ERRATUM
for

Volume 158 of the *Initial Reports* of the *Proceedings of the Ocean Drilling Program*

After final pages had been printed for Vol. 158 of the *Initial Reports* of the ODP *Proceedings*, an error was found on page 131.

This is the correct figure for Chapter 7, Figure 87.

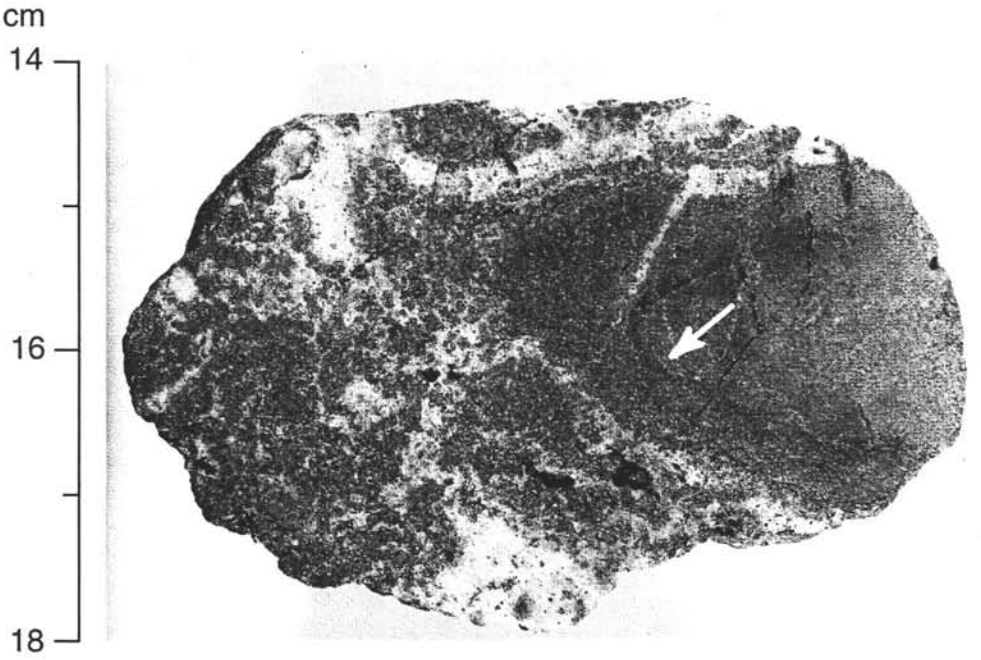
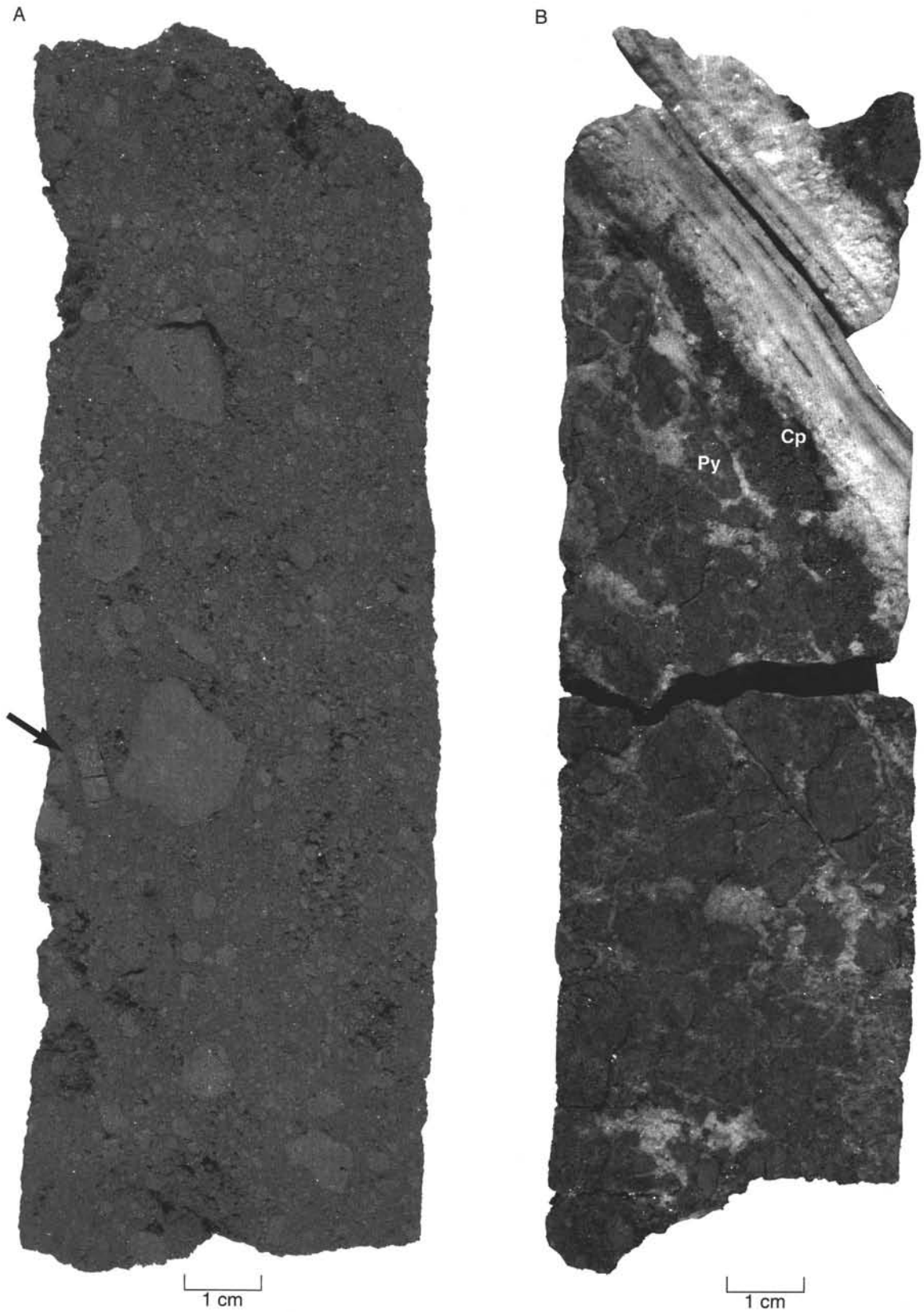


Figure 87. Gray chloritized basalt breccia with abundant white quartz plus pyrite veins. Sample 158-957E-15R-1 (Piece 4, 14–18 cm). A 1-mm-wide red Fe-oxide or oxyhydroxide band is seen within a 4-cm-sized, chloritized basalt clast (arrow).



A. Sample 158-957F-1N-1 (Piece 10B, 47–64 cm): nodular pyrite breccia composed of clasts of massive granular pyrite and an angular chalcopyrite clast (arrow) in a porous, sandy pyrite matrix.
B. Sample 158-957C-13N-2 (Pieces 3B and 3C, 19–39 cm): crustiform-banded anhydrite vein with a chalcopyrite selvage (Cp) and surrounding pyritization halo (Py) extending into pyrite-silica breccia.

PROCEEDINGS OF THE OCEAN DRILLING PROGRAM

VOLUME 158

INITIAL REPORTS

TAG: DRILLING AN ACTIVE HYDROTHERMAL SYSTEM ON A SEDIMENT-FREE SLOW-SPREADING RIDGE

Covering Leg 158 of the cruises of the Drilling Vessel *JOIDES Resolution*
Las Palmas, Gran Canaria, to Las Palmas, Gran Canaria, Site 957
23 September–22 November 1994

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Eva Maddox
Volume Editor

in cooperation with the
NATIONAL SCIENCE FOUNDATION
and
JOINT OCEANOGRAPHIC INSTITUTIONS, INC.

This publication was prepared by the Ocean Drilling Program, Texas A&M University, as an account of work performed under the international Ocean Drilling Program, which is managed by Joint Oceanographic Institutions, Inc., under contract with the National Science Foundation. Funding for the program was provided by the following agencies at the time of this cruise:

Canada/Australia Consortium for the Ocean Drilling Program, Department of Energy, Mines and Resources (Canada), and Department of Primary Industries and Energy (Australia)

Deutsche Forschungsgemeinschaft (Federal Republic of Germany)

European Science Foundation Consortium for Ocean Drilling (Belgium, Denmark, Finland, Greece, Iceland, Italy, The Netherlands, Norway, Spain, Sweden, Switzerland, and Turkey)

Institut Français de Recherche pour l'Exploitation de la Mer (France)

National Science Foundation (United States)

Natural Environment Research Council (United Kingdom)

University of Tokyo, Ocean Research Institute (Japan)

Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the National Science Foundation, the participating agencies, Joint Oceanographic Institutions, Inc., Texas A&M University, or Texas A&M Research Foundation.

Reference to the whole or to part of this volume should be made as follows:
Print citation:

Humphris, S.E., Herzig, P.M., Miller, D.J., et al., 1995. *Proc. ODP, Init. Repts.,* 158: College Station, TX (Ocean Drilling Program).

Shipboard Scientific Party, 1995. TAG-1 Area. *In* Humphris, S.E., Herzig, P.M., Miller, D.J., et al., *Proc. ODP, Init. Repts.,* 158: College Station, TX (Ocean Drilling Program), 65–140.

Electronic citation:

Humphris, S.E., Herzig, P.M., Miller, D.J., et al., 1995. *Proc. ODP, Init. Repts.* [CD-ROM], 158. Available: Ocean Drilling Program, Texas A&M University, College Station, TX 77845-9547, U.S.A.

Shipboard Scientific Party, 1995. TAG-1 Area. *In* Humphris, S.E., Herzig, P.M., Miller, D.J., et al., *Proc. ODP, Init. Repts.* [CD-ROM], 158, 65–140. Available: Ocean Drilling Program, Texas A&M University, College Station, TX 77845-9547, U.S.A.

Effective Publication Dates of ODP *Proceedings*

According to the International Code of Zoological Nomenclature, the date of publication of a work and of a contained name or statement affecting nomenclature is the date on which the publication was mailed to subscribers, placed on sale, or when the whole edition is distributed free of charge, mailed to institutions and individuals to whom free copies are distributed. The mailing date, *not the printed date,* is the correct one.

The mailing dates of recent *Proceedings of the Ocean Drilling Program* are as follows:

Volume 155 (*Initial Reports*): July 1995
Volume 156 (*Initial Reports*): September 1995
Volume 157 (*Initial Reports*): November 1995
Volume 144 (*Scientific Results*): December 1995
Volume 145 (*Scientific Results*): November 1995
Volume 146 Part 1 (*Scientific Results*): December 1995

Distribution

Copies of this publication may be obtained from Publications Distribution Center, Ocean Drilling Program, 1000 Discovery Drive, College Station, Texas 77845-9547, U.S.A. Orders for copies will require advance payment. See current ODP publication list for price and availability of this publication.

Printed February 1996

ISSN 0884-5883
Library of Congress 87-655-674

Printed in Canada by Friesens.

The paper used in this publication meets the minimum requirements of American National Standard for Information Sciences–Permanence of Paper for Printed Library Materials, ANSI Z39.48–1984∞™

Foreword

By the National Science Foundation

The National Science Foundation is proud to play a leading role in partnership with the U.S. oceanographic community in the operation and management of the Ocean Drilling Program (ODP). We are equally proud of the cooperation and commitment of our international partners, who contribute both financial and intellectual resources required to maintain the high quality of this unique program. The Ocean Drilling Program, like its predecessor, the Deep Sea Drilling Project (DSDP), is a model for the organization and planning of research to address global scientific problems that are of high priority internationally and of long-term interest to the scientific community and general public.

Major scientific themes guiding the development of specific drilling cruises range from determining the causes and effects of oceanic and climatic variability to understanding the circulation of fluids in the ocean crust and the resultant formation of mineral deposits. Although such studies are at the forefront of basic scientific inquiry into the processes that control and modify the global environment, they are equally important in providing the background for assessing man's impact on the global environment or for projecting resource availability for future generations.

The transition from the DSDP to the ODP was marked by a number of changes. The 471-foot *JOIDES Resolution,* which replaced the *Glomar Challenger,* has allowed larger scientific parties and the participation of more graduate students, a larger laboratory and technical capability, and operations in more hostile ocean regions. The *JOIDES Resolution* has drilled in all of the world's oceans, from the marginal ice regions of the Arctic to within sight of the Antarctic continent. Over 1,200 scientists and students from 26 nations have participated on project cruises. Cores recovered from the cruises and stored in ODP repositories in the United States and Europe have provided samples to an additional 1,000 scientists for longer term post-cruise research investigations. The downhole geochemical and geophysical logging program, unsurpassed in either academia or industry, is providing remarkable new data with which to study the Earth.

In 1994, NSF and our international partners renewed our commitment to the program for its final phase. Of the 20 countries that supported ODP initially, only one, Russia, has been unable to continue for financial reasons. As the reputation and scientific impact of the program continue to grow internationally, we hope to add additional members and new scientific constituencies. This global scientific participation continues to assure the program's scientific excellence by focusing and integrating the combined scientific knowledge and capabilities of its member nations.

We wish the program smooth sailing and good drilling!

Neal Lane
Director
National Science Foundation
Arlington, Virginia

Foreword

By Joint Oceanographic Institutions, Inc.

This volume presents scientific and engineering results from the Ocean Drilling Program (ODP). The papers presented here address the scientific and technical goals of the program, which include providing a global description of geological and geophysical structures including passive and active margins and sediment history, and studying in detail areas of major geophysical activity such as mid-ocean ridges and the associated hydrothermal circulations.

The Ocean Drilling Program, an international activity, operates a specially equipped deep-sea drilling ship, the *JOIDES Resolution* (Sedco/BP 471), which contains state-of-the-art laboratories, equipment, and computers. The ship is 471 feet (144 meters) long, is 70 feet (21 meters) wide, and has a displacement of 18,600 short tons. Her derrick towers 211 feet (64 meters) above the waterline, and a computer-controlled dynamic-positioning system stabilizes the ship over a specific location while drilling in water depths up to 27,000 feet (8230 meters). The drilling system collects cores from beneath the seafloor with a derrick and drawworks that can handle 30,000 feet (9144 meters) of drill pipe. More than 12,000 square feet (1115 square meters) of space distributed throughout the ship is devoted to scientific laboratories and equipment. The ship sails with a scientific and technical crew of 51 and a ship's crew (including the drill crew) of 62. The size and ice-strengthening of the ship allow drilling in high seas and ice-infested areas as well as permit a large group of multidisciplinary scientists to interact as part of the scientific party.

Logging, or measurements in the drilled holes, is an important part of the program. ODP provides a full suite of geochemical and geophysical measurements for every hole deeper than 1300 feet (400 meters). For each such hole, there are lowerings of basic oil-industry tools: nuclear, sonic, and electrical. In addition, a borehole televiewer is available for imaging the wall of the hole, a 12-channel logging tool provides accurate velocity and elastic property measurements as well as sonic waveforms for spectral analysis of energy propagation near the wall of the hole, and a vertical seismic profiler can record reflectors from below the total depth of the hole.

The management of the Ocean Drilling Program involves a partnership of scientists and governments. International oversight and coordination are provided by the ODP Council, a governmental consultative body of the partner countries, which is chaired by a representative from the United States National Science Foundation. The ODP Council periodically reviews the general progress of the program and discusses financial plans and other management issues. Overall scientific and management guidance is provided to the operators of the program by representatives from the group of institutions involved in the program, called the Joint Oceanographic Institutions for Deep Earth Sampling (JOIDES).

The Executive Committee (EXCOM), made up of the administrative heads of the JOIDES institutions, provides general oversight for ODP. The Planning Committee (PCOM), with its advisory structure, is made up of working scientists and provides scientific advice and detailed planning. PCOM has a network of panels and working groups that screen drilling proposals, evaluate instrumentation and measurement techniques, and assess geophysical-survey data and other safety and siting information. PCOM uses the recommendations of the panels and committees to select drilling targets, to specify the location and major scientific objectives of each two-month drilling segment or leg, and to provide the science operator with nominations for co-chief scientists.

Joint Oceanographic Institutions, Inc. (JOI), a nonprofit consortium of U.S. oceanographic institutions, serves as the National Science Foundation's prime contractor for ODP. JOI is responsible for seeing that the scientific objectives, plans, and recommendations of the JOIDES committees are translated into scientific operations consistent with scientific advice and budgetary constraints. JOI subcontracts the operations of the program to two universities: Texas A&M University and Lamont-Doherty Earth Observatory of Columbia University. JOI is also responsible for managing the U.S. contribution to ODP.

Texas A&M University (TAMU) serves as science operator for ODP. In this capacity, TAMU is responsible for planning the specific ship operations, actual drilling schedules, and final scientific rosters, which are developed in close cooperation with PCOM and the relevant panels. The science operator also ensures that adequate scientific analyses are performed on the cores by maintaining the shipboard scientific laboratories and computers and by providing logistical and technical support for shipboard scientific teams. Onshore, TAMU manages scientific activities after each leg, is curator for the cores, distributes samples, and coordinates the editing and publication of scientific results.

Lamont-Doherty Earth Observatory (LDEO) of Columbia University is responsible for the program's logging operation, including processing the data and providing assistance to scientists for data analysis. The ODP Data Bank, a repository for geophysical data, is also managed by LDEO.

Core samples from ODP and the previous Deep Sea Drilling Project are stored for future investigation at four sites: ODP Pacific and Indian Ocean cores at TAMU, DSDP Pacific and Indian Ocean cores at the Scripps Institution of Oceanography, ODP and DSDP Atlantic and Antarctic cores through Leg 150 at LDEO, and ODP Atlantic and Antarctic cores since Leg 151 at the University of Bremen, Federal Republic of Germany.

Scientific achievements of ODP include new information on early seafloor spreading and how continents separate and the margins evolve. The oldest Pacific crust has been drilled and sampled. We have new insights into glacial cycles and the fluctuations of ocean currents throughout geological time. Many of the scientific goals can be met only with new technology; thus the program has focused on engineering as well as science. To date, ODP engineers have demonstrated the capability to drill on bare rock at mid-ocean-ridge sites and have developed techniques for drilling in high-temperature and corrosive regions typical of hydrothermal vent areas. A new diamond coring system promises better core recovery in difficult areas.

In addition, ODP is cooperating closely with other geological and geophysical programs; for example, in 1991 the first hole was drilled by ODP for emplacement of a seismometer near Hawaii for the Ocean Seismic Network. JOI is pleased to have been able to play a facilitating role in the Ocean Drilling Program and its cooperative activities, and we are looking forward to many new results to come.

President
Joint Oceanographic Institutions, Inc.
Washington, D.C.

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University of Washington, College of Ocean and Fishery Sciences

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CD-ROM

The CD-ROM in the back of this volume contains shipboard gamma-ray attenuation porosity evaluator (GRAPE), index properties, magnetic susceptibility, natural gamma-ray, and *P*-wave data of cores collected on board *JOIDES Resolution* during Leg 158.

This CD also contains sulfide core logs, basement core logs, and thin section summary descriptions in spreadsheet format.

Core Data Directory Structure:

README document: README.doc
GRAPE documentation file: grape.doc
Index properties documentation file: index.doc
Magnetic susceptibility documentation file: magsus.doc
Natural gamma documentation file: natgam.doc
P-wave documentation file: pwave.doc
ODP Core Data (the file structure is identical for each hole.):
SITE # sub directory
HOLE # sub directory
GRAPE data file
INDEX data file
MAGSUS data file
NATGAM data file
PWAVE data file

The README file contains a summary of all the files loaded on the CD-ROM.

All of the ACSII documentation files should be compatible with any word processing program. All of the ASCII data files are TAB delimited for compatibility with most spreadsheet and database programs.

Summary of ODP Core Data
Site 957
Hole B:
index.dat
magsus.dat
natgam.dat
Hole C:
grape.dat
index.dat
magsus.dat
natgam.dat
Hole E:
index.dat
Hole F:
grape.dat
index.dat
magsus.dat
natgam.dat
Hole G:
index.dat
magsus.dat
natgam.dat
Hole H:
grape.dat
index.dat
magsus.dat
natgam.dat
Hole I:
index.dat
Hole J:
index.dat
Hole K:
index.dat
Hole M:
index.dat
Hole O:
index.dat
Hole P:
grape.dat
index.dat

magsus.dat
natgam.dat
pwave.dat

Hole Q:

grape.dat
index.dat
magsus.dat
natgam.dat
pwave.dat

Spreadsheet Directory Structure:

README document: README.doc

IGPETLOG

igpetlog.exl
igpetlog.xls

SULFLOGS

sulflog.exl
sulflog.xls

THINSEC

thinsec.exl
thinsec.xls
thinsec.txt

ACKNOWLEDGMENTS

This volume of shipboard results represents the product of the efforts of many individuals. The Leg 158 Scientific Party of the Ocean Drilling Program would like to express its thanks to the great number of people and organizations who helped make this cruise a success. We extend our gratitude to Captain Ed Oonk and his officers, engineers, and crew for providing us with a safe and pleasant environment in which to work. We are grateful to Gene Pollard, ODP Operations Superintendent, and Wayne Malone, SEDCO drilling superintendent, and his drilling crew, for their dedication and perseverance during a long series of very difficult drilling operations. In addition, special thanks are extended to Scott McGrath, ODP Development Engineer, who spent many hours keeping the motor-driven core barrel (MDCB) operational. If it had not been for all their skills and efforts, we could not have fulfilled the objectives of this leg and, without their good spirits, we would not have maintained our sanity.

Our special thanks go to the ODP technical staff, who had to cope with the valuable but fragile material recovered from the 17 holes drilled during the leg. Their good-humored dedication and professionalism were essential to our success. We also wish to express our appreciation to the shore-based ODP staff for all of their pre- and post-cruise efforts.

Finally, Jens Konnerup-Madsen of Copenhagen University, Denmark, unfortunately could not sail with us because of an accident that kept him in Las Palmas. We missed his expertise and friendship and wish him a full recovery.