Adaptive Wide Area Clusters for Surveillance

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At a Glance

What is it?

Using a variety of sensor payloads, groups of unmanned underwater vehicles use environmental information to adapt their sampling strategy to optimize surveillance.

How does it work?

Unmanned ocean gliders and man portable unmanned underwater vehicles act as a network to sense the current environment and tactical properties. The through-the-sensor data feed fuses with environmental prediction models that guide the surveillance strategy. The unmanned vehicles are then moved to optimize their sensing strategies taking into account the current environment and future environmental conditions.

What will it accomplish?

AWACS will provide the increased ability to predict the environmental conditions, and improve the ability to accomplish:

ASW
MCM
ISR Surveillance

Points of Contact

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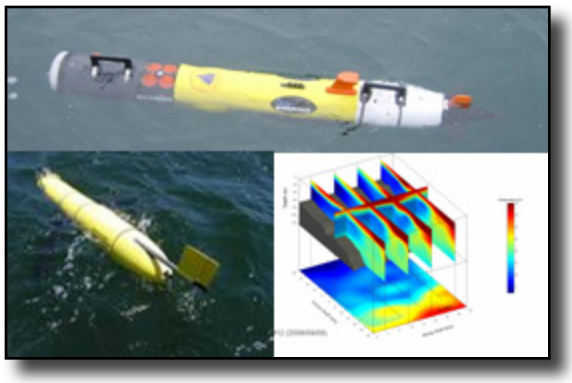

The Office of Naval Research developed ocean gliders for low-cost, persistent exploration of the ocean's thermohaline structure. Profiling ocean floats measure the state of the ocean temperature and salinity and telemeter the data from each profile back to a central location. The data is used together with ocean models where the data is assimilated into the ocean prediction, providing more accurate forecasts.

Small powered vehicles, such as the REMUS, were developed to provide accurate, unmanned surveys of bathymetry, currents, and temperature and salinity. The Adaptive Wide Area Clusters for Surveillance (AWACS) program asks the question: How do you use them together in an optimum way to sample and sensor the tactical environment optimally?

Gliders and floats use a buoyancy engine to generate vertical movement in the ocean; the small powered vehicles use propellers. Both use battery power to run the pumps/propellers. A critical technology challenge is making the vehicle both "smart" and autonomous. This portion of the technology is software development that links the sensed environment, a optimal goal, and the command and control structure of the vehicle. The AWACS challenge is to build the intelligence frameworks for multiple vehicle cooperation.

The Meteorological and Oceanographic Community use the oceanographic state data in their forecast models. The results of AWACS will allow them to concentrate groups of vehicles around a sensing goal. The Mine Warfare community will use this cooperative behavior to better and more rapidly clear mine fields. The ASW community is interested in finding the areas of best detection and lowest transmission loss and translating these fields into output from their Tactical Decision Aids.

Research Challenges and Opportunities:

- *Artificial Intelligence / Autonomy Advances*
- *Model/ data fusion for adaptive sampling strategies*
- *Through the sensor feedback / optimization strategies*