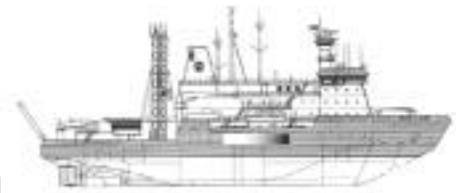


# SHALDRIL Newsletter

## Shallow Drilling along the Antarctic Continental Margin

News from the SHALDRIL Committee

Fall 2000 • Vol 1 • Issue 1



### Background

For over three decades, U.S. scientists and their international colleagues exploring the shallow shelves and seas along the margins of Antarctica have been consistently frustrated by their inability to penetrate through the over-compacted glacial diamictos encountered at shallow subbottom depths (within the upper 10 m) over these terranes. This is particularly frustrating because advanced high-resolution seismic reflection techniques clearly show in many areas (e.g., the Ross Sea and off Seymour Island) the presence of older successions of Neogene and even Paleogene sequences lying just beneath this thin veneer of diamictos (Figure 1). Until the means are developed to recover these sequences, a detailed history of the Antarctic ice sheets, which is an essential prerequisite to understanding Cenozoic paleoclimates and future climate change on a global scale, will undoubtedly remain an elusive and unobtainable goal.

As evidenced by workshop reports, white papers, and symposia publications (Anderson, 1994, Cooper et al, 1994, Webb, 1995) both the U.S. and international Antarctic geoscience communities are in full agreement that the most practical way to solve this long-standing problem of obtaining the necessary cores from the Antarctic continental margins and seas

is to install a shallow-water (< 1000 m), shallow penetration (50-150 m sub-seabed) rotary-drilling system as a widely-available, if not routinely used, tool on major research vessels operating in these waters. Deployment of such a system(s) would have a significant impact, directly or indirectly, on the scientific achievements of allied projects, programs, and initiatives such as: West Antarctic Ice Sheet Initiative (WAIS), Antarctic Ice Margin Evolution (ANTIME), Antarctic Off-shore Acoustic Stratigraphy (ANTOSTRAT), The Cape Roberts Project (CRP), Past Global Changes (PAGES), SCAR Global Change and the Antarctic (GLOCHANT), International Geosphere-Biosphere Program (IGBP), Paleoenvironments from Ice Cores (PICE), NSF MARGINS, Ocean Drilling Program (ODP) and STRATIFORM.

### Community Action

In response to a growing interest and need for the deployment of a shallow drilling system on United States Antarctic Program (USAP) vessels, The National Science Foundation's Antarctic Working Group on Geology and Geophysics (ANTWGGG) appointed at their September, 1996 meeting a committee to evaluate the technical feasibility of such an undertaking. An organizational meeting of this committee was

convened by Eugene Domack in December, 1996. The committee adopted the name "SHALDRIL" (Shallow Drilling) Committee. Drs. Eugene Domack (Hamilton College), Thomas Janecek, and Sherwood W. Wise, Jr. (both at Florida State University) as co-chairs (see page 3 for a listing of current SHALDRIL members). A workshop proposal to NSF, Office of Polar Programs, was prepared by Wise and Janecek to support the activities of the committee for the coming year. With funding of this proposal in March, 1997, a professional engineer, Mr. Leon Holloway with the Ocean Drilling Project, College Station, TX, was retained as a consultant to evaluate existing or proposed drilling systems and potential USAP platforms based on criteria provided by the committee. His evaluation (Holloway, 1997) was issued on November 30, 1997. Executive summaries of this and subsequent reports are available on the web site for the FSU Antarctic Marine Geology Research Facility at — [www.arf.fsu.edu](http://www.arf.fsu.edu) (select SHALDRIL link).

A workshop (SHALDRIL I) to discuss this engineering report was then held on February 28th, 1998, at FSU, and a workshop report was issued (Wise and Janecek, 1998). As noted in the workshop report, Mr. Holloway reported that no proven drilling system that could be mounted on existing USAP vessels and which met the Committee's specifications existed at the time (although there were several systems scheduled to come on line soon including PROD (Portable Remotely Operated Drill) and the Containerized Drilling System (from GeoDrilling).

In view of the consulting engineer's report, the SHALDRIL Committee proposed a number of tasks for itself and for the consulting engineer. Namely, the committee refined its criteria for site selection and identified likely

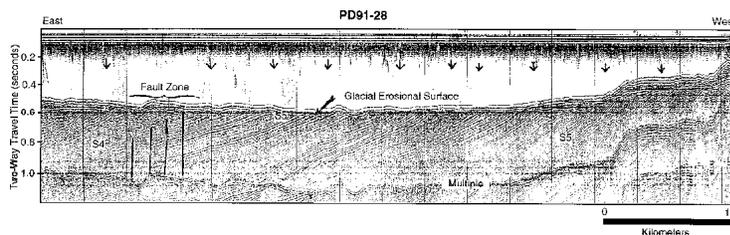


Figure 1. Polar Duke seismic reflection line PD91-28 off Seymour Island (Anderson et al., 1991 and Sloan et al., 1995). Along strike correlation of this profiles to exposures on Seymour Island indicate that the stratigraphic interval spans the upper Eocene through Miocene strata.

areas of the Antarctic margin where shallow drilling would be possible and useful (see "Potential Drilling Areas" file at "SHALDRIL" link at [www.arf.fsu.edu](http://www.arf.fsu.edu)). The engineer continued to study and monitor the progress of the operators of candidate drilling systems that might be utilized by U.S. investigators in the Antarctic. He also conducted a detailed cost and feasibility study on the emplacement of a moon pool on the *N. B. Palmer* and conducted a cost analysis for two hypothetical multi-leg drill plans.

The execution of the above tasks over the next one to two years provided the committee with the information they needed to implement the next major step in their program, i.e., the field testing of one or more shallow-drilling rigs in the Antarctic.

### The Current Plan

A second engineering report, based upon the revised logistical guidelines, was issued by the SHALDRIL consultant (Holloway, 1999), and the SHALDRIL committee convened another workshop (SHALDRIL II) sponsored by the National Science Foundation on October 14th and 15, 2000 to evaluate the report and plan future drilling operations. During the workshop, SHALDRIL members heard presentations from two of the top-ranked drilling contractors (Seacore and Geo Drilling). The committee was impressed with the capability of both contractors and the drilling systems they proposed for the task.

### Defining the long-term goals:

The committee then discussed a two-pronged effort to put forth a proposal for an initial drilling cruise. First, a "glossy" report will be generated that details the history of the Antarctic shallow drilling efforts, identifies long-term and short-term goals, sets forth the scientific themes that would be addressed with Antarctic shallow-water drilling and identifies scientific linkages with other efforts both in the Antarctic (e.g., ANTOSTRAT, GLOCHANT) and elsewhere (e.g., STRATIFORM, ODP). The report will explain the need for a scientific proof of concept (pilot) drilling cruise and

the rationale for the site selection (both for the initial drilling cruise and the longer term). In addition, the report will contain a conceptual management plan for achieving the long term goals. Finally, letters of interest from potential contractors would be included in an appendix. Sherwood Wise, Jr. and Thomas Janecek volunteered to take the lead on generating an initial draft of the report. This initial draft will be reviewed not only by the other SHALDRIL members but by other interested investigators as well.

### The short-term – the first drilling cruise:

Concurrently with the production of the "glossy" report, several members of SHALDRIL will begin drafting a proposal for a "demonstration" of Antarctic drilling capabilities. John Anderson, Patricia Manley, Sherwood Wise, Jr., and Rich Jarrard will take the lead in this multi-institutional effort that will focus, for a variety of reasons, on sites along the Antarctic Peninsula. These investigators have the wide range of expertise (stratigraphy, sedimentology, paleontology, paleoceanography, and logging) that is necessary for this multi-disciplinary effort. The proposal will draw points from the "glossy" report, emphasizing how these initial efforts fit into a long-term strategy. The proposal will detail the expected science returns while acknowledging the risks and high cost. An important aspect of the proposal will be the development of a plan that provides other researchers with timely access to the core material.

The target submission date for the proposal is June 1, 2001, with drilling occurring as early as January 2003 (first currently available date on the *Nathaniel B. Palmer*).

### Future Community Input

SHALDRIL members have planned two additional efforts to keep the community aware of the drilling plans and to coordinate community input. First, a newsletter (like this one) will be sent out on a quarterly basis (perhaps more if circumstances warrant). An email will be sent to the Antarctic community notifying them of

the publication of each newsletter. All newsletters will reside on the Antarctic Research Facility Website ([www.arf.fsu.edu](http://www.arf.fsu.edu)).

To coordinate future drilling, we (the SHALDRIL committee) plan on holding a "proposal planning" workshop next September (2001) after the WAIS workshop. This workshop will be open to all investigators interested in drilling in the Antarctic. Details of this workshop will be forthcoming in a future newsletter.

Finally, SHALDRIL members decided that a "steering" or coordinating committee is needed to facilitate and guide U.S. Antarctic drilling efforts. The current SHALDRIL members will comprise this committee until the September workshop, at which time a new committee will be elected by the workshop participants.

### References:

- Anderson, J. B., R. A. Askin, D. S. Barker, E. Barrera, et al., 1994. Antarctic Margin Project Report. Rice University, 22 pp. (unpublished).
- Cooper, A.K., P.F. Barker, P.N. Webb, G. Brancolini, G. (Eds.). The Antarctic Continental Margin: Geophysical and Geological Stratigraphic Records of Cenozoic Glaciation, Paleoenvironments and Sea Level Change, *Terra Antarctica*, Vol 1. 480pp.
- Holloway, G. L., 1997. Report on Drilling Systems for Antarctic Research Vessels. Antarctic Marine Geology Research Facility, Florida State University, Tallahassee, FL, ~500 pp. (unpublished)
- Holloway, G. L., 1999. Phase II Report on Drilling Systems for Antarctic Research Vessels. Antarctic Marine Geology Research Facility. Florida State University, Tallahassee, FL. Vols 1 and 2. ~600 pp (unpublished).

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Webb, P.-N., 1995. Shallow Penetration Drilling in Polar Marine Environments — The TERRA BOR System. Byrd Polar Research Center, Ohio State University, Columbus, Ohio, 32 pp. (unpublished).

Wise, S. W., T. R. Janecek, and the SHALDRIL Committee, 1998. Workshop Report on Shallow Drilling Systems for U.S. Antarctic Program Research Vessels. Antarctic Marine Geology Research Facility, Florida State University, Tallahassee, FL, 13 pp. (unpublished).

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## WORKSHOP HISTORY and PARTICIPANTS:

### Organizational Workshop

San Francisco (AGU)  
December 1996

#### Attendees:

John Anderson  
Lou Bartek  
Scott Borg  
Alan Cooper  
Eugene Domack  
Carlota Escutia  
Jim Holik  
James Kennett  
Larry Krissek  
Calvin Lee  
Pat Manley  
Ross Powell  
Anders Solheim  
Dietz Warnke  
Sherwood Wise, Jr.  
Peter Webb

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### SHALDRIL I Workshop

Antarctic Research Facility  
Tallahassee, FL.  
February 28th, 1998

#### SHALDRIL Members:

John Anderson  
Lou Bartek  
Alan Cooper  
Tom Janecek  
Sherwood Wise, Jr.  
Peter Webb

#### Others:

Scott Borg — NSF  
Leon Holloway — Consultant  
Matthew Curren — FSU  
Greg Mountain — ODP  
Shallow Water Drilling

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## SHALDRIL Membership (cont.)

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### SHALDRIL II Workshop

National Science Foundation  
Washington D.C.,  
October 14-15, 2000

#### SHALDRIL Members:

John Anderson  
Lou Bartek  
Alan Cooper  
Tom Janecek  
Pat Manley  
Sherwood Wise, Jr.  
Peter Webb

#### Others:

Scott Borg — NSF  
Leon Holloway — Consultant  
Tony Halliday — Seacore  
Odd Lovhaugen — Geo  
Drilling  
Karl Sandvik — Geo Drilling  
Roy Wilkens — ONR  
Frank Rack — JOI  
Greg Mountain — ODP  
Shallow Water PPG