we will be successful.

Looking towards the future, we have plans to expand the datasets we make available via **THREDDS** to include all of our **AUV** deployments, raw radial current measurements from the radar systems, the high-resolution surface current maps in the previously mentioned port/estuary areas and a merged product containing measurements from all 3 of the radar networks. We have been working closely with motivated undergraduate and graduate students to train them of the structure and use of these datasets and have seen an increase in the number of students working with them.