Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
1998		**00-00-1998 to 00-00-1998**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
On-Bottom Seismographs for Shallow Seismic Imaging of the Continental Shelf Seabed	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Woods Hole Oceanographic Institution,Department of Geology and Geophysics,Woods Hole,MA,02543**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES
See also ADM002252.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**2**	

On-Bottom Seismographs for Shallow Seismic Imaging of the Continental Shelf Seabed

John A. Collins
Dept. of Geology and Geophysics
Woods Hole Oceanographic Institution
Woods Hole, MA 02543
phone: 508-289-2733 fax: 508-457-2150 email: jcollins@whoi.edu

John I. Ewing,
Dept. of Geology and Geophysics
Woods Hole Oceanographic Institution
Woods Hole, MA 02543
phone: 508-289-2609 fax: 508-457-2187
Award#: N00014-97-I-0384
http://www.whoi.edu

LONG-TERM GOAL

The long term goals of this project are to map the three-dimensional, shear-wave velocity structure of the upper 50-100 m of the seabed, to correlate these measurements with geological structure, and to use the spatial variability in shear-wave structure to understand the depositional and erosional processes responsible for the measured structure.

OBJECTIVES

The objective of this work was to construct 9 on-bottom seismographs suitable for high-resolution, seismic imaging of the shallow (< ~100 m) seabed of the continental shelf and upper slope. While many U.S. institutions, including WHOI, operate ocean bottom seismographs (OBS), none of the existing OBS designs is suitable for imaging compressional-wave and shear-wave structure on the requisite scale of meters to tens of meters. This area of research is of growing interest to geologists, engineers, and environmental scientists.

APPROACH

The shallow water on-bottom seismograph (SWOBS) consists of seismometer and hydrophone sensors, an acquisition system (24-bit analog-to-digital-converter; buffer memory; hard disk), and a stand-alone, realtime clock. The acquisition system and clock are packaged in a glass ball pressure case suitable for deployment in water depths of up to 6000 m. The three-component seismometer (one vertical-component and two horizontal-component geophones, each with a natural frequency of 10 Hz) is mounted in a polypropylene-walled cylinder. The endcaps of the cylinder consist of two rectangular-shaped plates of aluminium that couple to the seafloor via a pair of runners. A bail structure on one of the plates ensures that the seismometer rests on the seafloor in the correct orientation. The seismometers were custom designed for this type of work, and are capable of recording ground motion without distortion up to frequencies as high as 50 Hz [Collins et al., 1996] . The particular acquisition system that SWOBS employs is the RefTekTM model 72A-07. This system is capable of digitizing 6

data channels at 24 bits resolution. Memory buffers of up to several megabytes capacity are used to make optimum use of recording devices. The acquisition software allows continuous, event-triggered, or windowed recording.

Deployment and recovery of SWOBS is a simple operation from any ship or even a small boat. On deployment, SWOBS is lowered to the seafloor on a surface tether with slight way on the ship, and dragged for a short distance to maximize the distance between the glass ball containing the data logger and the seismometer. The small mass and robust design of the sensor package means that it can be dragged on the bottom without sustaining damage. The surface float is the dropped over the side of the ship. Use of a surface float is necessary if the seismic source must be dragged along the bottom and short source/receiver offsets are required. A simple anchor relieves any drag on the sensor due to motion of the surface float. Use of a light, high-strength line for the surface tether, (e.g. Spectra or Certran polyethylene) allows the entire instrument system to be recovered by picking up the surface float, and winding the mooring onto a portable winch.

WORK COMPLETED

Eight SWOBS have been constructed.

RESULTS

See above.

IMPACT/APPLICATIONS

These instruments may be used to address a wide variety of seismological/acoustic problems both in shallow water and the deep ocean. RELATED PROJECTS In August/September of 1998, we used 8 SWOBS and the WHOI shear-wave source [Collins et al., 1996] to carry out a three-dimensional tomography experiment to image the P- and S-velocity structure of the upper ~50 m of the seabed in an area on the New Jersey continental shelf that has been the focus of a variety of ONR-funded geophysical and geological studies. The experiment, funded by ONR (Award # N00014-91-J-1286) , was very successful.

REFERENCES

Collins, J.A., G.H. Sutton, and J.I. Ewing, 1996. Shear wave velocity structure of the shallow water sediments in the East China Sea, in press Jour. Acoust. Soc. Am.