

# Report Documentation Page

*Form Approved*  
*OMB No. 0704-0188*

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE <b>1998</b>	2. REPORT TYPE	3. DATES COVERED <b>00-00-1998 to 00-00-1998</b>			
4. TITLE AND SUBTITLE <b>Small-Scale Sedimentological Measurements in Support of the High-Frequency Acoustics DRI</b>		5a. CONTRACT NUMBER			
		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) <b>Oregon State University ,College of Oceanic and Atmospheric Sciences,Corvallis,OR,97331</b>		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 <b>Approved for public release; distribution unlimited</b>					
13. SUPPLEMENTARY NOTES <b>See also ADM002252.</b>					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>Same as Report (SAR)</b>	18. NUMBER OF PAGES <b>2</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

## **Small-Scale Sedimentological Measurements in Support of the High-Frequency Acoustics DRI**

Robert A. Wheatcroft  
College of Oceanic & Atmospheric Sciences  
Oregon State University  
Corvallis, OR 97331  
phone: (541) 737-3891 fax: (541) 737-2064 e-mail: [raw@oce.orst.edu](mailto:raw@oce.orst.edu)  
Award #: N00014-98-1-0112

### **LONG-TERM GOAL**

The ultimate objective of this research program is to identify and obtain a predictive understanding of the physical and biological processes responsible for variations in the subsurface bulk density field of marine sediments. To achieve this goal, it is necessary to study formative processes occurring on the sediment surface (e.g., biogenic mound formation, ripple development), as well as processes occurring within the seabed (e.g., bioturbation and compaction). The approach to these areas of interest is predominantly field-oriented, with a secondary emphasis on model development.

### **OBJECTIVES**

The objectives of this one-year pilot study were threefold. First, pre-existing x-radiographs collected in the STRATAFORM program were shared with Dajun Tang (APL-UW) for statistical analyses. Second, emerging technologies involving digital radiography were monitored. Third, some of the technical difficulties associated with collecting x-radiographs in sandy sediments were examined. All of these activities were in preparation for more intensive field activities planned for FY 99 and beyond.

### **APPROACH**

The primary source of data on the subsurface bulk density field is derived from digitized x-radiographs. Briefly, portable x-ray units are used to sensitize film. Following wet-chemical development, the film is scanned. The brightness of a particular pixel is related to the bulk density along that particular beam-path. Independent measurements of bulk density, using a resistivity probe, along with various filtering techniques are used to calibrate the brightness information.

### **WORK COMPLETED**

A manuscript (Tang and Wheatcroft, 1999) is now in the final stages of preparation that uses digital x-radiograph data to examine the subsurface volume inhomogeneity field of bedded and bioturbated deposits. Several useful contacts were made in the medical and industrial radiography fields. Knowledge obtained through these entities was used in the preparation of a DURIP proposal to acquire a digital x-radiography system. Lastly, laboratory trials were conducted examining the suitability of various x-ray films for imaging sands.

## **RESULTS**

The primary result has been the demonstration that digitized x-radiographs can provide useful information on the volume inhomogeneity field. Power spectra of bioturbated sediment is clearly isotropic, whereas bedded radiographs are anisotropic. Problems (quenching) involving the calibration of the brightness data were identified and are now the subject of ongoing work.

## **IMPACT/APPLICATIONS**

For a range of frequencies, digital radiographs have the greatest potential for providing acousticians with high-quality data on the volume inhomogeneity field. Further development of this research topic has wide-ranging applications.

## **TRANSITIONS**

None are known.

## **REFERENCES**

Tang, D. and R.A. Wheatcroft. Sediment density inhomogeneity spectra estimated from digital x-radiographs. J. Acoustical Soc. America