

Instrumentation to Measure Bottom Roughness from GEOPROBE Tripods

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LONG-TERM GOALS

The long-term goal of our research is to improve our ability to model sediment transport and accumulation in coastal oceans. In particular, we hope to develop regional-scale models (~10s of kilometers) with predictive capability over time scales of decades. Such models are useful for a wide range of engineering, environmental, and tactical Naval applications. Field observations and measurements of sedimentary processes are a key component of our research, because careful quantitative data are needed to improve parameterizations of sedimentary processes and to test existing models. Measurement of bottom topography is crucial for interpretation of boundary layer processes because bottom roughness directly affects near-bottom flow, and sedimentary processes can alter bottom morphology.

OBJECTIVES

The technical objective of this effort is to enhance existing benthic boundary layer (GEOPROBE) tripod instrumentation by adding scanning sonar capabilities. The instruments acquired in this project will be deployed a tripod or other fixed platform and will provide time series of profiles and images of small scale (vertical scales of centimeters, horizontal scale of a few meters) bottom topography. These data will be used in conjunction with other measurements to improve our understanding of bottom boundary layer processes, with particular emphasis of sediment erosion, transport, and deposition. Our acquisition of these instruments will contribute of a pool of mature and quasi-standardized instrumentation for potential use in ONR field measurement programs.

APPROACH

We are collaborating with several other ONR investigators to design and build a standardized scanning sonar profiling and imaging system. We plan to buy the sonar head and components from a vendor and build a data logger and battery case according to a standardized design. The system will include an imaging sonar head to provide information about seabed topography within a few meters of the tripod, and a pencil-beam profiling sonar head to acquire more quantitative data along a transect within the image area. We are working closely with other ONR investigators as we build the data logger, implement logging and control software, and develop data processing methodology to minimize redundant efforts and provide systems that are complementary.

WORK COMPLETED

This year, we participated in an ONR tripod planning meeting in Arlington and, in conjunction with researchers from Univ. of South Florida and WHOI, agreed on system components and design criteria. We have decided to use an Imagenex sonar components (model 881A), which operate at user-selectable frequencies from 330 kHz to 1 Mhz. The data logger will provide power and instructions to the sonar heads, translate sonar output, and store it on a high-capacity (~40 GB) hard disk. The data logger will be based on a working prototype designed by Dr. Jim Irish at WHOI, and will be constructed at USGS facilities in St. Petersburg by Phil Thompson, who will be building several systems. For administrative convenience, we have shifted our ONR funds for this project into FY2002 and have postponed our purchase of instruments until October, 2001. We anticipate that a working system will be completed by the end of this year.

RESULTS

No results yet.

IMPACT/APPLICATIONS

Once acquired and tested, the instrument will be deployed along with other USGS equipment as part of the EuroSTRATAFORM field study along the Adriatic Coast. This experiment is scheduled for Autumn 2002 – Winter 2003.

TRANSITIONS

None yet.

RELATED PROJECTS

The instruments to be developed in this project will be deployed as part of the EuroSTRATAFORM project.