Executive Summary

SMP met on 23 and 25 February and held a joint session with IHP on 24 February in College Station. SMP reviewed laboratories and has specific recommendations regarding the Physical Properties, Paleontology, and XRF laboratories as follows:

SMP recommends that ODP/TAMU modify the existing GRAPE software to incorporate the Boyce correction for pore water as documented in Appendix B of Attachment 3 (93-1).

SMP recommends that ODP/TAMU initiate a QA/QC procedure for development of any future non-commercial software acquisitions (93-2). See Attachment 4 for the SMP recommended procedure.

SMP recommends that the operator proceed immediately with the development of the 4D-based Rawhide paleontological software package. The panel re-states that the ease of data input and production of range charts for shipboard use are of the utmost importance (93-3). SMP strongly suggests that TAMU interact with SMP and IHP panel members on this development by utilizing the members for software prototype trials (see page 16 for joint panels recommendations).

SMP recommends that some computer programmer time be allocated during the Leg 149 transit to assist the XRF technician in de-bugging the instrument and to assist in the incorporation of internal matrix corrections in the new system software (93-4).

SMP recommends that PCOM provide guidance to the panels and the operator on the appropriate mechanism for large capital equipment replacement. It is likely that many of the large laboratory items will require replacement within a narrow period of time (93-5).

In joint session with IHP, the two panels reviewed issues of overlapping mandate and made the following recommendations:

IHP/SMP recommend that the operator take the following actions (SMP recommendation 93-6):

- determine if and when the Boyce correction was removed from the software
- advice the science community about the requirement to correct GRAPE data
- at the time of the next release of the CD-ROM, replace old, uncorrected data with Boyce-corrected data
- immediately change the existing GRAPE software as per SMP recommendation 93-1

IHP/SMP recommend that the co-chief scientists, staff scientist and curator should be allowed to define intervals of limited sampling where all normal sample requests do not apply. The science party would then be required to make requests for samples within this limited sampling interval. The co-chief scientists, staff scientist and curator would then approve or reject these new requests for the limited sampling interval (SMP 93-7).

In addition, the joint panels reviewed prime data requirements for the new computing system, which is currently in the tendering process. The review is included in the minutes as Attachment 7.

SMP Minutes
Meeting 9
23 February 1993

I Introduction

Panel members and liaison were introduced. The chair welcomed the two new members from Germany and ESF. Concern was noted about the inconsistencies in member notices from JOI about this meeting. Some members were not informed.

Meeting Participants:

R. Brereton (member)
R. Chaney (member)
K. Moran (member, chair)
M. Mottl (member)
M. Rhodes (member)
E. Thomas (member)
J. Thurow (member)
D. Weis (member)
J. Fox (PCOM liaison)
J. Allan (TAMU liaison)
B. Julson (TAMU liaison)
P. Blum (guest)
A. Klaus (guest)

Regrets:

J-P Valet (member)
J. King (member)
H. Tokuyama (member)

II Approval/changes to SMP minutes no. 8 and revisions to this agenda

Meeting 8 minutes were approved. The agenda was revised to incorporate an update on the ODP Computing System.

III ODP/TAMU Report

J. Allan summarized the shipboard changes and issues since the last SMP meeting. The largest impact to the program is the lack of special operating funds (approximately $50K for FY93). Last fiscal year, a significant amount of resources were spent on new equipment. J. Allan summarized the new acquisitions, each are discussed in detail under business arising for each laboratory.

III Business Arising

Paleomagnetics

B. Julson and J. Allan reported that AC fields were evaluated on Legs 145 and 146 by ODP paleomagnetics technicians. No hazard was found (see Attachment 1). A core barrel magnetization study was completed on Leg 146 by staff scientist, Bob Musgrave. The test showed that very strong fields exist in the core barrels. These fields are sufficient to induce isothermal remanence in magnetite. AF demagnetization using the *Magnaflux* coil set to full wave reduced this magnetization, but after a round trip of the barrel to recover an APC core, the core barrel magnetization had returned to similar values to what it had been before demagnetization. In addition, the drill string itself was very strongly magnetized. Core barrel demagnetization is unlikely to significantly reduce drilling-induced overprinting.

The new Kappabridge and 486-based PC controller were installed at the Leg 147 portcall. The cryogenic magnetometer was upgraded at the same time from a 286 controller to a 486 controller. A dual-bladed saw was installed for producing flat-ended 1" specimen.

At the last SMP meeting, a new proposed AF demagnetization procedure was recommended. This recommendation has been put in place by the program. However, the AF coils in the cryogenic magnetometer require modification to achieve the higher fields. Bill Goodman of 2G visited the ship at the Leg 147 portcall and discussed options for modifying the existing AF coils to allow demagnetization to between 40 and 50 mT. Presently, the three coils are arranged concentrically, one axis has to be larger, limiting the maximum demagnetization field achievable. Bill is re-designing the set of coils so that they will be spaced along the core track, allowing all three to be reduced to the minimum possible diameter and boosting the maximum field achievable for the same peak amplifier output. **ACTION: B. Mills/B. Julson report on status of upgrade at next SMP meeting.**

J.-P. Valet faxed comments about the technical manual. He found the technical manual to be in pretty good shape. J. Allan reported that Bob Musgrave is currently revising the manual. **ACTION: ODP/TAMU forward a copy of the revised manual to J.-P. Valet for review.**

Physical Properties

K. Moran reported on the status of the shear vane and resistivity instruments. A vane instrument from her lab was loaned to the ship for Leg 146. At the end of the leg, components to upgrade the instrument were sent to the portcall. The upgrade will be completed by the end of the Leg 149 transit. Two resistivity instruments (Bremen and BIO) were evaluated on Leg 146 (Attachment 2). The Bremen instrument is well suited for ODP use in APC cores. All of the SMP system requirements are included in the design: easy calibration, direct data capture to computer files, stable and repeatable measurements , and a rugged design. The only advantage of the BIO system is the probe design. Consequently, Moran recommends the purchase of the Bremen instrument and an additional probe be built which can be used in more lithified sediments.

M. Mottl reported that the routine method for calculating pore water resistivity may not be appropriate for all sediments. In the past, a one drop resistivity probe was available in the laboratory for calibration of pore fluid. He was not sure if this instrument was still available. This instrument should be made available for use when an instrument for routine discrete resistivity becomes available. **ACTION: ODP/TAMU report on the status of the "one-drop" resistivity instrument.**

The image resistivity system, which is under development by P. Jackson of BGS (UK) was discussed by the panel. The panel had seen the prototype system at the Leg 134 portcall. Once again, the panel sees this instrument playing an integral role in the program. R. Brereton briefly reviewed the imaging system. This instrument could provide a link to core data for the FMS, would provide imaging data for interpretation of structural geology and sedimentology as well as high resolution sediment resistance. R. Brereton reported that this instrument could be ready for shipboard use given 12 months lead time. The panel had questions about the instrument: how long does it take to make the measurements, how is this instrument cleaned between measurements, what amount and kind of laboratory space is required and how much data does it produce? R. Brereton contacted P. Jackson. He responded to the questions. The measurements would take approximately 15 minutes per 1.5 m, the electrodes would have a quick and easy cleaning system before it was delivered to the ship, the space required is approximately the size of two PC computers, and the data produced are on the same order of magnitude as the existing MST data. The panel agreed that this instrument should now be included in the equipment priority list (see page 13).

Chaney reported that the manuals in the physical properties laboratory have been improved. The manuals still require a section on overall sampling protocols, a discussion on precision and bias for each measurement, and a procedure for updating. Staff scientist, Peter Blum has been updating the discrete index property manual. He suggested that the manuals be updated in a very simple manner, whereby scientists make handwritten notes in the manual. These handwritten changes could be updated in the manual at regular intervals. R. Chaney recommended that a sheet in the front of the manual include some additional information regarding manual changes proposed by sailing scientists. He suggested that the sheet includes columns for a short description of the proposed change, the page where the change is required, and the name of the user proposing the change. The panel agreed that this simple method for updating would be useful for all of the laboratories. The manuals for the physical properties laboratory still require updating before they will be useful for new shipboard scientists. **ACTION: R. Chaney to assist ODP/TAMU (P. Blum) in updating the physical properties manuals.**

Chaney updated the panel on the status of ASTM standard test method for specific gravity of soils by gas pycnometer. This standard procedure closely follows the existing procedure for shipboard grain density. Chaney provided copies of the standard to all members, liaison, and guests. The standard will be incorporated into the ASTM Standards book. **ACTION: ODP/TAMU to provide the final version of this standard as part of the references in the physical properties manual.**

P. Blum reported to the panel on the status of index properties and software development. He and a programmer are currently working on software for data entry and data base storage using a commercial package, 4D. B. Mills is currently working on a Labview application to transfer results from the pycnometer to a Macintosh. Their goal is to have these two systems ready for Leg 150. **ACTION: ODP/TAMU report on status of the discrete index property measurements software.**

K. Moran reported on the results of the GRAPE evaluation on Leg 146 (Attachment 3). The GRAPE data has not, in the recent past, been corrected for high porosity sediment. The GRAPE evaluation report recommends that this correction is added to the existing software. **SMP recommends that ODP/TAMU modify the existing GRAPE software to incorporate the Boyce correction for pore water as documented in Appendix B of Attachment 3 (93-1).** R. Chaney raised concern over the issue of software documentation. R. Whitmarsh, a recent SMP member had difficulty at the Hawaii port call meeting determining what equations were applied in the software. There was no documentation available on the ship which described how the GRAPE software functioned. **SMP recommends that ODP/TAMU initiate a QA/QC procedure for development of any future non-commercial software acquisitions (93-2). See Attachment 4 for the SMP recommended procedure.**

J. Allan and R. Current reported on the new natural gamma instrument. The panel saw the instrument which has just recently been completed. The instrument is ready to be shipped to the Leg 149 port call. The panel was pleased to see the progress on the natural gamma instrument. The instrument is now ready for testing on the ship. SMP congratulates TAMU on this development effort. The instrument should be treated onboard the ship as still under development. Baseline data are required to develop procedures for routine application on the ship. The primary application is the development of procedures for total gamma counts as a data set for correlation with downhole logs. Special procedures for the application of spectral gamma should be developed after total gamma procedures become routine. SMP recommends the following test schedule for the collection of baseline data for the natural gamma instrument:

1. Test three different types of whole round core sections which represent (a) sediment deposited under high sedimentation rates; (b) sediment deposited under low sedimentation rates; and (c) hard rock core. Cores selected for testing should fill the liner and represent relatively undisturbed sections. Cores should be tested in the liner and special care should be taken to clean the liner.
2. Each core should be run on the MST track so that the core is stopped at the natural gamma detectors at the smallest possible depth interval (2 - 5 cm). At each depth interval, gamma counts and spectra should be collected over varying counting times as given in the table below:

Natural Gamma Minimum Sampling Time Experiment

Counting time (seconds):	10	20	40	80	160	320
High Sed Rate Core	X	X	X	X	X	X
Low Sed Rate Core	X	X	X	X	X	X
Hard Rock Core	X	X	X	X	X	X

Paleontology

E. Thomas reported on the status of the paleontological software. J. Firth recently reviewed Bugware and found the software restrictive for the user. There are several layers of screens which are very cumbersome. E. Thomas agrees with Firth's assessment of this software. The development of paleo software has been hindered by several issues, some of which relate to overlapping mandates of panels. Panel mandates were tabled until the joint meeting (see pages 16-17).

SMP recommends that the operator proceed immediately with the development of the 4D-based Rawhide paleontological software package. The panel re-states that the ease of data input and production of range charts for shipboard use are of the utmost importance (93-3). SMP strongly suggests that TAMU interact with SMP and IHP panel members on this development by utilizing the members for software prototype trials (see page 16 for joint panels recommendations).

J. Allan reported on other laboratory updates. Two Zeiss SV-11 stereo microscopes were installed during the Leg 147 portcall. These are equipped with rotating stages with both reflected and transmitted fibre-optic light sources, brightfield and darkfield illumination of thin sections, and plain or polarized light. The laboratory was inventoried and the new cabinet for storage of supplies and lenses seems to be working well. Technicians were trained in the use and maintenance of microscopes by Emile Meylan of SERCO at the Leg 147 portcall. The microscopes are now maintained at regular intervals by SERCO.

E. Thomas again noted that sailing paleontologists are still concerned about the availability of taxonomic references. ODP/TAMU should ensure that the ODP and DSDP results volumes are readily available to the scientists in this laboratory. New sieves are also needed in the laboratory. **ACTION: E. Thomas to forward name of sieve manufacturer to J. Allan.**

Petrology

J. Allan reported on recent lab upgrades and changes. One Zeiss Axioplan petrographic microscope was installed during the Leg 147 portcall. Additional lenses were also purchased for both petrologic and paleontological applications. This upgrade as well as the other two microscopes installed are a significant improvement over the previous equipment.

There has been concerned raised by a member of the Leg 149 science party regarding the upgrade of the XRF. The XRF is currently in the process of upgrade from a PDP11 controller to a PC controller. The upgrade began at the Leg 146 portcall where the motor controllers for the goniometers were changed for compatibility with the overall PC upgrade. Since then, controller cards have been replaced and the final stage of upgrade is scheduled during the Leg 149 portcall. Because there is a two week transit before Leg 149, there is potentially enough time to de-bug the completely upgraded system. **SMP recommends that some computer programmer**

time be allocated during the Leg 149 transit to assist the XRF technician in debugging the instrument and to assist in the incorporation of internal matrix corrections in the new system software (93-4).

J. Allan proposed that the panel begin to consider replacement of the XRF. Although the upgrade to a PC-controller will be a major improvement, the XRF has still been operating under severe conditions and will likely require replacement in the near future. He proposed that the panel consider an energy dispersive XRF which may reduce the lab space required for the instrument and reduce the mechanical complexity of the instrument. M. Rhodes noted that an EDS instrument may reduce detection limits and produce poor counting statistics. The panel agreed that it is prudent to review all options for replacing the old instrument at this time. M. Rhodes will work with ODP/TAMU in the evaluation of XRF equipment. It is difficult for the panel to make recommendations with respect to this type of equipment because the program does not have a capital replacement plan. **SMP recommends that PCOM provide guidance to the panels and the operator on the appropriate mechanism for large capital equipment replacement. It is likely that many of the large laboratory items will require replacement within a narrow period of time (93-5). Most organizations work within a system where a capital replacement plan is implemented so that replacements can be budgeted and performed with limited impact on normal operations.**

M. Rhodes provided a copy of his report on XRF sediment analyses. This should now be made available in the XRF laboratory for sailing scientists and incorporated into the XRF manual.

Peak identification software that currently exists on the ship for the XRD is very limited. M. Rhodes proposed that a small cost upgrade to the XRD would significantly enhance the peak interpetation. The panel discussed this suggested upgrade (ca. $3k) and agreed that it should be included in the priority list.

Computers

B. Julson reported on the status of shipboard electronic mail. The system has been working effectively for several legs. TAMU are monitoring the use and documenting the costs. Email currently operates on the honour system where scientists are asked to limit their mail to 7 total pages per week. The modem which now operates at 2500 baud will soon be upgraded to 9600. This should significantly reduce email blast costs.

J. Allan presented a list of software that is currently available shipboard. The list was prepared by the ODP computer services group. The panel agreed that the documentation of available software is useful information for both planning purposes and for design of the new computing system. **ACTION: ODP/TAMU to update the software list by subdividing it by laboratory and noting which software has been developed specifically for the program.**

A discussion of the Amoco voice recognition software for visual core description was tabled until the next meeting because B. Mills could not attend the meeting. **ACTION: B. Mills to report on his evaluation of this software.**

VCD/Sedimentology

The panel reviewed the new version of SAM. It was demonstrated to the panel by Chris Mato. The new version is an improvement. However, all new software developments should not be developed using old "forms" software tools.

Mike Rhodes reported at the last two meetings on his investigation into the possibility of incorporating infrared (IR) methods as routine shipboard procedures. No action has been made on the recommendations. M. Rhodes forwarded a copy of his summary report to J. Allan. K. Moran sent a letter to Tim Herbert in support of the development. Herbert is preparing a proposal for building an instrument to use the IR method. The most promising aspect of the method may be the ability to routinely determine three major components: $CaCO_3$, silica, and clays. Instead of actual abundances, the output may be ratios of peaks (e.g., the ratio of a clay peak to quartz peak). Some of the potential problems with the method include: sample preparation (require size of $< 2\mu m$), absorption of water, contamination, and precise weighing of an accuracy of 0.5 mg/300 mg. At the last meeting, C. Sondergeld reported that Amoco had been using this method for 5 years. They have invested development time of approximately 2 years just for sample preparation. They have found that the method has been better than XRD for their needs; however, they have spent a considerable amount of time on site specific calibrations. **ACTION: Based on the potential of this method, SMP requests that ODP/TAMU pursue two aspects: (1) contact C. Sondergeld to investigate the potential for cooperative research; (2) the recommendation from SMP meeting no. 7 to ODP/TAMU should still proceed: SMP recommends that a few samples are sent to Corelabs for infrared mineral analysis (92-8) for evaluation of the IR method.**

Another potential new development, an XRF scanner was discussed again. It could also be used as a tool for the rational selection of intervals for detailed XRF or XRD analyses. Approximate cost estimates range from $75k to $100k. This technology would likely be limited to elements heavier than Ca and Fe. Some of the potential problems are: core topography, variable water content, and matrix effects. P. Schultheiss reported that a research group in Holland has already developed a scanner of this type. It seems this device has been used successfully to measure Ca, Ti, Mn, Fe, Ni and Cu. **Action: M. Rhodes to contact Spectra for more information on this development and report to SMP. J. Thurow to contact Jansen regarding their development.**

Allan reported that the shipboard X-Ray will be installed during the Leg 149A. It is a large unit and will be located in the sedimentology laboratory area where space has been designated for a future split-core MST.

Geochemistry

B. Julson reported on the upgrades to this lab. The LAS replacement will be completed during Leg 149A. The Dionex was replaced during Leg 148. The Autotitration device is onboard. The Rock Eval was removed and sent to Houston for repair during Legs 147 and 148. It will be back onboard for Leg 149A for continued comparison with the Geofina. **ACTION: ODP/TAMU report on the Rock Eval/Geofina comparison study.**

Improvements to this laboratory are going well. SMP urges TAMU to continue training of the new chemistry technicians. In the past, this has been accomplished by sending technicians to Joris Gieskes' laboratory at Scripps.

Underway Geophysics

A real time navigation system has not yet been installed. Adam Klaus, a new staff scientist is presently reviewing the options and will make a recommendation for acquisition of a system after Leg 149. The requirements for a seismic workstation will also be reviewed at the same time as the requirements for real time navigation. **ACTION: ODP/TAMU report to SMP at the next meeting on the acquisition of the real time navigation system.**

Brad Julson reported on other upgrades which include a new cable puller which reduces the number of people required on deck for handling the equipment, a level winder for the mag winch, and a digital depth cursor the 12 kHz system. In addition, an ethernet bridge to the underway laboratory will be installed during Leg 149A.

H. Tokuyama was not able to attend and therefore the discussion of seismic data acquisition tasks was tabled until the next meeting **(ACTION: H. Tokuyama).**

25 February
SMP - continued

IV IHP Report

See pages 16-17 for the summary of the joint IHP/SMP meeting held 24 February.

V PCOM Report

J. Fox reported on several key issues which impact SMP. The first was the continued budget constraints that the program will be living with in the near future. Consequently, the need to place priorities on all recommendations from the panel is critical. PCOM has decided to proceed with land testing and another sea trial of the DCS. However, if the DCS is not successful during its next sea trial, PCOM will seriously consider whether to pull the funding from this development.

VI SMP Publications

K. Moran reminded the panel about the previous discussions of proceeding with an SMP publication on shipboard laboratories. The suggestion for this publication came from the DMP who have recently completed a booklet on ODP downhole measurements. It was agreed that the appropriate audience would be the broader science community, including the geoscience community that is not now directly involved in the program. However, the panel is reluctant at this time to recommend a new publication which would cost approximately $25K when there are higher priority requirements. Therefore the panel will review the existing brochures that are already published by ODP/TAMU, and provide comments and suggestions on how to improve these publications for the broader geoscience community. **ACTION: ALL PANEL MEMBERS review the booklet titled "Opportunities for Scientific Research" for the next meeting.**

VII Upcoming Legs

The chair assigned watchdogs to legs on the FY94 schedule. **ACTION: The watchdogs will be responsible for contacting the co-chief scientists and the staff scientist for two purposes: (1) to inform the co-chief scientists of any ongoing upgrades to laboratories or to any problems in existing laboratories; and (2) to identify any specific special shipboard measurement requirements for the leg.** The scheduled legs have the following watchdogs:

Leg 152: NARM East Greenland Margin	Robin Brereton
Leg 153: MARK	Dominique Weis
Leg 154: Ceara Rise	Ellen Thomas
Leg 155: Amazon Fan	Jürgen Thurow
Leg 156: Barbados	Ron Chaney
Leg 157: DCS	Kate Moran
Leg 158: TAG	Mike Rhodes

Attachment 5 is the operations schedule (revised 17 Dec 92). Panel members should contact J. Allan for the names of the co-chief scientists and staff scientists.

VIII CATSCAN Review

R. Chaney reported on his further investigation into the potential for using CATSCAN (CT) technology to replace discrete index property measurements. The cost is still prohibitive (see Attachment 6). Magnetic resonance technology should also be considered in this evaluation in future. The technology presently is slightly immature. We may be able to determine water content directly using our existing GRAPE system. **ACTION: R. Chaney to report on possible water content determination for the next meeting.** SMP will continue to review the technologies as possible replacements for the labour-intensive discrete measurements.

IX Core-log data integration

P. Blum reported that ODP/TAMU have put together a "position" paper on their approach to core-log data integration. All panel members received a copy of this paper. **ACTION: The chair asked that all members review the report and either provide comments directly to Peter Blum or to the next SMP meeting .** K. Moran reported on the progress that has been made in core-log data integration which includes:

(a) the construction of a core natural gamma instrument

(b) successful use of a high resolution magnetic susceptibility downhole logging tool on Leg 145
(c) creation of the science party position "core-log data correlation specialist"

P. Blum has also been assigned the task of coordinating core-log integration efforts for ODP. He recommended that we begin to clearly identify the software tools that are required for core-log data integration and place priorities on these tools. The initial efforts to identify the tools were completed at the joint IHP/SMP meeting where prime data sets were reviewed (see Attachment 7 for core-log data integration prime data requirements). There will be a workshop and short course on core integration methods in April at URI. The panel asked that ODP/TAMU look to the science community represented at this workshop for priorities in software tool requirements. **ACTION: Moran or Blum to report on the results of the URI workshop for the next SMP meeting.**

X Shipboard Operations

B. Julson updated the panel on the status of the bar code reader system for core and sample tracking. The system will first be tested at the sampling table and at the Corelog station where labels will be generated. The first lab which will implement the system is the chemistry laboratory where there is a large effort now required for sample tracking. SMP supports the implementation of the bar code system. Full implementation of the system will significantly reduce errors and will reduce the time taken for tracking samples and cores.

B. Julson also reviewed the proposed "wish" plan for modifying the shipboard laboratories during the upcoming drydock. The plan is currently acceptable to SMP. However, it is likely that budget constraints will control the ultimate renovation plan. The panel would like to keep abreast of the proposed renovations. Presently, the panel would rank expansion of the downhole measurements laboratory as its number 1 priority and expansion of the chemistry laboratory as its number 2 priority. **ACTION: ODP/TAMU to present updated renovation plan at the next meeting.**

SMP again encouraged ODP/TAMU to continue their efforts on training technical staff. The highest priorities are training for technical staff working in physical properties, geochemistry, paleomagnetics, XRF, and micropaleontological sample preparation.

XII Equipment Priorities:

The panel reviewed equipment priorities and recommend the following equipment acquisitions in priority order:

1. Navigation
2. WSTP upgrades[1] (temperature has first priority)
3. MST upgrade for natural gamma
4. Discrete resistivity
5. Bar code readers & printers
6. Seismic workstation
7. Imaging resistivity
8. Seismic towing system
9. XRD upgrade
10. Hardrock velocimeter (requires more panel review)

Note: carbonate autosampler not yet available - will be reviewed again at next SMP

XIII Software Priorities

The panel reviewed the software/computing requirements and recommend the following (in priority order):

1. Micropaleontology data acquisition
2. Database backlog[2] (IHP highly ranked)
3. XRF software for data acquisition/corrections
4. VCD
5. Natural gamma software integration w/ MST
6. Discrete physical properties
7. Core-log data integration software tools
8. Paleomagnetics software - complete
9. Petrology - replace HRTHIN & HARVI
10. MST
11. SAM/Corelog
12. Chemistry

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[1] This item was added after the chair reviewed the list with the other panel chairs.

[2] Item added after chair reviewed priorities with other panel chairs.

The first five software requirements represent software or computing needs that do not presently exist. The existing software package which is called VCD is actually a barrel sheet production software package and not a visual core description data acquisition package. Items 6 through 9 require major upgrades and changes. Items 10-12 have the lowest priority because existing software is acceptable, although each would benefit from major improvements.

XIV Panel membership

The panel agreed to nominate to PCOM Joris Gieskes as the new SMP chairperson. Moran will step down after the next SMP meeting. J. King's last meeting was in September and J.P. Valet's last meeting will be in September '93. Consequently, the panel requires paleomagnetics specialist nominations. SMP agreed to nominate the following three individuals to PCOM:

Janet Parizeau (Univ. of Washington)
Jim Ogg (Purdue)
Brad Clements (Florida International)

Mike Mottl rotates off the panel as of this meeting, primarily due to his new membership on the JOI USSAC Committee. The panel requires a geochemist to replace Mike. Because the panel is nominating an inorganic geochemist as the new chair, SMP nominates the following organic geochemists to replace Mike:

Jean Whelan (WHOI)
Berndt Simoneit (OSU)

The chair expressed, on behalf of the panel, thanks to both Mike Mottl and John King for their special contributions to SMP's efforts. Both Mike and John contributed a significant amount of time in providing advice and by evaluating equipment, methods and data for the program.

With the rotations of Mottl, King, Valet and Moran, only two of the original SMP members will remain on the panel. The chair requested that Thomas and Rhodes remain on the panel for at least the next three meetings to provide continuity for the panel and to follow the major developments in their respective disciplines (micropaleontological software and XRF/XRD upgrades).

XV Next Meetings

J. P. Valet agreed to host the next meeting in Marseilles. The dates requested for this meeting are 27-28 September, 1993 (Monday and Tuesday).

Tentative dates for the "spring" meeting should coincide with a port call. The proposed dates are 25-27 January, 1994 at the Belairs Research Laboratory in Barbados to coincide with the Leg 154 port call.

Summary of the Joint IHP/SMP Meeting
24 February

The panels discussed overlapping concerns and reviewed and updated the existing prime data definitions for each laboratory.

The panels agreed that there was a need to review the program's definition of prime data. The intention of the review is to provide a baseline definition of data base fields for the new ODP computing system which is currently in the process of being tendered. The panels broke into groups to review and define prime data, data format, and meta-data for the shipboard laboratories. Each group reviewed the existing draft report on Geoscience Data Types which the ODP/TAMU database group had compiled. Prime data review is an essential part of the development of the new ODP computing system. Contractors will require an updated definition of all of the prime data, required data formats, and definition of meta-data for each laboratory. Attachment 7 is the compiled results of the joint panel prime data definitions.

The panels also discussed six overlapping issues. The issues are: (1) GRAPE data, (2) paleontology and VCD software developments, (3) Leg 150 onshore holes, (4) limited sampling intervals, and (5) archiving procedures. A summary of each issue, the concensus from the panels and any recommendations follows.

(1) GRAPE data

SMP recently reviewed a problem identified by Leg 138 scientists who suggested that the GRAPE was measuring density 10% too high (see Attachment 3). **IHP/SMP recommend that the operator take the following actions (SMP recommendation 93-6):**

- **determine if and when the Boyce correction was removed from the software**
- **advice the science community about the requirement to correct GRAPE data**
- **at the time of the next release of the CD-ROM, replace old, uncorrected data with Boyce-corrected data**
- **immediately change the existing GRAPE software as per SMP recommendation 93-1**

(2) Paleontology and VCD software

Both panels urge the operator to develop the paleonotological data acquisition/data base software as its highest priority. **The panels agreed that IHP will take the lead in advising the operator on this development.** IHP will discuss all recommendations with the SMP specialist, Ellen Thomas. SMP suggests that the current ODP/TAMU development for a Macintosh software application proceed as quickly as possible.

The panels discussed the VCD software and agree that the existing VCD software is a barrel sheet production tool, rather than a visual core description data acquisition tool. **The panels agreed that SMP will take the lead in advising the operator on the development of a true VCD software package.** This development should accommodate a revision of the existing Slides program.

(3) Leg 150 onshore holes

The panels discussed the onshore holes that will be drilled by the USGS as a complementary science program to Leg 150, New Jersey Sea Level. The co-chief scientists have acquired funding to include the results of these holes in the scientific results volume for the leg and to transport the recovered samples to the repository. The panels do not see any problems with this effort. IHP raised some concern about the possible cost of curating the additional material. R. Merrill and C. Mato did not see the additional material as a large burden on the curatorial system. SMP members suggested that more scientific benefit could be attained in future if similar programs with onshore holes would also try to make routine measurements, similar to the shipboard procedures. This could be accomplished if SMP developed general guidelines for measurements on onshore hole samples. **ACTION: SMP to develop general guidelines to assist scientists in planning for measurements on complementary holes.**

(4) Limited sampling intervals

The panels are concerned about oversampling of cores on legs with low recovery. **IHP/SMP recommend that the co-chief scientists, staff scientist and curator should be allowed to define intervals of limited sampling where all normal sample requests do not apply. The science party would then be required to make requests for samples within this limited sampling interval. The co-chief scientists, staff scientist and curator would then approve or reject these new requests for the limited sampling interval (SMP 93-7).**

(5) Core archive procedures

SMP asked IHP to review the existing archiving procedures for two reasons: (a) for possibly providing a thinner archive section which would provide a better sample for non-destructive testing; and (b) to provide more sample material in the working half. IHP agreed to review the procedures at their next meeting.

AC Field Report

Several readings with the Electric and Magnetic Field Sensor for AC fields have been taken during the cruise under different conditions (see Table). At the beginning of leg 143 Bill Goree brought the Walker Hall Probe back on board after it had been repaired. We attempted to use the instrument at that time to measure the magnetic field on the drill floor. First, the machine did not work properly. The problem seemed to be a high AC field was interfering with the equipment. Once this problem was dealt with (Bill Goree wrapped the entire monitor in Al foil) it was again taken to the drill floor. A high field was read on the drill floor of approximately 30 gauss.

As you can see during this trip a high field never existed on the drill floor. The only place that gave a high AC field was the draw work area when the travelling block was going up the derrick. This is the only time the motors are working in the area and the field is only detected very close to the motors (within a foot). As little as three feet away from the motors the AC field and magnetic field drop quickly (see Table).

I have learned at this late date that the ship, when docked in Honolulu was in the direct path of the Navy's Microwave Communications Satellites. These dishes produce large AC fields that travel many miles with great intensity. Therefore, the problems with the Hall Probe, which is working now, seem to have gone away. In conclusion, there does not appear to be a high AC field that is saturating the ship. There are some areas (motors) where the field exists when the equipment is being run, and therefore, a local affect.

DATE	WHERE	AC FIELD (200 mVA)	HALL PROBE (GAUSS, DC)
8/4/92 (transit)	BRIDGE	0.1	
	CATWALK	0.3	
	DRILL FLOOR	0.5	
	LOGGING WINCH	3	
	HELIO DECK	0	
	FAN TAIL	0	
9/10/92 (drilling APC)	BRIDGE	0	
	BEACH	0	
	CATWALK	0.1	
	DRILL FLOOR	0.2	
	DOGHOUSE	0.6	
	HELIO DECK	0.1	
	MAIN DECK	0.4	
9/11/92 (tripping pipe)	DRILL FLOOR	0	1.7
	DRAW WORKS: BLOCK GOING UP	27	110
	3 FEET AWAY FROM DRAW WORKS	6	2.4
	DRAW WORKS: BLOCK GOING DOWN	0.2	2.2
	3 FEET AWAY FROM DRAW WORKS	0	1.5

ODP Resistivity Evaluation

A Report to the JOIDES Shipboard Measurements Panel
and the Ocean Drilling Program

K. Moran
Leg 146 Physical Properties Specialist

Introduction

On Leg 146, Cascadia Margin, two discrete electrical resistivity systems were evaluated. One was loaned to the program by Prof. Spieß of the University of Bremen and the other system was a quickly constructed probe built by Dave Heffler in my home institution, Bedford Institute of Oceanography.

Both instruments were set up in the core laboratory. Unfortunately, we were unable to use the Bremen instrument under computer control because the HPIB interface card could not be properly installed in the IBM-PC compatible computer. However, I tested the software without actually running any tests and found the interface to be user friendly and accomodated all of the ODP required fields. The software also includes a simple calibration procedure.

The Bremen instrument consists of a four electrode probe which is designed to be pushed into soft sediment (APC) cores. A temperature sensor is also incorporated into the probe. The electrodes are configured in a four-electrode spread. We connected the ouput from this box to a digital multi-meter for display of the voltage. Temperature was measured using a separate sensor.

The BIO sensor is similarly configured, but does not include a temperture sensor. The BIO probe has small "pin-like" electrodes more suitable for use in the harder formations that are sampled with the XCB and the RCB. When used, this instrument was connected to the same digital multi-meter.

Evaluation Summary

The Bremen system proved to be a reliable and stable instrument. Data were collected in all soft sediment cores quickly . The speed of the measurement would have been improved with the use of computer control. The probe design is rugged and can easily withstand the heavy use of ODP. This instrument is easy to calibrate and physically compact so that it can easily fit into the shipboard laboratory. The existing probe design can only be used with soft sediment.

The BIO instrument is not rugged enough to withstand heavy use. The probe and electronics designs require improvements so that they could meet the heavy use requirement of shipboard equipment. Resistivitiesmeasured with this instrument were surprisingly stable and values compared well with the Bremen instrument, which is much more easily calibrated. The physical electrode design is more suitable for harder sediments than the Bremen probe design.

Recommendation

The Bremen instrument is well suited for ODP use in APC cores. All of the SMP system requirements are included in the design: easy calibration, direct data capture to computer files, stable and repeatable measurements , and a rugged design. The only advantage of the BIO system is the probe design. Consequently, I recommend the purchase of the Bremen instrument and request an additional probe be built which can be used in more lithified sediments.

ODP GRAPE Evaluation

A Report to the JOIDES Shipboard Measurements Panel

by

J. Lloyd, ODP/TAMU
K. Moran, SMP Chair

23 October 1992

Introduction

The JOIDES Shipboard Measurements Panel (SMP) was contacted by one of the co-chiefs from Leg 138 and several members of the Leg 138 science party regarding the liability of the gamma ray attenuation porosity evaluator (GRAPE) which is part of the multi-sensor track (MST). The scientists on Leg 138 suspected that the GRAPE was calculāting a bulk density that was up to 10% too high (Fig. 1). The offset between the discrete measurements and the GRAPE density was highest in high porosity materials.

R. Whitmarsh, SMP member, reviewed the GRAPE software and suggested several potential problems which could account for this offset: (1) the attenuation coefficient for the original Barium source was not changed to the appropriate Cesium coefficient when the source was changed at the beginning of ODP; (2) appropriate calibration calculations are not done in the software; and (3) a correction for pore water is not included in the software as recommended by Boyce (1976).

Evaluation

J. Lloyd (ODP/TAMU marine technical specialist) and K. Moran (SMP Chair) further evaluated the GRAPE system during Leg 146. The first potential problem identified by Whitmarsh was evaluated in two ways: (1) review of the existing GRAPE software; and (2) calculation of bulk density assuming an incorrect (barium) attenuation coefficient. The existing GRAPE software does not explicitly include an attenuation coefficient, rather the coefficient is determined using an aluminum standard with two different diameters. In addition, the calculation of bulk density using an attenuation coefficient of barium resulted in errors much greater than the observed error, on the order of 50%. Consequently, it was concluded that this problem was not the cause of the Leg 138 offset.

The second potential cause of the offset was studied by reviewing the existing software and documenting all of the equations used to determine bulk density from gamma counts. The software uses a standard which has two Al components of different diameters for determination of the intensity of the source (N) and the attenuation coefficient, μ (Appendix A). The software restricts the measurement of GRAPE density so that it will function only after a standard has been run through the MST. Although potentially better methods exist for system calibration and determination of coefficients, this method is adequate and somewhat user fool- proof. It was concluded that a calibration error did not cause the Leg 138 offset.

The third possible problem was evaluated by running a distilled water standard through the GRAPE, measuring the maximum number of counts and calculating the bulk density, assuming the Boyce (1976) correction was not applied in the software. The resulting calculated bulk density for water was 1.1 Mg/m3, the same value that was automatically output by the MST software. This bulk density is 10% higher than the actual density of distilled water. The Boyce (1976) equation was then applied using this GRAPE-measured density and the resulting corrected bulk density was 1.0 Mg/m3. The applicability of the Boyce correction to low porosity materials was checked by applying the correction equation to the Al standard. This resulted in a small change in bulk density (<0.5 %). Based on these tests, it was concluded that the Boyce correction was not included in the MST software and that this was the likely cause of the 10% error in bulk density for the high porosity sediment recovered during Leg 138.

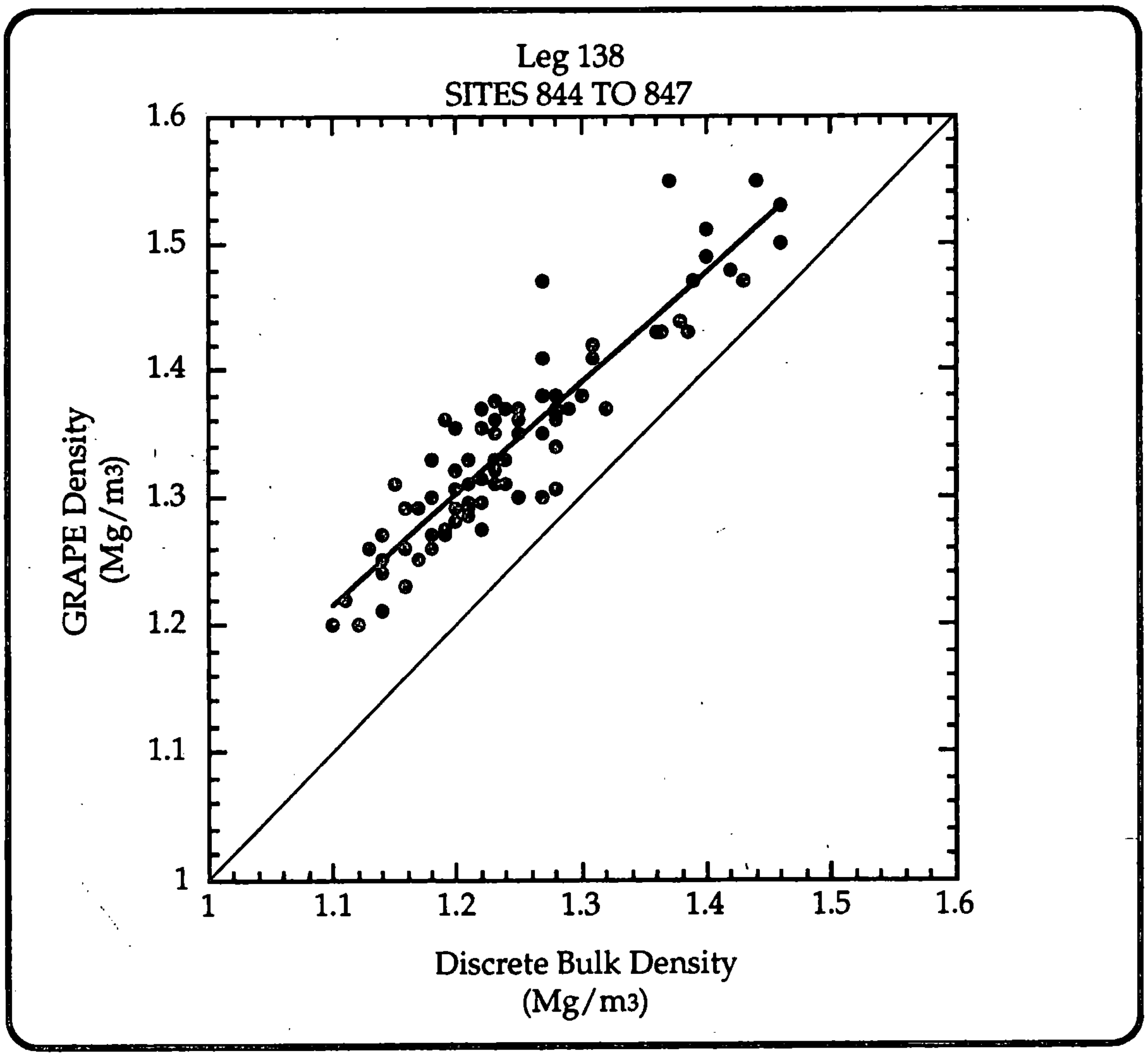

Fig. 1 Leg 138 bulk density comparison of discrete data and GRAPE data. Discrete bulk density is calculated from measured mass and volume. The data are from the upper 15 m of Sites 844 through 847 where sediment has the highest porosity.

Recommendations

The results demonstrate that the formulation currently used in the MST software for bulk density relies only on the source intensity and the Compton mass attentuation coefficient as determined from the Al calibration standard run. It is necessary, therefore, to correct the resulting bulk density determination calculated in the GRAPE subroutines of the MST software and substitute it back into the Boyce equation (Appendix B) to obtain true sediment bulk density.

Based on this evaluation, the following steps are recommended:

(1) Include the Boyce (1976) correction in the MST software for determination of "true" bulk density. Both values of bulk density should be recorded, uncorrected and "true".

(2) Include a summary sheet (e.g. Appendices A and B) of the MST equations used to determine bulk density in the physical properties cookbook so that shipboard scientists will understand the procedure.

(3) Use a distilled water core standard as a check on GRAPE-determined bulk density. When values of bulk density for the water standard vary by greater than + 0.01, then the system should be re-calibrated using the Al standard.

Reference

Boyce R.E., 1976, Initial Reports of the Deep Sea Drilling Project, Volume 33.Definitions and laboratory techniques of compressional sound velocity parametersand wet water content, wet bulk density, and porosity parameters by gravimetric andgamma ray attenuation techniques, p. 931-951.

Appendix A
Procedures Used in the Existing GRAPE Software (October, 1992)

The gamma ray attenuation porosity evaluator (GRAPE) is based on the Compton scattering effect of low energy gamma rays during collisions with other electrons. Gamma rays are transmitted through the material and the attenuated signal is detected with a sensor. Attenuation occurs from Compton scattering and from absorption (photoelectric). However, the dominant process is Compton scattering where the gamma ray (photon) gives up energy upon collision with an electron. Using this mechanism, bulk density is determined from the following basic equation:

$$\rho = \frac{1}{\mu d} \times \ln (N_o/N) \qquad \text{(A1)}$$

where: ρ is the bulk density, μ is the Compton scattering coefficient, N_o is the intensity of the gamma source (counts), d is the diameter of the material, and N is the intensity of the gamma rays which are detected after passing through the core sample diameter. In the ODP MST system, the coefficients which are used in this equation to calculate bulk density are determined through calibration of a standard with a known density. The known density standard (Al) has two components of different diameter which are run through the GRAPE prior to running any core sample. The results of this calibration run are used to determine the coefficients in equation (A1) (Fig. A1). In the ODP software, the calibration coefficients are designated as DCALK1 and DCALK2 and are determined as follows:

$$\text{DCALK1} = \frac{(\rho_{s1} - \rho_{s2})}{(\ln (N_1/N_2))} \qquad \text{(A2)}$$

where N1 and N2 are the measured number of counts for the two different diameter sections of the calibration standard, and ρ_{s1} and ρ_{s2}, are the two different averaged densities of the calibration standard as derived from gamma counts, and:

$$\text{DCALK2} = \rho_{s2} - \text{DCALK1} * \ln (N_2) \qquad \text{(A3)}$$

The uncorrected bulk density of any core sample interval is then determined by:

$$\rho = \text{DCALK1} * \ln (N_{max}) + \text{DCALK2} \qquad \text{(A4)}$$

where N_{max} is the number of counts measured at each sampling interval.

Equation (A4) can be derived by substitution of the respective densities and intensities for each part of the standard into equation (A1). If one takes the two equations for the two different diameters of the standard:

$$\rho_{s1} = \frac{1}{\mu d} * \ln (N_o/N_1) \qquad (A5)$$

and,

$$\rho_{s2} = \frac{1}{\mu d} * \ln (N_o/N_2) \qquad (A6)$$

subtracts them and simplifies, the result is DCALK1 = $-1/\mu d$ and DCALK2 = $\ln N_o/\mu d$.

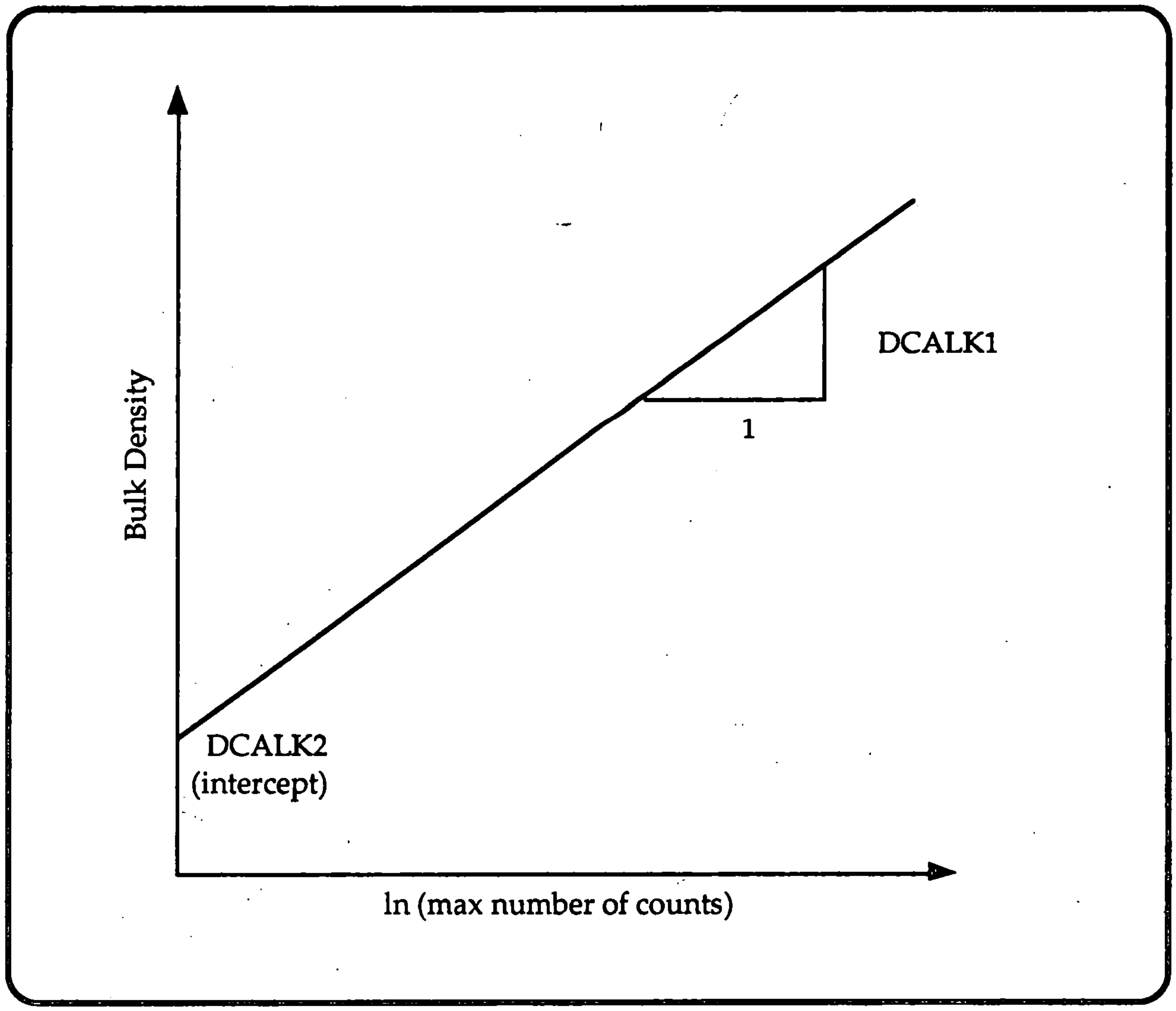

Fig. A1 Calibration coefficients determined from running the ODP Alumunim standard through the GRAPE. Bulk Density is known for each part of the Al standard diameter and the maximum number of counts is measured during the calibration run. A linear curve is fit to the two data points to determine DCALK1 and DCALK2

Appendix B
Recommended Correction for GRAPE Bulk Density

The Compton mass attenuation coefficient can be assumed as a constant for most of the common minerals found in marine sediment and rock samples. One exception to this assumption is water, containing hydrogen (atomic number of 1). The Compton mass attenuation coefficient of water is approximately 10 percent different than that of common minerals. Most marine sediment are a two-component system of minerals and water. Consequently, a correction must be applied to marine sediment to account for this difference in mass attenuation coefficients in the two components. Boyce (1976) developed a correction for the GRAPE bulk density determination which accounts for the lower Compton mass attenuation coefficient of water. The equation is as follows:

$$\rho = \frac{(\rho_{bc} - \rho_{fc})(\rho_g - \rho_f)}{(\rho_{gc} - \rho_{fc})} + \rho_f \qquad \text{(B1)}$$

where:

- ρ = true bulk density
- ρ_{bc} = bulk density calculated from gamma counts assuming a mass attenuation coefficient for quartz
- ρ_f = true fluid density
- ρ_{fc} = fluid density calculated from gamma counts assuming a mass attenuation coefficient for quartz
- ρ_g = true grain density
- ρ_{gc} = grain density calculated from gamma counts assuming a mass attenuation coefficient for quartz

and have values as follows:

ρ_f = 1.024 Mg/m^3, ρ_{fc} = 1.128 Mg/m^3, ρ_g = 2.65 Mg/m^3, pgc = 2.65 Mg/m^3 (assuming an attenuation coefficient for quartz).

Recommendation for Initiating a QA/QC for Noncommercial Laboratory Software

It is recommended that the technical staff begin a QA/QC program on all non-commercial software that has been generated for each laboratory. This should consist of the following as a minimum:

1. Compile a list of all user generated programs and macros employed in the labs onboard the ship.

2. Evaluate the status of each program indicating whether it has been built in an organized or *band-aid* fashion and whether it has been fully documented.

3. Fully documented will consist of a users manual, sample input/output data files, and a program that contains enough comment statements so that a user can understand its function.

4. Calibrate and verify all programs against either hand calculations or other programs accepted by the scientific community.

If outside assistance is required to perform program calibration, technical staff may solicit support from the SMP.

ODP Operations Schedule

Leg	Port of Origin	Dates
152 East Greenland Margin	Reykjavik 24-28 Sept	29 Sept - 24 Nov 93
153 MARK	Lisbon 24-28 Nov	29 Nov - 24 Jan 94
154 Ceara Rise	Barbados 24-28 Jan	29 Jan - 26 Mar 94
155 Amazon Fan	Recife 26-30 Mar	31 Mar - 26 May 94
156 Barbados	Barbados 26-30 May	31 May - 26 July 94
157 DCS Engineering	Barbados 26-30 July	31 July - 25 Sept 94
158 TAG	Barbados 25-29 Sept	30 Sept - 25 Nov 94
Dry Dock	Lisbon	25 Nov - 9 Dec 94

Discrete Measurements of Index Properties Update
SMP Meeting 2/93
R. Chaney

Purpose: Determination of bulk density and water content of intact cylindrical cores and biscuits.

C.T. Units (Conformal Tomography Unit)

Summary
Industry currently has built small CT units the size of a desk with high resolution (0.01 mm). Units typically handle upright samples with scanning rates of approximately 2 min/in of core. The technology will allow the operator to select a region of interest to determine properties. Cost for these units are $350,000. I have not found any units that handle continuous horizontal cores although one group says they could build us one for $500,000.

Additional Information
1. Units can operate using either an X-ray source or gamma ray source. This latter is very slow and can typically be found in universities.

2. Shell and ARCO Oil companies have adapted medical scanners with specially designed core holders to handle the weight.

3. CT technology gives you bulk density and water content but needs calibration curves.

Magnetic Resonance Imaging

Summary
The method will give porosity. Water content measurement by slowing of fast neutrons. The neutron source and detector both remain at the surface. This procedure has been standardized by ASTM in D3017 using either a sealed mixture of americium or radium as a source and a target material such as beryllium. A slow neutron detector can be either boron tri-fluoride or helium - 3 proportional counter. Procedure requires calibration curves.

IHP/SMP Prime Data Definitions
24 February 1993

Paleontology
(replaces existing draft versions of paleontology/ageprofile data files found in *Geoscience Data Types, 1 April 1992,*)

Prime Data

Sample ID fields (Leg, Site, Hole, Core, Core Type, Section, Top Interval, Bottom Interval, Marker)
Observer ID
Fossil group (alpha-numeric; 15 positions)
Taxa information:
- genus (30 letters)
- subgenus (30 letters)
- open nomenclature (10 letters)
- species (30 letters)
- subspecies (30 letters)
- original author (20 letters)
- original year (4 letters)
- author concept (20 letters)
- year concept (4 letters)

Taxa abundance:
- numeric (3 positions)
- relative abundance choice of:
  - abundant >60%
  - common 30-60%
  - uncommon 10-30%
  - rare 1 - 10%
  - trace < 1%
  - barren 0
- presence/abscence

Taxa preservation, choice of:
- very good
- good
- moderate
- poor

Zone (8 letters)
- abbreviated zone (16 letters)
- author (20 letters)
- year (4 letters)
- genus (30 letters)
- species (30 letters)

subspecies (30 letters)
  author (20 letters)
  year (4 letters)
Subzone (8 letters)
  abbreviated subzone (16 letters)
  author (20 letters)
  year (4 letters)
  genus (30 letters)
  species (30 letters)
  subspecies (30 letters)
    author (20 letters)
    year (4 letters)

Visual Core Description

The prime data set for the ODP database as listed in *Geoscience Data Types, 1 April 1992,* Chapter: Sediment/Sed. Rock requires the following modifications:

- Lithology should not be open text field, rather the fields should be defined and selected from with the option of adding new field names
- Additional field for colour, using the l*a*b* classification system
- Additional field to store pointer to colour reflectance spectral data file
- Additional field to store pointer to grain size data file

Chemistry

The prime data set for the ODP database as listed in *Geoscience Data Types, 1 April 1992,* Chapter: Interstitial Water requires the following modifications:

- a field for pretreatment
- a field for original volume
- a field for observer/analyst
- a field for chemical species

The prime data set for the ODP database as listed in *Geoscience Data Types, 1 April 1992,* Chapter: Sediment Chemical Analyses requires the following modifications:

- GHA/GC: add field for pointer to basic spectral data
- AA, XRF: use same format for each method and add the following records for each method: species, units, method, original sample size, aliquant analysed, weight % or ppm, analyst, comments
- L01: add to database: L01, original sample size, aliquant analysed, analyst, comments
- XRD: add to database: sample mount type, filter, radiation source, sample

treatment, sample description, pointer to spectral data (intensity vs. 2θ)

The prime data set for the ODP database as listed in *Geoscience Data Types, 1 April 1992,* Chapter: Hard Rock Analyses requires the following modifications:

- Rocky fields should no include mineral composition as a separate field
- XRD: use same format as listed above for sediment chemical XRD analyses
- XRF: use same format as listed above for sediment chemical XRF analyses
- LO1, CHNS: add to database, use same format as listed above for sediments, except add sample size and sample aliquant

Meta-data for all of the chemistry fields should include the Scientific Volume Explanatory Notes

Physical Properties

The prime data set for the ODP database as listed in *Geoscience Data Types, 1 April 1992,* Chapter: Thermal conductivity requires the following modifications:

- add probe temperature as a function of time
- add resistance vs length of heater coil

The prime data set for the ODP database as listed in *Geoscience Data Types, 1 April 1992,* Chapter: Compressional/Shear Wave Velocity requires the following modifications:

- remove all fields for shear
- two options for this measurement are Hamilton or DSV, so add test type field
- add calibration data for DSV: water temperature, travel time, calculated transducer separation
- delete field for beaker
- delete reference to thermcon raw data file

The prime data set for the ODP database as listed in *Geoscience Data Types, 1 April 1992,* Chapter: P-Wave Logger requires major modifications. The P-Wave Logger is now the Multi-Sensor Track with four sensors: Magnetic Susceptibility, P-Wave Velocity, GRAPE density, and Natural Gamma. The Chapter on GRAPE should be integrated into a new MST chapter.

Replace the words *thermal conductivity* with *index properties* on page 87 of *Geoscience Data Types, 1 April 1992,*.

Delete the words *thermal conductivity* on page 94 of *Geoscience Data Types, 1 April 1992,*.

Replace the words *thermal conductivity* with *shear strength* on page 100 of *Geoscience Data Types, 1 April 1992,* .

Underway Geophysics

Prime Data

Log of all operations
- deploy/recovery times
- deploy configurations

Navigation (GPS)
- Date
- Time 10^6
- Latitude 10^4
- Longitude 10^4
- Errors
  - PDLP
  - VDLP
  - HDLP
- Velocity
  - north
  - east
- Heading
- #sat
- ADCP
- other

Magnetics
- Time
- Date
- Field (0.1 nt)
- count?
- pointer to paper record

Seismic
- Time
- Date
- Shotpoint
- pointer to paper record types or to SEGY tape at each shotpoint

Core-Log Data Integration

Prime Data

Parameter	Units
Gamma spike[1]	unique to CLI
wireline depth	m, mbsf
CSI (core, section, interval)	same, mbsf
Sonic core monitor (SCM)	traveltime, clocktime
Bit depth indicator	mbsf, clocktime
Scribing core catcher	csi, theta
Tensor	clocktime, theta

Meta-data[2]

Operator's name
Date
Hole/Leg
Version/stage (e.g. onboard, cruise, final, pre-postcruise, publication)
Software setup/packages/versions (e.g. Khoros, etc.)
Definition of anchor dataset (usually CSI or logging record(s))
Repeated for each range of anchor:

- Range in anchor dataset
- Dataset(s) compared in the transform
- 'Picks" (tie points; csi to csi or csi to wld) with rationale
- Shift method (stretch or drag; particular to each dataset; could use default or adjust)
- Property sets (datasets which 'tag along')
- Plausibility limits (maximum adjustment permitted)
- Precision limits (depending on data sampling interval)
- Filters applied (i.e. re-sampling, trend removal, etc.)
- Quality/suitability of data for processing (e.g. seastate, logging speed, whether jams at bridges, core recovery, etc.)
- Confidence, in terms of autocorrelation techniques (incorporating error bounds on parameters)

Well-defined Data Types in *Geoscience Data Types, 1 April 1992,*

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[1] Proposed: to consist of a weak gamma source attached to one pipe in the bottom hole assembly which will be detected by the natural gamma tool

[2] Note: strong requirement for versioning

Corelog
Carbon/Carbonate
Paleomagnetics

Data Types Not Yet Defined

Downhole Measurements
Drilling Parameters
Structural Geology