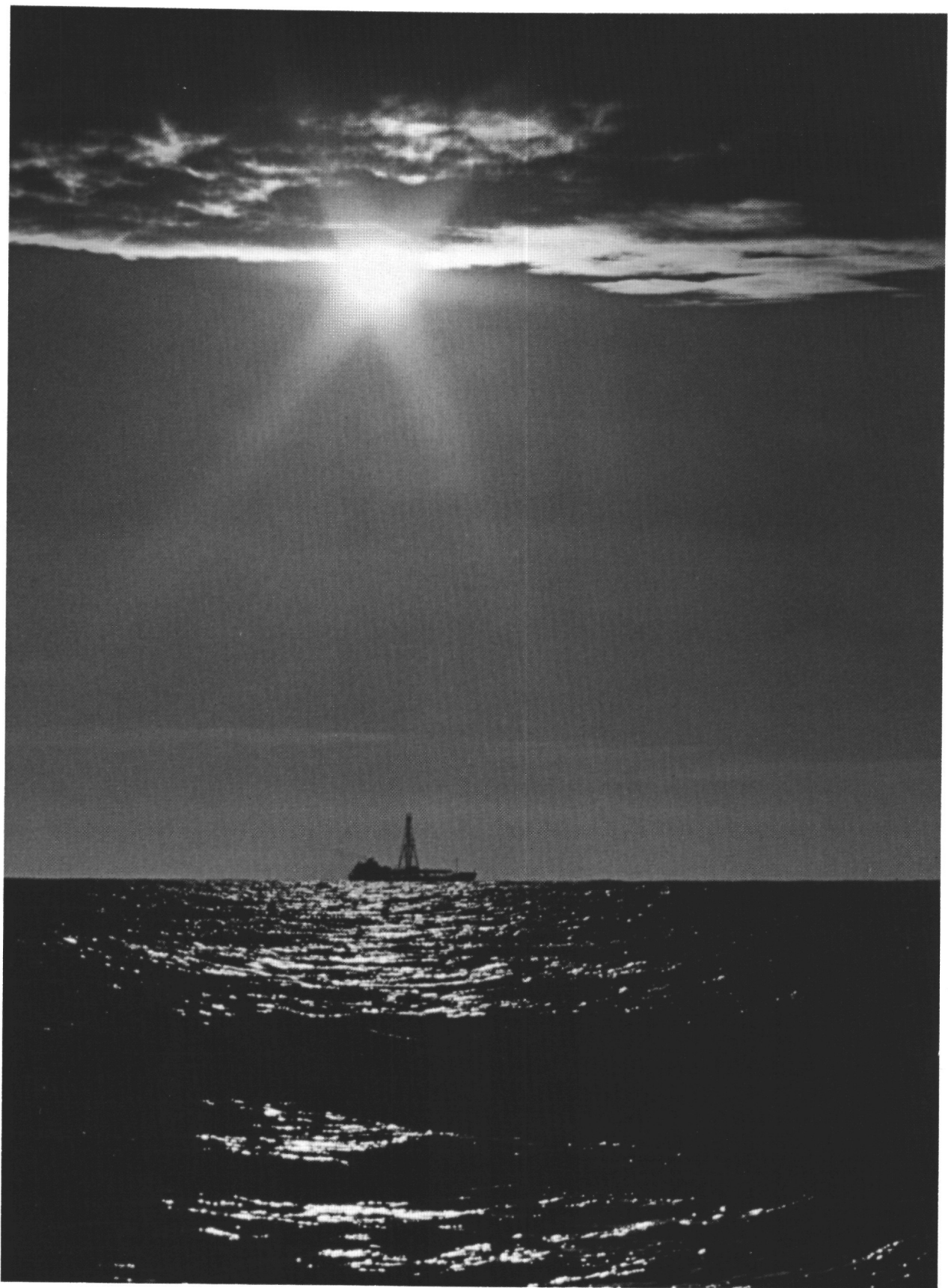




Initial Reports of the Deep Sea Drilling Project

A Project Planned by and Carried Out With the Advice of the
JOINT OCEANOGRAPHIC INSTITUTIONS FOR DEEP EARTH SAMPLING (JOIDES)

Volume I

covering Leg I of the cruises of the Drilling Vessel "*Glomar Challenger*"
Orange, Texas to Hoboken, N. J.
August-September 1968

PARTICIPATING SCIENTISTS

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Prepared for the
NATIONAL SCIENCE FOUNDATION
National Ocean Sediment Coring Program
Under Contract C-482

By the
UNIVERSITY OF CALIFORNIA
Scripps Institution of Oceanography
Prime Contractor for the Project

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Foreword

Marine geologists and oceanographers have long desired to study samples from deep in the sediments and rocks beneath the ocean floor in order to extend man's knowledge of the earth and its history. Until less than a decade ago it was possible to obtain samples of only a very limited nature. The success of Phase I of Project Mohole in early 1961, however, demonstrated the feasibility of extending the drilling techniques developed by the oil industry both to very great water depths and to great distances beneath the ocean floor. This success stimulated widespread discussion of possible projects directed at sedimentary drilling as distinguished from the very deep drilling objectives of Project Mohole itself. During the ensuing two or three years several formal and informal proposals were made to the National Science Foundation seeking financial support on behalf of individual institutions or groups of institutions to support sedimentary drilling projects, and for a considerable interval of time there was serious discussion of the possibility of doing such drilling as an intermediate phase of Project Mohole.

It ultimately became clear that eventually two quite different types of vessels would be required for deep rock and for sedimentary drilling—a large stable platform to permit drilling in one place for a long period of time to reach the deep mantle rock and a more modest ship that need stay on one station only for sufficient time to penetrate and sample the ocean sediments. Realizing this, the National Science Foundation proposed, in Congressional testimony given in the fall of 1963, that there be instituted an "Ocean Sediment Coring Program" distinct from, but complementary to, the Mohole Project.

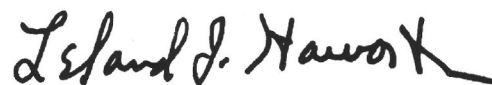
As a guide for the planning of such a program, the Foundation staff had many discus-

sions with knowledgeable scientists in the fields of oceanography, geophysics and geology and surveyed the means by which their cooperation could be obtained in carrying out the program. In the spring of 1964, initiative was taken by four of the major oceanographic institutions that had strong interests in these fields, and in May 1964 they formed the Joint Oceanographic Institutions for Deep Earth Sampling (JOIDES), a consortium that has provided the focal point for setting up scientific advisory panels with broad representation and for otherwise providing advisory planning and guidance to the Project.

As the discussions and plans progressed indicating the feasibility of such an effort, the Foundation provided for initial funding for the Project in fiscal year 1965 and formally established the "National Program" with funds made available in the fiscal year 1966 appropriation. The Foundation, in the summer of 1966, awarded a contract to the Scripps Institution of Oceanography to conduct the Deep Sea Drilling Project. On November 14, 1967, a subcontract was executed between Scripps Institution of Oceanography, University of California and Global Marine Inc., to supply a drilling ship capable of carrying out this drilling program at sea. The ship, constructed especially for the purpose, is capable of drilling in water depths up to 20,000 feet and with a penetration of about 2,500 feet into the sea floor. She was launched March 23, 1968, and christened *Glomar Challenger*. The ship was completed and outfitted; drilling operations began in the Gulf of Mexico in mid-August 1968.

Already the discoveries which have been made contribute greatly to the geological knowledge of the earth. The results will have far-reaching consequences in the continuing search for knowledge of the earth . . . a knowledge that should be valuable to people of all nations in planning the future course to take in the use of both land and sea areas.

This Program owes its success to many scientists, engineers, industrialists, and administrators. The Foundation is pleased with the successful management of the Program by the Scripps Institution of Oceanography. It is pleased also to note the sound advice which has been given by the Joint Oceanographic Institutions for Deep Earth Sampling and the many panels of scientists across the country which this organization convened. Global Marine Inc., which constructed and operates the Drilling Vessel *Glomar Challenger*, on which this work is carried out at sea, is to be congratulated for the understanding and cooperation it has given to this Program. And finally, I wish to extend my appreciation to members of the National Science Foundation staff for their diligent and careful overview of the Program.



Leland J. Haworth

Washington, D.C.
June 1969

Preface

Recognizing the need in the oceanographic community for scientific planning of a program to obtain deep sedimentary cores from the ocean bottoms, four of the major oceanographic institutions that had strong interests and programs in the fields of marine geology and geophysics, formed in May 1964, the Joint Oceanographic Institutions for Deep Earth Sampling (JOIDES). This group, Lamont-Doherty Geological Observatory; the Institute of Marine Sciences, University of Miami; the Scripps Institution of Oceanography, University of California at San Diego; and the Woods Hole Oceanographic Institution, expressed an interest in undertaking scientific planning and guidance of the sedimentary drilling program. It was the purpose of this group to foster programs to investigate the sediments and rocks beneath the deep oceans by drilling and coring. The membership of this original group was later enlarged in 1968 when the University of Washington became a member.

Through discussions sponsored by the JOIDES organization, with support from the National Science Foundation the Lamont-Doherty Geological Observatory operated a drilling program with Dr. J. Lamar Worzel as Principal Investigator. This successful drilling effort early in the summer of 1965, on the Blake Plateau region off Jacksonville, Florida, used the drilling vessel, *Caldrill I*.

With this success in hand, planning began for a more extensive deep sea effort. This resulted in the award of a contract by the National Science Foundation to the Scripps Institution of Oceanography for an eighteen-month drilling program in the Atlantic and Pacific Oceans, termed the Deep Sea Drilling Project. Operations at sea began in August 1968.

The goal of the Deep Sea Drilling Project is to gather scientific information that will help determine the age and processes of development of the ocean basins. The primary strategy is to drill deep holes into the ocean floor, relying largely on technology developed by the petroleum industry.

Through the efforts of these five principal organizations and of the panel members which were drawn from a large cross section of leading earth scientists and associates, a scientific program was developed.

Cores recovered from deep beneath the ocean floor will provide reference material for a multitude of future studies in fields such as biostratigraphy, physical stratigraphy, and paleomagnetism, that will afford a new scope for studies of the physical and chemical aspects of sediment provenance, transportation, deposition, and diagenesis. In-hole measurements, as feasible, should provide petrophysical data to permit inference of lithology of intervals from which no cores were recovered.

A report, describing the core materials and information obtained both at sea and in laboratories on shore, is published as soon as possible after the completion of each cruise. These reports are a cooperative effort of the scientists participating in the cruise and are intended primarily to be a compilation of results which, it is hoped, will be the starting point for many future new and exciting research programs. Preliminary interpretations of the data and observations taken at sea, are also included.

Following publication of each report, the core materials and data collected on the cruise will be made available to qualified scientists through the Curator of the Deep Sea Drilling

Project, following policies approved by the National Science Foundation.

The advent of *Glomar Challenger*, with its deep-water drilling ability, is exceedingly timely. It has come when geophysical investigation of the oceans has matured through 20 to 30 years of vigorous growth to the point where we have some knowledge about much of the formerly unknown oceanic areas of our planet. About one million miles of traverses had been made which tell us much about the global pattern of gravity, magnetic and thermal anomalies, and about the composition, thickness and stratification of the sedimentary cover of the deep-sea and continental margin. The coverage with such data has enabled the site selection panels to pick choice locations for drilling. The knowledge gained from each hole can be extended into the surrounding area. Detailed geophysical surveys were made for most of the selected locations prior to drilling.

The earth sciences have recently matured from an empirical status to one in which substantial theories and hypotheses about major tectonic processes are flourishing. Theories about the origin of magnetic fields and magnetic reversals, about ocean floor spreading and continental drift, and about the thermal history of our planet, have led to specific predictions that could be tested best by an enlightened program of sampling of deep-sea and continental margin sediments and underlying rocks.

The members of JOIDES and the scientists from all interested organizations who have served on the various advisory panels are proud to have been of service to the Nation and believe that the information and core materials that have been obtained will be of value to students of earth sciences and all humanity for many years to come.

Deep Sea Drilling Project

MEMBER ORGANIZATIONS OF THE JOINT OCEANOGRAPHIC INSTITUTIONS FOR DEEP EARTH SAMPLING (JOIDES):

Lamont-Doherty Geological Observatory, Columbia
University

Institute of Marine Science, University of Miami

Scripps Institution of Oceanography, University of
California

University of Washington

Woods Hole Oceanographic Institution

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Shell Development Company
Dr. Peter Lehner
Shell Development Company

Deep Sea Drilling Project

SAMPLE DISTRIBUTION POLICY

1. Requests for samples should be addressed to: Curator, Deep Sea Drilling Project; Scripps Institution of Oceanography, University of California at San Diego; La Jolla, California 92037. The requests should specify the quantities and intervals in the core required, a statement of the proposed research, the possibility of returning residue to the Curator, the estimated time required to complete and publish the results, and the availability or need of funding and availability of equipment and space foreseen for the research. Initial core description should normally serve as a basis for these sample requests. In order to ensure that early requests for highly desirable but limited samples can all be honored, distribution of samples will not be made until at least one month after the date of publication of each issue of the initial core description. The only exceptions to this policy will be for samples leading to the initial core description, or for specific instances involving ephemeral properties.

Requests for samples from researchers in industrial laboratories will be handled in the same manner as those from academic organizations, and there will be the same obligation to publish results promptly. Requests from foreign scientists or organizations will also be considered.

2. The Deep Sea Drilling Project's Curator has the responsibility for distributing samples, controlling quality of samples, and preserving core material. He also has the responsibility for maintaining a record of requests for samples that have been processed and filled, indicating the investigator and subjects to be studied. This record will be available to investigators.

The distribution of samples will be made directly from the two repositories at Lamont-Doherty Geological Observatory and Scripps Institution of Oceanography, by the Curator or his designated representative.

3. The National Science Foundation will establish a Sample Distribution Panel to advise on the distribution of core material, which will be chosen in accordance with its usual practices, in a manner which will assure advice in the various disciplines leading to a complete and adequate study of the core and related materials. The Curator and the Chief Scientist of the Deep Sea Drilling Project will meet with the Panel.

4. (a) Samples up to 3 cc/meter of core length can be automatically distributed by the Curator, Deep Sea Drilling Project or his authorized representative to any qualified investigator who requests them. The Curator will refrain from making automatic distribution of any parts of the cores which appear to be in particularly high demand and any requests for these parts of the cores will be referred to the Sample Distribution Panel for review. Requests for samples from thin layers or important stratigraphic boundaries will generally require Panel review.

(b) All requests for samples in excess of 4(a) above will be referred to the Sample Distribution Panel.

(c) If, in the opinion of scientific investigators, certain properties they wish to study may deteriorate prior to the normal availability of the samples, such investigators may request that the normal waiting period not apply. All such requests must be approved by the Sample Distribution Panel.

5. Samples will not be provided prior to the assurance that funding for sample studies either exists or is not needed. Provision of samples will not imply any associated commitment to fund the proposed or additional research. If a sample request is dependent, either wholly or in part, or proposed funding, the Curator will provide to the organization to whom the funding proposal has been submitted any information on the availability of samples that they may request, but will wait for final assurance that the funds are available before distributing the requested samples.

6. Investigators receiving samples are charged with:

- i) the responsibility of promptly publishing worthwhile results;
- ii) acknowledging, in publications, that the National Science Foundation supplied the samples;
- iii) submitting three copies of all reprints of published results to the Deep Sea Drilling Project; Scripps Institution of Oceanography, University of California at San Diego; La Jolla, California 92037; and
- iv) notifying the Curator of any additional work done on the sample that was not

stated in the original request for which the samples were made available; and

- v) returning, in good shape, remainder of samples after termination of research, if so requested by the Curator.
7. Cores will be made available at repositories for investigators to examine and specify exact samples, in such instances as this may be necessary for the scientific purposes of the sampling, subject to the limitations of 4(a), (b), (c), and 5 above, and with the specific permission of the Curator or his delegate.
 8. Cores of igneous and metamorphic rocks will also remain at the repositories where they will be available for observation and description, and
 9. Within the context of sample distribution, there also falls the category of raw data and information. Examples of this information would be the magnetic tapes from the X-Ray diffraction studies, the X-Ray radiographs of the cores, and logging records. Such information would be available, after publication of the initial descriptions, to any qualified investigators, and could be reproduced by those prepared to defray the costs.
 10. This policy has the approval of the National Science Foundation and is incorporated in the Program Plan for the Deep Sea Drilling Project. It is now in effect.

where selected samples may be taken for thin-section preparation and other work.

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