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14. ABSTRACT
We want to integrate acoustics across naval and oceanographic applications. On one hand active and passive acoustics are used to detect submarines. On the other hand, acoustics are used to measure and better understand the ocean environment of the detection problem. Acoustics are essential to the underwater ?infrastructure? tasks of navigation, communications, and time transfer. In all cases, the detailed understanding of acoustic propagation, ocean variability, temporal and spatial coherence, ambient sound and the assimilation of data in models is essential for improved systems performance and the quantification of the associated uncertainty.

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Acoustic Seaglider: Planning for the Philippine Sea

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LONG-TERM GOALS

We want to integrate acoustics across naval and oceanographic applications. On one hand active and passive acoustics are used to detect submarines. On the other hand, acoustics are used to measure and better understand the ocean environment of the detection problem. Acoustics are essential to the underwater "infrastructure" tasks of navigation, communications, and time transfer. In all cases, the detailed understanding of acoustic propagation, ocean variability, temporal and spatial coherence, ambient sound and the assimilation of data in models is essential for improved systems performance and the quantification of the associated uncertainty.

Within the context of the Quantifying, Predicting, and Exploiting (QPE) Uncertainty DRI activity in the Philippine Sea, Seagliders can serve as a multipurpose platform for acoustics to support research in acoustic propagation, tomography, ambient sound, navigation, and communications. Assimilating data into models will improve oceanographic and acoustic predictions; this will test many elements of the integrated end-to-end data-modeling-prediction-detection system. Planning will be crucial to coordinating all the necessary elements needed for the ultimate success of the QPE DRI.

OBJECTIVES

The original objectives envisioned a portion of the QPE program to be in the Philippine Sea proper in coordination with the planned ONR Ocean Acoustics Deep Water program experiment planned for 2009. In this context, acoustic Seagliders were envisioned to be used primarily as mobile receivers listening to moored and ship-suspended low frequency sources to study range dependent arrival structure and to serve as mobile tomography receivers. The assimilation of travel time data would be part of this larger effort.

The emphasis of the QPE has shifted to a shelf-slope area in the East China Sea and the Deep Water experiment will remain the Philippine Sea, but will shift to 2010-2011 Thus, this QPE planning effort shifted to defining the role of acoustic Seagliders in this new context, focusing on the using them to measure transmission loss in the QPE East China Sea experiment.

APPROACH

The funded proposal was for planning activities with the PI participating in planning meetings.

WORK COMPLETED

The project funding period was November 2006 – December 2007. The PI attended the three planning meetings in FY2007.

RESULTS

At the first planning meeting in December 2006, the capabilities of the acoustic Seaglider were presented, along with a plan for sampling in the Philippine Sea. It became clearer that most of the QPE effort would actually be in the East China Sea to the northeast of Taiwan. In the second planning meeting in June 2007, plans solidified, confirming that almost all effort would be at the shelf break northeast of Taiwan. Effort in the Philippine Sea proper would be limited to (likely) several gliders collecting oceanographic temperature salinity profile data providing some in-situ data to provide Kuroshio current upstream conditions. The primary role of acoustic Seagliders in the intensive study area northeast of Taiwan would be to complement other fixed/moving measurements of transmission loss and channel impulse response (i.e., arrival pattern), providing more spatial coverage and detail. For instance, the glider(s) can be directed in near-real time (within the limits of their ½ kt speed) to sample the cold dome and in canyons, and to respond to changing experimental requirements. In the last planning meeting in August 2007, the science plan for the overall experiment was reviewed with acoustic gliders called for in the role described.

RELATED PROJECTS

ONR – Acoustic Seagliders as described here are expected to be one component in the 2009 QPE experiment in the East China Sea and the 2010 Ocean Acoustics Deep Water Acoustic Propagation experiment in the Philippine Sea. The acoustic Seaglider will be used to measure transmission loss from ship/fixed sources in the QPE work. In the Philippine Sea experiment, it is expect the gliders will serve as mobile receivers in a tomography context, with data assimilation an integral part. Acoustic Seagliders will be continued to be developed and improved as part of the PLUS program, and are expected to play a role in Navy marine mammal monitoring and mitigation efforts.