

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this 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, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE 1997	3. REPORT TYPE AND DATES COVERED	
4. TITLE AND SUBTITLE "Strontium Isotopic Composition in Arctic Pleistocene and Pliocene Marine Sediments"			5. FUNDING NUMBERS N00014-93-1141	
6. AUTHOR(S) Scott Lehman/William Curry				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Woods Hole Oceanographic Institution Woods Hole, MA 02543			8. PERFORMING ORGANIZATION REPORT NUMBER 13114100	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) ONR Ballston Tower One 800 North Quincy St. Arlington, VA 22217-5660			10. SPONSORING/MONITORING AGENCY REPORT NUMBER 19980702 149	
11. SUPPLEMENTARY NOTES Approved for public release; distribution is limited				
12a. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) The primary goal of the research was to use $^{87}\text{Sr}/^{86}\text{Sr}$ as a geochronometer in Arctic Ocean sediments. This attempt was unsuccessful because the analytical precision of the analysis (± 0.000010) was insufficient to differentiate the expected change in oceanic $^{87}\text{Sr}/^{86}\text{Sr}$. New data published after the submission of this proposal indicated that the change was on 0.000025 , half that of previously published data. However, a study of the strontium isotopic composition of foraminifera from the Arctic implied that there is enrichment of radiogenic strontium in the Arctic halocline. Although the mean values are statistically different in the Arctic Ocean and the South Atlantic, contamination by clay minerals in the Arctic cannot be ruled out. A simple box model indicates that some enrichment of strontium in surface waters must occur, but the amount is very sensitive to the strontium isotopic composition of Arctic rivers. Models using the most recent riverine data do not produce the observed enrichment.				
14. SUBJECT TERMS			15. NUMBER OF PAGES	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT unclassified	20. LIMITATION OF ABSTRACT UL	



WOODS HOLE OCEANOGRAPHIC INSTITUTION

360 Woods Hole Rd./Clark Labs

Woods Hole, Massachusetts 02543-1542

Department of Geology & Geophysics

Phone: (508)289-2591

Fax: 508-457-2187

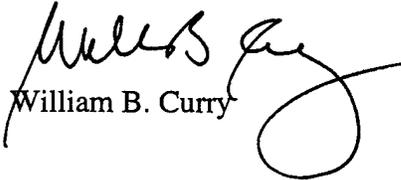
email:wcurry@whoi.edu

June 23, 1998

Defense Technical Information Center
8725 John J. Kingman Road
STE 0944
Ft. Belvoir, VA 22060-6218

In compliance with the reporting requirements on ONR Grant No. N00014-93-1-1141 entitled "Strontium Isotopic Composition in Arctic Pleistocene and Pliocene Marine Sediments" PI's Scott Lehman/W. B. Curry, enclosed are two copies of the report for your files.

Sincerely yours,


William B. Curry

WBC/amp

Enclosure

Final Report

ONR ASSERT Award N00014-93-1-1141

Title: Strontium Isotope Composition of Arctic Ocean Carbonates

PI: Scott Lehman and William Curry

Students

Robert Ackert

Susan Aldermann

Michael Horowitz

Graduate education and laboratory support were supplied to three students with this ASSERT award:

1) For Robert Ackert, the primary goal of the research was to use $^{87}\text{Sr}/^{86}\text{Sr}$ as a geochronometer in Arctic Ocean sediments. This attempt was unsuccessful because the analytical precision of the analysis (± 0.000010) was insufficient to differentiate the expected change in oceanic $^{87}\text{Sr}/^{86}\text{Sr}$. New data published after the submission of this proposal indicated that the change was on 0.000025, half that of previously published data. However, a study of the strontium isotopic composition of foraminifera from the Arctic implied that there is enrichment of radiogenic strontium in the Arctic halocline. Although the mean values are statistically different in the Arctic Ocean and the South Atlantic, contamination by clay minerals in the Arctic cannot be ruled out. A simple box model indicates that some enrichment of strontium in surface waters must occur, but the amount is very sensitive to the strontium isotopic composition of Arctic rivers. Models using the most recent riverine data do not produce the observed enrichment.

2) For Susan Aldermann, the award provided support for stipend and laboratory analyses for her Masters Thesis in the MIT/WHOI Joint Program in Oceanography. Her thesis was on the observed changes in foraminiferal flux and isotopic composition observed in a sediment trap from the ea of Okhotsk. Her principal results show that the population of foraminiferal are calcifying in the upper 30 meters of the water column, constrained to shallow depths by the presence of the very cold dichothermal layer at about 100 meters. The coiling ratio of *N. pachyderma*, which in other locations around the world shows a change in direction at about 7 to 8 °C, is less sensitive to temperature here. In this location, left coiling *N. pachyderma* are found in waters where surface temperatures are as warm as 14 °C because they are able to find much colder water only several tens of meters below the sea surface. Inasmuch as the Sea of Okhotsk is an analogue for the glacial North Atlantic, reconstruction of past SSTs which rely on *N. pachyderma* (l) may be biased.

3) Support for Michael Horowitz was provided for a short interval during his first year in the Joint Program at a time when he was taking classes in preparation for his general examination.

Publications

Ackert, R. P., Lehman, S, and Kurz, M., (1995). Evidence for heterogeneous strontium isotopic ratios in Arctic Ocean water. Fifth International Conference on Paleoceanography, Halifax, Nova Scotia.

Aldermann, S. Honjo, S. and Curry, W., (1996). Seasonal transition of species composition and isotopic variability of planktonic foraminifera in the Sea of Okhotsk. EOS, Transactions of the American Geophysical Union, v. 76, p. OS76.

Aldermann, Susan, (1996). Planktonic foraminifera in the Sea of Okhotsk: population and stable isotopic analysis from a sediment trap. MIT/WHOI Joint Program in oceanography, Masters Thesis, 99 pp.