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Editorial

Introduction to the Autonomous Ocean Sampling Network (AOSN) program

"Prediction is very difficult, especially about the future."

Origin disputed but often attributed to physicist Niels Bohr.

Determination of the present and future state of the ocean remains one of the greatest challenges in ocean sciences. Physical and biological processes in the ocean and overlying atmosphere act and interact over a broad range of time and space scales. Direct, simultaneous measurement on all of these scales is beyond the capabilities of even our most advanced observational tools. Numerical simulations can provide insight into ocean behavior on many scales, but are dependent on both approximations for unresolved processes and on imposed surface and boundary conditions of questionable fidelity. These dependencies limit a model's ability to accurately simulate and predict the ocean.

One promising approach to this challenge involves the constraint of high-resolution numerical ocean models with distributed in-situ and remote oceanographic measurements, i.e. data assimilation. Given unlimited observations, the data assimilation problem is reduced to the development of numerical methods for reconciling models and data. In reality, available observations are limited and the ocean is undersampled. It is therefore relevant to ask: for a given ocean region and a finite number of observational assets, how can these assets be most effectively utilized so as to result in the most accurate (i.e. least uncertain) forecast of future ocean conditions? This question is at the core of the Autonomous Ocean Sampling Network (AOSN) program.

AOSN is an ambitious and ongoing effort to combine new observational technologies and sampling methodologies with advanced ocean models to improve our ability to observe and predict the physical and biological state of the ocean in real time and over sustained periods. The program encompasses technological challenges ranging from platform and sensor design to the development of robust adaptive sampling protocols to real-time data quality control and novel data assimilation methods. A key AOSN hypothesis is that the use of repositionable assets (for example, autonomous vehicles vs. moored sensors) can maximize the value of investments in regional ocean prediction systems. This special issue details some of the key scientific and technical advances resulting from the AOSN-II field program performed in Monterey Bay, California, from mid-July to early September 2003.

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