Meeting Minutes
DEep Submergence Science Committee
Woods Hole Oceanographic Institution
Carriage House
27-28 July 1999

Appendices

I. Meeting Agenda
II. Participant List
III. 1999 NDSF Operations
IV. NSF Report and Academic Fleet Review Recommendations
V. NURP Science Dive Activities 1998
VI. 1999 & 2000 ALVIN/ROV Schedules
VII. MBARI Activities in 1999 & 2000
VIII. MPL Report on 1999 & 2000 plans
IX. HURL Report
X. ROPOS Report
XI. Draft Oil Industry Rqts for a Survey AUV
XII. Post-ALVIN Overhaul, 2001 and Beyond
XIII. ROV Upgrade Summary
XIV. Status of 2nd NDSF Equipment Upgrade Proposal
XV. ATLANTIS Turnover Book
XVI. SEA CLIFF Engineering Study

Welcome and Introductions – The DEep Submergence Science Committee met in the Carriage House of Woods Hole Oceanographic Institution on July 27-28, 1999. Patty Fryer, DESSC Chair, called the meeting to order at 8:50 am. After introduction of the participants, the meeting agenda was reviewed, see ***Appendix I***. The items of the agenda were addressed in the order as recorded in these minutes. The meeting participant list is included as ***Appendix II***.

Accept Minutes - The December DESSC meeting minutes were accepted as written.

National Deep Submergence Facility (NDSF) Operator's Report – Dick Pittenger gave the introduction to the NDSF report by noting that KNORR can be seen at the dock in Woods Hole. SEA CLIFF is now located in its storage garage at WHOI while their engineering study is in progress.

1999 NDSF Operations – Rick Chandler provided a summary of 1999 ALVIN and ROV operations, see ***Appendix III***. Operations in 1999 have been going well with a lot of work already accomplished this year with the ROVs. The average bottom time for ALVIN in 1999 has been 5.5 hours. For the ROVs, the average bottom time per lowering for Jason has been 13 hours, 15 hours for Argo II and 33 hours for DSL-120. Rick provided a list of ALVIN/ROV highlights from this year's operations. Only two ALVIN dives have been lost this year (due to weather and ship anchor repair). ALVIN bottom time is up for the third straight year. 252 nautical miles have been surveyed with the towed vehicles. Argo II night operations were

National Oceanic and Atmospheric Administration/National Undersea Research Program (NOAA/NURP) – Gene Smith reviewed the NURP science dive operations for 1998, see ***Appendix V***. There were 373 human occupied submersible dives in 1998 as well as 202 ROV dives. 87 projects were carried out. Funds for NURP field programs are dispersed through the NURP centers. There is $500K a year marked for support of the National Deep Submergence Facility operations. A center can add to this amount if it is their center priority. There was a general discussion about the 1999 NURP scheduling problems and how they can be avoided in the future. Gene encouraged the community to keep NURP proposal pressure high. Communication with the NURP centers is essential throughout the scheduling and planning process.

DESSC Issues:

DESSC Terms of Reference – Prior to the meeting, Patty Fryer drafted proposed revisions to the DESSC Terms of Reference. The Terms are being revised so that they more adequately reflect the role of DESSC. It was noted that DESSC no longer reviews ALVIN proposals. Dan Fornari stated that an important role of DESSC is to try to predict where the facilities are needed in the out years. He suggested that the agencies, operator, and UNOLS Office work together to inform the community of funded programs and their locations for the out years. The community needs to know where funded programs are planned so that collaborations could be formed. One suggested approach is to facilitate this planning discussion into the community by identifying heroes and giving them an opportunity to speak at the December DESSC meeting. It was also suggested to hold planning workshops at AGU or the Ocean Science Meeting. This will be re-addressed later in the meeting. To help maximize the utilization of the Facilities, a suggestion was made to add a click-on button on the DSF page (with a link to UNOLS/DESSC page) showing "funded-unscheduled" programs for 2001 and beyond. WHOI and the UNOLS Office could let the community know that the list is there by e-mail blast. The times in which the vehicles would be out of service for overhauls/maintenance should also be included on the webpage. It was recommended that an e-mail blast be sent to the community announcing the next ALVIN overhaul dates and when the vehicle would be in the Atlantic. Cindy Van Dover, Dan Fornari, and Bill Ryan volunteered to come up with a plan to help maximize future facility use.

Deep Submergence Scheduling: 2000 and Beyond -. Jon Alberts reviewed the 1999 ALVIN and ROV schedules, see ***Appendix VI***. Operations this year began in the Southern EPR then continued in the Hess Deep, Northern EPR and Southern California/Oregon after a maintenance period. The second half of the year will see work in the Gulf of Alaska, Juan de Fuca, Southern California, before ending in the Northern EPR. This is a very ambitious schedule. The port times are not only being used for staging, but also for ship maintenance.

There were four ROV operations in 1999 on ships other than ATLANTIS: Bob Ballard in the Mediterranean on a chartered vessel, and Jim Cowen, Chadwick/Embley, and Alan Chave all on R/V THOMPSON. The Cowen and Chadwick/Embley legs were on Juan de Fuca and the Chave leg was to repair the H20 installation.

through NURP. Jim Bellingham added to the report by reporting that MBARI will be working with WHOI on the Jason upgrade. MBARI will have an AUV program in the future.

MPL – Patty Fryer summarized MPL operations in 1999 and those planned for 2000, details are provided in ***Appendix VIII***. MPL has been involved with the substantial upgrade of their Deep Tow Fish #6 and the Control Vehicle. There are four funded Control Vehicle operations scheduled for 2000, two out of Hawaii and one in the Juan de Fuca Plate area. In March, MPL used their Short baseline (SBL) navigation. DESSC was interested in this system and suggested that it be investigated to see if it could also benefit the NDSF. Ken Smith of SIO reported that they are developing a vertical profiling pump sampler that they will use in the Arctic. They also have funds to start developing a second generation ROVER.

ATV – CMD Sadorf of the Navy Deep Submergence Group gave the ATV report. He began by reporting that ATV is operated from the vessel KELLY CHOUEST, which is also the support platform for other Navy vehicles. ATV can be operated in a flyaway mode by shipping it and its A-frame to other support platforms. When ATV was sent to the east coast, it required five flatbed trucks. ATV is approximately 100 lbs. positively buoyant and utilizes a very capable fiber optic cable, however it is different from the UNOLS standard .680 fiber optic cables now in operation. Navigation on KELLEY is being upgraded to the Nautronix 916 ultra short baseline which inputs to the Winfrog system.

ATV recent operations included the discovery of USS YORKTOWN, work at the Atlantic Undersea test and evaluation center and operations off Southern California with Peter Lonsdale. Peter Lonsdale was charged approximately $6k/day for the ATV operations. Since the Navy is concerned with reliability of the system, they recommend that ten extra days be added to a cruise to work out any kinks. No support for ATV can come out from Navy operations. It requires approximately 18 people for an ATV operation. There is no longer in an agreement with NURP for a 60-day annual availability of the vehicle for science. CMD Sadorf reported that continual use is required to sustain ATV. This past year the Navy sent an e-mail to SIO offering a two-week availability period. Peter Lonsdale was the only one who took advantage of the opportunity with four sea days. The future of ATV is unclear.

HURL – Patty summarized the HURL written report, see ***Appendix IX***. HURL 1998 projects fell into two categories, the Innovations Project and the CORE project. The Innovations project was a new thrust and made 30 PISCES V dives and 33 ROV dives. This was the first year HURL routinely used their RCV-150 ROV. The CORE projects made 20 dives including four dives for HUGO servicing. It was reported that the HUGO signal has been lost and a broken cable is suspected. HURL is investigating tools for operations in high heat environments. This is in cooperation with NASA in preparation for Europa exploration.

ROPOS – The ROPOS written report is included as ***Appendix X***. The vehicle was used in two cruises for THOMPSON, one to support the NOAA/NURP vents program. The other cruise was to look at changes since last year's chimney recovery program at Endeavour Ridge. Improvements to ROPOS include better camera controller and a new data management system for providing integrated dive logs. The Canadian funding agency, NSERC, has tripled funding for Canadian scientists for use of ROPOS. There is still some time available for ROPOS is 2000.

DESCEND Workshop – Patty Fryer reviewed the information contained on the DESCEND website, as well as the tentative agenda for the workshop. The workshop will be three days with Day One is planned for science discussion. Day Two is to identify future technology. Breakouts sessions are planned each day with plenary sessions to follow. Patty reviewed the list of people who have been approached to be speakers and session leaders. She reviewed the application form and some minor editorial revisions were recommended by DESSC. There was a brief discussion on the involvement of the press during the workshop. There was concern that participation by the press would hamper open discussion by participants. The final day of the workshop will include a wrap-up session as well as a presentation by Jim Bellingham on technology costs and realities.

July 28, 1999 - Day 2

Long Range Planning:

ATLANTIS/ALVIN/ROV 2001/2002/2003 - There are a number of programs which are funded but could not be scheduled in 2000 for logistical reasons. A world map was presented showing ATLANTIS/ALVIN/ROV pending and funded programs for the out years, see Appendix XII. There is funded work in the Indian Ocean as well as a funded ALVIN program off Hawaii. Additionally, there is quite a bit of interest for continued work in the traditional areas (Pacific and MAR) in the out years.

Upgrades to the National Facility Vehicles, Science Sensors and ATLANTIS:
Dick Pittenger began with a perspective on the future of deep submergence science. The community is very stimulated. The vehicle and technologies have moved at such a quick pace over recent years, it is time to look forward.

Status Report on Current Upgrade Proposals – Andy Bowen began by giving highlights of a recent Bob Ballard cruise. He showed an example of the navigation tracks obtained during the cruise using three different systems. Andy showed various Imaginex images as well as a photo mosaic of one of the shipwrecks which had been located. He showed the 150 kHz subbottom profiler data obtained using Jason. He noted that this was in relatively shallow water and would not be standard equipment on Jason, but was part of the ongoing R&D efforts by WHOI DSG and DSL. He showed photos of various artifacts collected.

Andy provided a summary of objectives for ROV upgrades. WHOI submitted a proposal for a two-year program to upgrade the tethered vehicle systems of the NDSF. The first year funds were provided in early July, see ***Appendix XIII***. Some of the major objectives include: improving portability, incorporating upgrade developments from other research operations, providing an open telemetry architecture to provide flexibility for future technology, the ability to operate to 6,500 meters with the possibility to extend the depth within the limit of the currently used .680 fiber optic cable, enabling concurrent operation of ROV Jason and ARGO II or DSL-120 so that these vehicles can all stand alone as separate operations. The issue of whether simultaneous ROV and tethered vehicle operations on three different ships is logistically feasible from a personnel point of view needs to be addressed as it would be very difficult to field three teams of technicians under the current DSF model. The proposed upgrade will use

The new video system and switcher for ALVIN have been designed and components are purchased. They are being reconfigured for installation in ALVIN. Several models of flat LCD screens have been tested for use in ALVIN. WHOI is in the process of purchasing one additional scanning altimeter sonar for use with either ALVIN or Jason. Several digital snapshot cameras have been purchased and are being used by scientists. WHOI is continuing to test commercially available consumer grade cameras in order to optimize strobe synchronization capability for the hand held digital cameras. A full-scale test of the steerable elevator is envisioned for late 1999 or early 2000, most of the components of the system have been fabricated and model tests completed.

The DESSC discussed the status of various other items. No improvements have been made to the Winfrog system. Part of the reason for this is that the ship has been operating in the South Pacific, and it was too difficult for the vender to travel to the ship. The basic problem is that the Nautronix 916 is not compatible with the Winfrog system. WHOI is satisfied with the performance of ATLANTIS' SeaBeam system. They feel that it is performing well because the array is mounted on a "cowcatcher" away from the hull of the ship.

ATLANTIS Improvements- Joe Coburn reported that through the efforts of SIO, WHOI and DESSC, a list of ship improvements/upgrades or problem areas (also referred to as a turnover book) has been compiled. Joe provided the status of items included in the turnover book, see ***Appendix XV***. There are still items that need to be corrected, but with ATLANTIS full schedule it has been difficult to get things accomplished. He reported that the anchor handling problem has caused cracks and it is still banging. WHOI is still finding new items to be added to the turnover book and suggestions from the community are welcome. Cindy Van Dover suggested adding an anti-motion table for stabilizing things on lab tables (microscopes). Marv Lilley suggested the STBD hydroboom fairlead be improved for switching out leads. Cindy commented that lab table arrangements should be looked at. She would like more low tables in the lab since these are used for computers.

NDSF Memorandum of Understanding (MOU) - Patty received a copy of the MOU from the agencies before it was delivered for signature approval. The MOU is intended to be reviewed every three years. The agencies reported that the only major change from the previous MOU was the elimination the NDSF funding safety net. It was also suggested that NSF should have an ROV expert on the panels for review of ROV proposals. DESSC could provide a list of ROV experts. It was commented by DESSC that although the MOU is between the agencies, it does impact the operator and DESSC. As a result, DESSC should have had an opportunity for review and input to the MOU update early in the process. The MOU is being routed through the agencies for signature approval.

Future Funding for Deep Submergence Science - Dan Fornari led a discussion on future funding paradigms for the deep submergence science. He introduced the concept of having one lead agency adopt deep submergence and be the advocate for the deep submergence needs. There appears to be a decoupling with one agency supporting the development and construction of assets and the another agency supporting operations. ODP could be used as the model. The DESSC in the past has had to focus on short-term issues, now it is time to look at future directions and needs. Support for deep submergence science has been healthy, but now ways of

Personnel Overtime Issues – Overtime on ATLANTIS has been an issue on at least three to four cruises this past year. Scientists expect to be able to operate 24 hr/day when on station. Managing the overtime requirements in terms of budget and manpower has been a challenge for WHOI. If a person is added to a cruise, it costs approximately $300 a day, but it means a bunk. This is not being proposed by WHOI. Paying the overtime costs about $500 a day. Pre-cruise communication is essential in defining personnel requirements for the science operations. The funding issues associated with overtime costs needs to be addressed by WHOI and the funding agencies. This issue needs further attention.

Cruise planning – A number of cruise planning questions need to be addressed and WHOI is looking for input. For example, how does the operator plan for a cruise that requires two days of DSL120 and 35 ALVIN days? This would mean adding support people to the cruise? There is also the issue of coordinating Jason operations with ALVIN dives during the same cruise. It can be very time consuming. Some of this can be addressed during the pre-cruise planning stages, but guidance from the agencies and DESSC would be helpful. These issues impact the day rate.

The meeting was adjourned at 2:00 pm.

Appendix I

DEep Submergence Science Committee
Woods Hole Oceanographic Institution
Carriage House
27-28 July 1999

MEETING BEGINS AT 8:30 AM

Day One: Tuesday, 27 July 1999

AM

I. Introductory Remarks, Meeting Logistics, Introductions, Any Changes to Agenda Items, Accept minutes (Fryer)

II. National Facility Operators Report (Pittenger/WHOI Personnel)

A. National Facility Vehicles Operations Summary

III. Operational Summary of Other Deep Submergence Activities (Fryer)

A. MBARI
B. MPL
C. Navy – Cdr Curt Sadorf
D. NURP
E. ROPOS

IV. Agency Reports

A. NSF - (E. Dieter)
B. ONR – (S. Millick)
C. NOAA – (E. Smith)

V. Terms of Reference

VI. Deep Submergence Scheduling: 2000 and Beyond

A. Results from May panel - updating DESSC/UNOLS deep submergence funded programs listing. Mechanism for dissemination of funded programs information to potential PIs.

PM

VI. Deep Submergence Scheduling: 2000 and Beyond (continued)

A. Review of Planning Letters and Website postings and identification of funded programs.
B. Review strawman schedule for 2000

Appendix II

Attendance List
DEep Submergence Science Committee Meeting
Carriage House
July 27-28, 1999

NAME	AFFILIATION	PHONE/FAX/E-MAIL
Jonathan Alberts	WHOI	(508) 289-2277/(508) 457-2185/ jalberts@whoi.edu
Jack Bash	UNOLS	(401) 874-6825/(401) 874-6167/ unols@gso.uri.edu
James Bellingham	MIT/MBARI	(617) 253-7136/(617) 253-5730/ belling@mit.edu
Andy Bowen	WHOI	(508) 457-2643/(508) 457-2191/ abowen@whoi.edu
Robert Brown	WHOI	(508) 289-2786//rbrown@whoi.edu
Richard Chandler	WHOI	(508) 289-2272/(508) 457-2107/ rchandler@whoi.edu
Joe Coburn	WHOI	(508) 289-2620//jcoburn@whoi.edu
Annette DeSilva	UNOLS	(401) 874-6825/(401) 874-6167/ unols@gso.uri.edu
Dolly Dieter	NSF	(703) 306-1577/(703)306-0390/ edieter@nsf.gov
Robert Embley	NOAA/PMEL	(541) 867-0275/(541) 867-3907/ embley@pmel.noaa.gov
Dan Fornari	WHOI	(508) 289-2857/(508) 457-2187/ dfornari@whoi.edu
Patricia Fryer	SOEST	(808) 956-6346/(808) 956-3188/ pfryer@soest.hawaii.edu
Marvin Lilley	U of Washington	(206) 543-0859/(206) 543-0275/ lilley@ocean.washington.edu
Sujata Millick	ONR	(703) 696-4530/(703) 696-2007/ millics@onr.navy.mil
Dan Orange	UC Santa Cruz	(831) 459-3280/(831) 459-3074/ dano@es.ucsd.edu
Dick Pittenger	WHOI	(508) 289-2597/(508) 457-2185/ rpittenger@whoi.edu
Bill Ryan	LDEO	(914) 365-8312//billr@ldeo.columbia.edu
Kurt Sadorf	Navy - DSU	(619) 545-6890//dsuxo@nosc.mil
Gene Smith	NOAA/NURP	(202)482-2153//gene.smith@noaa.gov
Shozo Tashiro	JAMSTEC	+81-468-67-5652//tashiros@jamstec.go.jp
Cindy Van Dover	College of W&M	(757) 221-2229/(757) 221-6483/ cindy_vandover@wm.edu
Barry Walden	WHOI	(508) 289-2407/bwalden@whoi.edu
Dana Yoerger	WHOI	(508) 289-2608/dyoerger@whoi.edu

Appendix III

1999 NDSF Operations *(to date)*

	ALVIN	*Jason*	*Argo2*	*DSL-120*
Days at Sea:	**162**	**17**	**32**	**90**
Assigned Operating Days:	**183**	**22**	**14**	**9**
Dives/Lowerings Completed:	**103**	**10**	**11**	**6**
Average Duration (hrs):	**8.3**	**17**	**20**	**48**
Average Bottom Time (hrs):	**5.5**	**13**	**15**	**33**

- **Highlights:**
  - *Only two ALVIN dives lost (weather/ship anchor repair)*
  - *ALVIN average bottom time up for third straight year*
  - *252 nautical miles surveyed with towed vehicles*
  - *Argo2 night ops on ATLANTIS in conjunction with ALVIN dives*
  - *Ping/receive at vehicles for improved LBL nav*
  - *Purchase/initial testing of SM2000 multi-beam sonar*
  - *Vertical mosaics using Argo2*
  - *Location and survey of 7th century BC shipwrecks*
  - *New ROV control vans*
  - *Rebuild of Hiab complete; traction winch rehab underway*

Appendix IV

THE ACADEMIC RESEARCH FLEET REVIEW: Committee Membership

Roland Schmitt, Chair

Earl Doyle, Steven Ramberg, Hugo Bezdek, Christopher D'Elia, Ellen Druffel, Larry Mayer, Georges Weatherly

FLEET REVIEW: MEETINGS HELD

- June 8-10, 1998, NSF, Arlington, VA
- September 1-3, 1998, Scripps Institution of Oceanography, La Jolla, CA
- December 2-3, 1998, University of Rhode Island, Narragansett, RI
- March 3-4, 1999, NSF, Arlington, VA

FLEET REVIEW: RECOMMENDATION

- NSF must accelerate and expand efforts to articulate a broadly based vision for the future of ocean science and technology.

FLEET REVIEW: RECOMMENDATION

- Funding Agencies and UNOLS should work to enhance quality control, expand technical and safety training, and develop even higher standards for shared-use facilities.

FLEET REVIEW: RECOMMENDATION

- NSF should consider a trial including commercial ship operators as UNOLS non-member operators to provide unique fleet capabilities.

FLEET REVIEW: RECOMMENDATION

There should be prepared and maintained a long range plan for modernization and composition of the oceanographic research fleet that reaches well into the 21st century

Appendix V

National Undersea Research Program
Science Dive Activities 1998

Research Center/Program	Occupied Submersibles	Remotely Operated Vehicles	Nitrox/ SCUBA	Participants	Institutes	Projects
Northeastern United States and Great Lakes Center at University of Connecticut	28	61	0	143	30	8
Mid-Atlantic Center at Rutgers University	24	11	216	87	15	6
Southeastern United States and Gulf of Mexico Center at University of North Carolina	0	40*	4642	140	60	31
Caribbean Center	0	0	2752	44	10	7
West Coast and Polar Regions Center at University of Alaska	263	79	60	160	71	24
Hawaii and Western Pacific Center at University of Hawaii	58	36	0	33	16	11
TOTALS	373	202	7670	607	202	87

* 25 of these dives were in conjunction with the West Coast & Polar Regions Center.

Appendix VI

1999

ALVIN & ROV OPERATIONS

Deep Submergence Group

Woods Hole Oceanographic Institution

Alvin & ROV Operations on R/V *Atlantis*

VRIJENHOEK LUPTON *Alvin*	SINTON VAN DOVER *Alvin* DSL-120	KARSON *Alvin* Argo DSL-120	MULLINEAUX FISHER CAVANAUGH *Alvin*	CARY LUTHER LUTZ *Alvin*	MAINTENANCE	CARSON TORRES *Alvin*	STEVENS DUNCAN *Alvin*	LEVIN LONSDALE BROWN *Alvin*	FISHER CAVANAUGH *Alvin*	SEYFRIED BECKER KASTENER *Alvin*	SMITH *Alvin*	MAINTENANCE	LUTZ VAN DOVER *Alvin*	MANAHAN DEMING *Alvin*
Southern E.P.R.		*Hess Deep*	*Northern E.P.R.*			*S. Cal.-Oregon*		*Gulf of Alaska*	*Juan de Fuca*		*Cal. Coast*		*Northern E.P.R.*	

ROV Operations on Other Ships

BALLARD YOERGER *Jason* DSL-120	COWEN *Jason*	CHADWICK EMBLEY *Jason*	CHAVE *Jason*	
Northern Horizon	**R/V *Thompson***			
Med.	*Juan de Fuca*			

07/27/99

Year 2000

ALVIN & ROV OPERATIONS

Deep Submergence Group

Woods Hole Oceanographic Institution

JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC

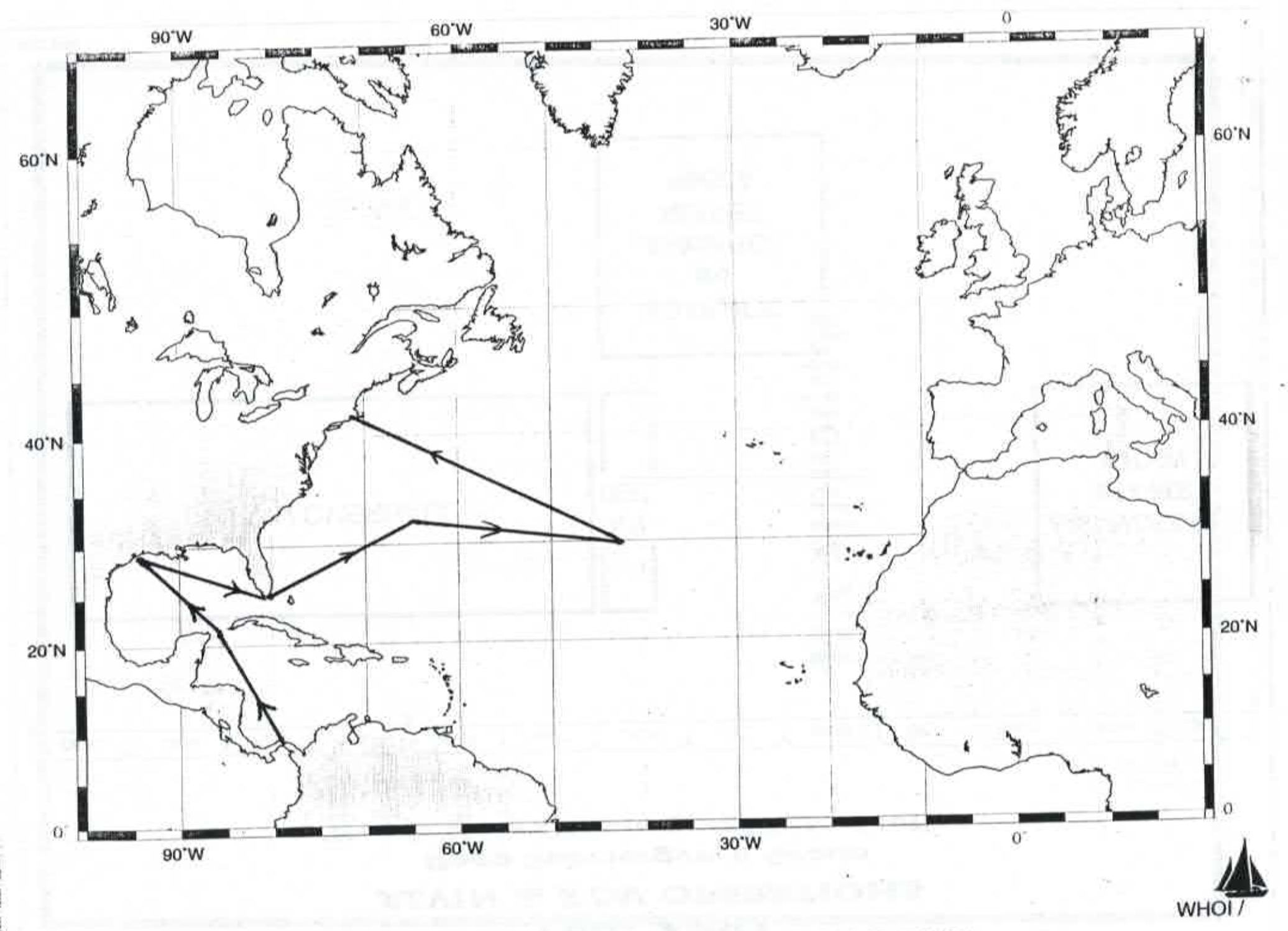
Alvin & ROV Operations on R/V *Atlantis*

Guaymas	E.P.R.	Calif.	Northern E.P.R.	Juan de Fuca	JdF	JdF	MAINTENANCE	JdF	Gulf of Mexico	Mid Atlantic Ridge
CARY LUTHER *Alvin*	FELBECK Van DOVER *Alvin*	TORRES *Alvin*	MANAHAN CARY FELBECK *Alvin*	DELANEY *Jason* *Alvin*	CARSON KASTNER PLUMLEY *Alvin*	SEEWALD WILCOCK *Alvin*		DELANEY *Alvin*	MacDONALD *Alvin*	BLACKMAN *Jason* / Argo Media DSL-120 *Alvin*

ROV Operations on Other Ships

R/V *Melville*	Ship TBD	*Thompson*		*Knorr*
East Pacific Rise	Black Sea	Eureka	JdF	Indian Ocean
FORNARI Argo-II DSL-120	BALLARD *Jason* DSL-120	LEVIN *Jason*	RONA *Jason*	Van DOVER FORNARI *Jason* Argo-II DSL-120

07/27/99



R/V ATLANTIS & ALVIN PROPOSED 2000 CRUISE
TRACKS

ONE METER SEDIMENT CORES

Coring devices can be attached to the vehicle which have successfully retrieve up to six one-meter sediment cores. These coring units can be orientated for either vertical or horizontal operation.

INETERFACES

Interfacing user equipment to Ventana is an easy task. Electrical connections are made using a Seacon MIN-K-19-CCP. This connector contains most of the required interface needs: serial communication, +24 VDC, +12 VDC, 120VAC, and video connections. Three such ports are available. If custom connections or voltages are required they can be accommodated on fairly short notice.

Hydraulic connections are made via qds and are available at two separate levels: 800 psi from a controllable four-way valve and 3000 psi @ 5 gpm max through a servo valve.

WESTERN FLYER

The Western Flyer /Tiburon offshore system is similar in concept to the Pt Lobos / Ventana configuration, but with enhanced performance in sea keeping, longer range and the ability to dive to greater depths.

The R/V Western Flyer is a 35.66-meter small water-plane area twin hull (SWATH) oceanographic research vessel designed and constructed for the Monterey Bay Aquarium Research Institute (MBARI). The R/V Western Flyer is to serve the oceanographic community as a stable platform for deploying, operating, and recovering a tethered remotely operated vehicle (ROV) to a depth of 4,000 meters, conducting hydro-casts (CTD), and other oceanographic activities with state-of-the-art equipment. General ROV operations will, however, be the vessel's primary mission.

Voyage profiles

Vessel operations will typically consist of one-day voyages having a duration of 12 hours or less and near-coastal voyages of an average duration of three days. Extended voyages of two to three weeks' duration will be infrequent, with three extended voyages being planned over an operational year. The R/V Western Flyer will on occasion be temporarily redeployed to a new home port which, for example, could result in an open-ocean transit to a port in Hawaii.

SPECIFCATIONS-

Gross Tonnage	499 US, 847 ITC
Net Tonnage	230 US, 254 ITC
Length (LOA)	117'-3 5/8"

Appendix VIII

STATUS OF 2nd NDSF EQUIPMENT UPGRADE PROPOSAL

Datalogging

Principal hardware selected (NT), software for *Alvin* being tested, software modules for ROV and tethered vehicles completed and operational, interfacing of more complex *Alvin* sensors still needs work. Plan is to test in parallel with currently operational datalogger and implement fully at next overhaul.

Video Systems

New *Alvin* system designed and components purchased. Currently being reconfigured for installation in *Alvin*. Significant improvement in video switching to reduce noise and provide improved capabilities and flexibility for data overlays. Y-C video compatible. Experimenting with DVD recording of 1 and 3-chip signals for future evolution to digital video recording to improve archiving of data.

Syntactic Foam for *Alvin* & *Jason*

Completed in 1998.

Hand-held Digital Snapshot Cameras

Several cameras purchased and being used by science since Fall, 1998. Continuing to test commercially available consumer grade cameras in order to optimize strobe synchronization capability. Plan to purchase 2 additional cameras for science prior to expiration of grant.

Steerable Elevator

Elevator electronics have been completed. Topside communications electronics is under development. Mechanical model testing has been done and a full sized test elevator will be constructed this summer.

Inductively Coupled Links for Temperature and Data Transmission

Completed and in general use with temperature probes. Similar commercially available units are still being tested as are smaller devices more easily used with manipulator held tools.

Major Hot Water Samplers

Completed in 1998. Refurbished 8 bottles and fabricated 3 new major bottles. Currently have 8 major pairs for use by science. Restocked spares and nozzles as well.

Appendix XV

Status of items from R/V Atlantis Turnover Book-1

Italic = Completed

Bold = Important + difficult or expensive

- ☑ *Propulsion Control Upgrade*
  - Some sensors remain to be installed
- ACCU (load shedding vs. auto start)
- ☑ *Power Limit Operation*
- HVAC in Labs
  - Some Major work completed, distribution still problematic
- Improve lab Power
- ☑ *Soft Start controllers for Cranes*
- Lab Drainage System
- Workboat Storage & Launch
  - One approach tried
- ☑ *Lab Compressed Air*
- ☑ *Crane Whip Speed*
- Darkroom
- Alvin Hanger Drains
  - ☑ Partial success

Status of items from R/V Atlantis Turnover Book-3

Italic = Completed

Bold = Important + difficult or expensive

- Shower Grab Bars
- Accommodation Ladder
- Forward Vent Intake Pre-Heater
- ☑ *Alvin Battery Charging Power*
- Weathertight Doors
  - ☑ 2 replaced, but several more need replacing
- ☑ *Second Fuel Oil Purifier*
- Mooring Chocks
- **Jacket Water Heat Exchangers**
- ☑ *Engineroom high Temps.*
  - Less extensive Mods than Revelle, seems OK
- Reefer Plant Reliability
- DC Propulsion Parameter Monitoring
- Engine Smoke
  - MAY have been solved by new injectors on 3 engines
- **Main SW cooling Isolation**
- After Main Deck hatch to Science Storeroom
- ☑ *Reverse Power Relays*

New Items to be added to R/V Atlantis Turnover Book

Italic = Completed

Bold = Important + difficult or expensive

- Clothes Dryer Exhaust
- Expand Alvin Electronics Shop
- Rearrange doors and access at after end of 01` deck.
- Remove door at after end of main deck.
- Insure that alarms can be heard topside

APPENDIX XVI

SEA CLIFF - ALVIN ENGINEERING STUDY STATUS REPORT

- Reutilization of SEA CLIFF / SEA CLIFF components in an upgraded ALVIN
- Other options for upgrading ALVIN

User Survey

- Science related improvements for submersible systems
- Goal - all science users w/in last 5 yrs

VISITS COMPLETED

- MIR Aug '98
- NAUTILE Jan '99
- PISCES IV &V Feb '99
- CONSUL Apr '99
- FINLAND Apr '99

VISITS PLANNED

- SHINKAI 6500 Oct '99

MPL Report

Dear Patty:

In response to your request for a report to the summer DESSC meeting, I have the following:

Over the period since the December DESSC meeting the Marine Physical Laboratory group has been involved in substantial upgrading of our two primary systems, with one major at-sea operation and planning ahead for work in the remainder of this year and on into 2001.

The principal upgrading that has taken place is conversion of one of the Deep Tow fish (#6) and the Control Vehicle to take advantage of the availability of fiber optic cable. The TV systems on both vehicles are now capable of full bandwidth operation, rather than relying on slow scan technology as in the past. The modifications to both systems are such that the vehicles can continue to be operated from 0.68" coax-cored electromechanical cables when desired, but can take advantage of fiber when available (e. g. ATLANTIS, NEW HORIZON, REVELLE, and on others with portable winch systems).

The milestone operation in this conversion effort was the conduct of a highly successful near bottom survey off Southern California for the Navy using fish 6 in March. All systems performed well, with 110 kHz sidelooking sonar coverage of a full 1500 meter swath, 4 kHz system resolving subbottom structure to 100 meters bottom penetration and television coverage of key areas to determine the nature of seafloor fabric. For the first time we used short baseline acoustic navigation.

Alteration of the Control Vehicle to take advantage of fiber optic technology was triggered by planning for operation on ATLANTIS this September to carry out a variety of functions in collaboration with ALVIN operations. The tasks to be carried out include recovery of CORK data loggers from 4 ODP holes followed by logging and water sampling. This will require entry into the 15 cm. diameter CORK opening, assisted by a one meter diameter entry cone to placed by ALVIN, and continuous measurement of temperature and pressure to subbottom depths of about 250 m in 2500 m of water, at which point water samples will be taken and the Control Vehicle and logging tool recovered on board. For this operation we have also modified our transponder interrogation and reply system to be compatible with either unique interrogation or unique reply configurations.

At this point there are 4 funded Control Vehicle operations scheduled for 2000 - two out of Hawaii and one in the Juan de Fuca Plate area in support of installation and survey of geodetic markers and for wireline reentry work. The reentry work will include logging and installation of packers in ODP holes on the Costa Rica Rift.

One further augmentation to our systems is the acquisition of a full depth accumulator to mitigate transmission of heaving motion of the support ship to the payload. This unit is being built by Dynacon and includes a two-way compressor to maintain the necessary balancing gas pressure, and additional gas volume to maintain the resonant period at a sufficiently long value. Depending on delivery, this new unit may be used for the September ATLANTIS operation.

Appendix IX

Hawai'i Undersea Research Laboratory
Research Accomplishments in August -October 1998

Research projects in 1998 were divided into two categories, the HURL Innovations Project, and the Core Projects. The HURL Innovations Project was directed at addressing the NOAA's Environmental Stewardship Mission, to build sustainable fisheries, recover protected species, and sustain healthy coasts. This was especially timely given the declining state of the Hawaiian coastal fisheries and the serious decline of the Hawaiian monk seal population. The Core Projects were directed at NOAA's Environmental Assessment and Prediction Mission and focused on the Loihi Seamount.

The Innovations Project was a new thrust for HURL and 30 dives in *Pisces V*, and33 ROV dives were made covering five separate projects. This was the first year in which HURL's *RCV-150* ROV has been used routinely in research projects. Its configuration, with simultaneous video from the ROV garage 25m above the seabed, and the ROV atthe seabed, provided both synoptic and close-up views that greatly assisted the conduct of transit surveys.

A key component of the Innovations Project was gaining an understanding of the interactions between the life processes of the benthos and nekton. It is important to understand not only how the species are interlinked, but also how the geology of the ocean floor impacts the distribution and abundance of benthic and demersal organisms. This interrelationship is important to spawning habitats of marine fishes, juvenile nursery habitats, distribution of forage for Hawiian monk seals, and the clustering or absence of sessile benthic organisms.

The proposals funded ranged from management problems of Hawaiian precious corals to dee water benthic communities that may provide foraging materials for endangered Hawaiian monk seals. Three projects specifically targeted two key commercial species of deepwater snappers, onaga, (*Etelis coruscans*), and ehu, (*Etelis carbuculus*). They were designed to look at distribution, nursery habitat, and spawning sites. In addition baseline surveys of these species were made in areas designated by Hawaii's Department of Living and Natural Resources as "refuge areas". These two deepwater snappers, onaga and ehu, are the primary target of both commercial and recreational fisheries throughout the Hawaiian Islands, as well as the north west Hawaiian Islands. Population estimates and habitat correlations are extremely important in the management of this fishery.

Another area of concern to NOAA is the dwindling numbers of the Hawaiian monk seal, particularly those located at French Frigate Shoals. Both the Pisces V and the ROV were used to check habitats used by deep water foraging seals. Surveys of the fish community were made as well as surveys of area of commercially important precious coral beds.

The Core Component addressed the Submarine Volcanic Processes of Loihi Seamount Hawaii. 20 dives were scheduled to support these projects including 4 dives devoted to servicing HUGO (Hawaii Undersea Geo-Observatory) and to surveying project areas to establish safe approach routes and working areas. Many of these dives were

Appendix X

July 20, 1999
Update on ROPOS for DESSC

ROPOS is just completing the second of two cruises in the NE Pacific on the Thomas G. THOMPSON. The first was a US/Canada trip to Axial Seamount led by the NOAA Vents program. The second is a US/Canada trip to Endeavour Ridge to look at changes since last year's collection of four chimneys and to improve information on part of the pilot Marine Protected Area, specifically the High Rise field. The scientific program has included everything from high resolution bottom surveys with the Imagenex scanning sonar, through video mapping, fluid, biological and geological sampling of various sorts, to the deployment and recovery of instrumentation. The NOAA 'Rumbleometer' whose feet were stuck in solidified lava since the January 1998 eruption was successfully recovered. ROPOS milestones on these trips include passing dive 500 and the longest dive so far, 41 hours in the water, 38 hours on the bottom.

Improvements include better camera controller and a new data management system that results in everyone going home with one or more CD-ROMS containing integrated dive logs, including navigation and frame-grabbed imagery. Another improvement probably invisible to the user is an improved telemetry system. For the immediate future, a 5500m cable has been completed and a new winch ordered. The winch is currently undergoing an engineering review to improve its portability. A new 600m tether has also been completed to increase the live boating depth.

The main Canadian science funding agency (NSERC) has effectively tripled the funding available to Canadian scientists for use of ROPOS, through a Major Facilities Access Grant. This could provide an opportunity for collaborative research with Canadians. Part of the funding is to support a mobilization on the Atlantic coast.

There is still plenty of ROPOS time available, although June, July and August of 2000 are filling up.

Cheers
John Garrett
Executive Vice President
direct tel 250-652-5750 fax 250-652-5734
Canadian Scientific Submersible Facility
c/o Institute of Ocean Sciences
PO Box 6000
Sidney B.C. V8L 4B2
Canada.
Visit our Website: www.ropos.com

Appendix XI

Survey AUV – Oil Industry Requirements

The following outline specification for a survey AUV has been prepared by BP Amoco and Shell to encourage development of industry standard vehicles. Appropriate specifications are required to encourage fit for purpose survey AUVs. Over specification of AUVs may delay their introduction, hamper their transportability and delay acceptance by the oil industry, as it will add to the AUV cost and delay their development.

AUVs should be considered for suitable survey operations in all water depths, ranging from nearshore and shelf (possibly a large market) to deep ocean (a more limited market).

Survey AUV requirements are listed below, and are divided into essential and preferred requirements.

Cost Reduction

For the industry to adopt these vehicles, survey AUVs must reduce costs (or be at least comparable) compared to conventional surveys. To encourage rapid development, the industry should aim to significantly reduce survey costs by the use of survey AUVs. To ensure significant cost reductions, the following are required: -

- Highly efficient operations (rapid line turns, fast survey speed, limited weather dependence).
- Fit for purpose vehicles - not over specified for the task.
- Capable of safe operation (including launch/recovery) in sea states of greater than 2 metres.
- Preferably capable of safe operation (including launch/recovery) in extreme sea states.
- Endurance of at least 24 hours, preferably 48 hours.
- Capable of deployment from low cost support vessels.
- Low recharge time or multiple AUVs (one operating, one recharging).

Support Vessel

The type of support vessel will dictate survey costs. Waiting for full AUV autonomy may delay introduction of Survey AUVs. Although full autonomy is desirable in the longer term, at present it is likely that a support vessel will be required to support and partly (or fully) position the AUV.

- Support of the AUV must be possible from vessels of opportunity
- Vessel may undertake simultaneous operations (e.g. multi-channel high resolution seismic or shallow gas surveys).
- It is preferred that multiple AUVs operate from a single support vessel. This will require a level of autonomy by the AUV.

Flexible launch/recovery

Launch and recovery of the vehicle should be carefully considered, as it will impact upon both cost of the operations and safety aspects of AUV operations.

- Capable of launch/recovery in sea states of greater than 2 metres.
- Preferably capable of launch/recovery in extreme sea states.
- Capable of launch/recovery from a variety of support vessels.
- Preferably capable of launch/recovery from a moving vessel.

Survey Speed

- A preferred cruising speed of 4 knots.
- Preferably capable of maintaining survey speed in high current environments.

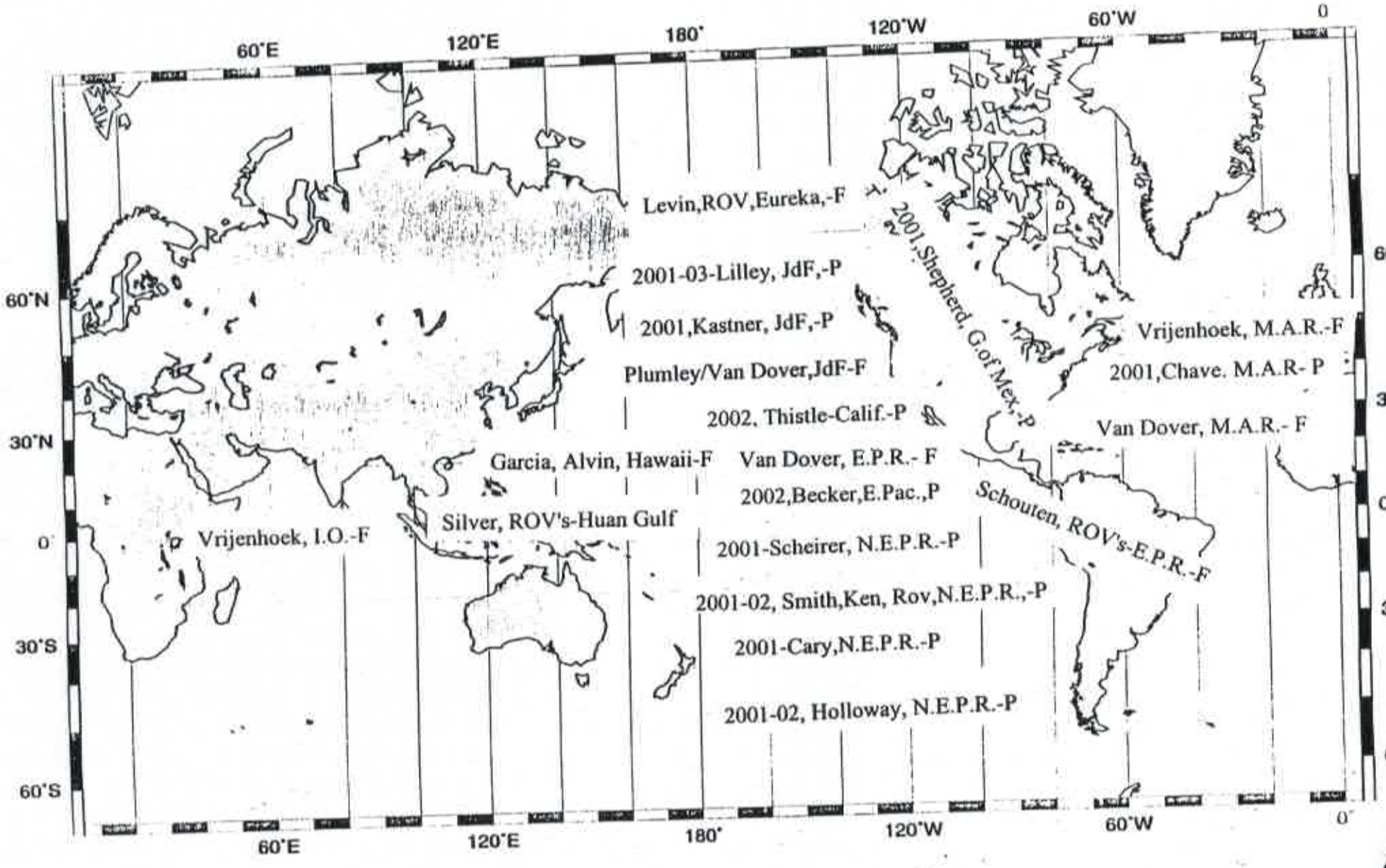
Depth Capability

Survey AUV depth requirements will depend upon international survey portfolios. Careful analysis is required of AUV costs for various water depths compared to this portfolio. It is suggested that a survey AUV that can operate in water depths of up to 3000 metres should be adequate for most oil industry applications in the medium term. However, there will also be applications for AUVs in shallower and deeper waters. It is likely that cheaper AUVs for operations in shallower waters will create their own niche markets.

Air Transportable

For international acceptance, the AUV package should be air transportable.

Appendix XII



POST-ALVIN OVERHAUL, 2001 AND BEYOND

WHOI /

Appendix XIII

Upgrade to Tethered Vehicles of NDSF

- Address identified shortcomings of Jason/Medea system:
  - Manipulative capabilities
  - Sample and equipment payload capacity
  - Speed and thrust
  - Increase depth to 6500m min.
  - Tether management

Upgrade to Other NDSF Tethered Vehicles

- Include telemetry and control upgrades to DSL 120 and Argo II
- Provide stand alone control and telemetry electronics for Argo II
- Ensure cross platform compatibility
  - support
  - sensor mobility
- Provide vehicles with dedicated sensors (depth, altimeter, etc.)
- Address known shortcomings

Argo II:	lighting
	compatible propulsion
DSL 120:	digital sonar electronics
	tow dynamics

Appendix XIV