Twenty-fourth International Research Ship Operators Meeting (IRSO)

25–27 May 2011

University of Washington
Seattle, Washington USA

A. PROCEEDINGS 7

List of Attendees

Nation	First name	Last name	Organisation	Position
Australia	Toni	Moate	CSIRO Marine & Atmospheric Research	Deputy Chief Science Ops & Executive Director, FRV Project.
	Ronald	Plaschke	CSIRO Marine & Atmospheric Research	Director, Marine National Facility
Belgium	André	Pollentier	Royal Belgian Institute for Natural Sciences, MUMM-UGMM	Adviseur
Canada	Yves	Perron	Defence Research and Development Canada	Manager/ Technical Services
	Jennifer	Nield	Fisheries and Oceans Canada	Senior Policy Advisor
	Ron	Newhook	Marine Institute of Memorial University	Director, Research & Development
Chile	Enrique	Aranda	Instituto de Fomento PesQuero	Marine Operations Department Chief
China	Li	Tiegang	Institute of Oceanology, Chinese Academy of Sciences	Vice Director
	Sui	Yiyong	Institute of Oceanology, Chinese Academy of Sciences	
Denmark	Helge	Thomsen	DTU Aqua	Research Director
France	Sébastien	DuPont	IFREMER	Naval Architect
	Olivier	Quedec	IFREMER	
	Helene	Leau	IPEV Technopole	Vessel Manager
Germany	Klaus	von Bröckel	Leibniz Institute of Marine Sciences	Senior Scientist
India	Prattipati	Rao	National Institute of Oceanography	Head, Research Vessels Management
Ireland	Aodhán	Fitzgerald	Marine Institute	Team Leader
Italy	David	Sage	NURC, NATO	Head, Ship Management
Japan	Kazuhiro	Maeda	JAMSTEC/Research Fleet Department	Engineer
	Shinichi	Kusaka	Nippon Marine Enterprises	Deputy General Manager
	Shozo	Tashiro	JAMSTEC/Research Fleet Department	Director
Netherlands	Erica	Koning	NIOZ Royal Netherlands Institute for Sea Research	Co-ordinator. Marine Research Facilities
New Zealand	Fred	Smits	NIWA, National Institute of Water and Atmospheric Research Ltd	General Manager, Marine Business Services
Norway	Hans	Knudsen	Institute of Marine Research	Head of Electronic Instrument Division
	Per	Nieuwejaar	Institute of Marine Research	Director RV Department
	Oystein	Mikelborg	Norwegian Polar Institute	Director of Operations & Logistics
Spain	Juan	Danobeitia	Paseo Maritimo de la Barceloneta	Director
	Arturo Castellon	Masalles	Unit CSIC, Paseo Maritimo de la Barceloneta	Ship Manager Marine Technology
U.K.	David	Blake	British Antarctic Survey	Head of Technology & Engineering
	Roland	Rogers	National Oceanography Centre	Legal and Environmental Advisor
	Geraint	West	National Oceanography Centre	Head, National Marine Facilities Sea Systems

Nation	First name	Last name	Organisation	Position
U.S.A.	Bauke (Bob)	Houtman	National Science Foundation	Head, Integrative Programs
	Dennis	Nixon	UNOLS/University of Rhode Island Oceanography	Legal Advisor
	Tim	Schnoor	Office of Naval Research	Program Manager
	Thomas	Althouse	TS Althouse Marine	President
	Chris	Beaverson	NOAA	Corp Officer
	Michael	Devany	NOAA	Director, Marine Operation Center
	Eric	King	Schmidt Ocean Institute 15727	Marine Operations Manager
	Demian	Bailey	Oregon State University	Marine Superintendent
	David	Murphy	Sea-Bird Electronics	R&D Manager
	James	Postel	UW School of Oceanography	Manager, Shipboard Science
	Doug	Russell	University of Washington	Manager of Marine Operations
	Daniel	Schwartz	University of Washington	Ret. Marine Superintendent
	Daniel	Simon	NOAA/PMEL	Associate Director for Operations
	Daryl	Swensen	Oregon State University	Marine Technician Superintendent
	Liz	Tirpak	US Department of State	Foreign Affairs Officer
	William	Wilcock	School of Oceanography, University of Washington	Associate Director
	Pete	Zerr	Schmidt Ocean Institute	Operations Manager

A. Proceedings

A.1. Opening Session

The Opening Session was chaired by Mr Geraint West.

A.1.1. Welcome and Administrative Matters

Geraint West welcomed 47 participants from 18 countries to the 24th IRSO being hosted by the University of Washington (UW) in Seattle. As incoming IRSO Chair, Geraint thanked Fred Smits for his contribution as previous Chair and presented Fred with a small gift representing the appreciation of all IRSO participants. Geraint also welcomed Ron Plaschke as incoming vice Chair/Secretary.

A.1.2. Round Table Introduction of Participants

Each IRSO participant provided a brief personal introduction to the meeting.

A.1.3. Welcome to the University of Washington

William Wilcock welcomed IRSO participants on behalf of the School of Oceanography at UW. The School has 100 staff, 80 graduate students and over 100 undergraduates working in the traditional areas of physical, chemical and biological oceanography as well as marine geology and geophysics. Other key areas of activity include research related to climate change, coastal oceanography, extreme environments and ocean observing. Two research vessels are operated by the School; the global class *Thomas G Thompson* and local class *Clifford A Barnes*.

Jeff Simmen welcomed IRSO participants on behalf of the Applied Physics Laboratory (APL) at UW. APL has a proud history of collaboration with a range of IRSO institutions with research vessels and programs. APL at UW is one of five university affiliated research centres around the USA which form part of the naval research enterprise. Core research areas, include acoustics and remote sensing, ocean and physics engineering, medical and industrial ultrasound, polar science and logistics, environmental and information systems, and electronic and photonic systems. Covering the globe and varying in scope, field programs span basic research to operational activities. Examples include the north Atlantic bloom study and Navy under-ice exercises. Jeff closed by reinforcing the key and dominant role for manned research vessels in the global context.

Completing the hosts welcome, Lisa Graumlich, Dean, College of the Environment at UW and spoke about the key role of UW in US and global research efforts, and the importance of the School of Oceanography and research vessels to the UW student experience.

A.1.4. Membership Rules

Geraint West spoke about the importance of the IRSO forum for research vessel (RV) operators and encouraged participants to use meeting breaks to network and share issues. He suggested there would be more meeting time available to discuss key

issues if Country Reports were presented by poster in future. After brief discussion, the meeting agreed that Country Reports would be presented by poster at future meetings, however any new participants would be asked to provide a short verbal presentation as an introduction to the IRSO forum.

Geraint moved on to discuss IRSO management. It has been previously agreed that:

- title of meeting changed from ISOM to IRSO;
- management committee to consist of Chair, Vice-Chair/Secretary, immediate past Chair, and Host for that year's IRSO meeting;
- financial contribution of €200 per delegate (reduced fee for partner program) and
- IRSO sub-committees to include INMARTECH sub-committee but no permanent IMO representation, no permanent representation to ERVO/COMNAP etc. and that members their carry own expenses.

From the previous meeting, outstanding IRSO management issues include membership and country representatives. In relation to membership, due to changes in funding and outsourcing arrangements which have created commercial tension between funders and service providers, there has been a suggestion to create three categories of membership; full, associated and invitees. This generated discussion around membership in the context of different funding models in different countries and how to define commercial operators. The discussion then moved to the issue of country representatives/coordinators. At one level, this would simplify country representation at IRSO by packaging each country down to one representative. However, how would each country representative be selected, particularly in countries with a diverse range of potential candidates?

Further discussion on these topics was deferred to the end of the final day to allow further consideration by participants. When revisited, there was general consensus that whatever decisions were to be made regarding membership, it was important that the free flow of information which has so far characterised the spirit of IRSO should be maintained. *The Chair provided an undertaking to draft ideas around membership and country representative issues and circulate to IRSO over next few months with a view to seeking consensus before the next meeting in 2012.*

There was also a suggestion that IRSO could seek membership to the IOC. This could be problematic, as IRSO is a diverse group which does not always have a common view. The issue comes back to determining the identity and purpose of the IRSO forum, which is seen at least by some as providing a sharing experience rather than creating policy.

A.1.5. Review of the Minutes of 23rd ISOM and Adoption of Agenda

The minutes of the 23rd ISOM were then introduced and IRSO (ISOM) members thanked for the contributions made. The minutes were adopted without modifications as a true record of the meeting held at the Leibniz Institute of Marine Sciences at the Christian-Albrechts University of Kiel, IFM-GEOMAR, Kiel, Germany on 19–21 March 2010. The final version of these minutes will be available on the ISOM web site, http://www.isom-info.org.

Progress on undertakings from 2010 meeting in Kiel:

- Toni Moate thankfully advised she has had assistance from IRSO for the new Australian research vessel project;
- Geraint West & Olivier Lefort survey of medical requirements among IRSO participants – refer MLC discussion later;
- Rolly Rogers & Liz Tirpak MSR guide – refer MSR discussion later and
- *Geraint asked participants to think about IRSO website during the meeting, what should be on the website and what should not.*

Comments on the agenda were invited, which was adopted with minor additions.

A.2. Theme 1: Delegates Reports of Activities

A.2.1. Australia – Ron Plaschke (CSIRO Marine & Atmospheric Research)
See B.1 for report.

A.2.2. Belgium – Andre Pollentier (Belgium Federal Science Office, RBINS-MUMM)
See B.2 for report.

A.2.3. Canada – Jennifer Nield (Fisheries & Oceans Canada)
PowerPoint presentation provided to all meeting participants.

A.2.4. Canada – Yves Perron (Defence Research and Development Canada)
See B.3 for report.

A.2.5. Chile - Enrique Aranda Orrego (Instituto de Fomento PesQuero)
PowerPoint presentation provided to all meeting participants.

A.2.6. China – Li Tiegang (IOCAS)
See B.6 for report.

A.2.7. Denmark – Helge A Thomsen / Hans-Erik Mahnfeldt (DTU Aqua)
See B.7 for report.

A.2.8. Finland – Juha Flinkman (SYKE)
See B.8 for report.

A.2.9. France – Hélène Leau (IPEV) and Olivier Quedec (IFREMER)
See B.9 for report.

A.2.10. Germany – Dr. Klaus von Broeckel (Leibniz-Institute fur Meereswissenscaften)
See B.10 for report.

A.2.11. Iceland – Vignir Thoroddsen (MRI)
See B.11 for report.

A.2.12. India – Prattipati Rao (NIO)
PowerPoint presentation provided to all meeting participants.

A.2.13. Ireland – Aodhán Fitzgerald (Marine Institute)
See B.13**Error! Reference source not found.** for report.

A.2.14. Italy – Giuseppe Magnifico (CNR)
See B.14 for report.

A.2.15. Japan – Shozo Tashiro (JAMSTEC)
See B.15 for report.

A.2.16. NATO – Ian Sage (NURC, NATO)
PowerPoint presentation provided to all meeting participants.

A.2.17. Netherlands – Erica Koning (NIOZ)
See B.17 for report.

A.2.18. New Zealand – Fred Smits (NIWA)
See B.18 for report.

A.2.19. Norway - Per Nieuwejaar (IMR)
See B.19 for report.

A.2.20. Spain – Jose I Diaz (IEO)
See B.20 for report.

A.2.21. UK – David Blake (BAS)
See B.21 for report.

A.2.22. UK – Geraint West (NOCS)
See B.22 for report.

A.2.23. USA – Mike Devany (NOAA)
PowerPoint presentation provided to all meeting participants.

A.2.24. USA– Bob Houtman (NSF/UNOLS)
See B.24 for report.

A.3. Theme 2: Research Vessel Builds, Modifications & Performance

A.3.1. Canadian Coastguard Fleet Modernization – Jennifer Nield (F&O, Canada)

Canada is planning for the next generation of multi-functional and multi-disciplinary research vessels to cover near-shore, offshore and polar regions. Three near-shore vessels are in progress:

- 25m *Vladikov* due in late summer 2011 for Gulf of St. Lawrence region and
- two 22m vessels *M. Perley* and *Leim* due in fall 2011 for Atlantic coast.

In design contract for three Offshore Fisheries Science Vessels (OFSV). Two will be based on the Atlantic Coast and one on the Pacific Coast. The construction contract will be awarded in winter 2012 with delivery of the first vessel in 2014 and the final vessel in 2015 and the OFSV are planned to be:

- 55m length;
- 16m breadth;
- 6.1m draft;
- 2209 tonne displacement and
- accommodation 35 berths.

In design contract for one Offshore Oceanographic Science Vessel (OOSV) to replace CCGS *Hudson* based on the Atlantic Coast. The construction contract will be awarded in winter 2012 with vessel delivery in 2014 and the OOSV is planned to be:

- 78m length;
- 16m breadth;
- 5.8m draft;
- 3550 tonnes displacement and
- accommodation 56 berths.

A design is expected in 2013 for multi-season polar icebreaker to replace CCGS *Louis St. Laurent*. This vessel will be tasked with security, scientific, monitoring, developmental and emergency response activities.

There was discussion around the National Shipbuilding Procurement Strategy and the difficulty of estimating and funding larger vessel builds over time. An industry day will be held for the icebreaker.

A.3.2. Procurement of RV *Investigator* – Toni Moate (CSIRO)

In Australia, the Marine National Facility Steering Committee (MNF SC) has been planning for replacement of the RV *Southern Surveyor* since mid-2005. Marine community engagement began with an expert Working Group which reported on future needs for blue-water research vessel capability and provided a detailed Statement of Requirements in November 2007. Subsequently the procurement process for the new vessel was separated into groups; the design and build of vessel and permanently fitted equipment, scientific equipment, vessel management contract, and disposal of existing vessel *Southern Surveyor*.

A Request for Proposal (RFP) was released 31 October 2009 and closed 11 January 2010. This was followed by a Request for Refined Offer (RRO) which was released 12 April 2010 and closed 29 June 2010. Best and Final Offers (BAFO) were negotiated

with shortlisted respondents followed by detailed contract negotiations which resulted in a build contract being signed on 17 January 2011. The result is:

- prime contractor – Teekay Holdings (Australia) Pty. Ltd.
- ship designer – RALion. A consortium consisting of Robert Allan Ltd (Vancouver, Canada), Alion Canada (Kanata, Ontario) and Alion Science & Technology (Alexandria, Virginia USA)
- shipbuilder – Sembawang Shipyard Pty Ltd, Singapore

The new vessel will present significant opportunities and challenges in regard to the process for allocating voyages (multiyear applications and contributing to national priorities), optimizing the utilisation of greater capability and capacity, modularisation (who owns, maintains and mobilises modular equipment), international collaborations, data and physical collection management and charter versus research work.

Lessons and issues so far in the project include developing a capabilities document suitable for industry and a lengthy tender process required to develop a mature specification on contract signing. Commercial issues have included build contract performance indicators, liquidated damages, how to treat owner supplied equipment and having commercially experienced people involved in the process. Toni closed in thanking IRSO colleagues for their willing assistance with queries regarding Australia's new research vessel.

A.3.3. RV *Investigator* Technical Update – Ron Plaschke (CSIRO)

Following the procurement process described immediately above, Australia's new research vessel *Investigator* is now in the detailed design stages and construction is planned to commence in November 2011 at Sembawang Shipyard in Singapore. Tank testing of the hull and appendage forms is complete and has confirmed power requirements and favourable bubble sweep-down characteristics. *Investigator's* specifications are listed below, with the comparable specification for the current vessel *Southern Surveyor* shown in brackets:

- Owner : CSIRO
- Design: Lloyds class, DP1, Ice Class 1C, DNV Silent-R
- Length/Beam: 89m / 18.5m (*Southern Surveyor* 66m / 12.3m)
- Displacement: 4,575t (1594t)
- Accommodations: 40 Scientists, ~20 Crew (15 scientists, 14 crew)
- Range: 10,800 NM at normal cruising speed 12 Kt
- Speed: Maintain 12k in SS6; 15k in SS2 (11k max)
- Missions: Up to 60d, multi-purpose (26d, limited multi-purpose)
- Science load: 250 Tons
- Acoustics: Deep, mid, and shallow multi-beams; other systems
- Handling Systems: Full suite of winches, cranes and overboard gear
- Laboratories: 600 Sq M
- Containers: 12 standard 20 ft ISO containers on deck and in hold

Investigator will be fitted with twin reversible screws, a retractable bow thruster and independent twin rudders which will be required to comply with DP1. It is expected the vessel will be delivered from the shipyard in May 2013.

Following the RV *Investigator* procurement and technical presentations, questions included the need for two drop keels (one for voyage by voyage and one for more

permanently mounted equipment), cost of build (~AUD$90M), possible need for two Satcom antennas due to shadowing by weather radar dome, will a new vessel management contract will be required (yes) and if the tank test model was fitted with a gondola and drop keels (yes).

A.3.4. NSF/UNOLS Fleet Renewal – Bob Houtman (NSF) & Tim Schnoor (US ONR)

The US Office of Naval Research is planning the acquisition of two new oceanographic research vessels for delivery in late 2014 or early 2015. The Naval Sea Systems Command is managing the design and construction program. Two design-build teams are competing for the construction contract, expected to be awarded in September. The operators of the two ships have been chosen; Woods Hole Oceanographic Institution will operate the first ship delivered, and Scripps Institution of Oceanography will operate the second.

Fabrication of RV *Sikuliaq (*which means *"Young sea ice able to be walked on")* began in January 2011 at Marinette Marine Corporation (MMC) and the keel was laid in April 2011. The vessel is planned to the following specifications:

- LOA: 261 ft (80 m)
- Displacement Tonnage: 3800 LT
- Ice Classification: IACS PC-5
- Positioning: DPS-1
- Science Berths: 24
- Crew: 22
- Endurance: 45 days

The following key points are noted:

- launch planned for June 2012;
- begin science outfitting in January 2013;
- preliminary acceptance by UAF in June 2013;
- 5 month delay due to weight mitigation changes;
- 12' mid-body for added buoyancy;
- superstructure changed to aluminum;
- science trials planned from June 2013 to December 2013 and
- begin science operations in early 2014.

A.3.5. Acoustic Equipment Under Bow and Solution – Sui YiYong (Chinese Academy of Sci)

Designed bow shape and position of bow thrusters can influence the acoustic performance of a research vessel. These problems can be minimised through:

- careful design and positioning of the gondola bearing in mind the hull and bow shape and
- installing louvre-like rotating covers on tunnel thrusters to seal off the tunnel when thrusters are not in use and acoustic operations are in progress.

A.3.6. *Discovery* Replacement – Geraint West (NOC)

The *Discovery* replacement has been designed by Skipsteknisk AS, Norway and the build project is underway by shipbuilder Construcciones Navales P. Freire, S.A., Vigo in Spain. In comparison with the *James Cook*, the new *Discovery* has the following specifications:

	James Cook	Discovery
Length Overall:	89.50 m	99.70m
Breadth:	18.60 m	18.0m
Draft:	5.50-5.70 m	6.50m
Displacement:	5368t GRT	6075T GRT
Class:	Lloyds +100A1, Ice 1C, FS, +LMC, UMS, DP(AM) Research Vessel	Lloyds +100A1, Ice 1D, +LMC, UMS, IWS, EP, DP(AM), NAV1, IBS, Research Vessel
Maximum Speed:	15 kts SS4	15kts SS2
Cruising Speed:	12 kts SS4	12kts SS4
Maximum Endurance:	50 days	50 days
Science & Stores DW:	385T	380T
Scientific Berths:	32 singles	28 singles
Officers:	9 singles	12 singles
Crew & Technicians:	13 singles	12 singles
Open Deck Spaces (Aftdck&Stbd Amidshps):	$446m^2$ ($4800ft^2$)	$432m^2$ ($4650ft^2$)
Total Lab Areas:	$278m^2$ ($2992ft^2$)	$389\ m^2$ ($4187ft^2$)

Handling equipment will include a 20t stern A-frame, 20t@17m midship aft crane, 2t@5m stbd knuckleboom crane, 20t stbd A-frame, 20t bullhorn crane and 2 * 5t@2m aft cranes. The first sea trials are expected in January 2013 and deep sea trials completed in October 2013.

A.3.7. Polar 10 Icebreaker – Per Nieuwejaar (IMR, Norway)

Norway is planning a new icebreaker which will be owned by the Norwegian Polar Institute and operated by the Institute of Marine Research. User groups are expected to be the Norwegian Polar Institute (30%), University of Tromsø (50%) and the Institute of Marine Research, with other potential users from the Universities of Oslo, Bergen and Svalbard. The conceptual design includes the following capabilities:

- multifunctional (biology, oceanography, geology);
- ice breaking capabilities (POLAR 10);
- helicopter carrier;
- logistics vessel;
- student training;
- long endurance and
- clean ship.

The hull will be built to DNV Polar 10 or Polar 10 Icebreaker (vessels intended for ice breaking, built for another main purpose) and the propulsion system will be diesel-electric

machinery (AC) and ”Z-drive” propulsors. Two tunnel thrusters will be fitted to the bow area for DP operations.

The project status is as follows:

- ”Gateway review 1” passed 2010;
- ”Gateway review 2” hopefully passed in June 2011;
- funding for construction expected to be available from January 2012;
- hopefully prequalification of shipyards is completed before the end of 2011 and
- vessel ready for operations in mid 2014?

Rolls Royce will provide the detailed construction drawings as the shipyard is chosen. No further changes will be allowed from ship users now the design is complete and only the Project Manager can approve further changes. The cost of the build is expected to be $215M.

A.3.8. Multipurpose Midsize RV Design – Juanjo Dañobeitia & Arturo Castellón (CSIC)

Spain’s experience at CSIC in midsize RV design includes the 70m *Sarmiento de Gamboa* (2003-2007) and the 50m *Garcia del Cid* replacement. With *Sarmiento de Gamboa,* the initial concept was provided as scientific facilities and operations defined through scenarios before the tender process for technical design and construction commenced. For the *Garcia del Cid* replacement, the initial concept is a specification and general arrangement provided by users. This requires input from the research side (crew, technicians, scientists and operator) and the engineering company and shipyard.

CSIC has found that inter-operability is key to the design process. The various elements which must work flexibly together to meet voyage scenarios which are always different include:

- deployed equipment;
- hull mounted (fixed) equipment;
- deck operations and handling;
- laboratories and services
- information & communication technologies and
- mobile equipment.

Defining the maximum depth of operations and equipment requirements such as power and weight are important. Multipurpose laboratories are classified as wet (sample reception), dry (sample processing), analytical (scientific equipment) and control (winches, deployed and hull mounted equipment). Land based facilities to support RV operations must also be considered.

A.3.9. Planning and Programming Vessel Schedules – Fred Smits (NIWA)

As NIWA is as a Crown Research Institute, NIWA vessels need to have a high degree of utilisation to provide a commercial return to the New Zealand Government. In planning vessel schedules, a complex range of factors must be considered:

- NIWA’s client base – three NZ Ministries, with M. Fisheries highly variable demand which creates uncertainty for viability of commercial operations;
- time dependencies – fish spawning, time-series surveys, international scientific collaboration, interaction between science programs and commercial client timing;

- equipment dependencies – conflicts between NIWA, NZ science partners, international science partners, multi-vessel studies, purchase/rent of equipment and weather dependencies;
- location dependencies – cost, ease of access, transport of equipment and transit requirements of various ports and
- crew dependencies – crew leave balances and capabilities (eg, fishing, DP, ice).

In considering the factors, the scheduling process used by NIWA is driven by user requirements:

- fisheries (scope and timing set by Mfish): lead-time 2 - 6 months;
- NZ science voyages (MSI and NIWA 5-year program, which changes every 6 months!): lead-time 2 - 12 months;
- int. science voyages: lead-time 6 - 18 months and
- commercial charters: lead-time 1-3 months.

As a result, the vessel schedule often changes every three months. This creates difficulty for science staff, technical support staff and marine crew, however facilitates the commercial viability of vessels as required by NIWA Board and shareholding ministers.

A.3.10. Newbuilds in Denmark and Greenland – Helge Thomsen (DTU Aqua)

The Danish and Greenlandic research vessels have all reached retirement age – refer table below.

Name	Owner	Type	Home Harbor	Year	BRT	Remarks
Dana	Technical University of Denmark	Global	Hirtshals	81	2545	Multi disciplinary
Gunnar Thorson	The Royal Danish Navy	Local	Korsør	81	1211	Oil spill
Paamiut	Greenland Institute of Nature	Regional	Hirtshals	71	721	Deep sea fishing
Adolf Jensen	Greenland Institute of Nature	Local	Nuuk	67	167	Multi disciplinary
Havfisken	Technical University of Denmark	Local	Hirtshals	63	20	Fisheries
Ophelia	Copenhagen University	Local	Helsingør	59	28	Education
Genetica I	Aarhus University	Local	Aarhus	61	20	Education
Havkatten	Technical University of Denmark	Local	Copenhagen	70	6	Fisheries

An integrated plan exist for the replacement of *Dana* and *Paamuit* – a single 65 meter vessel can accomodate the needs for both Denmark and Greenland. In addition:

- replacement vessel for *Adolf Jensen* is currently under way at Karstensens Skibsvaerft, Skagen, Denmark;
- replacement vessel for *Havfisken* has been funded by the Technical University of Denmark (in operation from 2012);
- a *Genetica I* replacement vessel has been secured by DK national infrastructure funding (in operation from 2013?) and
- new *Havfisken* design is not finalized yet. However, it will most likely be a modification of a standard fishing trawler (15m pp / 5,6m).

The new *Adolf Jensen's* specifications are:

- LOA: 32m
- Breadth: 10m
- Class DMA
- Main Engine: Cummins 746kW
- Aux Engine: Cummins 220kW
- Thruster: Hundestet SFT5
- Speed: 12k
- Science Berths: 10
- Crew: 6
- Fuel Oil: 100m^3
- Fresh Water: 30m^3
- Design: OSK-ShipTech
- Owner: Greenlands Naturinstitut

Funding has yet to be resolved for the new *Dana*:

- a preliminary GA for a new vessel has been elaborated by OSK-Shiptech A/S in collaboration with Danish universities and marine institutions;
- the building cost is estimated to be 500 mio. DKK (100 mio. US$) incl. scientific state-of-the-art equipment;
- running costs are estimated to be 120.000 DKK (24.000 US$) per day when operating the vessel 250-300 days every year and
- the vessel will operate at least 4 months every year in Greenland waters.

The new *Dana* is expected to be 64m LOA and will be designed for north Atlantic waters and will therefore have no foc'sle and be ice strengthened.

A.3.11. NOAA FRV – Mike Devany (NOAA)

A new NOAA 40 day endurance Fisheries Survey Vessel (FSV) *Reuben Lasker* is under construction at Marinette Marine Corporation in Wisconsin and is due for acceptance in October 2013. The vessel has been specified to:

- Length Overall: 63.57 m
- Length Between Perpendiculars: 58.00 m
- Length on DWL: 61.00 m
- Beam: 15.00 m
- Draft (full load): 5.90 m
- Displacement (full load): 2442 mt
- Power: 2250 kW

- Speed: 14 knots
- Accommodations: 39
- Endurance: 40 Days
- Compliance with ICES 209 Radiated Noise Standard from 0 to 11 knots.
- Compliance with ABS, 46 CFR and other invoked regulatory body requirements.

Functional mission and equipment requirements will include:

- stock assessment (including hydro-acoustic surveys);
- physical and biological oceanography;
- fisheries oceanography;
- life history;
- marine mammal assessment and biological research;
- weather and sea state observation;
- gear development and
- habitat studies.

Unique design features include a dynamic positioning system, de-icing, anti-roll tank, scientific van, margin allowance for future scientific systems, high lift rudder for maneuverability and a hull form and propeller designed to enhance acoustic and sonar performance. Acoustic equipment will include a range of scientific sounders, ADCP, side and bottom multi-beam systems, self-noise monitoring, acoustic release and net mensuration systems. Other features include below deck winches, net reel, stern and side A-frame and a marine mammal observation station. Particular attention has been given to the design of hull and equipment to ensure minimal bubble sweep-down and noise characteristics including:

- constrained and unconstrained layer hull, deck and bulkhead damping;
- propulsion motor and diesel generator foundation damping;
- bulkhead acoustical treatments for airborne noise and
- controlled and minimum flow velocity requirements for piping and HVAC.

During the discussion which followed, additional information was provided from NOAA's FSV experience:

- not sure why 33Hz noise coming from generators;
- engine control system designed to be automated to optimize power generation but did not work, so has had to be replaced;
- 18 crew and 17 scientists on board;
- noise monitoring is expensive, so noise ranging done every five years – looking into developing a passive monitoring system and
- on Dyson, resilient equipment mounts lasted 2 yrs (from expected 10 yrs).

A.3.12. *Belgica* Relacement – Andre Pollentier (RBINS MUMM)

Belgium's RV *Belgica* was built in 1984 and a feasibility study has shown a new build will be more cost-effective than a mid life refit to meet modern national and international science mission requirements. The preliminary functional specifications are for:

- multidisciplinary research vessel : fisheries, acoustics, oceanography, environmental monitoring, geophysics, biology, hydrography, etc.;
- buoy handling, mooring of landers, handling of ROV's, AUV's and other mobile equipment and

- working zone to be defined: complementary with the new built RV *Simon Steven* of VLIZ (actual working zone of Belgica: 32° to 65° N – 15° E to 15° W).

The *Belgica* replacement vessel's general specifications are:

- Overall length 65 m
- Beam 17 m
- Draft 4,6 m
- Max speed 16 kn
- Working speed 11 kn
- Endurance 30 days
- Crew 15
- Scientists 24
- 7 * 20' containers, two of which under cover
- 3 * flat 20' ISO or 6 *10' ISO containers for incubators

During discussions which followed, Andre confirmed that the new Belgium government has not yet been formed following elections, so there is no budget for the new vessel yet, only a feasibility study. The new vessel will not have a gondola as it needs a shallow draft for coastal operations.

The discussion then moved to lifecycle costs in ship design. NOAA ships went from 12 to 16 knots and USA scientists expect this from other vessels, which increases fuel costs. Some operators like wider ships which provide more internal area for flexibility in design and refit, these hulls are however less fuel efficient in a head sea. Other operators prefer long and narrow vessels to maximise fuel efficiency.

A.3.13. German Fleet Renewal and Sonne Replacement – Klaus von Broeckel (IFM GEOMAR)

After more than 29 years of operation, 32 expeditions and nearly 310 days per year at sea, the replacement for the *Polarstern* is underway. Scientific and shipbuilding technical requirements have been formulated and first design studies were contracted, carried out and evaluated. Discussions about the tender process are underway. *Meteor* has been operating 25 years and has fulfilled 84 expeditions averaging 310 days per year at sea. The vessel is running well and the main cranes have been replaced.

Sonne is the only privately owned ship in the German fleet. The tender process has been running for 18 months and replacement is due in 2014 for delivery in 2015. *Maria S Merian* is the newest ship of the fleet (2006), operating multidisciplinary cruises 310 days per year Problems with the pod drives have been solved and damage sustained last year in collision with a Greek ferry have been compensated by insurance. Four new seismic compressors (12m3/min each) were recently fitted.

Poseidon is the oldest vessel in the fleet and has conducted 386 expeditions since 1976. Following a major refit in 2009/10, the vessel is in Class until 2015 when a replacement is due. The first scientific technical requirements have been formulated and funding discussions are underway. *Alkor* has been conducting multidisciplinary research cruises since 1986 and has had a major refit in 2010. Also since 1986, *Heincke* has been conducting multidisciplinary cruises including student practicals, and has undergone a major refit in 2008/09.

A.3.14. Challenges of Running an Ageing Ship – David Blake (BAS)

RRS *Ernest Shackleton* was commissioned in 1995 as an 80m ocean going vessel, primarily as a logistics vessel with science capabilities. The vessel is ice strengthened to DNV rules with a double hull and is under bare boat charter from Rieber Ship Management, operated for 120 days per year in the North Sea. There is pressure from Rieber to keep a high level of reliability for oil field survey activities. Maintenance issues include:

- corrosion (pipework and superstructure);
- rotating machinery (auxiliary generators);
- equipment;
- DP desk;
- acoustic references and
- control system (Valmarine).

RRS *James Clark Ross* was commissioned 1991 as a 99m ocean going vessel for logistics and scientific survey. The vessel has Ice Class Lloyds + 100 A1 Ice Class 1AS. Survey capability includes multi-beam and sub-bottom profiler, acoustics, winches and underway instrumentation. Maintenance issues include:

- corrosion (pipework and superstructure);
- rotating machinery;
- equipment;
- ageing technical systems;
- instrumentation upgrades and
- traditional engineering approach by crew.

Upgrades completed or underway on *James Clark Ross* include replacement of the control system (GEM drives), superstructure steelwork, multi-beam, sub-bottom profiler and galley. Issues scheduled to be addressed during a later life refit include corrosion, engines, equipment, electric drives, winches and science equipment. More general observations lead to conclude that 1980s/1990s technology has sparing challenges and corrosion in highly serviced vessels is difficult to address.

During discussions that followed, David added that a water pipe had leaked into a fuel tank and a new kind of glass fibre epoxy paint (Ecospeed) had been successfully trialled, lasted over 2 years. There also seems to be a pattern that engineers like to carry a spare ship and really only need critical spares, however spares for old electronic systems are not always available.

The discussion then moved to the funding problems with upkeep of older ships. NERC UK has taken a 12% cash cut, but capital allocation has actually been cut by 50% with most being spent on contracted build of new ship. Does it make sense to spend money on a ship you are getting rid of soon? Will today's new ships be around in 50 years time such as those that were built in the 1960's – probably not. Operators need large capital allocations probably every seven years to properly maintain ships. There was general agreement that more time should be allowed at next IRSO meeting for old ship maintenance and how to maintain modern vessels with changing technology.

A.3.15. Stability Modifications to the CFAV *Quest* – Yves Perron (DRDC)

Quest underwent an inclining experiment in June 2008. When performing stability analysis following the incline, data obtained from experiment did not align with the last Manual of Trim and Stability done in Sept 2009 following the refit of 1999. Further analysis revealed that:

- assumptions made in the past were wrong and did not relate to any acceptable stability standards;
- stability problems were identified in 1986, but not correct in the 1997-1999 refit and
- new stability calculations (Nov 2009) showed a risk to ship and crew when ship in damage state.

Further analysis revealed that stability standards on two compartments, should they be flooded in a damage state, was not met. In December 2009, Naval authorities order CFAV *Quest* alongside pending resolution. A plan was developed to address the problems by sub-division of no. 1 deck, increasing buoyancy by fitting sponsons (water wings) and the reduction of weight by removal of fitted equipment (forward LAT frame and GP oceanographic system). The opportunity was also taken to improve ship while alongside for the stability work by making changes to the switchboard and electrical cable to generators as well as modification of the ship's mast in support of Q340 trial on signature management. A further inclining experiment is planned followed by harbour and sea trials to confirm the stability work and improvements.

In the discussions which followed, Yves noted that the stability standards had changed four times over the life of the ship, which combined with growth in weight had required the stability works. UNOLS performed a study in 1995 and had found weight growth on all ships over time. Yves also noted some 23km of new wiring has now been installed in *Quest* as part of the improvement works.

A.3.16. New *Hakurei* and JAMSTEC's Fleet Renewal Plan – Kazuhiro Maeda (JAMSTEC)

Many types of RV's are used in Japan:

- University education and fishery training vessels *Hokko Maru* and *Bosei*.
- Marine meteorological research vessels *Chofu Maru, Kofu Maru, Seifu Maru, Ryofu Maru* and *Keifu Maru*.
- Hydrographic survey vessels *Takuyo, Shoyo, Meiyo, Tenyo, Kaiyo* and *Jinbei*.
- Antarctic research vessel *Shirase*.
- Ocean underground resources and geological survey vessels *Hakurei Maru, Sigen* and *Hakurei* (now under construction). *Hakurei* will be 118m LOA, 19m beam and 9.2m draft. The vessel will have sea floor excavation and landing capability and be fitted with a 7.5m^2 moon pool, heave compensating winch, two azimuth thrusters and three bow thrusters.
- Ocean research vessels *Kaiyo, Kairei, Natsushim, Yokosuka, Tansei Maru, Hakuho Maru* and *Mirai*.

There is some demand for the next generation oceanographic research vessels. Firstly, in the 2000t class with high mobility around the coast and inshore and secondly, for AUV and ROV support mother ship of 5000t class to study physics aiming at resource inquiry and disaster prevention.

A.3.17. *Pelagia* Mid-life Refit – Erica Koning (NIOZ)

The 66m RV *Pelagia* was built 1990 and is available for use by the Dutch marine research community. Originally built as a North Sea vessel to a specification of 200m CTD cable, the number of days at sea and the area of operation have increased steadily, with the scientists now wanting 6000m CTD cable. In 2010, the ship was 20 years old and with the 20 year special survey coming up this seemed the best time for a refit. A European tender was won by Astander in Santander, Spain who began the refit in January 2010 at a total cost of €4.5M, including extra's for science.

Work undertaken during the refit includes:

- new Caterpillar engines, 12 and 8 cylinder, Tier 2;
- diesel electric drive;
- electronic fuel injection;
- new generator 800 kW instead of 620 kWh, the ship can now run on the smallest engine alone;
- air conditioning in the container hold;
- new starboard aft crane;
- new piping, cranes, nautical instruments, V-sat;
- Kelvin Hughes ECDIS system, no more paper charts;
- Hyde Guardian HG 60 ballast water treatment unit installed and
- accommodation renovated and redecorated.

New science equipment fitted includes a Kongsberg HiPAP 100 USBL system (4000m), new scientific bottom penetrating Echosounder and new 9.6 km synthetic cable with fibre optics. This fibre optic cable was fitted onto an existing winch that had synthetic cable after the winch was overhauled.

A.3.18. *Tangaroa* Upgrades – Fred Smits (NIWA)

The 70m *Tangaroa* is a multi-purpose research vessel operated by NIWA in the conduct of fisheries research, biodiversity and biosecurity studies, oceanography and oil and gas surveys. Based on a 2006 study *"Future Proofing NIWA's Vessels"* it was decided to:

- install DP2 capability to meet the needs of ocean sciences, provide alternative propulsion and secure commercial charter work;
- install a new deep ocean winch;
- improve laboratory spaces;
- improve deck space and
- generally upgrade/refurbish the vessel's freezers, electrical switch gear and alarm systems.

NIWA contracted Skipsteknisks and Kongsberg for an independent assessment of the vessel station keeping ability using the following underwater propulsion systems:

- Main propeller and rudder;
- 800kw stern thruster (new);
- 800kw retractable azimuth (new) and
- 600kw bow thruster (new).

Following further design by Marine Industrial Design in Auckland, key components were purchase and the works were planned in phases and stages to minimise disruption to the vessels schedule:

- Stage 1a: Construction alongside in Whangarei, rebuild of fishhold, installation of winches, completed July-August 2009 and
- Stage 1b: New freezer equipment and ballasting (207 tonnes of new ballast), completed in Wellington October 2009.

Stage 2: tender process was awarded to ST Marine, Tuas Yard, Singapore and the following works scheduled under a Bimco "Repaircon" contract:

- DP2 Installation: new generators, new bow section with 800kW retractable azimuth and 600 kW tunnel thruster, 800 kW stern thruster, new bridge extension, DP controls etc.;
- mid-life refit: switchgear, alarming and fire fighting systems, watertight doors, wiring, lighting, galley and accommodation, engine and steering gear controls, sewage plant, deck winches;
- painting: grit blasted vessel completely, new coating system and
- biannual drydocking: pulled rudder and shaft, hull thickness, winch control systems.

The following conclusions are drawn now the work has been successfully completed:

- what worked well –
  - DP Systems
  - switch gear, PMS
  - refit, painting
  - life of ship extended by 10 years
- what did not work so well –
  - still outstanding commissioning work to be done
  - step-up gearbox failure
  - still many small repairs/fixes to be done (electrical, hydraulic)
  - noise of bow and retractable thrusters
  - cost from pre-guestimate of US$4M to actual US$19M

Lessons learned include:

- badly under estimated extent of project, particularly in terms of manpower required;
- in-house management with external designers worked well but project had significant impact on other vessel operations;
- "growing of scope of work" was inevitable;
- support from NIWA Board and share-holding ministers was fantastic and
- retrofit of 19-year old vessel was worth while.

A.4. Theme 3: Manning, Safety and Training

A.4.1. Sailors do Unpredictable Things - Geraint West (NOCS)

During this presentation, Geraint provided several sobering examples of situations which highlight the unpredictability of human factors in everyday situations. In Dec 2006, an officer jumped from a research vessel while berthed alongside at NOC in Southampton. Fortunately, the rescue boat was deployed and no major injuries were sustained. Drugs, alcohol and depression were identified as contributing factors. Of more serious consequence, in April 2011 Geraint was attending a function onboard the UK submarine HMS *Astute* when a crewman opened fire with a semi-automatic weapon resulting in the death of an Officer and serious injury to another. The crewman was subsequently charged with murder and three attempted murders.

These disturbing events are relevant to all vessel operators and raise a number of important issues:

- how well do we know our people?;
- don't be complacent about inter-personal situations;
- ISM can't predict every situation;
- procedures for chaperoning visitors in an emergency;
- chain of custody for collecting and maintaining evidence and
- access to trauma support.

A.4.2. Drug Policies and Testing (open discussion) – Ian Sage (NURC, NATO)

Ian opened the discussion on drug polices and testing for scientists and crew on research vessels. NATO crew sign up and declare against drug & alcohol (D&A) policy in employment contracts, including random testing and mandatory testing after any accident. Random alcohol testing is carried out by trained Master using calibrated equipment on the vessel and a chain of custody has been established for other samples that may be taken for delivery to the analytical laboratory.

This generated lively discussion among operators in search of common ground, particularly in regard to alcohol given cultural differences and varying alcohol policies on ships. In Norway, if a sailor is involved in an incident and appears drunk, the hospital will provide treatment but will not release medical records, making enforcement difficult. In the USA, all UNOLS vessels are required by the Coast Guard to test 50% of people annually, however this is difficult when ships are away for years at a time. Scientists and technicians are required to sign D&A policy, and there is random D&A testing for crew and anybody following an incident. If a scientist breaches D&A policy, the home institution can be notified and funding can be withdrawn.

More generally, most operators have D&A policies however enforcement is problematic and often not mandated. Some only enforce drug and not alcohol policies. Some vessels carry alcohol testing equipment, but if not properly calibrated and used by trained person the results do not stand up in court. When in port where no approved contractors are available, there can be chain of custody issues with samples for testing. One suggestion is to check with the local P&I club who may have access to appropriate sample collection and transport arrangements.

There are often inconsistencies between scientists and crew, where scientists are accustomed to operating in a less regulated environment and can be reluctant to provide medical information (eg. pre-existing conditions) and comply with seagoing D&A policy. There is also concern among vessel operators that the use of soft drugs and alcohol among scientists may be increasing, with enforcement again having proved difficult. The discussion also touched on the related issue of psychological health; if crew and scientists are trained to recognise and report symptoms and if psychological health is part of initial and ongoing medical assessments. Responses to this issue were also varied.

A.4.3. MLC2006 & STCW2010 (open discussion) – Per Nieuwejaar (IMR)

Per opened discussion on the Maritime Labour Convention (MLC) 2006 which has been adopted by the UN's International Labour Organisation (but not yet in force). This convention covers working and living conditions for seafarers onboard ships and will come into force late 2011 or early 2012. An important difference to other ILO Conventions is that the MLC 2006 has provision for enforcement by means of a regular inspection and certification regime, on a conventional 5 yearly cycle, and also enforcement by port States under the principle of "no more favorable treatment" for ships of a non-party State. It applies to all commercial ships, with minor exceptions and their seafarers, in accordance with Article II of the Convention. The working and living conditions that must be inspected and approved before certifying a ship include:

- Minimum age and medical certification
- Qualifications of seafarers and employment agreements
- Use of any licensed or certified or regulated private recruitment and placement service
- Hours of work or rest and manning levels for the ship
- Accommodation (single berth cabins)
- On-board recreational facilities including food and catering
- Health, safety and accident prevention
- On-board medical care
- On-board complaint procedures
- Payment of wages

Note: regarding accommodation and recreational facilities, applies to ships constructed (keel laid) from date MLC 2006 comes into force.

While there is some overlap between MLC and the existing STCW convention, STCW is mainly concerned with fitness for duty and safety, while MLC also includes social welfare and industrial relations aspects. There was discussion if seagoing scientists are assumed to be seafarers by the MLC (they are not in the USA), and if Special Purpose Ships are exempt. Ultimately, these interpretations of MLC 2006 will be made by each Port State Authority. Find out what you are facing and start early to address the issues.

A.4.4. Buoy Operations Training in Indonesia – Shinichi Kusaka (NME)

The international TAO-TRITON buoy array has expanded from equatorial regions in the eastern Pacific (PMEL) to the western Pacific (JAMSTEC) and now the Indian Ocean (JAMSTEC). The largest TRITON buoy stands 5.2m high, 2m wide and weighs 2400kg in air; these buoys therefore require specialised training and equipment for servicing operations. In April and May 2011, JAMSTEC instructors joined Indonesia's RV *Baruna Jaya* □ and conducted a successful TRITON buoy servicing training cruise, which covered deployment and retrieval operations.

A.5. Theme 4: Scientific Technology

A.5.1. ROV's and Propellers Don't Mix…Damage to ISIS ROV – Geraint West (NOC)

NOC has suffered an unfortunate incident which involved an ROV being drawn into a ships propeller, resulting in approximately £0.5M damage. The ships propeller also suffered blade-tip damage, which was visible from a window in the ships skeg following the incident. To investigate the incident, NOC established a Board of Inquiry which as chaired by colleague from British Antarctic Survey with members from Woods Hole, IFREMER and the NOC Research Ship Manager. Contributing factors were found to be:

- prevailing conditions at time of incident were moderate;
- lack of availability of azimuth thruster;
- insufficient knowledge and understanding of the vessel's capability with reduced propulsion;
- insufficient appreciation of the vessel's reactive forces to keep station with reduced propulsion;
- insufficient trials to prove the vessels ability to keep station;
- a combination of minimal preparation and a less than comprehensive pre launch checklist;
- inadequate risk analysis by all concerned;
- inadequate delegation of responsibility during the deployment process and
- insufficient manning in key areas (the Bridge).

After some sympathy from other operators who have experienced similar incidents, Geraint advised that a revised procedure for deployment and recovery of the ROV has now been formalised following the investigation. There had also been a secondary issue relating to late incident notification as the vessel had been working under an Antarctic environmental permit.

A.5.2. Synthetic Cable Technology (open discussion) – Hans-Petter Knudsen (IMR)

Hans-Petter opened discussion using IMR's synthetic cable for deep sea camera as an example. Synthetic cables have significant advantages over conventional steel cables in regard to greatly increased working depth (almost weightless in water) and payload (increased breaking strain for comparable cable diameter). However, care must be taken to protect synthetic cable against any any abrasion points, as they are more easily damaged than steel cables.

Further information was provided in the discussions that followed. With scientific equipment which must be lowered to the sea floor (such as a sediment grabs, corers etc.), synthetic cables are also preferred as the low weight of deployed cable provides much better feedback to the winch operator when the package contacts the sea floor. Synthetics have been used for CTD operations, however additional weight needs to be added to the CTD package to maintain in-water stability. However, synthetics are not generally used for fishing or dredging type operations, where the catenary formed by a steel cable is necessary to tow the equipment correctly on the sea floor. It is possible to re-terminate synthetic cables at sea, however this is a time consuming operation. A number of operators have found their synthetic cables to have a useful life around 5 years with an associated 30% reduction in breaking strain, mostly towards the latter part of this period.

It is possible to convert steel wire winch systems to synthetic cables, however due to the increased breaking strain of synthetic cables, care needs to be taken to ensure that the cable remains the weakest link in the system compared to the A-frame, sheaves and winch mountings. As with all cables, during installation it is important to spool cable onto the winch with sufficient tension to avoid spooling problems on the first deployment.

A.5.3. ROV Victor Modernisation – Sébastien Dupont (IFREMER)

The 6000m rated ROV Victor entered service in 1998 and has since performed 300 dives representing 4000 hours of work. The aim of the modernisation program was to replace old equipment, reduce costs and increase scientific performance over the next 10 years of operation. The scope of work undertaken included:

- a new power supply;
- new real time hardware and software;
- implementation of 3 new work stations for scientific module;
- adaptation of up to date software;
- new video HD camera and new digital camera;
- replacement of DVDs with HDD for data storage (8 hard disks of 750 GO for a campaign of 15 dives of 20 hours, instead of 300 DVDs);
- upgrade of manipulation arms and
- upgrade of navigation.

This program of work was successfully completed over 36 months at a cost of €2.5 M.

A.6. Theme 5: Legal and Insurance

A.6.1. Marine Insurance and Legal Update – Prof. Dennis Nixon (UNOLS)

Denis provided an overview of the global marine insurance market, noting that insured values for renewed insurance policy vessels had decreased since 2009. The market is currently oversubscribed with insurers and higher-risk ships are not paying correspondingly higher premiums. With larger vessels planned in future, there are concerns about how the industry would cope with a large loss. Unrest in the Middle East, piracy and terrorism continue to create a mood of uncertainty in the market.

Noteworthy proposed policy changes affecting insurance include revised requirements on hours of work and rest (STCW) and new US requirements for the prevention of drug and alcohol abuse, as well as updated standards relating to medical fitness standards for seafarers (list of potentially precluding medical conditions and BMI test). Future policy changes may include new standards for lifeboat hooks and revised mariner medical evaluations.

Fallout from the Deepwater Horizon disaster continues. Industry and Government were clearly unprepared for an event such as this, perhaps because the release of petroleum into the sea from extraction activities had been historically low at 3% of total compared to natural seeps (62%), transportation (12%) and consumption (37%). In total, some 4.9 million barrels of oil were discharged, 1.8 million gallons of dispersant applied and a large number of industry and research vessels mobilised to monitor the plume and plug the well. Total costs are now estimated to exceed $43 billion and BP has already pledged $20 billion for the Gulf Coast Cleanup Facility. Regulatory complacency will end, with the dissolution of the Minerals Management Service. Offshore drilling will be more expensive, but safer: ExxonMobil, Chevron, ConocoPhilips, and Royal Dutch Shell are investing $1 billion in a new deep water oil containment system (modified tankers, drill ships, well-test vessels, etc.) that will be operational by early 2012.

In reviewing casualties, a number of trends have emerged. UK P&I Club highlights dangers of using untrained or poorly supervised crews for mooring operations. Standard P&I Club says ISM internal audits and Masters' reviews ineffective, perhaps due to poor understanding and staff training. Two people died when a sludge barge collided with a duck boat on the Delaware River; records imply the mate on the larger vessel was using his cell phone (Coast Guard has now banned personal use of cell-phones on a vessel's bridge). The new Chilean RV *Cabos De Hornos* was swept inland by a Tsunami prior to being launched at the shipyard and has since been successfully refloated.

Legal cases and news include:

- an incident in China's EEZ where 5 Chinese ships harassed the USNV *Impeccable*;
- conflict between Chinese and Philippine vessels in South China Sea;
- New Zealand seismic survey by *Orient Explorer* disrupted by activists;
- temporary Inuit court injunction halts *Polarstern* seismic survey in Baffin Bay;
- RV *Gould* fined and engineer jailed for discharging oily water and
- Carnival paid $24M by Rolls Royce for faulty propulsion system.

Scientific developments of international concern include the first of seven floating nuclear power stations which was recently launched by Russia, reportedly destined for the Russian Arctic to be used for ships undertaking raw mineral extraction. These power stations are also capable of desalination. The growth in unmanned systems technology is

pushing legal boundaries. These technologies often cross research and naval defense and are pre-dated by the Law of the Sea. Should these systems enjoy the rights of innocent passage in territorial seas and beyond?

In summary, marine insurance costs will remain stable however the cost of fuel is more difficult to predict. The Deepwater Horizon disaster will affect liability laws and offshore safety, while AUV and ROV technology will push the boundaries of maritime law.

A.6.2. MSR Guidelines & Environmental Update – Liz Tirpak (DoS) and Roland Rogers (NOC)

Rolly and Liz provided an overview of current MSR diplomatic clearance and environmental issues, noting that a revised United Nations Convention on the Law of the Sea (UNCLOS) guide has been released for obtaining Marine Scientific Research (MSR) diplomatic clearances for RV's working in foreign waters. The guide can be found at: http://www.un.org/Depts/los/doalos_publications/publicationstexts/msr_guide%202010_final.pdf

An overview of current MSR diplomatic clearance issues includes:

- some Coastal States requiring Form A's to be translated into nominated languages (can IRSO adopt a common format?);
- special permits required by Australia for work in marine parks or on mammals;
- scope of MSR in a changing Arctic Ocean;
- sovereign seafloor rights extending beyond the continental shelf along with increasing interest in deep sea mining;
- can implied consent be assumed if application conditions have been met (including 6-month advance notification) – nobody has tested this yet;
- should "passage observations" require MSR clearance and if so, what type?;
- MSR status of operational oceanography including gliders and floats – legal complications arising from multiple stakeholders including research, defence and commercial use;
- real time "streamed observations";
- repeat MSR with mooring arrays;
- compliance opportunities and challenges with telepresence and
- responsibility for obtaining approvals – permitting science, not ships?

New IMO guidelines for Ships Operating in Polar Waters are available. As some polar waters are now ice-free in summer, increasing access by non Polar Class vessels into these areas is being sought. Other environmental issues include:

- tensions regarding ocean fertilisation experiments now being addressed by IMO LC/P however may take up to five years to resolve;
- landing of scientific samples and food waste;
- underwater noise policy eg. seismic work;
- ship noise and the "quiet ocean" experiment;
- Eurofleets and environmental management including new vessel design and
- ducted propellers and injury to marine mammals.

The presentation closed with a query about the need to update the Code of Conduct for Marine Scientific Research Vessel's which was drafted by ISOM in 2007.

A.6.3. Commercial Charter of Research Vessels (open discussion) - Fred Smits (NIWA)

A discussion on issues around the commercial chartering of research vessels was led by Fred Smits from NIWA, for whom commercial charter is necessary to fund the operation of *Tangaroa*. Fred's presentation covered issues such as:

- the impact of commercial charters on the vessel's research program
- marketing (expensive);
- charter rates (equipment, support, fuel etc);
- contract formats (Bimco, collaborative research agreements etc.) and
- commercial and operational risk management (HSE, staff training, vessel compliance, equipment, shore support etc.).

More generally, agreement on the contract indemnity regime with a commercial partner can be difficult. This varies across countries (eg. knock for knock liability), and some countries do not permit Government RV's to compete with industry in the commercial arena. In addition, not all RV's and associated systems are well set up for commercial work. UNOLS vessels have attempted to obtain commercial work during slow periods, but issues such as insurance make this difficult as UNOLS vessels don't usually carry hull insurance.

A.7. Theme 6: Cooperation and Outreach

A.7.1. Ocean Facilities Exchange Group (OFEG) and OFEG-Tech – Erica Koning (NIOZ)

OFEG (www.ofeg.org) facilitates the exchange of ship time and major pieces of equipment based on the 'bartering' principle using a value points system, including joint cruises. Its six member agencies (NERC, BMBF, IFREMER, NIOZ, CSIC and IMR) run multiple ship fleets (except NIOZ), generating increased equipment access and real efficiencies for OFEG partners, with combined savings since 2005 estimated at €2.6M. OFEG –Tech, a technical sub-group of the OFEG forum, is generating real benefits through increased information exchange, sharing of equipment, staff and technology.

Recent OFEG highlights include a German cruise on *Viking Explorer* (the first Norwegian barter), four Dutch science teams on *Meteor*, a Dutch cruise on *James Cook* (Punta Arenas to Las Palmas) and a French cruise on *Sonne* near Tahiti. Equipment sharing has also been improved through the NERC – CSIC seismic agreement.

OFEG – Tech has identified the following topics as key items for future meetings:

- interoperability (all equipment);
- coring technology and development;
- ROV interoperability and exchange of technicians;
- ship software and data systems; networking, data acquisition, post processing
- deep sea cable technology;
- cross compatibility of equipment pools and
- equipment loss, lessons learned, reasons, solutions & consequences.

Technical training and co-operation has also been a feature of the NERC – CSIC seismic agreement as well as transferring piston coring technology, with trials and research cruises used to develop shared knowledge and understandings. Overall, the benefits of these collaborations have exceeded the initial expectations.

A.7.2. INMARTEC – Fred Smits (NIWA)

INMARTECH is an annual meeting of international marine technicians which was formed under the IRSO banner. After having to unfortunately cancel INMARTECH 2011 in New Zealand due to poor enrolments, Fred led a discussion on the future of this technical forum. IRSO participants felt that wide-spread budget constraints had contributed to the poor enrolments for the New Zealand meeting and the future focus of INMARTECH should remain on technical, not management issues. Meetings with interactive and hands-on workshops work best. After some discussion, delegates decided against a proposal to combine OFEG & INMARTECH meetings.

The meeting then agreed in-principal to hold the next INMARTECH meeting at NIOZ in the Netherlands during 2012, which should improve attendance by marine technicians based in the northern hemisphere. Consideration should also be given to expand beyond IRSO member organisations into areas such as Antarctic programs for example. All agreed that long lead times for these meetings were important for budgeting purposes. *Fred Smits undertook to lead an email discussion in the coming months to work through the details of the next INMARTECH meeting.*

A.7.3. Eurofleets – Per Nieuwejaar (IMR)

Eurofleets (www.eurofleets.eu) is a ca. €9 M (€7.2M EU contribution) program comprising 24 marine institutes, universities, foundations and SMEs, from 16 European countries. The program is aimed towards an alliance of European research fleets. IFM-GEOMAR, ESF Marine Board and DTU Aqua have joined as Associate Partners and more are likely to follow. The project commenced on 1 September 2009 and will last for 4 years.

Two calls were made in 2010; Global/Ocean and Regional 1. 38 eligible proposals were received, 23 (60%) Global/Ocean and 15 (40%) for Regional RV's. Five cruises were funded onboard Regional RVs for 36.6 days. The last call (for Regional 2) will be made in 2011 with 12 Regional RV's accessible. Funding for 2012-13 will be decided in November 2011. A widened partnership with the Eurofleets2 proposal will provide further integration for young scientists and non equipped countries as well as other networking opportunities in virtually joining fleets within maritime regions and sharing scientific evaluations.

A.7.4. ERVO – Juanjo Dañobeitia (CSIC)

The objective of the European Research Vessel Operators (ERVO) members is to create and maintain a forum for European research vessel operators, with special focus on research vessels and associated equipment and/or instruments, which will give the members the following opportunities:

- attend ERVO meetings where common issues/problems are identified and discussed, and possible solutions presented;
- contribute to the development within Europe of best practice in the operation of research vessels and associated equipment;
- learn about developments and plans for procurement of new RV´s, equipment and instruments, and upgrades of existing RV´s;
- be a member of a pan-European network of RV´s which presents a wide range of opportunities;
- identify methods and ways to minimize the impact of the operations of research vessels and associated instruments and equipment on the environment and marine life and
- develop and maintain a strategy for the future growth of ERVO in terms of membership, and useful for European RV´s operators in particular and the European Marine science community and its stakeholders in general.

The 13th ERVO meeting (ERVO 2011) was held in Sardinia, Italy on 11 – 12 May 2011, with 26 representatives from 18 organisations in 12 different countries plus one USA observer. ERVO will make efforts to maintain and improve relationships with the following organisations for the benefit of both parties:

- European Science Foundation/Marine Board (ESF/MB);
- International Research Ship Operators (IRSO);
- OFEG (Ocean Facilities Exchange Group) and
- Research Vessel Operator Committee (RVOC) in USA.

These groups shall receive a formal invitation to attend the annual ERVO meetings as observers.

A.8. Closing of 24th IRSO

A.8.1. Suggestions and Topics for 25th IRSO (2012) – Geraint West (Chair IRSO)

Confirming discussions at the opening session, country reports will be provided by poster at the 25th IRSO (apart from verbal reports from new participants) to allow more time for discussion of critical issues. It was also agreed the workshop had been very useful, including the focus on new technologies, and should be continued. David Blake volunteered to lead the 2012 workshop on communications capabilities (VSAT etc). For the 2012 meeting agenda, suggested topics for discussion included a focus on new-build details, high latitude work (which Fred Smits volunteered to lead), keeping old ships running and keeping new ships fitted with modern technology running.

A.8.2. Date, Place and Venue for 25th IRSO (2012) – Geraint West (NOC)

Geraint West invited members to participate in the 25th IRSO which will be held at the National Oceanography Centre, Southampton, UK in October 2012. As the inaugural meeting of ISOM (now IRSO) was hosted by the UK, this meeting will have special significance.

A.8.3. Date, Place and Venue for 26th IRSO (2013) – Geraint West (Chair IRSO)

IMR in Norway has volunteered to host the 26th IRSO. However, it has been customary to alternate between a European & non European country, so IRSO is looking for a non European volunteer country to host the 2013 meeting.

A.9. Adjourn

Geraint West thanked William Wilcock, his team and the University of Washington for their excellent organisation and hosting of the meeting, after which the meeting was adjourned.

A.10. Undertakings

A.1.4 *The Chair provided an undertaking to draft ideas around membership and country representative issues and circulate to IRSO over next few months with a view to seeking consensus before the next meeting in 2012.*

A.1.5 *Geraint asked participants to think about IRSO website during the meeting, what should be on the website and what should not.*

A.7.2 *Fred Smits undertook to lead an email discussion in the coming months to work through the details of the next INMARTECH meeting.*

B. Country Reports

B.1. Australia – Ron Plaschke (CSIRO)

Overview

CSIRO has signed a contract with TK Holdings Australia to build Australia's new Marine National Facility (MNF) research vessel which has been named *Investigator*. At 90m in length, the new vessel is in the final design stages by RALion (USA and Canada) and will be built at Sembawang shipyard in Singapore. RV *Investigator* is planned to be commissioning during the 2013/14 year.

Southern Surveyor will continue to serve as Australia's MNF research vessel until RV *Investigator* arrives. A special project of enhanced maintenance continues to maintain the reliability of the 40 year old *Southern Surveyor* within acceptable levels through this period.

Vessels

CSIRO Marine National Facility Vessel.

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Southern Surveyor		*Ocean*	*66*	*1972 (converted 1990, 2002)*	*180*	*Australasian region*	*Enhance maintenance program (CMAN2).* *Emergency dry-docking March 2011 to repair Kort nozzle.*	*See A.1.*

Further information can be found at *http://www.marine.csiro.au/nationalfacility/*

Other Australian Vessels

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
RSV Aurora Australis		Polar Ocean	95	1990	184	Antarctic, Southern Ocean	Has provided Antarctic support, resupply and marine science services under charter from P&O Maritime Services to Australian Antarctic Division since 1990.	*Current charter ends in 2012.*
Solander			36	2007		Tropical Australia	Australian Institute of Marine Science	
Cape Fergusson			22	2000		Tropical Australia	Australian Institute of Marine Science	
Negerin			25	1985		South Australia	South Australian Research and Development Institute	
Naturaliste			*23*	*2001*		*Western Australia*	*Western Australian Department of Fisheries*	

Equipment

As part of RV *Southern Surveyor's* annual Capex process for scientific equipment, the existing *Lachat* seawater nutrient analysis system will be replaced with a new *Seal Analytical* system which is expected to increase the quality of nutrient data generated on the vessel. The vessel's *Simrad* EK500 echo sounder has been replaced with a new EK60, which completes the upgrade of the 12, 38 and 120kHz single and split beam echo sounder systems.

Cooperation

During November 2010, the Marine National Facility held a Voyage Manager Training Program which focused on the human interactions, conflict management, teamwork, self understanding and health and safety management required for a successful voyage. Conducted as a week-long residential workshop, the program was attended by CSIRO participants and four members hosted by the Australian Antarctic Division who are working as Voyage Leaders on *Aurora Australis*. The feedback from this program has been very positive.

B.2. Belgium – Andre Pollentier (Belgium Federal Science Office, RBINS-MUMM)

Overview

Vessels

Name		Type	LOA (m)	Built	Op. Days	Main area of operations	Notes	*Plans for Replacement*
Belgica		Regional	51	1984	180	32N-65N, 15W-15E. Mainly Southern Bight North Sea & regional area beyond (English Channel, Irish Sea, and eastern Atlantic continental margin)	Belgica, owned by the Federal Science Policy Office, is operated by the Belgian Navy on behalf/expense of RBINS - MUMM which manages the vessel. The RV is manned by only one fixed crew. Operating cost in 2009: 1.950 M€. In 2009, following EC regulations concerning the use of halogenous gases, the fire detection and extension system has been replaced. Three CASCO claims (incidents occurred in 2006-2007) have been settled satisfactory by the insurance company (franchise was 37.500 €, now 44.000 € each claim). No incidents since 2007.	*In 2009 a modest feasibility study either to do a midlife conversion or to replace the RV has taken place with a clear outcome : new built.* *In 2010, pending agreement of the Ministry Council, tendering for the design study of the new built ship will take place.*
Zeeleeuw		Regional (Refitted Pilot tender)	56	1977	150	Coastal Zone	Operated by VLIZ & Department Fleet (Flanders Min. Science & Public Works)	*In 2008 an agreement between the Ministry of Science & Public Works has been signed to substantiate the research facilities of the Flanders Marine Institute task through the funding for a new built coastal research vessel & land based facilities.*

Simon Stevin		*Regional*	*36*	*2012*	*150*	*Belgian Continental Shelf Hull - Le Havre - Bremerhaven*	*Flanders Marine Institute* *Project started in 2005* *Complimentarily with Belgica* *End 2006 : concept* *2009 budget available + tender* *12.5m € (including vat & scientific equip)* *DAMEN build*	

Cooperation

Belgica and Zeeleeuw/Simon Stevin are complementary. Cruise schedules are tuned between the two ships and an agreement on exchange scientific equipment exists.

B.3. Canada – Jennifer Nield (Fisheries & Oceans Canada)

Not updated since 2010 meeting – see PowerPoint presentation provided to all meeting participants for up to date information

B.3.1. Overview

Of general interest, Canada has experienced the lightest ice conditions this winter on its east coast since 1969. Conditions on the Great Lakes however, were normal. The Arctic has significant coverage with a great deal of multi year that has shifted further south into the regions of Baffin Bay. This southward movement of hard Arctic ice may precipitate over the coming years as natural ice boundaries (bridges) that typically help hold this ice back, can deteriorate with warmer overall temperatures.

To this end, the requirement for Canadian scientific research vessels to operate in areas where infusions of muti-year ice exist is seen as a requirement for many years to come. The assignment of ice class will be determined from a vigorous scenario based approach. This will require an analysis of the likelihood of damage during various manoeuvres in ice or in ice infested waters. The results of the analysis will determine where on the hull extra strengthening will be required.

With respect to the specifics of ship building activity in Canada with respect to research vessels, one small 18 metre vessel was delivered to the Great Lakes for limnology studies in June 2009. One other such vessel (similar design) will be delivered to the east coast for fisheries research in June of 2010.

Design for two 22 metre and one 25 metre vessel was completed in December, 2009. Construction has begun in March, 2010 with delivery of all three in March, 2011.

A complete review of both major projects; the Offshore Oceanographic Vessel and three Offshore Fisheries Science vessels was completed over this past year. It is anticipated to be in full design contract by June with a construction award by middle of 2011.

The Polar project is in the project definition phase with each operational requirement undergoing a vigorous validation phase. It is anticipated that the Coast Guard will be ready to enter into a design contract by mid 2011.

All vessels mentioned below will be following a “design for build” process.

B.3.2. Vessels

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Replacement for the CCGS HUDSON		Regional	90 M	1964	200 r	Eastern North Atlantic	Vessel is planned for replacement in 2014. Crew size is 30 + with 25 scientists Pengo winch with capability of 30 Metre piston cores. Two cranes and gallows. Most scientific work is done from the fordeck of this ship.	*Plans are to replace to the vessel in 2014. Design should be completed in 2011.*
Offshore Fisheries Research Fleet (4 vessels)		Regional	57 to 65 Metres	1977 to 1984	170	Eastern North Atlantic and Western Pacific		Plans are currently underway to replace three of the OFSVs on the East coast with two new ones and the one vessel on the West Coast by 2014.
Inshore Fisheries Research Fleet (5 vessels, three being replaced)		Coastal	18 to 30 Metres	1980 to 1992	150 to 200 days	Near coastal (ice free) waters of Canada's east and wests coasts.		Entering construction two replace three by March 31st, 2011.
Specialty Vessels		Near Coastal	13 Metres +		200	Near coastal (ice free) waters of Canada's east and wests coasts.		Delivered the new 18 Metre CCGS KELSO to replace the 16 Metre CCGS SHARK on the Great Lakes for scientific research. 2nd vessel is near completion for the East Coast.
Polar	 Addition to Fleet	Global	140 Metre		TBD	High Arctic	TBD	Design to commence mid 2011. Delivery is planned for 2017.

B.3.3. Equipment
B.3.4. Cooperation

Canada enjoyed some excellent cooperation from many members of ISOM with respect to concept development of the OFSV with respect to layout and type of deck used for the trawl deck. Further we have benefitted greatly by spending a great deal of time onboard the RV Maria S Merian thanks to efforts of Dr. Klaus von Broeckel who help secure connections.

B.4. Canada – Yves Perron (Defence Research and Development Canada)

Overview

Defence Research & Development Canada is a special agency of the Department of National Defence in Canada. The Agency has seven research centres and employs approximately 1900 employees. The mandate of Defence R&D Canada - Atlantic is to conduct research and development in the areas of Underwater Sensing and Countermeasures, Naval Command & Control Information Systems, Naval Platforms, Air Platforms, Signature Management, Emerging Materials and Modelling and Simulation. These R&D activities support operations, acquisition, maintenance and requirements planning by Canada's Navy and Air Force.

Within undersea warfare, DRDC Atlantic leads in sonar technology , mine countermeasures, and torpedo defence. We are expanding our expertise in naval command & control and information systems. We also lead in naval platform R&D, encompassing structural modelling, computational fluid dynamics, and operational effectiveness applied to ships and submarines. We manage air platform technology programs for the benefit of Air Force operations, including aeropropulsion, aerodynamics, flight mechanics, structures and materials. Our R&D in signature management investigates and reduces the vulnerability of military platforms to emissions and reflections of energy. Our emerging materials R&D supports a variety of Canadian Forces material requirements, from "functional" and "smart" materials to advanced power sources. We employ modelling and simulation to develop and integrate platform and combat systems models for acquisition, requirements, rehearsal and training.

CFAV QUEST is operated by the Canadian Navy Auxiliary Fleet Authority and tasked by DRDC Atlantic in support of the maritime R&D program.

Vessels

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
CFAV QUEST (AGOR 172)	 	*Ocean Research Vessel*	*77 m*	*1969* *Mid-Life refit 1997-1999*	*125 sea days*	*Scotian Shelf, North Atlantic, East Coast North America, Gulf of Mexico*	Crew: 23 Science Berths: 20 Electronics Radar: Racal-Decca Bridgemaster 2, "X" band and "S" band Communication: Full suite of modern communication equipment including Fleet Broadband Special: • Echo sounders • Sub-bottom profile • Current profiler • Directional wave measurement system • Wave height meter • Environmental sensor • Bathymetry • Expendable bathythermograph launcher • Radio direction finder • Underwater telephone	*CFAV QUEST has been restricted alongside for the past 15 months due to stability issues. An extensive repair package has been implemented and the ship is nearly ready for re-entry into service (May 2011).* *The Maritime S&T Experimentation Capability project is in its option analysis phase aims at re-capitalizing 3 main R&D assets including CFAV QUEST (larger portion of project). The project is aiming to entre definition phase in 2012 and implementation phase in 2014 for a new vessel available for operation in 2016.*

http://www.atlantic.drdc-rddc.gc.ca/factsheets/TS0102/TS0102_eng.html

Equipment

DRDC Atlantic operates an Acoustic Calibration Barge. Details found at URL below.
http://www.atlantic.drdc-rddc.gc.ca/factsheets/TS0203/TS0203_eng.html

Cooperation

DRDC Atlantic contributes actively to activities of The Technical Cooperation Panel (TTCP) between Australia, Canada, New Zealand, United Kingdom and the United States of America. We worked closely with the NATO Undersea Research Centre for some programs and have bi-lateral agreements with the United States of America, United Kingdom, Australia, the Netherlands and Sweden.

B.5. Chile – Enrique Aranda Orrego (Instituto de Fomento PesQuero)

Overview

Vessels

Name		Type	LOA (m)	Built	Op. Days	Main area of operations	Notes	*Plans for Replacement*
R/V ABATE MOLINA		Regional	43,6			Chilean 200 mile EEZ	Displacement: 426 Tons. Accommodation: 30 Crew: 15 Scientist:15	
Zeeleeuw		Ocean	74	In-build		E. Pacific & Southern Ocean	Length: 74,1 m; readth: 15,6 m; Draft: 5,8 m; Displacement: +3000 Tons. Accommodation : 68 Crew: 43 Scientist: 25	

Cooperation

B.6. China – (IOCAS)

Overview

In 2010, RS “Ke Xue Yi Hao” and “Ke Xue San Hao” supplied two share voyage for free for scientists from other institutes and universities in China; RS “Shiyan 1” supplied 50 days cooperation ship time in China.

Vessels

Name		**Type**	**LOA (m)**	**Built**	**Op. Days**	**Main area of operations during year**	**Notes**	***Plans for Replacement***
“Ke Xue Yi Hao”		Ocean	104	1981.1	200	China sea, the north-west area of the Pacific Ocean	Displacement: 3300 ton	
“Ke Xue San Hao”		Ocean	73.9	2006.7	200	China sea	Displacement: 1224 ton	
R/V Shiyan 1		Ocean	60.9	2009.4	150	South sea of China Indian Ocean	Displacement: 2500 ton SWATH	
R/V Haiyang 6		Global	106.0	2009.10			Displacement: 4600 ton	
“KeXue” (Science)		*Global*	*99.6*	*New Build*			*Displacement: ~5000 ton*	

http://english.qdio.cas.cn/rs/fs/rv/

Cooperation

- Ke Xue Yi Hao supplied 21 days ship time for free for scientists from other institutes and universities in China, in 2010.
- Ke Xue San Hao supplied 48 days ship time for free in China, in 2010.
- Shiyan 1 supplied 50 days cooperation ship time in China, in 2010.

B.7. Denmark – DTU Aqua, by Helge A Thomsen / Hans-Erik Mahnfeldt

Overview

Research vessels in Denmark are owned and managed separately by the Universities.
As main operator and owner of the only ocean going research vessel in Denmark, the Technical University of Denmark – National Institute of Aquatic Resources (DTU Aqua) represents Denamrk within IRSO.
Besides DTU Aqua, also the University of Copenhagen (KU), the Greenland Institute of Natural Resources, the University of Aarhus (AU / which includes the National Environmental Research Institute), and the Geological Survey of Denmark and Greenland (GEUS) are main operators within seagoing field work.

http://www.aqua.dtu.dk/english.aspx

DTU Aqua is operating the below mentioned vessels (and additionally a range of small inland water crafts).
The institute runs a land based department (Section for Marine Services) which is responsible for purchase and maintenance of research equipment as well as mobilisation prior to research cruises.

Developments in 2010 encompass further emphasis on defining a national plan for the replacement of vessels currently being operated by Danish universities, a major docking event for DANA, further improvement of the DANA ISM/ISPS protocols, and further progress with regard to establishing proper working routines within the Danish Centre for Marine Research (DCH / http://www.danskhavforskning.net/English.aspx).

Vessels

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Dana		Global	78,4	1981	150 days/year	North Sea, Baltic, North Atlantic, Greenland	Technical University of Denmark DTU Aqua	*A larger maintenance docking was scheduled for the autumn of 2010. Ongoing application process to raise funding for a replacement vessel of approx same size, but truly multifunctional*
Havfisken		Local	13,7	1963	200 days/year	Danish waters	Technical University of Denmark DTU Aqua	*The replacement of this vessel is in progress. The new vessel will be operational from beginning of 2012*

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Havkatten		Local	9,6	1988	Few days/year	Danish waters	Technical University of Denmark DTU Aqua	*Is currently taken out of operation.*
Havtasken		Local	5	1989	Few days/year	Danish waters	Technical University of Denmark DTU Aqua	
Havmusen		Local	6,3	1996	Few days/year	Danish waters	Technical University of Denmark DTU Aqua	
Various Royal Danish Navy vessels		Global					Various Royal Danish Navy vessels operating in the North Atlantic.. These can be used on an ad hoc basis for 'light' marine research / special mobilisation basis.	
Paamiut		Regional	58,6	1971	90-100	Greenland waters	Greenland Institute of Natural Resources / Deep sea fishing	*Replacement of this vessel is under consideration by the Greenland Institute of Natural Resources. The possibility of linking this with a DANA replacement is under consideration.*

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Adolf Jensen		Local	32	1967		Greenland inland waters	Greenland Institute of Natural Resources Fishing and research	*A replacement vessel is currently being built.*
Ophelia		Local	15,4	1958		Danish waters	Copenhagen University Education / research	
Genetica II		Local	14,8	1961		Danish waters	Aarhus University Education / research Has suffered a fire, and presently unknown if being rebuilt.	*Funding is available for a replacement vessel and the building process is under way (see below)*
New		Regional Danish waters	25	Est 2013			Aarhus University. New multipurpose research vessel. North Sea, internal Danish waters and the Baltic Sea.	

Equipment

DTU Aqua runs a department dedicated to performing mobilisation, calibration, general service and development of research equipment. The current focus area is on smaller equipment at large and possibilities of cost reductions while still retrieving quality data. Efforts have been made during 2010 to establish better IT-based solutions for maintaining an overview of marine research equipment owned and operated by DTU Aqua.

DTU Aqua operates a range of equipment such as smaller video ROVs, towed platforms, TRIAXUS units, core samplers, containerised mobile labs, CTDs, buoys, 'acoustics', pressure tank etc. DTU Aqua has recently initiated video surveillance of commercial fishing (discard) – concept which is now in operation throughout the EU.

The IT-software development group (the Software Development Center at DTU Informatics: http://www.imm.dtu.dk/English/Industrial_collaboration/SDC.aspx) has successfully contributed to the further development of software tools developed within DTU Aqua: Fish stock databases, Quality Index Method Rating System, Seafood Spoilage and Safety Predictor, FishFrame, Ship Information System etc.

Cooperation

The vision and strategy of DTU Aqua is to further enhance cooperation within both the national research community and internationally to enhance research collaboration at large and the shared usage of vessel platforms and equipment.

B.8. Finland

Overview

R/V Aranda operated since 1st Jan 2009 by Finnish Environment Institute/Marine Research Center (owner, 65%) and Finnish Meteorological Institute (35%). R/v Muikku operated since 1st Jan 2010 by Finnish Environment Institute/Marine Research Center, in co-operation with University of Eastern Finland

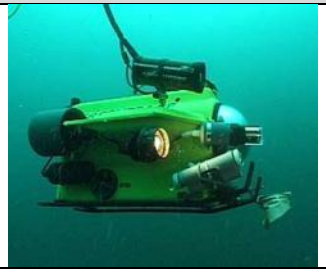
Vessels

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
r/v Aranda		Regional/ Ocean	59.2	built 1989, major refit completed May 2010	120-150 days/year	The Baltic Sea (occasionally Arctic Sea)	Major refit completed May 2010. Berths: scientists 24, crew 14.	No
r/v Muikku		coastal	27,7	rebuilt as research vessel in 1989	60 days/year	Coastal areas of the Baltic Sea, large inland lakes	Berths: scientific 10, crew 5.	No

http://www.itameriportaali.fi/en/aranda/aranda_matkat/en_GB/2010/

http://www.joensuu.fi/eti/suurjarvi/english/valikko/index_4.html

Equipment

Name		Type	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Aranda: Benthos Mini Rover		ROV	1990	No operations		ROV has been under repair at manufacturer	tentative plans for replacement or major refit

For other scientific instrumentation/equipment, as well as laboratory instrumentation and facilities onboard r/v Aranda and r/v Muikku, please cf. Respective websites given above.

Cooperation

Aranda:
-cruise Combine 2/FINMARINET, EU-funded research
-cruises SUPREMO I and SUPREMO II, Support for remote sensing and ecosystem modelling EU funded research

Muikku:
-2 week cruise with FIN National Board of Anitquities/Marine Archaeology unit
-4 weeks TOMFA-HEPLA cruises, funded by Academy of Finland
-2 weeks FINMARINET, funded by EU

B.9. France – Hélène Leau (IPEV) and Olivier Quedec (IFREMER)

Overview

The French Oceanographic Fleet is administered by four research bodies: IFREMER, IPEV, IRD and CNRS. In 2008, the Ministry of Scientific Research supported the creation of the Fleet Strategic and Technical Committee (CSTF), charged mainly with updating the strategy on maritime assets for oceanographic research.

As part of the continuation of a state-sponsored modernisation audit carried out in April 2006 and the conclusions of the CSTF presented in March 2010 and marked by efforts to respond to needs to control the costs of oceanic exploration, the four operators of the fleet decided to create a single fleet administration entity in the form of a *Unité Mixte de Service* (combined service unit - UMS). The aims of this combined service unit are:

- Integrated programming of vessels and equipments (reduce transit time, optimize equipments and teams inter-operabilityCoordination of investment policies
- An ability to propose a plan of concerted evolution of the national fleet

Vessels

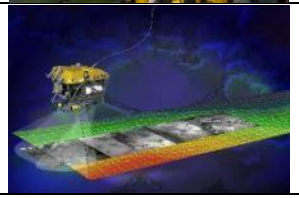
Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Pourquoi Pas?		Global	108	2005		N. Atlantic, S. Atlantic, W. Mediterranean	Shipower : Ifremer Operator : Genavir	
L'Atalante		Global	85	1990		N. Atlantic, S. Atlantic, W. Mediterranean	Shipower : Ifremer Operator : Genavir Vessel has been modernised in 2009 : Change of all scientific equipments including one EM 122 and one EM 710 multibeam echo sounders, rebuild of laboratories and scientific spaces, mid-life	

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
							maintenance	
Thalassa		Global				N. Atlantic and North Sea	Shipower : Ifremer Operator : Genavir	
Le Suroit		Regional	56	1975		N. Atlantic & W. Mediterranean	Shipower : Ifremer Operator : Genavir	Plan to be replaced in 2017
L'Europe		Coastal	29.6	1993		Mediterranean	Shipower : Ifremer Operator : Genavir	
Thalia		Coastal	24.5	1975		Channel sea, Atlantic coastline	Shipower : Ifremer Operator : Genavir	Plan to be replace in 2015 by one ship of 35 meters long
Gwen Drez		Coastal	24.5	1975		Channel and Atlantic coastline	Shipower : Ifremer Operator : Genavir	
Haliotis		work boat	9.5	2008		Channel, Atlantic and Mediterranean coastline	Shipower : Ifremer Operator : Genavir	

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
							Entered service in for shallow waters mapping (<10m). Transport by specific truck equipped with its own crane	
Marion Dufresne		Global	120	1995	217	Indian ocean	Shipower : IPEV Operator : CMA-CGM Equipped with giant piston corer	Major refit planned before 2015
L'Astrolabe		Regional ice breaker	65	1987			Shipower : IPEV Operator : P&O	
Antea		Regional	35	1995			Shipower : IRD Operator : Genavir	
Alis		Coastal	28.5	1987			Shipower : IRD Operator : Genavir	
Côte de la Manche		Coastal	24.9	1997			Shipower : INSU Operator : DT-INSU	

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
								
Téthys II		Coastal	24.9	1997			Shipower : INSU Operator : DT-INSU	

Equipment

Name		Type	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Nautile		Manned submarine (6000 m)	1984			Owner : Ifremer Operator : Genavir	
Victor		ROV (6000 m)	1996			Owner : Ifremer Operator : Genavir modernization completed in 2010	
Asterx		AUV					

Name		Type	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Idefx		AUV					

B.10. Germany – Dr. Klaus von Broeckel (Leibniz Institute of Marine Sciences)

Overview

Different federal as well as state ministries run about 23 vessels of different sizes. In general, the fleet is ageing. Several replacements are under way (Sonne) and planned within the next few years (Poseidon, Polarstern and some smaller regional ones). For the oceanographic science community the important RVs belong to the Ministry of Education and Research (BMBF).

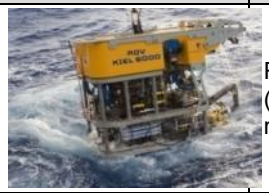
Vessels

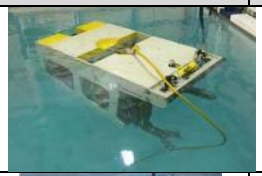
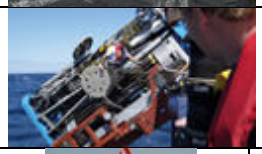
Name		Type	LOA	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Meteor		Global	98	1986	320	Mainly Atlantic Ocean	100% ownership by the Federal German Government run by shipping company Laeisz. 'Flagship' is now fulfilling its 80th expedition in the Southern Atlantic.	
Polarstern		Global (Polar)	118	1982	320	Arctic (Greenland Sea) and Antarctic (Atlantic Sector)	Belongs to Alfred-Wegener Institute in Bremerhaven: 100% ownership by the Federal German Government, run by shipping company Laeisz. Supplies regularly the German Antarctic stations.	*Design study for replacement is in preparation*
Maria S. Merian		Ocean	95	2006	320	Tropical and subtropical Atlantic, Mediterranean	100% ownership by the federal state of Mecklenburg Vorpommern run by shipping company Briese Newest and most modern RV of fleet with excellent manoeuvrability and station keeping with pods, pump jet and DP.	
Sonne		Global	98	1969 (rebuilt 1977)	250 under BMBF charter	Pacific Ocean	100% private ownership by RF Forschungsschiffahrt GmbH. Project Management organization Juelich has a charter agreement over 250 days/ year.	*Will be replaced by government owned multidisciplinary Deep-Sea RV in 2013*

Name		Type	LOA	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Poseidon		Ocean	61	1976	310	North and Subtropical Atlantic, Mediterranean	The 'old lady' of the Leibniz Institute of Ocean Sciences (IFM-GEOMAR) will complete her 400th cruise in 2010	*Received a 3 Mill EUR refit 2009/2010 including new engines. To be replaced in 2015; discussions started 2009.*
Alkor *Heincke*		Regional	55	1990	300 each	ALKOR: Baltic & North Seas HEINCKE: North & Baltic Seas	Sister ships ALKOR (IFM-GEOMAR, Kiel): academic science; monitoring; student education HEINCKE (AWI, Bremerhaven): academic science, monitoring, student education	*ALKOR receives a 3 Mill € general overhaul 2009/2010* *HEINCKE will complete a 5 Mill e overhaul 2010*

More information as well as the specific websites of most vessels can be found on Eurofleet website: http://www.eurofleets.eu
More information about METEOR and MARIA S. MERIAN under: http://www.ifm.zmaw.de/de/leitstelle

Equipment

Name		Type	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Kiel 6000		ROV (max. 6000 m)	2009	60	Atlantic, Pacific	Owner: IFM-GEOMAR see: http://www.ifm-geomar.de/index.php?id=3269&L=1	
Quest		ROV (max. 4000 m)	2003			Owner: MARUM see: http://www.marum.de/en/Remotely_operated_vehicle_ROV_QUEST_4000_m.html	

Name		Type	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
PHOCA		ROV (max. 3000 m)	2010		Atlantic	Owner: IFM-GEOMAR see: http://www.ifm-geomar.de/index.php?id=6029&L=1	
CHEROKEE		ROV (max. 1000 m)				Owner: MARUM see: http://www.marum.de/en/CHEROKEE_1000_m.html	
ABYSS		AUV (max. 6000 m)	2009	30	Atlantic	Owner: IFM-GEOMAR see: http://www.ifm-geomar.de/index.php?id=auv&L=1	
AUV		AUV (max. 5000 m)				Owner: MARUM see: http://www.marum.de/en/AUV.html	
MeBo		Sea Floor Drill Rig (max. 2000 m)				Owner: MARUM see: http://www.marum.de/en/Sea_floor_drill_rig_MeBo.html	
JAGO		manned submersible (2 pers) max. depth 400 m	1989	50	Norway, South Pacific	Owner: IFM-GEOMAR see: http://www.ifm-geomar.de/index.php?id=jago&L=1	

Name		Type	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
winch		transportable winch	2009			cable: 5000 m, 11 mm Ø, one conductor cable	
more instruments		grabs, cores, vehicles				see: www. MARUM.de www.IFM-GEOMAR.de www.AWI.de	

Cooperation

Mainly through Ocean Facilities Exchange Group (OFEG), SONNE cruise for NERC around Sumatra, German cruises on PELAGIA and THALASSA.

B.11. Iceland – Vignir Thoroddsen (MRI)

Overview

The Marine Research Institute in Iceland owns and operates 2 research vessels.

Vessels

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Arni Fridriksson		*Global*	*70*	*2000*	*180*	*N. Atlantic*		
Bjarni Saemundsson		*Regional*	*55*	*1970 Partly rebuilt 2002*	*170*	*Around Iceland*	*New equipment: Echosounder EK60 18,38,70,120kHz*	

For information on the vessels please visit our home page www.hafo.is

Cooperation

A joint survey in cooperation with Greenland Nature Institute on cod spawning in East Greenland waters. March 2009

B.12. India – Prattipati Rao (NIO)

Overview

Vessels

Name		Type	LOA (m)	Built	Op. Days	Main area of operations	Notes	*Plans for Replacement*
RV Gaveshani				1975-94			CSIR/NIO Built as hoper barge, converted into a multi-disciplinary research vessel	
CRV Sagar Sukti			23	2003			CSIR/NIO Built as fishing vessel, converted into a coastal research vessel Electronic Chart Display Information System Portable CTD system Digital Side Scan Sonar system Digital Sparker system Automatic Weather Station Water and seabed samplers	Under consideratio
RV Sindhu Sankalp			56	2009			CSIR/NIO Japanese fishing training vessel-converted into a multi-disciplinary research vessel CTD system and water samplers Shallow and deep water Echosounders Shallow and deep water water Multibeam systems Sub-bottom profiler and sidescan sonar Automatic Weather Station Sediment samplers (Grabs, corers)	

ORV Sagar Kanya			100	1983			MoES / NCAOR Dynamic Positioning SystemMultibeam system Gravimeter Magnetometer Side scan sonar Sub bottom profiler ADCP CTD system (6000m) 24m Piston Corer Spade corer Assorted sampling devicesspecialized laboratories	
FORV Sagar Sampada				1983			MoES / CMLR	
CRV Sagar Purvi			30	1996			MoES/ NIOT Echosounders Shallow water multibeam CTD Probe Samplers	**Under consideration**
CRV Sagar Paschimi				1996			MoES/ NIOT Echosounders Shallow water multibeam CTD Probe Samplers	**Under consideration**
BTV Sagar Manjusha			60	2006			MoES/ NIOT Ecosounders CTD system Corers and seabed samplers Deck machinery for launch / recovery of data buoys	

TDV Sagar Nidhi			103	2007			MoES/ NIOT Dynamic Positioning System Multibeam systems Side scan sonar Sub bottom profiler ADCP CTD system (6000m) Piston Corer Spade corer Assorted sampling devices specialized laboratories High capacity deck facilities for launch / recovery of heavy systems	
RV Samudra Manthan				1985			GSI	Under construction
CRV Samudra Kaustubh				1986			GSI	
CRV Samudra Saudhikama				1986			GSI	
RV Sagar Dhwani				2000			NPOL	
RV Sindhu Sadhana			80	Expected delivery 2012			CSIR/NIO Length oa 80.00 m Breadth moulded 17.60 m Draught scantling 5.00 m Design speed 13.5 Knots Installed generater power min. 4 X 1200 kW Installed propulsjon motors min. 2x 1200 kW Bow thrusters min. 2x 600 kW Gross tonnage ca 4170 GT Endurance 35 + 5 days Range 10,000 nm Number of scientists 21 Number of crew & officers 35	
Polar Research Vessel				Designing stage			MoES/NCAOR	

Cooperation

B.13. Ireland – Aodhán Fitzgerald (Marine Institute)

Overview

- The main changes to operation in the period was the addition of the ROV team being built up and developed during 2010.
- The tender process for vessel technical and operational services provision was completed in 2010 and P&O Maritime services were awarded the contract.

Vessels

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Celtic Explorer:		Ocean	65.5	2002 Modified to accommodate Holland 1 ROV in 2008	330	Irish continental shelf and N. Atlantic, North Sea	Vessel completed 288 science days in 2010, 2.5 year refit completed in 2010	*No plan for replacement as vessel is only 1/3 of the way through its life cycle.*
Celtic Voyager		*Regional*	*31.5*	*1997* *Mid life refit including superstructure modifications in 2006*	*255*	*Irish coasts, Irish Continental shelf*	.	*No plans for replacement, vessel completed mid life refit in 2006.*

Equipment

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Holland 1		*work class ROV (SMD QUASAR)*	*3.1m*	*Delivered in August 2008*	*60*	*Irish continental shelf edge, Bay of Biscay, North Atlantic*	*3000m operating depth 100hp, Hydraulic Self contained portable launch and recovery system, workshop and control containers HDTV equipped.* *Reson Multibeam and INS navigation integration completed in 2010*	*None ROV is 3 years old*

- Losses: none in 2010

Cooperation

- Celtic Voyager made available for Eurofleets training program in 2010.
- MI is Eurofleets partner.
- Work completed for NERC at the PAP site under MODOO program
- Celtic Explorer is utilised annually for internationally co-ordinated ICES programs

B.14. Italy – CNR

Overview

National Research Council (CNR) operates two centralised Research Vessels by means of the Operative Programming Office, which manages CNR oceanographic infrastructures in terms of support to oceanographic research programmes carried out by CNR researchers. In particular it is in charge for the annual scheduling of the oceanographic cruise proposals for each centralised CNR research vessel (Urania and Dallaporta, owned and operated by private companies).

The arrangement of the scheduling involves both CNR researchers and a Marine Commission. Seven CNR members compose the Commission, appointed every three years by CNR Central Administration. The Office collects researchers' applications and submits them to the Marine Commission. Research items, ship time, methodology, instrumentation, expected results, funding and personnel involved are some of the information that researchers are due to provide in the application form. All the positively evaluated proposals are then scheduled for each vessel.

Vessels

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
URANIA		OCEANIC	61.3	1992	326	MEDITERRANEAN SEA		
G. DALLAPORTA		*REGIONAL*	*35.76*	*2000*	*303*	*MEDITERRANEAN SEA*		

http://www.cnr.it/sitocnr/UPO/gestione/infoce/UPOinfoce.html

B.15. Japan – Shozo Tashiro (JAMSTEC)

Overview

Vessels (JAMSTEC Fleet)

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
NATSUSHIMA		Ocean	67	1981	285	Around Japan Mariana Area	Operated by NME	
YOKOSUKA		Ocean	105	1990	270	Mariana Area Around Japan	“Operated by NME	
KAIYO		Ocean	62	1985	294	South Pacific Ocean Around Japan	“Operated by NME	
KAIREI		Ocean	105	1997	306	Around Japan	“Operated by NME	
MIRAI		Global	129	1997	250	South Pacific Ocean Arctic Sea Western Pacific Ocean	Operated by GODI	

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
TANSEI MARU		Regional	51	1982	277	Around Japan	Operated by JAMSTEC	
HAKUHOU MARU		Ocean	100	1989	258	Mariana Area North Pacific Ocean Indian Ocean	Operated by JAMSTEC	
CHIKYU		Global	210	2005	238	Nankai Trough (South of Japan)	Operated by MQJ	

Op. Days: Japanese FY 2010 (April 2010 –March 2011)
Further information can be obtained following web sites.

JAMSTEC:
http://www.jamstec.go.jp/e/index.html

JAMSTEC Fleet and Equipment:
http://www.jamstec.go.jp/jamstec-e/maritec/rvm/index.html

JAMSTEC Deep Sea Drilling Vessel CHIKYU:
http://www.jamstec.go.jp/chikyu/eng/index.html

NME:
http://www.nmeweb.jp/e/index.html

GODI:
http://www.godi.co.jp/

MQJ:
http://www.mqj.co.jp/english/index.html

B.16. NATO – Ian Sage (NURC, NATO)

NOT UPDATED since 2010 meeting – see Powerpoint

B.16.1. Overview

Two research vessels operated in support of the NATO Undersea Research Centre (NURC) in La Spezia, Italy. NURC is a subordinate command to the Supreme Allied Commander Transformation based in Norfolk, VA, USA.

B.16.2. Vessels

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
NRV ALLIANCE		*Global*	*93m*	*1988*	*200*	*Mediterranean*	*2010 – Upgrade of davits and fast rescue boats* *2010 – Upgrade of satellite comms system* *25 Crew – 25 Science staff*	
CRV LEONARDO		*Regional*	*28.6m*	*2002*	*160*	*Mediterranean*	*5 Crew – 10 Science staff*	

www.nurc.nato.int

B.16.3. Cooperation

Multiple joint research projects with other govt. and research laboratories. Ships are available for charter to other institutes.

B.17. Netherlands – Erica Koning (NIOZ)

Overview

As of October a merger of NIOZ and CEME, the Center for Estuarine and Marine Ecology in Yerseke will probably be effective. CEME has its own ship, 34-m LUCTOR that mainly operates in the Schelde Estuary. Although CEME will stay in Yerseke, the operation of LUCTOR will eventually become part of NIOZ shipping.

RV Pelagia underwent her Midlife Refit in 2010. During the refit the ship was outfitted with new engines (Tier 2), a new, larger generator for the diesel-electric drive, a Ballast Water Treatment Unit, new navigation and communication systems, EDIS electronic chart system, new data acquisition and data logging systems. New scientific instruments include the newly developed TITAN Ultra Clean CTD-system, a Kongsberg HiPAP-100 USBL system and a new 9.6km Kevlar synthetic cable with fibre optics.

Vessels

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Pelagia		Ocean	66	1991	323	Indian Ocean (Arabian Sea, Somali Basin, Mozambique Channel); Tropical and Northeast Atlantic Ocean, North Sea, Atlantic (Porcupine) Mediterranean.	1-4 2010: MID-LIFE REFIT including New navigation, data acquisition and data logging systems, Ballast Water treatment unit. New engines (Tier 2) New TITAN Ultra Clean CTD system with Large Volume Samplers USBL system, New 9.6 km Kevlar Cable.	
Navicula			25	1981		Dutch, German and Danish Wadden Sea, Coastal North Sea		
Stern			*15*			*Dutch Wadden Sea*		

Equipment

Name		Type	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
MOVE		*Mobile Lander*	*2005*	*270*	*Mediterranean*	*Recovered July 2010*	*none*
UCC	*To be added*	*Ultra Clean CTD System*	*2010*		*North Atlantic*	*Newly developed bottles Try-out and first successful deployments in 2010.*	*none*

Cooperation

- Barter intervention Irminger Sea onboard FS METEOR, 2 July – 2 August 2010.
- Mozambique Channel: NIOZ team onboard FRS ALGOA (South Africa): 28 September- 11 October 2010.
- OFEG Piston Core Trials Cruise on RV Pourquois Pas?, May 2010.
- OFEG Piston Core Trials Cruise on RV Pelagia, 6 – 18 November 2010.
- NIOZ analytical support on FS POLARSTERN, 28 November 2010 – 5 February 2011.
- 2 NIOZ cruises on FS METEOR, 26 December – 12 February 2011.
- In 2010 NIOZ scientists have participated in cruises in the Russian Arctic, Lofoten Area, Baltic Sea and Amazon Delta.

B.18. New Zealand – Fred Smits (NIWA)

Overview

Tangaroa – Between mid-July and mid-November 2010 Stage 2 of the DP2 retrofit, and mid-life refit, were completed at the ST Marine, Tuas Yard in Singapore. The work included the installation of the generators and associated equipment, new switchboards, a tunnel and retractable azimuth thruster in a new bow module, a new stern tunnel thruster, a bridge extension to the starboard side, a HiPAP500, moonpool and installation of Kongsberg DP control gear. The opportunity was taken to install other new electronic and mechanical equipment, while much of the existing machinery was overhauled, particularly winches, wave gates, cabling, lighting, MOB crane etc. The fire alarming and fire fighting systems were upgraded. The vessel was completely grit-blasted down to bare metal from keel to mast and repainted. All windows and portholes were removed, stripped, repainted and resealed. The galley was renewed, as was the drystore, while all floor linoleum was replaced. *Tangaroa's* Kongsberg EM300 multi-beam echosounder was also upgraded to an EM302.

The total *Tangaroa* DP2 retrofit and mid-life refit cost around NZ$24M (Euro13M). Significant problems were experienced with a new step-up gearbox from the main engine PTO to the main generator. FMEA and other seatrials went exceptionally well.

Tangaroa went back in operation on 2 January 2011, and will complete a total of 175 days at sea for the remainder of the financial year, ending 30 June 2011. During March 2011 the vessel was involved in a 25-day study of SMS deposits in deep water of the Kermadecs region using WHOI's AUV Sentry and deep sea cameras, whereby the DP2 system was extensively used.

Kaharoa – As usual *Kaharoa* has been working of the coast of NZ conducting fisheries, marine biodiversity, oceanographic research and seabed mapping. The ARGO-11 voyage was undertaken between October and December in which 110 floats were deployed between New Zealand and Valparaiso. This voyage was funded by SCRIPPS University of San Diego, the University of Washington, CSIRO and NIWA. For the coming year (August to November 2011) ARGO-12 is scheduled in the Pacific, deploying a further 120 floats. Thus voyage, again funded by mentioned four science institutes, bringing the total number of floats deployed by *Kaharao* to just under 1,000 -- a world record by far.

Kaharao was drydocked in July 2010; no major modifications are planned for the ship in the short term.

Ikatere – During 2010 NIWA's purpose built, 14m inshore research catamaran, was commissioned and has seen 72 days usage. Part of this work involved the use of the vessel by five hi-tech seabed mapping equipment manufacturers: Kongsberg, Applied Acoustics, Geo Acoustics, Reson and R2Sonic, testing their latest equipment development. The test conducted in the Wellington region included the mapping of soft sediments, sandwaves, reefs and rock outcrops, two wrecks, fresh water plumes and seawall armouring. The collected common datasets will be made available to attendees of the Shallow water Conference 2012, for their analysis and presentation during the conference. The Shallow Water Conference 2012 will be held in Wellington between 20 and 24 February 2012 and is hosted by LINZ, GNS and NIWA. Please refer to www.shallowsurvey.org.

Vessels

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Tangaroa			70	1991	175	NZ EEZ Tasman Sea Pacific Ocean Antarctica	Upgraded to DP2 (DNV Dynpos AUTR) In 2010 Operational crew = 14 Scientific Staff = 26	*None*
Kaharoa			28	1981	177	NZ EEZ Tasman sea Pacific Ocean Indian Ocean	Operational crew = 6 Scientific Staff = 6	*None*
Pelorus			10	1980	0	Coastal NZ	Operating crew = 2 Science staff = 2	*None*
Ikatere			*13.9*	*2009*	*72*	*Coastal NZ*	*New vessel launched Dec 2009* *2 x diesel/jet propulsion* *Cruise speed 27 knots* *Operational Crew = 2* *Science staff = 2 berths or up to 10 for day trips*	*None*

Equipment

Upgrade EM300 to EM302.

Cooperation

Kaharoa – Charter to Scripps, University of Washington, CSIRO for ARGO 11 Voyage (63 days)
University of Aberdeen for benthic lander deployment (10 days)

Tangaroa – Joint charter with GNS and WHOI for Kermadecs study (25 days)

B.19. Norway - Per Nieuwejaar (IMR)

Overview

The Norwegian Institute of Marine Research (IMR) owns four vessels, operates two for other owners and rents another two vessels.

Vessels

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
G.O.Sars			77.5	2003	275	Norwegian Economical Zone including Spitsbergen and Jan Mayen. North and South Atlantic		
Johan Hjort			64.4	1990	275	Norwegian Economical Zone including Spitsbergen and Jan Mayen		
Håkon Mosby			47	1980	275	Norwegian Economical Zone including Spitsbergen and Jan Mayen	Have gone through major upgrades of the interior, installed a new auxiliary engine and a new power distribution system.	*Plans for replacement to be developed in 2010/11*
G.M.Dannevig			28	1979	180	Skagerrak	New auxiliary engine, new propeller in 2011	

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Dr Fridtjof Nansen			57	1993	310	West Africa	Owner: NORAD	*To insert a 10 m section to make room for more labs and cabins is under consideration*
Hans Brattström			24.3	1992	200	Bergen area	Owner: University of Bergen	
Fangst			15	2000	180	Coast of Norway Bergen to Russian border	Rented	*Contract ends in 2011*
Jan Mayen			63,8	1988	75	Barents Sea	To be taken over by the University of Tromsø in June 2011	
NEW Polar 10 Icebreaker			*100*	*2013*	*310*	*Arctic/Antarctica*	*See* **Error! Reference source not found.** • *Multifunctional (biology, oceanography, geology)* • *Icebreaker (DNV Polar 10)* • *Helicopter carrier* • *Logistics vessel* • *Training and education* • *Endurance* • *Clean ship*	

For more information about the vessels, please visit our website www.imr.no
Some cruise information for the oceangoing vessels can also be found on www.pogo-oceancruises.org

Equipment:

Installation of HIPAP on Johan Hjort has been postponed to 2012.

International cooperation: IMR became a full member of the Ocean Facilities Exchange Group (OFEG) in November 2006. IMR is the coordinating agency for “Networking activities” in the EUROFLEETS project and has currently the presidency in the EurOcean, the European information centre for marine science and technology. IMR/RV department is also represented in the Finance Advisory Panel for the “Aurora Borealis” project.

B.20. Spain - Jose I. Diaz (IEO)

Overview

The construction of the two regional vessels has already re-start in a a new shipyard with delivery of the first vessel R/V Ramón Margalef probably in august this year and the second one, Ángeles Alvariño, in summer 2012.

The modernization plan for the local vessels F. de P. Navarro has been postponed until 2012 and along this year no activity has been planned for this vessel.

Vessels

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Cornide Saavedra		Regional Research Vessel (formerly oceanic class)	66,7	1972	320	Mediterranean Atlantic	New equipment: • Biol. Echosounder EK60 (18, 38, 70, 120, 200 kHz) • ADCP 75 kHz • ISO 20' Radio-isotope lab. • ISO 20' Flow-cam lab. • MDM 400	2015 Global vessel Length 90 m, Diesel-electric: ICES 209 DP II VSAT Conceptual project ready
F.P. Navarro		Local Research Vessel	30.5	1987	220	Mediterranean Atlantic	Fish trawling, CTD Winch EA500, SCANMAR	*MLU* 2012 New winches and upgraded scientific capability New cabins ADCP
Odón de Buen		Local Research Vessel	24.0	1973		Mediterranean	MBES 3002D, TOPAS PS40, CTD Winch, EA500	*Should be retired by mid 2012.*

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
José Rioja		Local Research Vessel	15.8	1984		Bay of Biscay	Coax and inox Winch	Not planned
J.M. Navaz		Local Research Vessel	15.8	1984		Bay of Biscay	Inox Winch	Not planned
Lura		Local Research Vessel	14.3	1981		Bay of Biscay	CTD Winch	Not planned
Ramón Margalef		Regional Research Vessel	46.70	2011		Mediterranean Atlantic	Fish trawling, CTD full capabilities Diesel/electric on silent block, Acoustic Isolation hull ROV, Dynamic Position, Acoustic position HiPAP 500. EA600 (12, 200kHz), EK60 (18,38,70,120,200,333 kHz) ME70, Net Sonar FS 20/25, Net Sonar ITI, SCANMAR MBES EM710, TOPASPS18 VMADCP 150 kHz.	
Ángeles Alvariño		*Regional Research Vessel*	46.7	2012		*Mediterranean Atlantic*	*Fish trawling, CTD full capabilities* *Diesel/electric on silent block, Acoustic Isolation hull* *ROV, Dynamic Position, Acoustic position HiPAP 500.* *EA600 (12, 200kHz), EK60 (18,38,70,120,200,333 kHz) MS70, Net Sonar FS 20/25, Net Sonar ITI, SCANMAR MBES EM710, TOPASPS18 VMADCP 150 kHz.*	

http://www.ieo.es/buques.htm

Equipment

The new IEO ROV has been named as LIROPUS2000. The system is a Sub-Atlantic **Super Mohawq II** that was accepted after diving to 2000 m WD in September 2010. The first operation is planned for June 2011 on board R/V Sarmiento de Gamboa.

No loss of equipment has occurred during 2010.

B.21. UK – David Blake (BAS)

Overview

Both vessels are operated without standby. Keeping the vessels maintained without extended refits is a significant challenge

Vessels

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
James Clark Ross		Global Icebreaker	99	1991		During 2010 the JCR undertook 19 science cruises for BAS and NERC sponsored science. There were also commercial charters, barter work and offset cruises with other Antarctic operations. The ship worked in the Antarctica, Arctic and on passage between the UK and Antarctica.	The role of the vessel is to undertake multi-disciplinary research and survey in the polar regions. The vessel also has the capability to undertake logistics work in support of polar programmes. The upkeep of the vessel continues with major refit items in 2011 to overhaul science gantries, cranes and the superstructure.	The replacement of the JCR is currently scheduled for 2017. A later life refit is however planned for 2014 which will extend the life of the vessel.
Ernest Shackleton		*Global logistics*	*80*	*1995*		*During 2010 the ES supported a science cruise but was primarily focused on oilfield support work in the North Sea and delivering equipment to the new Antarctic Station being constructed at Halley.*	*Primarily used for logistics work but does mount several smaller science cruises in the Weddell Sea. On a long lease bare boat charter from Rieber Ship Management, the vessel is also used for 120 days per year in the North Sea.*	*The Ernest Shackleton is under a long-term charter which ends in 2014.*

B.22. UK – Geraint West (NOC)

Overview

Sea Systems which operates the 2 multidisciplinary global research vessels and National Marine Equipment Pool is part of the National Marine Facilities Division at NOCS. This is quite separate from NERC's other ship operation at BAS (see above).

The National Oceanography Centre, Southampton and Proudman Oceanographic Laboratory in Liverpool merged on 1 April 2010 to form a single institution, the National Ocanography Centre (NOC). Although this did not significantly affect the organisation of the ships, the parent division (National Marine Facilities) was dissolved and the Head of Sea Systems now reports directly to the Director, NOC.

During the autumn the Government undertook a comprehensive spending review which resulted in a cut (in real terms) of ca. 12% over the spending period 2011-15 to the Natural Environmental Research Council's (NERC) resource budget allocation; capital funding has been cut by 50% over the same period. Nevertheless NERC has decided to protect the research ship operation and the Sea Systems budget will increase by 5% in cash terms over this period, which will nevertheless result in a real terms cut due to inflation. Planning for this is currently in progress.

The ships have largely completed the programme without major operational problems, although RRS James Cook lost part of a cruise due to an electrical control issue. However, the most significant event of the year was a collision between the Isis ROV and the port-prop of the James Cook. While the propeller blades suffered some damage, the ROV was partially destroyed and is currently unserviceable. A decision has recently been made to undertake a repair, but finding the funds for this is problematic given the current financial climate.

Vessels

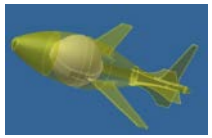
Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
James Cook		Global	90	2006	310	N. Atlantic, S. Atlantic, Southern Ocean	Busy year with a large range of challenging cruises delivered. Some electrical control problems resulted in loss of days to 1 cruise in January.	*Discovery Replacement – see below*
Discovery		*Global*	*90*	*1962 (rebuilt 1982)*	*315*	*N. Atlantic, S. Atlantic.*	*The vessel will be 50 years old next year, but has largely run well during 2010. Some minor problems with voltage control of the main motor, but otherwise completed a busy programme. Has recently completed her last docking in NERC service in Amsterdam.*	

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*

Discovery		*Global*	*99.7*	*NA*	*NA*	*In build, Vigo, Spain*	*Planned for delivery June 2013:*
							• *50 days endurance*
							• *Scientific Transit Speed – 12 knots maximum*
							• *23 Officers & Crew*
							• *28 Scientists & Technicians*
							• *DP Capable (DP2) SS6/7*
							• *Multidisciplinary*
							• *Multibeam(s) & Sub Bottom profiler*
							• *Minimal Ice Class – for hull life (Lloyds 1D)*
							• *Overside/overstern lifting - 20tonnes*
							• *Drop Keels*
							• *Low URN but NOT ICES 209*
							• *Propulsion*
							  • *2 x Azimuthing Units Aft*
							  • *Azimuthing Thruster Fwd*
							  • *Manoeuvring Thruster Fwd*	

Equipment

Name		Type	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Isis		ROV	2002	50	Mid-Atlantic Ridge & Antarctic Peninsula	Severely damaged in Jan 2011 – repairs in progress. 6500m depth capability – derivative of WHOI Jason II vehicle	
Autosub 3		AUV	2005	14	Black Sea	1700m depth capability.	

Name		Type	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Autosub 6000		AUV	2007	30	Cayman Trough	Discovered deepest world's deepest hydrothermal event during cruise in the Cayman Trough.	
Long Range AUV		*AUV*	*2010*		*N. Atantic*	*Conducted successful first set of trials in 2010. Further trials currently in progress* *Range/Endurance: 6000 km & 6 months* *Max depth: 6000 m* *Speed: 0.4-1.5 m/s* *Hotel load: 1W* *Length/ Volume: 3m & 500 litres*	

Cooperation

- 2 joint NERC/CSIC seismic/geophysics training cruises on the *Sarmiento da Gamboa* (total 25 days)
- 2 seismic cruises on *Sarmiento da Gamboa* (total 67 days) and 2 on *RRS James Cook* (total 33 days) as part of NERC/CSIC joint seismic facility.
- 2 joint NIOZ, NERC, IFREMER deep sea coring trials cruises on the *Pour quoi pas?* & *Pelagia* (25 days)
- TOBI cruise on *Marion Dufresne* (44 days.)
- Deep sea fibre optic winch/cable system for *RV Poseidon* (21 days)
- Moorings support for RAPID Climate Change array on *Oceanus* (28 days) and *Ron Brown* (7 days).
- Autosub3 cruise onboard Turkish vessel in Black Sea.
- Barter cruise with NIOZ on *RRS James Cook* (36 days)
- Outline agreement with IFM-Geomar to establish joint ROV capability; Kiel 6000 programmed to support NERC cruise on *RRS James Cook* in Indian Ocean.
- Eurofleets partner, leading work package on ship greening.
- Sea Systems Programme Manager Chairs OFEG Tech.

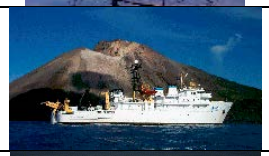
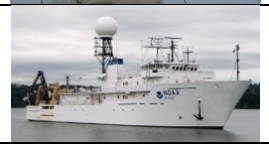
B.23. USA – Mike Devany (NOAA)

Overview

- Execution Year status
  - Budget delayed
  - Only 4 months remain in FY11 schedule
  - 3025 Operating Days
- Challenges
  - Tight budget times ahead
  - Operations and maintenance
  - Recapitalization

Vessels

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Oscar Dyson			64	2005		Kodiak, AK		
Fairweather			70	1968		Ketchikan, AK		
Bell M. Shimada						Seattle, WA		
Rainier			70	1968		Seattle, WA		

McArthur II			68	1985		Seattle, WA		
Hi'ialakai			68	1984		Pearl Harbor		
Oscar Elton			61	1988		Pearl Harbor		
Ka'imimoana			68	1989 (re-built 1995)		Pearl Harbor		
Ferdinand r. Hassler				In-build		New Castle, NH		
Delaware II			47	1968 (re-built 1996)		Woods Hole		
Henry B. Bigelow						Woods Hole		
Okeanos Explorer			59	1989 (re-built 2006)		Davisville, RI		

Thomas Jefferson			58	1991		Norfolk, VA		
Ronald H. Brown			84	1997		Charleston, SC		
Nancy Foster			57	1991		Charleston, SC		
Gordon Gunter			68	1990 (re-built 1999)		Pascagoula, MS		
Pisces						Pascagoula, MS		
Oregon II			52	1967		Pascagoula, MS		
Reben Lasker (FSV 6)				In-build Marinette, WI				

Cooperation

B.24. USA– Bob Houtman (NSF/UNOLS)

Overview

During the period January through December 2010, the U.S. Academic Research Fleet (see Section A.1.2) conducted approximately 4011 operational days at sea with cruises all around the world. Pressures on the federal funding agencies' budgets continued to rise at rates equal to or greater than the budgets.

The Academic Research Fleet of oceanographic research platforms participate in the University National Oceanographic Laboratory System (UNOLS) consortium, which serves to support and coordinate the scheduling, usage, maintenance, repair and outfitting of the member research facilities.

In planning for the 2010 schedules during the fall of 2009, the effects of a reduced number of science proposals for research ship-time, a reduced number of requests for use of the Fleet by other agencies and organisations, as well as level base budgets with increasing personnel costs indicated there would be a reduction in the number of total operating days. NSF was provided with American Recovery and Reinvestment Act (ARRA) funding which allowed an increase in the support of Fleet equipment maintenance and upgrades as well as a slight increase in the success rate for science proposals. The original projection for 2010 of 3300 ship-days of work was surpassed. For 2011 the Global Class ships are expected to be at or below capacity with three vessels entering shipyard maintenance periods as the year began. The trend in recent years of a reduced demand for use of the Intermediate Class ships continues into 2011 and will result in partial layups and extended maintenance periods until the peak summer research season in the Atlantic when several ships will be needed to meet the requirements.

The National Research Council of the National Academies Committee on the Evolution of the National Oceanographic Research Fleet published its report in 2009 (http://dels.nas.edu/osb/). Their recommendations included the need for increased federal agency coordination and the production of a single, comprehensive Fleet Renewal Plan; the importance of science community involvement in ship acquisitions; and the need for larger, more capable general purpose Global and Regional Class ships. The National Research Council Committee on an Ocean Infrastructure Strategy for U.S. Ocean Research in 2030 also recently completed a study titled "Critical Infrastructure for Ocean Research and Societal Needs in 2030" which will be available in July 2011.

Vessels

The US fleet consists of 21 ships with six Global Class, five Ocean/Intermediate Class, seven Regional Class and the three Local Class ships.

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Melville		Global	85	1969 (rebuilt 1993)	317	Pacific/Atlantic	Owned by US Navy, operated by Scripps Institution of Oceanography	*Possible retirement in 2014*
Roger Revelle		Global	84	1996	312	Pacific/Atlantic	Owned by US Navy, operated by Scripps Institution of Oceanography	
Knorr		Global	85	1970 (rebuilt 1993)	306	Pacific/Atlantic	Owned by US Navy, operated by Woods Hole Oceanographic Institution	*Possible retirement in 2014*
Atlantis		Global	84	1997	326	Pacific/Atlantic	Owned by US Navy, operated by Woods Hole Oceanographic Institution	
Thomas G Thompson		Global	84	1991	326	Pacific	Owned by US Navy, operated by University of Washington	
Marcus G. Langseth		Global	72	1991 (rebuilt 2007)	76	Pacific	Owned by NSF, operated by Lamont-Doherty Earth Observatory. 2D and 3D seismic capable.	
Sikuliaq Alaska Region Research Vessel (ARRV)		Global					Contract with Marinette Marine Corp (Guido Perla and Associates Naval Architect) signed December 2009. Design Verification and Transfer completed, and construction began in Fall 2010. Keel laid in	*Planned for Fleet entry in 2014*

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
							April 2011.	
Kilo Moana		Ocean	57	2002	259	Pacific	Owned by US Navy, operated by University of Hawaii	
OCRV Ocean Class Research Vessel		Ocean					Acquisition Process underway with two Design Teams funded for a planned down-select to one design by Summer 2011. Lead ship with an option for a second ship. Selection process for Ship operators completed in May 2010. Woods Hole will operate the lead ship and Scirpps will operate the second ship.	*Planned for Fleet entry in 2014*
Endeavor		Ocean Intermediate	56	1976 (rebuilt 1993)	189	Atlantic	Owned by NSF, operated by University of Rhode Island.	
Oceanus		Ocean Intermediate	54	1976 (rebuilt 1994)	179	Atlantic	Owned by NSF, operated by Woods Hole Oceanographic Institution	*Planned for retirement in 2012.*
Wecoma		Ocean Intermediate	56	1976 (rebuilt 1994)	166	Pacific	Owned by NSF, operated by Oregon State University	
New Horizon		Ocean Intermediate	52	1978 (rebuilt 1996)	164	Pacific	Owned and operated by Scripps Institution of Oceanography	
Point Sur		Regional	41	1981	152	Pacific	Owned by NSF, operated by Moss Landing Marine Laboratories	
Cape Hatteras		Regional	41	1981 (rebuilt 2004)	202	Atlantic	Owned by NSF, operated by Duke University/University of North Carolina	

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Atlantic Explorer		Regional	51	1982 (rebuilt 2004)	134	Atlantic	Owned by Bank of Bermuda, operated by Bermuda Institute for Ocean Sciences	
Robert Gordon Sproul		Regional Coastal	38	1981	99	Pacific	Owned and operated by Scripps Institution of Oceanography	
Pelican		Regional Coastal	35	1985 (rebuilt 2003)	237	Gulf of Mexico	Owned and operated by the Louisiana Universities Marine Consortium	
Walton Smith		Regional Coastal	29	2000	181	Atlantic/Gulf of Mexico	Owned and operated the University of Miami	
Hugh R Sharp		Regional Coastal	45	2005	148	Atlantic	Owned and operated by the University of Delaware	
RCRV Regional Class Research Vessel		Regional					Down-selection to one design complete. UNOLS to review several design issues. NSF considering options to support request for construction funding.	
Savannah		Local	28	2001	106	Atlantic	Owned and operated by University System of Georgia	
Blue Heron		Local	26	1985 (rebuilt 1999)	81	Great Lakes	Owned and operated by the University of Minnesota-Duluth	

Name		Type	LOA (m)	Built	Op. Days	Main area of operations during year	Notes	*Plans for Replacement*
Clifford Barnes		Local	20	1966 (rebuilt 1984)	51	Pacific	Owned by NSF, operated by the University of Washington	
Joides Resolution		Scientific Ocean Drilling Vessel	143	1978			Owned by TransOcean and DSND Shipping AS.	
Flip		Research Platform (R/P)	108	1962	27	Pacific	Owned by US Navy, operated by Scripps Institution of Oceanography Marine Physical Laboratory	

Equipment

		ype		s			acement*
Alvin		Deep Submergence Vessel (DSV)	1964	141	Pacific/Gulf of Mexico	Owned by US Navy, operated by Woods Hole Oceanographic Institution	The hemispheres and view port inserts for the Replacement Human Occupied Vehicle (RHOV) have been successfully electron beam welded . Phase 1 Final Design Review completed in September 2010 which validated the approach of integrating the new personnel sphere into a modified current ALVIN vehicle frame to deliver a 4500 meter capability by mid-FY2012. The upgrade to a fully capable 6500 meter vehicle will be an optional Phase 2, dependent on available funding levels.
Hybrid Remotely Operated Vehicle		HROV	2008				

		ype		s			acement
Jason		ROV	1988	138	Pacific/Gulf of Mexico		
Sentry		AUV	2007	85	Pacific/Gulf of Mexico	5000m depth capability, replaced the Autonomous Benthic Explorer (ABE) in the Deep Submergence Facility inventory	

Cooperation

The U.S. federal funding agencies cooperate on a national level through several organizations including the University National Laboratory System (UNOLS) and the Interagency Working Group on Facilities. On an international level the mechanisms for cooperation include the International Research Ship Operators Meeting and the European Ocean Facilities Exchange Group.