

87-326
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EXECUTIVE SUMMARY
JOIDES DOWNHOLE MEASUREMENTS PANEL

Texas A & M University
College Station

2 -3 April 1987

HIGHLIGHTS

- (i) Geochemical logs are proving to have a higher accuracy than previously envisaged. Log-derived weight-percent concentrations of Al, Fe and Si are accurate to within 5 per cent of quoted figures.
- (ii) COSOD II white paper on logging is at draft 1 stage. Two further iterations envisaged.
- (iii) Operational difficulties continue to prevent logging. Two basic problems have been Co-chief modifications to programme, sometimes without consulting LDGO scientist; and failure of TAMU to drill loggable hole.
- (iv) TAMU have advised DMP that they will be prepared to expose BHA to some risk in order to facilitate logging through pipe, the omission of which is causing much useful information to be lost.
- (v) A physical properties working group is proposed under the auspices of DMP to follow up the recommendations of the JOI/USSAC workshop of 1986.

MEETING OF JOIDES DOWNHOLE MEASUREMENTS PANEL

87-326
Rec'd 4/22/87

Texas A&M University
College Station

April 2-3, 1987

8.30 am

MINUTES

Present

Chairman: P.F. Worthington (UK)

Members: E. Howell (USA)
G. Olhoeft (USA)
R. Traeger (USA)
H. Fujimoto (Japan)
R. Jung (FRG)
M. Salisbury (Canada)
B. Steingrimsson (ESF)
S. Bell (at-large)

Liaisons: R. Anderson (LDGO)
R. Jarrard (LDGO)
C. Avroux (TAMU/ODP)
M. Langseth (PCOM)
K. Becker (LITHP)*

Guests: B. Harding (TAMU/ODP)*
C. Hanson (TAMU/ODP)*
A. Meyer (TAMU/ODP)*

Absent with Apology R. Stephen (USA)

Absent J-P. Pozzi (France)
F. Sayles (USA)

* denotes partial attendance

1. Welcome

The Chairman welcomed DMP Members and Liaisons. This was the first DMP meeting under the new Chair. Outgoing chairman Matt Salisbury was thanked for all his efforts both on behalf of DMP and in support of the cause of scientific well logging in general.

Introductory Remarks

The Chairman briefly summarized the current status of DMP and the key events since the last DMP meeting in November 1986. A strong support for downhole measurements was evinced at the annual meeting of PCOM and Panel Chairmen in Hawaii in January 1987, at which a report on present and future directions of downhole measurements was presented. The Chairman outlined the main points of the report for the benefit of members.

Review of Agenda and Revisions

Several items were modified/added as follows:

- (a) Item 6(ii) to include an advisory statement to EXCOM on procedures for use of re-entry holes and policy on their long-term observational use. This has been requested by PCOM.
- (b) Item 11 to include DMP priorities for New Technology.
- (c) Item 24 to be extended to include new Japanese proposal for a focussed plan of downhole observatories and experiments in the Nankai Trough and the Japan Sea.
- (d) Item 27 to include appointment of a DMP liaison to TEDCOM.
- (e) Item 27 to include a description of recent DOSECC activity.

2. Minutes of previous DMP meeting, Tokyo, November 1986

These had only been received by the Chairman immediately prior to this meeting. As such, there had not been time to review them.

Adopted provisionally with the right to further change within the duration of this meeting.

3. Panel Philosophy

DMP Recommendation 1987/1

DMP decision-making should be driven by the following philosophy.

- (i) ODP holes are not objectives in themselves. They constitute a scientific legacy for the future in terms of:

- seismic control points;
- standard logging suites;
- preserved core material;
- physical properties database;
- downhole experiments and long-term observations.

(ii) The acquisition of downhole-measurement data should be planned from a global standpoint, not a parochial one. Specific tools are being recommended in response to requests from the community for a global programme of downhole measurements.

(iii) When a site is vacated, properly executed logs provide the only continuous record of the succession. It is not possible to obtain the same information from core measurements. Logs provide an intermediate sampling scale between core and surface geophysics, they characterise the subsurface environment and record physical properties in that in-situ environment, and they allow active and transient phenomena to be studied.

4. Vertical Seismic Profiling (VSP)

PCOM Question

"Should VSP be a routine experiment on board ship and what is its scientific return?"

DMP Response

Application of VSP should depend on its relevance to the scientific objectives, its priority rating vis-a-vis other measurements and experiments, the existence of a science-driven commitment to its application, and the subsequent dedication of resources/effort for processing and interpretation.

The scientific returns of VSP include:

- detection of reflectors beneath the drill bit;
- measurement at a scale which is closer to geophysics;
- three-dimensional information;
- data from uppermost 70 m of sediment which is currently not logged;
- potentially better porosity characterisation in some basalts/carbonates.

DMP is prepared to encourage appropriate initiatives for VSP deployment including:

- scientific proposals;
- JOI-USSAC workshop on VSP;
- USSAC offer to fund acquisition of VSP capability;
- establishment of technical support within an approved institution.

DMP Recommendation 1987/2

VSP should not be a routine experiment on the ODP drill ship.

5. Logging Through Pipe

PCOM Question

"What is the quality of logs taken through the drill pipe?"

DMP Response

The "geochemical combination" of the natural gamma spectral tool (NGT), aluminium activation clay tool (AACT) and induced gamma spectral tool (GST) is the most useful for logging in drill pipe. The thermal-epithermal neutron tool (CNT-G) also incorporated within this string allows porosity to be determined. Log quality is degraded by pipe but the data remain useful. Steel effects can be smoothed by making a second logging run with the pipe displaced by a few metres. No quantitative comparisons are available of log data from the geochemical combination in open and steel-lined holes.

There are two distinct applications:

- (i) logging in top pipe;
- (ii) logging full hole in pipe where open hole logging cannot be done, e.g. when the core barrel is stuck.

In both cases logging is physically achievable in terms of tool diameter vs inner pipe diameter and indeed has been done already on Legs 101, 102, 105 and 111.

There are some lithologies through which it is always difficult to drill and for which logging through pipe might provide the only means of acquiring downhole measurements. Without this facility these lithologies might never be characterised and might therefore represent a permanent gap in our knowledge. For this reason logging through pipe should be routine where there is no other way of obtaining the data. This should be done even where there is some risk to the drill pipe.

DMP Recommendation 1987/3

Wherever possible logging through pipe with the geochemical/neutron combination should be routinely carried out even though this might place the drillstring/BHA at risk. This would provide further information on the formations that cause the swelling problems as well as furnishing data that would have been lost.

DMP Recommendation 1987/4

A more realistic definition of what constitutes an acceptable level of risk to the drillstring should be formulated. This definition should

admit an element of risk since the occasional loss of a BHA is sustainable and would be costwise incremental to the cost of the drilling operation itself.

DMP Recommendation 1987/5

During an upcoming leg the side entry sub should be used to make a dedicated comparison of nuclear logs in pipe and in open hole for quantitative assessment of degradation.

6. USSAC Workshops

(i) Physical Properties

A summary of the recommendations from the JOI/USSAC workshop in June 1986 was followed by reiteration that physical properties are not represented in the JOIDES structure. DMP considers this to be a major omission.

DMP Recommendation 1987/6

DMP to be permitted to convene a technical working group on physical properties to pursue the recommendations of the JOI/USSAC workshop held at Cornell University in June 1986. The group should provide advice on and monitor progress in the establishment of improved facilities for the laboratory measurement of physical/mechanical properties. The group should report to PCOM through DMP.

DMP Recommendation 1987/7

The DMP physical properties working group should be internationally drawn and should comprise a maximum of seven members plus liaisons. Members should be drawn from the following nominees:

Dan Karig (Cornell Univ.)
Armand Silva (Univ. Rhode Island)
Bobb Carson (Lehigh Univ.)
Peter Jackson (British Geological Survey, UK)
Dick von Herzen (WHOI)
Eve Sprunt (Mobil)
Rick Carlson (TAMU)
Kate Moran (Atlantic Geoscience Center, Canada)

Karig/Silva nominated for Chair or Co-chair. Liaisons to be nominated from ODP/TAMU, DMP and IHP.

DMP Recommendation 1987/8

The DMP physical properties working group should meet 3-4 times over a 2-3 year period in the expectation that such an effort will lead to a substantial upgrade in laboratory physical properties: USSAC to be asked to meet costs of US attendees.

(ii) Research Possibilities for Use of Deep Sea Drillholes

Workshop held in February 1987. Principal thrust was development of a wireline re-entry capability. Wireline re-entry logging will never replace logging from the drill ship. Where long-term observations are planned holes should be drilled specifically with this purpose in mind. There is no clear policy on jurisdiction over ODP holes.

PCOM Request

"In order to give EXCOM direction for a policy on long-term use of ODP holes, could DMP give specifics on what aspects of re-entry need to be covered?"

DMP Response

- (i) Considerable precedent exists for returning to DSDP holes for the purpose of re-entry and doing further science. This implies that JOIDES has always regarded the existing boreholes as a scientific resource that can be visited following appropriate consultation with and review by JOIDES planning bodies. This precedent also implies that JOIDES has a long-term interest in protecting this resource from damage or loss. This view and commitment form a basis for the use of a hole by both JOIDES and non-JOIDES communities.
- (ii) Efforts within the JOIDES community to use the holes for scientific purposes should be done with the full knowledge and approval of the JOIDES EXCOM. The approval process should include an evaluation of the scientific merit of the work programme versus the potential jeopardy to the borehole for future use. The activity from non-ODP ships should be monitored by establishing strong communications before and after re-entry and requiring a prospectus and report.
- (iii) Neither JOIDES nor any other body has clear legal jurisdiction over the use of boreholes outside EEZs. Nevertheless considerable control over the use of these holes could be exercised because of the breadth of the JOIDES community and its participating scientists. This control might be enhanced through the publication of a policy guideline emphasising the need for cooperation and communication.

7. Logging Contractor's Report

Successes:-

- (i) Geochemical tool combination is being evaluated for accuracy of elemental concentrations. For Al, Fe and Si the tool is capable of furnishing a weight percentage concentration that is accurate to within $\pm 5\%$ of quoted figure.

- (ii) Leg 111 - first recognition of faulting from magnetometer confirmed by Ti vs Gd crossplot from mineralogy tool.
- (iii) Leg 111 - successful run of analogue borehole televiewer with digital processing.
- (iv) Leg 112 - recognition of turbiditic sequences from resistivity and gamma ray logs.
- (v) Legs 112/113 - excellent synthetic seismograms.

Difficulties:-

- (i) Greater incidence of stuck core barrels corresponding to use of XCB.
- (ii) Of the total sites drilled 36% have been logged. Of sites with holes deeper than 400 m, 73% have been logged. Of these 73%, only 48% have been logged with two tool combinations. These statistics are getting worse.
- (iii) Major problem continues to be bridging aggravated by mud system.
- (iv) First use of side entry sub on Leg 113 resulted in a tool being blown off the wireline.
- (v) Co-chief scientists are modifying scientific programme to exclusion of logging during course of a leg. This was a particular problem during Leg 113 when LDGO logging scientist was not even consulted.

8. TAMU Briefing

Led by B. Harding:

(i) Logging through pipe

No problem provided that drill pipe is safe. Panel considered that definition of "safe" is too conservative. Some risk should be accepted. TAMU advised DMP that they will be prepared to expose BHA to some risk in order to facilitate logging through pipe, the omission of which is causing much useful information to be lost.

(ii) Mud Programme

TAMU/ODP have inaugurated a research contract for alternative mud systems with Texas A&M University. This is primarily intended to look at flow loops and carrying capacities but it could be extended to encompass swelling of rock materials for those muds identified as having good carrying capacity. LDGO will advise TAMU of their requirements in this area.

(iv) Side Entry Sub

Guidelines for operation of the side entry sub should be available prior to Leg 115. To prevent repetition of tool loss, tool should be positioned below drill pipe during circulation.

DMP Recommendation 1987/9

DMP reinforces entrusting TAMU Operations Superintendent with authority to see that holes required to be logged according to PCOM directives and guidelines are logged. This recommendation requires that TAMU Operations Superintendent be aware of PCOM directives and guidelines concerning logging.

DMP Recommendation 1987/10

DMP reiterates that it is TAMU responsibility to provide loggable hole and, to this end, Panel endorses TAMU programme to investigate alternative mud systems. DMP recommends that this programme be extended to investigate clay swelling control aimed at improved borehole stability for both logging and coring.

8. Logging Technology Improvements

Post Leg 114 the three standard Schlumberger logging suites are to be merged into two digital combinations as follows:

- (A) Eight-channel sonic (SDT)
Caliper
Natural gamma spectral (NGT)
Thermal-epithermal neutron (CNT-G)
Phasor induction (DIT-E)
Spherically focussed resistivity (SFL)
- (B) Natural gamma spectral (NGT)
Aluminium activation (AACT)
Gamma spectral tool (GST)
* Lithodensity tool (LDT)

* Depends on availability of through-wired GST: not likely before Leg 116.

The move to two tool combinations is a recognition of the reality that it is difficult to get three logging runs in an ODP hole.

Two other major advances are:

- (i) Acquisition of Schlumberger workstation for interpretation of activation logs. Can now reprocess old GST logs for Ti and Gd. (This is a classic example of the scientific legacy of well logs).
- (ii) Acquisition of source spectra for the eight-channel sonic tool from Schlumberger.

PCOM Request

"Review the budget outline for FY88 and forward advice to PCOM."

DMP Response

Technical priorities agreed as follows:

- | | |
|---|----------|
| (i) Temperature tools | (\$30k) |
| (ii) User software/data dissemination | (\$20k) |
| (iii) Formation microscanner | (\$150k) |
| (iv) Three-component gyro magnetometer | (\$30k) |
| (v) Third wireline packer | (\$80k) |
| (vi) Second digital televiewer | (\$94k) |
| (vii) Induced polarization tool | |
| (viii) High resolution gamma spectroscopy | |

Notes: Second sidewall entry sub will happen anyway. Terralog work stations substituted by (ii). MWD and High Temperature Tools deferred.

DMP Recommendation 1987/11

The DMP-recommended priorities and time schedulings for logging technology developments are as follows. All items for FY87 and FY88 are considered essential and are in priority order.

FY87

- (1) Temperature tools
- (2) User software/data dissemination
- (3) Formation microscanner

FY88

- (1) Three component gyro magnetometer/susceptibility tool
- (2) Third wireline packer
- (3) Digital televiewer

FY89

Induced polarization

FY90

High resolution gamma spectroscopy
MWD
High temperature tools

9. COSOD II White Paper

A first draft was circulated based on contributions from nominated panel members. This was subjected to a preliminary review. Contributors to study and forward comments to Chairman within two weeks.

10. Logging Programme - Upcoming Legs

Leg 115

DMP Recommendation 1987/12

The three deepest holes of Leg 115 should be logged with the standard Schlumberger suite.

Leg 116

DMP Recommendation 1987/13

Seismic-stratigraphy and geochemical combinations to be run in all five holes of Leg 116 that are scheduled for logging. Additionally:

BF-1
BHTV (bottom 200 m)

BF-3,4
BHTV (bottom 200 m)
Temperature
Kuster Sampler
Packer

BF-2,5
Kuster Sampler

Leg 117

DMP Recommendation 1987/14

Standard Schlumberger suites plus high-resolution resistivity tool to be run in the following five holes of Leg 117: NP 2, 4, 5, 6 and 7. Borehole televiewer to be run in NP 6, 7. VSP survey at NP 6. Barnes new water sampler to be deployed in every hole if available.

Leg 118

DMP Recommendation 1987/15

Logging schedule for deep-mantle re-entry hole, Leg 118:

Schlumberger standard suite (with Temp)	45h
BHTV/magnetometer	16
Multichannel Sonic Tool	13
Gyro Magnetometer	15
Susceptibility	8
Packer	48
Wireline packer or Kuster T/H ₂ O	14
Complex Resistivity	12
Dual Laterolog	11
Flowmeter	?
VSP	18

DMP Recommendation 1987/16

Back-up logging schedule for Leg 118 if deep re-entry hole not drilled is as follows, in order of priority with priority being invoked as holes become shallower:

Schlumberger Standard Suite
Wireline Packer
Magnetometer
Multichannel Sonic
Borehole Televiewer
VSP

Legs 119 and 120

DMP Recommendation 1987/17

For Legs 119 and 120 all holes to be logged with standard Schlumberger suite. BHTV to be run at KHP-1, 3 and SKP6B. VSP to be run at KHP-3 and SKP-3.

11. Proposal 270/F

"Tomographic Imaging of a Hydrothermal Circulation Cell"

DMP Response

DMP endorses the concept of tomographic surveying between boreholes and would be pleased to consider a detailed proposal in the future.

12. Proposal 272/F

"Summary for long-term downhole measurements in seas around Japan" plus unsolicited addendum

DMP Response

DMP supports proposal 272/F and wishes to encourage it. Proposal is technically workable.

DMP Recommendation 1987/18

Consideration be given to placing temperature array in hole NK-2 or the physical-property probe hole if the latter is approved.

13. New Panel Members

DMP Recommendation 1987/19

DMP nominates the following to replace those four members rotated off in 1986:

Wendell Givens (Mobil)
Carl Sondergeld (Amoco)
(alternative Arthur Cheng (MIT))
Bobb Carson (Lehigh Univ.)
Bob Porter (Univ. of Washington)

This list supersedes that issued by DMP in 1986.

14. TEDCOM Liaison

Deferred until PCOM approve full Panel complement.

15. DOSECC

DMP members were briefed about DOSECC activity: no decisions on future DOSECC/DMP liaison.

16. Next Meeting

DMP Recommendation 1987/20

DMP to meet on 18/19 August 1987 at University of Washington, WA.

Paul F. Worthington
14 April, 1987