



Twenty-first International Research Ship Operators Meeting (ISOM)
17 – 19 October 2007
at the
Institute of Oceanology, Chinese Academy of Sciences,
Quindao, China

List of Attendees

Country	Representative (Title First Name - Last Name)		Organisation
Australia	Capt Fred	Stein	CSIRO Marine Research
Australia	John Russell	Connor	P & O Maritime Services Pty Ltd
Canada	Cpt Ron T	Grady	Department of Fisheries and Oceans, Canadian Coast Guard
Canada	Kenneth D	Cooke	Department of Fisheries and Oceans, Canadian Coast Guard
Chile	Enrique	Aranda	Instituto de Fomento Pesquero
China	Fan	Wang	Institute of Oceanology, Chinese Academy of Sciences
China	Fei	Xiao	Institute of Marine Geology, Chinese National Geological Survey
China	Guohua	Song	Institute of Oceanology, Chinese Academy of Sciences
China	Jianjun	Yu	Institute of Oceanology, Chinese Academy of Sciences
China	Qijun	Sun	Institute of Oceanology, Chinese Academy of Sciences
China	Shouxian	Zhao	Ocean University of China
China	Prof Song	Sun	Institute of Oceanology, Chinese Academy of Sciences
China	Dr Tiegang	Li	Institute of Oceanology, Chinese Academy of Sciences
China	Xiaojiang	Su	Institute of Marine Geology, Chinese National Geological Survey
China	Xiaoyang	Cai	South China Sea Institute of Oceanology, Chinese Academy of Sciences
China	Xingming	Liang	Yellow Sea Fishery Research Institute
China	Xuan	Zhu	Institute of Oceanology, Chinese Academy of Sciences
China	Yiyong	Sui	Institute of Oceanology, Chinese Academy of Sciences
China	Yijun	Hou	Institute of Oceanology, Chinese Academy of Sciences
China	Zhenyu	Wang	Maritime Safety Administration
Denmark	Steen	Silberg	Danish Institute for Fisheries Research
France	Olivier	Lefort	IFREMER Brest
Germany	Dr Klaus	von Broeckel	Leibniz-Institute für Meereswissenschaften
India	Dr Maruthadu	Sudhakar	National Centre for Antarctic & Ocean Research
Ireland	John	Breslin	Marine Institute Galway
Japan	Tetsuya	Yokota	Nippon Marine Enterprises (NME)
Japan	Tatsuo	Adachi	Japan Agency for Marine-Earth Science and Technology (JAMSTEC)
Japan	Tetsuo	Uchida	Japan Agency for Marine-Earth Science and Technology (JAMSTEC)
Japan	Capt Masataka	Zaitso	Nippon Marine Enterprises Ltd
Netherlands	Marieke	Rietveld	Royal Netherlands Institute for Sea Research (NIOZ)
New Zealand	Fred	Smits	National Institute of Water and Atmospheric Research Ltd
New Zealand	Greg	Foothed	National Institute of Water and Atmospheric Research Ltd
Norway	Per	Niewejaar	IMR Bergen
South Africa	Ms Sharon	Du Plessis	Department Environment and Tourism, Marine and Coastal Management
Spain	Prof Juanjo	Danobeitia	Centro Mediterraneo de Investigaciones Maritima
United Kingdom	David	Blake	British Antarctic Survey
United Kingdom	Geraint	West	National Oceanography Centre, Southampton, National Marine Facilities
United Kingdom	Edward	Cooper	National Oceanography Centre Southampton
USA	Daniel	Rolland	Alion Science
USA	Prof Dennis	Nixon	University of Rhode Island
USA	Weimin	Hui	

1. Opening Session

The Opening Session was chaired by **Mr Per Nieuwejaar**

Opening

Per welcomed all participants to Quindao and thanked Prof Song Sun, Director of the Institute of Oceanology, Chinese Academy of Sciences for hosting the 21st ISOM meeting in China. He expressed the importance of the ISOM meetings and the benefits of this worldwide collaboration to the operators of research vessels for the international marine sciences community. The 21st ISOM is attended by forty participants from seventeen countries and Per congratulated the group on the increasing number of attendees each year. Mr Nieuwejaar regretted that some members were not able to attend the meeting and wishes those the very best wishes and hoped to meet them next year.

Official Welcome

Following the official opening by Per Nieuwejaar, **Prof Song Sun** extended a warm welcome to the ISOM participants on behalf of the people of China. Prof Song expressed his sincere delight in meeting all in Quindao and was honoured to host the 21st ISOM at IOCAS.

Administrative Matters

Per Nieuwejaar reminded the ISOM members to pay their Euro100 cost contribution to the host nation and to submit their National Delegates Reports in digital format to the secretary, Mr Fred Smits.

Introduction of Participants

All participants gave a short introduction of themselves and the country and organisations they represented

Adoption of Agenda and Review of the Minutes of Nineteenth Meeting

Per Nieuwejaar invited comments on the agenda, which was adopted with minor additions. **Fred Smits** then introduced the minutes of the 20th ISOM and thanked the members for the contributions made. The minutes were without modifications adopted as a true record of the ship operators meeting held in the Marine Institute in Galway, Ireland, 25 – 26 October 2006. The final version of these minutes is available on the ISOM web site (<http://www.isom-info.org>).

2. Introduction of IOCAS

Following the official opening **Prof Song Sun** gave a presentation about the Institute of Oceanology, Chinese Academy of Sciences. IOCAS was founded as a marine biological research laboratory in 1950 and became a multi-disciplinary institute in 1959. IOCAS is the largest, oldest and one of the most important centres for marine sciences, graduate training and public service in China. Dr Song showed pictures of IOCAS' buildings, including the aquarium building with its exceptional museum with the marine biological specimens, and from the Institute's research vessels. IOCAS employs some 1100 personnel, including 60 research professors, 100 assistant-professors, 150 scientific and technical staff and 470 post-graduate students. IOCAS is part of the Chinese education system. PhD levels can be obtained through the Institute, as approved by the Chinese Ministry of Education. The Institute of Oceanography comprises four research departments: mariculture, dynamic processes, ocean circulation and wave studies, and geological evaluation of the continental margins. Research carried out targets as main issues the population growth and its influence of the environment. IOCAS also supports aquaculture studies, particularly shrimp culture, scallops, kelp, crab, sea urchins, abalone and anchovy. Studies towards Red Tides also form an important part of the Institute's research. The research vessels owned by IOCAS are

shared with other Chinese research institutes and the vessels venture widely in the Pacific and conduct Antarctic voyages. IOCAS is an executive member of POGO.

3. Delegates Reports of Activities

Captain Fred Stein (Australia – CSIRO, Marine Research) reported on the Australian research fleet, which is divided in two groups: the coastal vessel fleet (<35m) and the ocean going vessels. Three of the coastal vessels are owned and operated by the Australian Institute of Marine Sciences (AIMS): *Lady Basten*, *Solander* and *Cape Fergusson*. The *Lady Basten* will be decommissioned and her work taken over by the *Solander*. The South Australian Research and Development Institute owns the coastal research vessel *Negerin*, while RV *Naturaliste* is owned by the Western Australian Department of Fisheries. Australia operates three ocean going research vessels: the icebreaker *Aurora Australis* and the *Southern Supporter*, both owned by P&O Maritime Services and the *Southern Surveyor*, owned by CSIRO and funded through the National Facility Funding. All large vessels are operated by P&O. The *Aurora Australis*, built in 1990 is chartered to the Australian Antarctic Division for 170 days per annum until at least 2012. Last year an upgrade to the accommodation and laboratory facilities were completed. While in recent years A\$2.7m has been spent to extend the life of the *Southern Surveyor* she is now due for replacement as the end of her life has been determined at 1 July 2011. Consultation with the scientific community has led to a Statement of Requirements for a replacement vessel, which is now complete and will be released in due course.

Captain Ron Grady (Canada - Department of Fisheries and Oceans, Canadian Coast Guard) reported on the major modifications that were completed on the CCGS *Amundsen*, a Canadian research icebreaker built in 1979 for international collaboration in the study of the changing Arctic environment. The vessel is capable of breaking ice of one metre thick at three knots. The modification project has been funded by the International Joint Ventures Fund of the Canada Foundation for Innovation in collaboration with the Department of Fisheries & Oceans-Canadian Coast Guard and cost CAN\$27.7m. A Canadian consortium of 54 researchers from 12 Canadian universities and 5 Federal departments, in total 66 Arctic experts from 44 institutions in 9 foreign countries were involved in the design which was co-management with Canadian Coast Guard. The scientific modifications (CAN\$12,8M) comprised the fitting of an 8'x8' moonpool for CTD and ROV deployments, dynamic positioning by means of two azipods, new internal communications systems, and new laboratories, winches and A-frames. New scientific equipment (CAN\$8,8M) included an EM300 multi-beam and EK60 single-beam echosounders, ADCP, Knudsen K320R 3.5kHz subbottom profiler, mooring equipment (ADCPs, current meters, traps), laboratory equipment, ROV, plankton nets and ice camp support facilities. The EM300 was built in the hull to protect the transducers from ice damage. First mission after completion of the modification was an ice overwintering programme jointly with the hydrographic vessel CSL *Heron*. CCGS *Amundsen* is currently involved in a 15 months' IPY mission in the Arctic region, which started on July 26, 2007 and an estimated return date of 6 November 2008. The voyage will contribute to 3 distinct IPY scientific programs: ArcticNet, Inuit's Health Survey and the Circumpolar Flaw Lead (CFL).

Following an inquiry from **Prof Dennis Nixon**, **Capt Grady** advised that for the Inuit's Health Survey, which studies the health of the native Inuit Eskimo population, two specialised nurses were engaged on the *Amundsen*.

Mr Enrique Aranda (Chile – IFOP) reported on the Chilean research vessel fleet, which comprises three research vessels. The 42m research vessel RV *Abate Molina*, operated by Instituto de Fomento Pesquero and with home base in Valparaiso, completed 92 days at sea. The Chilean has approved a new multi-purpose vessel, which will be 70-72 long, a beam of 15-18m and around 3,500t. Design tenders have been requested from Skipstekniks and Rolls Royce Marine, based on specifications detailed by the Chilean

Navy and IFOP. Design and construction will need to meet ICES209. Construction is due to start early 2009.

Dr Tiegang Li (China – IOCAS) presented the meeting with an overview of the Chinese research vessels. A total of fourteen vessels are owned by the Ministry of Education, the Ministry of Land and Resource, the Ministry of Agriculture, the Oceanic Administration (SOA) and the Chinese Academy of Sciences (CAS). Seven of these vessels are based in Quindao: *Ye Zhi Zheng*, *Bei Dou*, *Xiang Yang Hong 09*, *Dayang Yi Hao*, *Ke Xue San Hao* and the *Ke Xue Yi Hao*. The research ice breaker *Xue Long* is based Shanghai, while the *Fan Dou Si Hao*, *Tan Bao*, *Xiang Yang Hong 14*, *Shi Yan 2* and *Shi Yan 3* and *Hai Yang Si Hao* are all based on Guangzhou. The newest research vessel RV *Ke Xue San Hao*, meaning Science Number 3, was delivered on 28 July 2006 to IOCAS. This vessel was built by the Wuchang Shipyard with an overall length of 73.9m, beam of 10.2m and a displacement of 1,224 tonnes. The Chinese research vessels offer a most impressive range of marine research capabilities ranging from general scientific studies to fisheries stock assessments, and from marine geology and geophysics to seabed mapping and mineral resources studies.

Three new research vessels are planned or under design. The RV *Science* a blue ocean research vessel will be based in Quindao. Two specialised vessels, one for gashydrates studies and one swath vessel will be operated from Guangzhou.

Capt Masataka Zaitzu asked what the main purpose of the proposed swath vessel will be. **Dr Li** advised that the vessel would be built for general scientific studies as well as seabed mapping.

Two further presentations were made by China towards the ice breaker research vessel *Xuelong* and RV *Ye Zhi Zhang*. RV *Xuelong* (167m long, 21,025t) was built in 1995 and is operated by the Polar Research Institute of China out of Shanghai. The vessel is a B2 Class ice breaker and carries 40 crew and up to 110 scientific/technical staff. She has a maximum operational radius of 21,000 nautical miles and can carry 10,225 tonnes cargo. *Xuelong* is mainly used for Arctic (2 voyages) and Antarctic (10 voyages) scientific studies and support activities. She is often involved in international collaboration research, particularly with Russia, America, Finland, Japan, Korea and Australia.

RV *Ye Zhi Zhang* is owned and operated by the Qingdao Institute of Marine Geology, China Geological Survey. This 53m, 638t geosciences vessel was purpose built in 2005 for nearshore and continental shelf geophysical and geological investigations. *Ye Zhi Zhang* is provided with a Kongsberg EM950 multibeam echosounder, a EA400P marine sounder system, a Seaspy magnetometer, a Ses-96 parameter matrix subbottom profiler, a dual frequency side-scan sonar and a Kss-31M marine gravimeter. Furthermore a HGD-200 type marine engineering drill and an “A” rack fixed for gravity coring, piston coring and grab coring allow seabed samples to be taken. Twenty three scientific/technical staff can be carried on the vessel.

Steen Silberg (Denmark – DIFRES) gave a detailed overview of the Danish research vessel fleet comprising a total of eight vessels. The four small vessels *Havfisken*, *Ophelia*, *Genetica II* and *the Havkatten* are all less than 30t and owned by Danish universities. Two vessels, the *Pamiut* (71t) and the *Alfred Jensen* (67t) are based in Greenland, while the *Gunnar Thorson* (81t) is owned by the Danish Royal Navy and used for oil spill containment. Denmark’s ocean going research vessel, the *Dana* (2,545t – 78.4m) was built in 1980 and her replacement is under consideration. A study group is working on specifications for several replacement vessel, whereby multi-tasking and collaboration between scientific and other users is of much importance. During 2007 *Dana* has been 180 days at sea of which 42 days around Greenland.

Ken Cooke asked whether the scientific community has conducted a compatibility and capability study. **Steen** advised that the scientific needs have been driving the changes, specifically seeking an increase in size of the small vessels and for closer collaboration between the institutions and universities.

Steen Silberg responded to an enquiry by **Ron Grady** whether a compatibility study has been conducted to evaluate the acoustic performance of each vessel. While this study was done some further work was needed. **Per Nieuwejaar** advised that comparing vessels for acoustic performance is very difficult as this is constrained by the operational cost (particularly manning) and that therefore Norway used three vessels for this purpose.

Dr Klaus von Broeckel (Germany – Leibniz-Institute für Meereswissenschaften) gave an overview of the seven large German research vessels: *Polarstern*, *Meteor*, *Sonne*, *Maria S. Merian*, *Poseidon*, *Alkor* and *Heincke*. The icebreaker research vessel *Polarstern* (118m, 17,300t) conducted a Arctic voyage last summer whereby the ice thickness encountered was less than 1m compared to over 2.5m during previous voyages; a clear sign of the global warming problems in the Arctic. The *Maria S. Merian* experienced considerable problems with her azimuth propulsion system caused by sliprings between the pod and the vessel as well as by faulty shaft seals resulting in seawater entering the electric motors. The vessel has been in dry dock and due to go back into service in the next few weeks. During 2007 the laboratories and cabins of RV *Meteor* were renovated, while a new deep sea multibeam echosounder (Kongsberg EM120) and a new retractable bow thruster were fitted. New equipment developments include a 6,000m Kiel ROV for geological studies and the KOSMOS (Kiel Off-Shore Mesocosms) floating biological water column analysis unit.

Per Nieuwejaar remarked that the proposed new research ice breaker *Aurora Borealis* is a European funding bid for which the German government has approved Euro5M for the design and a further Euro75M for the construction, subject to additional EU funding.

Dan Rolland enquired whether the EM120 on the *Maria S. Merian* was flush mounted? **Dr Klaus von Broeckel** advised that this was the case and that the vessel experienced bubble sheeting problems.

Mr John Breslin (Ireland- Marine Institute) reported on the two multipurpose research vessels owned by the Marine Institute: RV *Celtic Voyager* and RV *Celtic Explorer*. The *Celtic Voyager* had been at sea for 240 days during 2007 and the *Celtic Explorer* 299 days. As reported last year P&O Marine Services (Irl) Ltd has taken over the operations of the vessels and John reported that the partner ship worked well. For 2008 onwards the Marine Institute aims to rely less on commercial revenue and targets increased government funding for an Integrated Marine Exploration (IME) Programme. The IME programme seeks i) to provide SSTI (Strategy for Science, technology and Innovation) grant-aid towards ship-time onboard the national research vessels for Irish 3rd level institutes and R&D organisations for both training and research surveys, ii) to establish a multidisciplinary field-team that can increase the quantity and quality of information gathered during survey programmes and iii) to provide “hands on” training in the collection of data onboard Ireland’s research vessels leading to the development and operation of accredited marine science modules for 3rd level students. **John Breslin** showed several successful voyages funded through the IME programme, which included the SALSEA, Bright Sparks, PAP and HABIT voyages. The Marine Institute is considering the acquisition of a deep water ROV as this is a major short coming for the Irish marine scientific studies and to support underwater laboratories.

Fred Smits enquired as to the budgetary costs for the ROV. **John Breslin** responded that the budget estimate for a 3,000m rated ROV is Euro2.8M, while the French deep water ROV (6,000m) is estimated to cost Euro10M. The operational cost of an ROV is a major issue and the Irish Navy will supply experienced ROV personnel to assist the Marine Institute.

Ken Cooke asked how the Marine Institute ensured that *Celtic Explorer* remained ICES209 compliant. **John Breslin** said that this had not been checked, whereas **David Blake** advised that on the *James Clark Ross* all engine, generator and compressor mounts were replaced after 10 years.

Dr Maruthadu Sudhakar (India - National Centre for Antarctic & Ocean Research) provided information on the research vessels of India. The *Gaveshani* (1975/94), *Sagar Kanya* (1982), *Sagar Sampada* (1983), *Sagar Purvi* (1996), *Sagar Paschimi* (1996) and the *Sagar Shakthi* (2000) are all owned by the Department of Ocean Development. NIO, the Indian Navy and FSI own the *Sagar Sukthi* (2002), *Sagar Dwani* (2000) and twelve fisheries survey vessels. Three new build vessels are underway: *Sagar Manjusha* (2006), *Sagar Nidhi* (2007), *Gaveshani Ii* (2008) and a new seismic vessel (ONGC) is proposed for 2008. During 2005-06 ocean research vessel *Sagar Kanya* (100m, 4,888 t) went through a US\$9M refit which included the fitting of a new multi-beam echosounder, a new crane/LARS, as well as five 1080kW Wartsila 6L20 generators, a 1200kW bow thruster and a 800kW retractable stern thruster in support of the new dynamic positioning system. The design for the latest Indian ocean going research vessel *Sagar Nidhi* is nearing completion. This 103m long vessel, capable of carrying up to 32 scientists, is designed as a DP2, ice class (Ice 1c) ship. She will be provided with a 60 ton a-frame, 10 ton offshore crane, traction and storage winch complex, containerised modular science laboratories, and multi-beam echosounder, ADCP and USBL/LBL systems. India is studying the option of building a polar research vessel with a suggested launch data of 2010, possibly followed by a geotechnical vessel in 2011.

Mr Tetsuo Uchida (Japan - JAMSTEC) reported on the JAMSTEC fleet activities in 2007. JAMSTEC owns and operates seven research vessels RV's *Natsushima*, *Kaiyo*, *Yokosuka*, *Kairei*, *Mirai*, *Hakuho-Maru* and *Tansei-Maru*, the drill vessel *Chikyu*, the manned submersible *Shinkai 6500*, the ROVs *Hyper Dolphin* and *Kaiko 7000* and AUV *Urashima*. The seven research vessels completed 1858 cruise days at sea, a reduction from the 1981 days in 2006. The *Shinkai 6500* spent 68 days at sea, *Hyper-Dolphin* 115 and *Kaiko7000* 30 days. Mr Tetsuo Uchida told the meeting about the emergency seabed survey conducted by *Kairei* to study the offshore seafloor stability following the Chuetsu earthquake that could effect the overall integrity of the Kashiwazaki Nuclear Powerplant. The *Mirai* had to be towed some 520 miles to Hachinohe port by the tug *Shinryu-Maru* after an illegal driftnet had wrapped itself around the propeller. Divers removed the net and a total of 10 days research time was lost. *Shinkai 6500* experienced a leak at 4,000m water depth as a result of a 1mm gap in the conical hatch. This has now be remedied and since September 2007 the deep manned submersible is fully operational again.

Captain Masataka Zaitu (Japan – JAMSTEC) gave an overview of the activities of the new 210m drilling vessel *Chikyu*. The vessel has been through her shake-down and has started her first IODP drill hole at Kumanonada. Prior to this *Chikyu* conducted trials in Kenya (about two months) after which she was chartered out for commercial exploration drilling at the north-west shelf of Australia for five months.

Ms Marieke Rietveld (Netherlands - NIOZ) reported on the activities of NIOZ's 66m RV *Pelagia*, which completed 321 operational days, including 190 days for Dutch, IPY and ESF EuroCORES Programmes, 100 days for EU programmes (included 24 barter days for BMBF), 3 days intervention recovery upper part PAP mooring for NERC, 28 commercial charter days as well as 26 days for maintenance, motor revision and the fitting of a new CTD-cable. In September 2006 a study on running cost efficiency and management was conducted by the "Committee Future Pelagia", which included an evaluation as to whether the NIOZ fleet should be managed by a commercial ship operator. The main conclusion of the study was that outsourcing the ship is not considered a cost effective option. Other recommendations included improvement of communications between shore and vessel personnel, a more appropriate Collective Employment Contract for seagoing staff, and maintaining the high standard of maintenance and science outputs.

Mr Greg Foothead (New Zealand – NIWA) reported that as in previous years NIWA Vessels has continued to operate its two research vessels RV *Tangaroa* (70m), and RV *Kaharoa* (28m), plus the 10.5-meter hydrographic survey launch SL *Pelorus*. *Tangaroa* was at sea for 321 days and *Kaharoa* 255 days, while *Pelorus* was used for some 94 days for general scientific and survey work. *Tangaroa* continued to be engaged predominantly in surveys required for the New Zealand government, including 101 days for marine sciences (geological, oceanographic and biodiversity studies) and 119 days for fisheries research (mainly stock assessments using fisheries acoustics and some deep sea trawling). Contracts for 33 days external charter work were completed as well as 68 days “Ocean Survey 20/20”, the New Zealand government funded EEZ mapping survey. *Kaharoa* was involved in 28 days marine sciences, 105 days fisheries research and 21 days commercial charters. She continues to be engaged in the international ARGO-float initiative and as of late August 2007 *Kaharoa* holds the world record for deploying ARGO-floats: 457 floats of the total of about 2900 deployed. Two significant equipment problems occurred on NIWA’s vessels during 2006-07. As reported in Galway *Tangaroa* continues to experience problems with its electronic winch controls and a funding request has been submitted to the Board of Directors for replacement of all Brattvaag electronics with a Scantrol system to be installed in May 2008. In recent months a serious reduction in the performance of *Tangaroa*’s EM300 has been observed, in that the sounding depth has been reduced to about 2,500m from the earlier 5,200m. A Kongsberg SIMRAD engineer has been on board for several days and concluded that the by now 10-year old transducers are showing serious deterioration. As some 65% of the New Zealand EEZ is much deeper than 2,500m the transducers will need to be replaced and dry-docking is scheduled for May 2008. Within the next few years the overall system will be upgraded to an EM302 (once this new version of the 30kHz is proven), and the transducers to be installed in 2008 are EM302 capable. The damage to *Tangaroa*’s gearbox as reported in Galway has now been rectified in that a new power-take-off shaft was installed in February 2007. NIWA’s equipment replacement programme for *Tangaroa* has continued this year and included a major refurbishment of the galley and messroom, the modernisation of the smoke alarm system, a new Pallfinger crane on the bow, winch drums, replacement of bridge electronics, and a new audio-visual system for the meeting room. *Kaharoa* was provided with a new depth sounder, computers and improved communication systems. A technical and commercial study has been completed for the conversion of *Tangaroa* to a DP2 station-keeping vessel, which besides improving NIWA’s scientific outputs, would allow NIWA to secure more external scientific and commercial charter work, thus reducing its dependency on the uncertain government funds. Such a DP system would also provide increased redundancy for this single-engine, single screw vessel. It is expected that the NIWA Board of Directors will approve the conversion in its October 2007 meeting, with installation scheduled for May-June 2009. In spite of the reduced cruising speed of *Tangaroa* to 10.5 knots and that of *Kaharoa* to 9.5 knots, NIWA has not been able to make savings in fuel cost last year, mainly as a result of the failed gearbox which required *Tangaroa* to use its stand-by generator for several months until the new PTO-shaft was installed in February 2007.

Per Nieuwejaar (Norway – IMR) gave an overview of the 17 research vessels operated by Norway. The large number of vessel is inefficient and progress is slowly made to combine activities and for the various agencies to work closer together. A Kongsberg EM1002 has been fitted to *Hjort*. An interdepartmental group has just been established to set the specifications for a new proposed Norwegian icebreaker/research vessel, about 90m long and 3,500t, due for delivery in 2012. *GO Sars* will leave Bergen mid November 2007 for an IPY cruise, to return in May 2008. The voyage will include a geological survey off the Brazilian coast, krill surveys around South-Georgia and Bovet Island, a hydrographic survey off Queen Maud’s Land and a biological survey near Namibia. IMR is working together with the Norwegian Navy in the deployment of the Hugin AUV.

Sharon Du Plessis (South Africa – DEAT, Marine and Coastal Management) gave an overview of the South-African research fleet, which comprises the DEAT flag ship FRV *Africana* (77.8m, 2,471t), FRV *Algoa* (52.6m, 759t), FRS *Sardinops* (36.6m, 255t), and ice strengthened Antarctic supply/oceanographic

research vessel *Angulhas* (112m, 6,122t). All vessels are based in Capetown and managed by Smit Armandla Marine. *Angulhas* is the main supply vessel for SANAP, the South African National Antarctic Programme. She is over 28 years old and as the cost of maintenance is increasing and science requirements have changed replacement is required. Treasury is reluctant to provide capital for the replacement and DEAT has been requested to find alternative funding solution. Following discussions between DEAT and Treasury an agreement was reached to investigate the feasibility of a PPP (Public Private Partnership) arrangement. The current replacement costs is estimated at R900 million and an order for a new research vessel has been placed in May 2005.

Prof Juanjo Dañobeitia (Spain – UTM/CSIC) reported on the Spanish research vessel fleet consisting of five vessels, three owned by the CSIC: the 70m *Sarmiento de Gamboa* which was delivered in 2006, the 37m *Garcia del Cid*, and the 24m *Mytilus*. SCIC also operates the two vessel belonging to the Spanish Navy, the 82,5m Antarctic vessel *Hesperides*, and the 40m Antarctic Stations vessel supplier *Las Palmas*. IEO owns a part of the 75m French/Spanish vessel *Thalassa*, the 67m *Cornide de Saavedra*, the 30,5m *F. P. Navarro* and the 24m *Odon de Buen*. The construction of two new 35m vessels for IEO have been approved. MAPA owns the 53m *Vizconde de Eza*, the 30m *Emma Bardan* which was launched in 2006, and the just commissioned 70m vessel *Miguel Oliver*. Prof Dañobeitia detailed the equipment fitted to RV *Sarmiento de Gamboa*, and the recently acquired 6,000m seismic streamer. During 2006-07 CSIC became full OFEG member, exchanging 20 days barter with IFREMER in exchange for the *Victor* installation.

Mr David Blake (UK – BAS) reported on the activities of the British Antarctic Survey (BAS). RSS *James Clark Ross*, 100m, 7,000t, was built in 1991. This vessel conducted studies around South Georgia, in the Bellingshausen Sea and the Antarctic Peninsula during September 2006 and 2007, also deploying the ISIS ROV in Antarctic waters. Upon return an extended eight week refit took place to replace control system and new windows while the data acquisition system was upgraded. RSS *Ernest Shackleton*, owner by Rieber Shipping from Bergen, is operated by BAS and chartered back to the owner for oil and gas survey work in the North Sea during the Antarctic winters. This vessel was commissioned 1995, is 80 metres long, 5,500 tonnes, ice strengthened and has DP2 station keeping capabilities. During 2006-07 *Ernest Shackleton* was used by BAS for logistics support to the Antarctic stations, an oceanographic survey in the Weddell and Scotia Seas, for the deployment and recovery of moorings and for the Halley VI British Antarctic Station rebuild. She conducted a 120 day charter in the North Sea for Acergy. David advised the high annual compliance cost (approximately £120k) for keeping RRS *Shackleton* in DP-class. Each year the ship fails the FMEA test and upgrading is required. Experienced DP operators are a necessity.

Mr Geraint West (UK – NOCS/Marine Facilities) described the formation of “Sea Systems”, incorporating the Research Ship Unit and UK Ocean Research Services. RRS *Discovery* conducted surveys in the North Atlantic, while the RRS *James Cook* went through her final sea trials and is ready for her first voyage to the Caribbean. Time barter was exchanged with the UNOLS vessel *Ron Brown* (RAPID in the North Atlantic), the *Meteor* (TOBI) and the *Celtic Explorer* (PAP). The Isis ROV cruise to Antarctica was successful. The failure of the Power Management System on RRS *Discovery* was a major issue during the year. The *Discovery* replacement project is well underway with the vessel expected to be decommissioned by 2011/12, at which time the vessel is 47 years old (see below).

Prof Dennis Nixon (USA – UNOLS) updated the ISOM members on the UNOLS fleet activities in behalf of Dolly Dieter who was unable to attend, being involved in studies for the proposed Antarctic Regional Research Vessel. The UNOLS’ vessel fleet comprises 23 research ships, whereby the large vessels are owned by the US Navy and absorbs some 65% of the entire NSF-fund. Sixty-one science institutions are involved in the UNOLS fleet, which includes 6 global class vessels. The seismic vessel *Marcus Langseth* is now fully commissioned, be it that it took twice as long as planned and at double the cost. The cost of the proposed Antarctic class vessel is currently estimated at US\$150M. The 6,500m rated

manned submarine to replace the *Alvis* is scheduled for operational trials by 2010. The new regional class vessels is under consideration. The main challenge the UNOLS fleet experiences is to contain the operational cost, in particular fuel. The total number of seadays for the UNOLS fleet was 5,000 days in 2002, which has now been reduced to only 2,000 per annum. Operators are looking more and more for commercial charters. Crewing issues are serious issues as vessels are being laid up and experience to conduct scientific studies is under considerable threat. The US is likely to sign up to UNCLOS next year because of the Arctic oil and gas fields. Dennis expects a major “oil rush” to the Arctic ocean.

Ken Cooke (Canada - Department of Fisheries and Oceans, Canadian Coast Guard) presented interesting comparative fisheries acoustic trials completed in 2006 using CCGS *WE Ricker* (58m, 1105t) and CCGS *PJ Tully* (69m, 2021t). CCGS *WE Ricker* has an in-line mounted EK500 (38 and 120kHz) transducer arrangement on a 1.2m extension ram below the keel, 5.2m deep, while CCGS *JP Tully* is fitted with an in-line flush-hull mounted EK60 system, comprising 18, 38, 70, 120 and 200kHz sounders at about 5 meters deep. In spite of the Can\$500k EK60 sounder upgrade and the more advanced transducer array the comparative study clearly shows the benefit of the ram mounted system. At 25knots wind the aeration underneath *PJ Tully* is so much the data is useless for fisheries research purposes. Ken asked the meeting for its opinion. **Steen Silberg** recommended the use of towed bodies, while **Per Nieuwejaar** advised that the Norwegian experience with the EK60 is very good and that he considered that the problem is the result of the flush mounted transducers on the *PJ Tully*. John Breslin reported similar problems on the Irish ships, particularly with head wind and waves.

4. **International Marine Science Code of Conduct (John Breslin, Prof Dennis Nixon, Geraint West).**

John Breslin, Prof Dennis Nixon, Geraint West completed a comprehensive literature study and exchanged information with various ISOM members and other interested parties. Based on this they concluded that all anthropogenic activities have potential environmental impacts. The objective of the proposed protocol (code of practise) is to minimise those impacts while adopting a pragmatic approach that facilitates the conduct of marine scientific research. Recognising the importance of vessel-based marine scientific research the utilisation of environmentally responsible practices is strongly encouraged. Acknowledging the potential impact that the conduct of marine scientific research may have on the environment, the delegates to ISOM have approved the following guidelines for the conduct of scientific operations at sea. Those subscribing to this Code of Practise consider preservation of the environment as paramount, and consequently adopt the precautionary approach as the basis for the proposed mitigation measures.

Environmental Impacts and Responsible Research Practices. *Every vessel conducting marine science should develop a marine environmental management plan.* The following are common areas where certain operations may have an impact and the complexity of these measures will vary on a case-by-case basis depending on such factors as vessel size, duration of voyage, geographical location, and mission type. Areas for consideration are impacts from ship operations and from scientific activities as follows.

Ship Operations

- **Activities**
 - Oil spills
 - Exhaust emissions
 - Garbage/plastics disposal
 - Sewage discharge
 - Anchoring
 - Hazardous waste release

- Vessel noise emission
- Grounding/collision events
- Ballast water release
- Mitigation

Every research vessel should be operated in compliance with the International Safety Management (ISM) code (or equivalent), which addresses all the above listed potential activities. Where there are special requirements for operations in sensitive areas (including marine protected areas, polar latitudes etc), additional measures such as specialised training, procedures, crew, or equipment may need to be incorporated into the cruise plan.

Science

1) Physical Impacts

- Activities
 - Dredging
 - Grab & core sampling
 - Lander operations
 - Trawling
 - Mooring deployments
 - Remotely Operated Vehicle (ROV) sampling
 - Jetting system operations for cable burial
 - High Intensity lighting for camera operations
- Mitigation
 - The cruise plan should be designed to employ the most appropriate tool(s) to collect the scientific information while minimising the environmental impact. The number of samples taken should be minimised, and in particular, scientists should consider available existing biological and physical data and/or samples from the target site. Where appropriate a pre-site survey should be conducted to determine possible impacts and suitable mitigation measures. The sampling methodologies should be designed to match the site-specific characteristics of the area, in particular through the use of less intrusive tools in sensitive/protected areas.

2) Acoustical Impacts

- Activities:
 - Seismic surveying
 - Sub-bottom profiling
 - Multibeam or single-beam surveying
 - Sidescan surveying
 - Acoustic positioning
 - Scanning fish-finding sonar operations
 - Acoustic Doppler Current Profiling (ADCP)
 - Rock drilling and chipping
- Mitigation
 - The minimum acoustic source level and duration to achieve the desired results should be used and the acoustic frequencies chosen in order to minimise impacts on marine life. In areas where marine mammals are known or are suspected to exist, additional measures may be required including, for example, soft-starts, visual surveillance and acoustic monitoring.

3) Chemical Impacts

- Activities
 - Tracer (dyes, fluorescent beads, SF6 etc.)
 - Seeding (CO2 sequestration)

- Expendable Bathythermograph (XBT) – copper, batteries
- Mitigation
 - The use of chemical tracers should be discouraged, as well as the use of expendable devices which contain hazardous materials. Where there is no alternative to these techniques, every effort should be taken to minimise their use.
- (4) Accidental**
- Incidents
 - Behavioural impacts on marine life
 - Chemical discharge – eg hydraulic fluid leakage from ROV; release of radio-isotopes
 - Cross-contamination of biological communities
 - Pollution resulting from loss of equipment – e.g. batteries and instruments
 - Discharges from drilling or coring into shallow oil/gas
 - Physical disturbance of delicate habitats – ROV umbilical, errors in manoeuvring and anchoring
- Mitigation
 - A risk assessment of the entire cruise plan should be completed before any equipment is deployed. If necessary, the operator should consider modifying the equipment and/or expertise employed in order to reduce risks to an acceptable level. In some cases it may be necessary to develop contingency measures in order to recover lost equipment (including collaboration with other research vessel operators.)

Prof Nixon has presented the above Code of Practise to the UNOLS council who supported the document. Environmental sensitivity and sustainability will have a major impact on future marine scientific studies and various countries (eg Sweden and all Antarctic Treaty Countries for scientific work in the Antarctic) have already moved to permitting marine scientific studies. Major impacts are those associated with the Internal Argo-programme that uses lithium batteries in the floats and the dumping of fish for fisheries research. **Per Nieuwejaar** advised that under the ISM-code the responsibility for environmental impact rests with the DPA and not with the Master. **Dennis Nixon** concurred and noted that the DPA is the potential “jailee”. David Blake endorsed the document and all ISOM members accepted the proposed Code of Practise as an important, albeit living document. The document will be put on the ISOM website.

5. Future Plans on Research Fleets and Marine Infrastructure

Sui YiYong (China – IOCAS) presented the ISOM members with an impressive and detailed overview of the current and future Chinese research vessel fleet, its operational capabilities and structures. Of particular importance are the plans for the proposed RV *Ke Xue*, an advanced research platform for scientists to participate in major international marine research programs, as well as to conduct deep sea scientific exploration and research. Her main scientific purpose will be for applications in marine geology, marine biology and ecology, and marine chemistry in the deep waters of Western Pacific. The vessel will be managed in accordance with the "co-building, condominium and sharing" principle. *Ke Xue* will be 99m long, 4,000t displacement and can carry up to 78 people. The construction project was officially launched in 2007 and it is estimated that the vessel will be commissioned in four years. The vessel will be run under a new operation strategy to ensure the sharing of the vessel and her equipment; to enhance the cooperation and communication between Chinese and foreign scientists; and to achieve an accessible facility allowing multi-disciplinary cruises.

Mr Ed Cooper (UK – NOCS/Marine Facilities) reported on progress with the RRS *Discovery* replacement. The current *Discovery* was built in 1963 and underwent a major mid-life refit in 1991/92. The estimated cost for the replacement vessel is £55M of which part will be funded by the UK Treasury

the remainder by NERC. The replacement project commenced in June 2007 following Strategy Decisions. Vessel definition is being undertaken and includes OFEG barter users and other NERC barter partners. The new vessel will be of a similar operational performance as the existing *Discovery* to allow for safe year round observational campaigns, with an expected endurance of 50 days, 30 berths for scientific/technical staff and low running costs at minimum environmental impact. Ice class will be minimal and the vessel should be DP2 capable (not certified). Delivery is expected in 2011.

Per Nieuwejaar suggested the all new vessels should be built to ICES209. While this industry standard is only required for fisheries research vessels it provides much better performance for all sounder types and is therefore strongly recommended by Per.

Olivier Lefort asked whether gondolas or dropkeels were proposed. In his view gondolas are much better for hydrographic work and for ADCPs as a gondola has a permanent fitting while each time a drop keel is lowered it fits slightly different.

Prof Juanjo Dañobeitia (Spain – UTM/CSIC) informed the ISOM members towards progress on the 70m *Sarmiento de Gamboa* which was delivered late 2006. The *Sarmiento de Gamboa* is a fully multi-disciplinary research vessel that provides equipment and capabilities for all main marine sciences. Trials and commissioning are continuing with the vessel undergoing ICES209 testing at this very moment. Commissioning of the *Sarmiento de Gamboa* was delayed by some nine months as a result of technical/logistical and operational issues, but she is now expected to be fully operational late 2008. The total cost of the vessel is estimated to be Euro46M. Prof Dañobeitia also showed a video of the first sea trials of the vessel.

Mr Dan Rolland (USA - Alion Science) presented an update on the US research vessel construction programme. Concept/design/construction is underway for a range of new vessels: up to three Regional Class Research Vessels (RCRV), two ocean class vessels (AGOR), one Alaska Region Research Vessel (ARRV) and the final commissioning of the RV *Marcus Langseth* multi-channel seismic vessel.

The RCRVs are about 150ft long, general purpose, mono-hull ships to be operated by UNOLS academic institutions and directly funded by US National Science Foundation. Two contracts were awarded in May 2006 for competitive preliminary design. The requirements were modified in early 2007 and the preliminary design is due for completion in March 2008. The detailed design and construction is envisaged to start early 2009 with completion of the vessels due early 2011. Accommodation will be for 6 singles and 11 doubles and the vessels' range will be 5,400 NM at an optimal cruising speed of 10 knots. Middle depth multi-beam and single-beam echosounders, an ADCP and a subbottom profiler will be fitted together with a full suite of winches, cranes, and overboard equipment, while the vessels will be capable of carrying two standard 20ft containers on deck.

Two mid-size, general purpose, monohull AGOR ocean class research vessels are planned for construction in the next six years. The vessels will be funded through the US Navy (US\$185 for both vessels) and operated by the UNOLS Academic Institutions. The requirements development and conceptual design will be completed during 2008 with the start of construction for the first ship expected in 2011 and commissioning of both vessels by 2014. The vessels will be fitted with the full suite of oceanographic scientific and hydrographic facilities and carry up to 25 scientific/technical staff.

An agreement between NSF and University of Alaska has been signed for the construction of one Alaska Region Research Vessel at an expected total budget of US\$123M. The detailed design and construction will start in August 2008 with commissioning in July 2011. The 236ft long vessel is designed for breaking ice of 2.5 feet thick at 2 knots. Twenty six scientist berths will be provided.

The commissioning of the multi-channel seismic research vessel *Marcus Langseth* is nearing completion with certification, DP testing, and multibeam acceptance trials due for completion by late October 2007. NSF science inspection is planned for second week of November 2007 with shakedown cruises scheduled for early 2008.

Captain Fred Stein (Australia – CSIRO, Marine Research) gave a presentation towards the progress on the replacement for the 36 year old RV *Southern Surveyor*. The statement of requirements have been completed and the envisaged vessel will 70-80m long, a beam of 17-20m and about 3000t displacement. She will be fitted with diesel electric propulsion and fixed pitch propellers. Desired transit speed will be 16kt and cruising 12kt. The vessel will be able to carry up to 30 science/technical staff and will carry a light ice class. It is expected that the vessel will be commissioned late 2011.

It is proposed that the acquisition will be by an open call to the market for the charter of a vessel to deliver the desired capability as a package solution. This would be on the basis of a Public Private Partnership arrangement. The opportunities for potential suppliers to deliver innovative and cost effective responses to providing the capability sought will be maximised if the Statement of Requirements is structured as a Statement of Functional Capabilities and not a detail design brief. Change in research directions and technologies will occur during the life of the vessel. Over the long term the most efficient platform will be one that is engineered by design to efficiently accommodate change. While a PPP is envisaged for the vessel itself this may not be the case for the scientific outfit/equipment.

Mr Olivier Lefort (France – Ifremer Brest) provided a detailed presentation on the modernisation of RV *l'Atalante*. This vessel was built in 1990 as a state-of-the art vessel at the time but now requires a mid-life maintenance and upgrade to meet the changed scientific requirements. The EM12D will be replaced with two new multibeam echo-sounders: one 6,000m sounder (1°x2°) and one 2,000m medium depth sounder (0.5°x0.5°). Detailed modelling has been completed to ensure minimal effect of bubble on the new sounders. Maintenance will include painting of tanks, decks and major refurbishment of the winches, thrusters, electrical and power systems, laboratories and communications systems.

Two years commissioning of RV *Pourquos Pas?* have seen considerable improvements to the vessel. The ROV *Victor 6000* can now be operated from both stern and starboard, while both ROVs *Victor 6000* and *Nautilie* can be deployed simultaneously. The multibeam echo-sounders have been greatly improved and SAT is planned by the end of next year. The coring system will be upgraded to 40 m by the beginning of 2008.

Captain Ron Grady (Canada – CCG/DFO) presented the ISOM members with an overview of the Canadian research vessel renewal plans. The Offshore Fisheries Science Vessels Project aims to deliver three new modern, state of the art science research vessels replacing four existing vessels that are nearing the end of their life cycle. Vessels are required to operate in different Canadian waters and climates, such as North and Southern Atlantic, Arctic, Inland waters, and Pacific Oceans. The new vessels are required to conduct various programs: fishing (shallow and deep water, maximum 3500 m), oceanographic and some hydrographic operations, acoustic surveys and search and rescue, and are required to operate in ice infested waters. The vessels need to be compliant with ICES 209, which impacts on propeller design, on generator, motor and equipment mountings and bulkhead insulation. The contract award is scheduled for 2008, with delivery of the vessels between 2011 and 2012.

Canada is also looking at the construction of an offshore oceanographic science vessel as a replacement for the 44 year old CCGS *Hudson*. The new vessel will be a more integrated oceanographic, hydrographic, biological, and geophysical survey vessel, helicopter capable and with increased ice capability for Canadian Arctic operations. The contract award is scheduled for 2008 with delivery in 2012.

6. Other Reports

Marieke Rietveld (Netherlands – NIOZ) reported on progress of the **European Ocean Research Fleet Working Group (OFWG)**. As reported last year the OFWG has prepared a draft plan that includes an inventory of the current European research vessel fleet and major equipment that will provide a basis for decision making on future investments in marine infrastructure, including fleet renewal. The draft plan has now been officially reported as “The ESF Marine Board Working Group Report in Print” and can be downloaded from www.esf.org/marineboard. The report gives an overview of the existing management and funding processes and existing partnerships providing a basis for improvement and possibilities for further collaboration. The working group has made an analysis of the academic European fleet and has divided the ships in Global Class (11), Ocean Class (15) and Regional Class (20). The European research fleet is ageing and a replacement strategy has been developed for the period 2005 – 2025. A high priority replacement strategy for the next 10 years to renew the quickly ageing Regional Class fleet has been recommended. The rapid decline of the Regional Class fleet may jeopardize the continuity of research that is of high societal relevance and public interest for European citizens with respect to environmental issues, living resources and water quality.

The report concluded that the European set of large exchangeable equipment is state-of-the-art, performing excellently, and is more extensive than elsewhere in the world. However a limited number of nations own most of the large and exchangeable instruments and the availability of the more sophisticated and most capable instruments is very limited. Technical support, insurance and scheduling are crucial issues for exchange of instruments

Marieke Rietveld (Netherlands – NIOZ) also reported on the **Ocean Facilities Exchange Group (OFEG)**; “a bottom-up approach of research fleet co-ordination & harmonisation”. OFEG comprises a group of six European agencies: NERC, BMBF, IFREMER, NIOZ, CSIC and IMR. All OFEG members, except NIOZ, run multiple fleets, totalling 22 of the 26 Ocean, Global Class and Regional Class ships in Europe. OFEG facilitates the exchange of shiptime and major pieces of equipment based on the ‘bartering’ principle, and also include joint cruises. The exchange is based on “value points” according to scientific capacity as agreed between members. Please refer to www.ofeg.org for more information. Besides the research vessel barterers, heavy equipment such as ROV Victor, submersible Nautilie, TOBI, SAR, multichannel seismics, mobile compressors and laboratory containers can also be accessed from a so called ‘virtual’ pool of heavy equipment: <http://www.nioz.nl/ofeg>.

Marieke Rietveld also advised the meeting of the recently introduced **OFEG-Tech** group, which aims to build a network of OFEG Marine Techicians for the exchange of skills and information, and to assist the development of common equipment strategies. The first OFEG-Tech meeting will be hosted by IMR in Bergen, Norway, on 24-25 October 2007 with 16 participants from six OFEG countries participating.

European Research Vessel Operators Meeting – ERVO (John Breslin – MI). The 9th ERVO Meeting (ERVO 2007) was held at the Flanders Marine Institute on 19th – 21st June 2006. In total 30 representatives from 20 organisations in 13 countries participated. Many of the issues discussed during the ERVO are also on the agenda of the current ISOM meeting and not further discussed here. Items of interest covered during ERVO2007 were Charter Party Agreements and Mutual Hold Harmless Agreements. ERVO members discussed the issue of liability for 3rd party equipment embarked onboard research vessels. In general research vessel operators accept no responsibility for user equipment whilst carried or deployed from vessels and most operators confirmed that scientists are aware of their responsibilities in this regard. For the purpose of chartering a mixture of standard BIMCO Supply Time 89 charter party or institute specific agreements are used. Another item discussed was that of post-cruise assessments; whereby participants were asked to briefly discuss the evaluation of cruises. NIOZ has

adapted the UNOLS system, while NOC and MI hold formal post-cruise meetings and issue post cruise assessment forms.

Olivier Lefort (France – IFREMER) informed the ISOM participants of the **INMARTECH 2008** meeting to be held at the Ifremer European Center Of Underwater Technologies in Toulon, La Seyne sur mer in France between 7 and 10 October 2008. Suggested topics for the meeting will be new equipment and ships, underwater systems, ROVs, AUVs, observatories, deployment methods and interoperability of underwater systems, user and operator's feedback, acquisition and treatment software. Two half days for round table discussion on special topics is also proposed.

7. Safety and Security Issues

Tetsuya Yokota (Japan - NME) gave a detailed presentation on the Health, Safety and Environment Management System adapted by JAMSTEC. The JAMSTEC safety training is modelled on safety manuals from the oil and gas industry, which has a highly developed awareness of safety. The recently commissioned *Chikyu* is a research drilling vessel that uses the same equipment and work procedures as traditional oil drilling rigs. Training is focussed on Sea Survival techniques, Helicopter Underwater Escape Training (HUET) and fire fighting and evacuation. There are no public HUET or Sea Survival training facilities in JAPAN and currently personnel need to go abroad for appropriate training. As this is very costly and time consuming JAMSTEC has started its own training. A four-seater helicopter simulator and a facility for fire fighting and evacuation training have been built. The facilities will be used to train all marine technicians and the vessel crews for their STCW certification.

8. Diplomatic Clearance

Tatsuo Adachi (Japan – JAMSTEC) reported on Japan's Coastal Area Coordination Group which was set up in April 2007 to improve EEZ clearance application procedures (particularly with Russia for coastal scientific research) and for negotiation with regional fishermen's groups in Japan. Improved coordination is required as a result of the increasing of the number of science voyages from 69 (2003) to 111(2007) by an increasing number of vessels 5 (2003) to 8 in (2007), as well as an increase in seismic surveys for scientific purposes. Months of stationary drilling by ODP vessel *Chikyu* and the laying of submarine cables to monitor seismic activity close to shore under the DONET programme (Dense Oceanfloor Network System for Earthquakes and Tsunamis) will have an impact on fishing operations. Better coordination between science and fishing agencies is therefore of most importance, allowing early notification of research plans to the fishermen interest groups, gaining their understanding prior to the implementation of the research, and obtaining and evaluation of fishing information.

9. Insurance and Liability

Prof Dennis Nixon (US – UNOLS/NSF) reported on developments in the international marine insurance market. Dennis referenced the "Global Marine Insurers Report 2007" as prepared by Astrid Selmann for 20th International Union of Marine Insurers (IUMI) Conference in Copenhagen, 9-12 September 2007. By the end of August 2006 it was estimated that the worldwide marine insurance premiums totalled close to US\$20 billion, whereby Europe had some 63.9% of the market share. Large insurers have moved to China: AIG Insurance Co (AIU), Lloyd's, Marsh and Zurich have opened up business there. The marine hull and cargo/transport gross ultimate loss ration has seen a slight increase in 2006 to just over 80% and some increase in premiums can therefore be expected.

There is a strong demand for shipping with size of vessels rapidly increasing, which poses a concentration of risk problems for insurers: the cargo/hull loss for a mega-ship could exceed US\$1-2B. A significant number of ships are under construction with shipyards building or having orders for in 2007/2008 totalling as much as 20% of the current world fleet. Ship prices are up 50% on average and builders are ramping up production and cutting production time. China is trying to compete with Japan and Korea. Typical cost for a LNG Carrier is expected to be US\$220M in 2007 compared to US\$150M in 2002. For a large crude oil carrier these figures are US\$129M and US\$64 respectively, and US\$57M and US\$33M for a mid-size container ship. Manpower (crew) shortages are more likely, while port and lock log jams are expected. New routes are needed, including the expansion of the Panama Canal and Arctic Routes. It is expected that shipping industry will see overcapacity and falling transport prices in the foreseeable future.

During the IUMI Conference several scenarios of potential marine terrorism were presented by Dr Robert P Hartwig, President of the Insurance Information Institute. Situations described include attack on land or major port using a commercial containership smuggling chemical, biological or radiological materials; the use of a fishing trawler to transport such weapons; hijacking of a vessel to raise funds for terrorist activities and the scuttling of a ship in a critical, narrow sealane, thus blocking major shipping routes.

The IUMU Conference identified that the Arctic will pose a major marine challenge for 21st Century. The Arctic region will provide new shipping lanes for the increasing trade: the Arctic route cuts about 2,500 nautical miles of the Europe to Asia route. Furthermore the region holds immense economic opportunities. Claims due under the 1982 United Nations Convention on the Law of the Sea (UNCLOS) by the surrounding countries must be made soon: Russia (2009), Canada (2013) and Denmark (2014). The United States of America has not ratified UNCLOS, as yet. This will lead to territorial disputes between these nations with Russia already having planted its flag on the North Pole using a submarine in August 2007, claiming this to be on the Lomonosov Ridge, an extension of its Legal Continental Shelf. Huge environmental concerns for the Arctic resulting from climate change, increasing shipping and exploration exist.

Dennis Nixon also ran through a number of liability cases. The 32m, 200t **research vessel *Thesis***, while drifting on location of the Italian coast was run over by the container vessel *MSC Eleni* (295m, 21,586t) at 25 knots in broad day light, whereby the Russian scientist Petr Mikhejchik lost his life. The *Eleni* continued her course after the collision, never having noticed the accident. While the inquiry is underway, the Master of the *Eleni* is likely to be charged with involuntary manslaughter. Dennis also reported on the attack of group of seven illegal French driftnetters on the ***Oceana Ranger***. *Oceana*, an international non-profit organisation designed to protect and restore the world's oceans has over 300,000 members in more than 150 countries. Researchers on board *Oceana Ranger* were recording activities of 80 French fishing boats using driftnets, banned in the EU since 2002. The seven driftnetters carried out a concerted attack: threw ropes/buoys to entangle *Oceana Ranger's* propellers and demanded camera equipment to be handed over until border control and French Navy helicopters caused the attackers to flee. Dennis advised the ISOM members to remain vigilant towards terrorism and piracy stating the attack on the *Maurice Ewing* and the Japanese research vessel *Mirai* preparations for sailing through the Strait of Mallaka in 2000. This vessel still trails warps when in dangerous areas.

Dennis further reported on the inquiry on the **fatal accident on USCGC *Healy***, whereby two divers lost their lives during a practice dive in the ice. The inquiry revealed that in spite of the *Healy* being run as a very professional vessel, a complete breakdown of procedures on the vessel had occurred. The ship had been away for six weeks, a long period, and the discipline had broken down: the vessel took a "break". A few beers had been consumed during a barbeque on the ice and the chief diver decided to do a recreational dive. The Master has been discharged and there will be no more diving from US Coast Guard ships. New research dive rules have been set which shall be followed to the letter.

Prof Nixon reported on some other issues that will have an impact on research vessel operations. The Californian Attorney General and environmental groups have called for federal regulations to curb exhaust emissions from the worldwide fleet of oceangoing vessels: ships produce an amount of CO equal to over 100,000 cars. Suggestions to curb vessel emissions include that all vessels shall reduce speed and change to higher grade fuel when entering Californian waters, while vessels alongside piers and jetties are no longer permitted to operate harbour generators, but are required to use shore power.

Research in the Arctic Ocean continues to grow due to a greater ability of research vessels to access the Arctic Ocean and the initiation of the International Polar Year (IPY) during 2007-2009. An intensified research interest has led to a greater number of ocean research sensors (moorings, buoys, AUVs or ROVs) being deployed in the Arctic, resulting in a higher probability of vessels colliding with such sensors. Polar bears are believed to become extinct in the wild by 2050 and consequently killing/shooting of these animals is only permitted in case of an emergency.

10. High Latitudes

Fred Smits (New Zealand – NIWA) gave a brief overview on the **developments of shipping regulations in the Arctic/Antarctic**. The IMO guidelines for the operation of ships in Arctic waters are now well accepted, while the modifications for the Antarctic Treaty Areas as proposed by COMNAP (Council of Managers of National Antarctic Programmes) are still pending and subject to IMO review/acceptance.

11. Data Handling, Data Bases, Web Portals and Public Outreach

Steen Silberg (Denmark – DIFRES) described the impressive Ship Information System developed by the Danish Institute for Fisheries Research for improved data collection and distribution on the vessel, and to shore. SIS allows for continuous data collection from both ship instruments (such as navigation, meteorology, ferry box, etc) to voyage specific instruments (CTD, TOV, ROV, winches etc) and to voyage activities (tracks, trawl nets). Cruise planning and ship routing can be done using this software package. ArcGis Globe is used to display the survey area with the cruise route and 3D models of the vessel and symbols of activities created rendered and interacted with. The cruise route can also be rendered showing the variations in temperature, oxygen, salinity, etc of the route.

EurOcean Web Portal (Norway - Per Nieuwejaar) reported on the web portal that was established by IFREMER and FCT in 2000, and based in Lisbon, Portugal. The portal is currently supported by ten MoU members from nine countries. A “stichting” foundation under Dutch law was established in 2007 to make EurOcean into a legal entity to bid for EU-funded projects. The portal provides information on 67 underwater vehicles (13 AUVs, 17 manned submersibles, 37 ROVs) as well as on the 233 in service, 4 planned and 26 phased out research vessels. The Large Exchangeable Instruments Info-base (**EurOcean-LEXI**) has been developed in partnership with the Institute of Marine Research (Norway) and has been completed and officially launched on 4 October 2007. EurOcean-LEXI aims to facilitate the exchange of large marine research instruments of which 24 main categories have been identified. The input of information will be done by the EurOcean office and by the operators who will be invited to input the specifications of their instruments. The **EurOcean-Map** info-base has been on-line since 7 March 2007 and gathers information for the 543 marine projects funded by COST, EUREKA, EUROCORES, FP6, INTERREG III, LIFE and SMAP. A friendly interface provides the end-user with a set of efficient tools for searching, retrieving and printing information related to projects. This info-base represents a major achievement of EurOcean.

Per Nieuwejaar also reported on the **Research Vessel Position Web Site** providing up to date position information on the location of research (and other) vessels. The web site has been established to provide vessel operators, scientists and the general public with the position using the ship's weather station information normally transmitted hourly (<http://www.sailwx.info/sitemap.html>). Per encouraged every research operator to install weather stations on their vessels with automatic transfer to their national meteorology office and onward to www.sailwx.info.

Marieke Rietveld (Netherlands – NIOZ) provided an update on the **POGO International Research Cruise Database and Website**. POGO (Partnership for Observation of the Global Ocean) is a forum created in 1999 by directors and leaders of major 28 oceanographic institutions around the world to promote global oceanography, particularly the implementation of an international and integrated global ocean observing system <http://www.ocean-partners.org>. POGO-7, January 2006, endorsed a Working Group's recommendation to set up of an International Research Cruise Database and Website with main objectives to access to information on research cruises, future and past cruises. An open call for proposals to prepare this data base with a deadline of 1 July 2006 was issued whereby, from the six proposals received, the **SeaDataNet** proposal emerged as the consensus winner. SeaDataNet is a Pan-European infrastructure for ocean and marine data management. SeaDataNet is a five year EU-funded project from April 2006 to April 2011, co-funded by the Alfred P Sloan Foundation and NOAA. The British Oceanographic Data Centre (BODC) will be involved to guarantee continuity. Partners in SeaDataNet are National Oceanographic Data Centres (NODCs) from 35 countries that are part of major marine and oceanographic institutes, well experienced and engaged in many national and international data management projects and programmes, and also active in international organisations, such as IOC/IODE and ICES. See <http://www.seadatanet.org/>.

Late 2006 a dedicated website was developed with three major databases of the global fleet of research vessels larger than 60 m: cruise programmes, research vessel directory and cruise summary reports. The Website (www.pogo-oceancruises.org) was launched in May 2007 and supports common vocabularies and the ICES Shipcode as the linking pin between directories.

12. Research Vessel Performance

Olivier Lefort (France – IFREMER) gave a presentation towards **IFREMER's philosophy regarding the use of laboratories and other scientific spaces** on their vessels. Deck and laboratories arrangements are designed to manage samples from the dirtiest to cleanest. Most laboratories (max 30 m² each) are now dedicated to different activities: geology, hydrology, chemical and cold laboratories. Each laboratory is provided with fresh and sea water, flexible non permanent cables and gas pipes routes, and data networks. Clean laboratories are no longer permanently on the vessel and come in 20ft containers supported by their scientific teams. The latest French vessels (as do the Norwegian vessels) have one mission centre just under the wheelhouse, which allows direct communication between the Mission Chief and the wheelhouse. The Electronic Officer, Mission Chief and ROV operators are all working at the same level. Intensive use is made of a multi-service network, allowing data storage in the database (Techsas) and distribution of information to dedicated screens in all scientific spaces (SDIV). As some scientists go to sea only once every 2 to 3 years post-processing rooms are placed as low as possible in the vessels to ensure a quiet place with minimal motion.

Following the presentation by Olivier Lefort the ISOM members discussed extensively **satellite data transmissions between ship and shore**. The French and Norwegian research vessels have continuous satellite lines allowing unlimited access to landbase systems and the Internet. BAS installed new satcom system on their vessels, which, when fitted four years ago, was more than adequate. System now suffer from overuse (abuse) by science and technical staff. CSIRO operates open bandwidth, but no

websearching or video downloads. Good management practices have reduced use of satellite communications by some 40%.

Olivier Lefort (France – IFREMER) reported on the studies completed by IFREMER as to **air bubbles and hydro-acoustic instruments** underneath research vessels. Since 1990 IFREMER's approach has been to position sounder transducers in the forward third part of the hull to avoid air bubble sheeting from the bow. IFREMER also avoided flush transducers and integrated the transducers in blisters to minimise turbulence created by the hull layer. Prior to construction model tests were carried out using colour dyes injected at the bow and observed with cameras in the test flume. That conservative approach has been successful on *l'Atalante*, *Thalassa* and *Le Suroit*, but not on *Pourquoi pas?*

Since 2005 IFREMER have conducted stationary and dynamic calculations to determine flow lines, and fitted cameras under *Pourquoi pas?* to investigate the phenomenon. Flume tank testing was conducted to confirm the analyses and calculations with the fitted gondola and the proposed remedial measures. Tests have been carried out at sea to validate the new location of sounders. The results show a strong dependence on trim, but lesser on sounder depth for the original gondola. The remedial measure proposed is to move the gondola forward and lower to 2.25m underneath the keel. Comparative tests were carried out by using simultaneously one EA600 with its transducer fixed 2 m before the gondola and 2.25 m underneath the keel and one EA600 with its transducer in the gondola at 0.7 m underneath the keel. The first transducer showed only 1% of false detections, the second over 7%.

Olivier called for more and closer research cooperation between the ship operators to improve the understanding of bubble sheeting and better performance of research vessel sounders.

Per Nieuwejaar (Norway – IMR) presented a document on medical standards. NEED MORE INFO, NOT ON DVD OF ISOM 2007.

Geraint West (UK - NOCS/Marine Facilities) showed the meeting the outcomes of the first round of the **manning questionnaire**. It was agreed that further work is required and Geraint will modify the questionnaire to also take into account the recommendations made by the members, and report back during the next ISOM meeting.

12. Show and Tell

David Blake (UK – BAS) reported on **ship refits and upkeep by the British Antarctic Survey**. RRS *James Clark Ross* sails each year for Antarctica in September returning in May/June for a 4 to 5 week refit in UK. This vessel is technically complex; a midlife refit is not planned. Similarly RRS *Ernest Shackleton* conducts a cruise in the Antarctic between October to May, followed by 120 days commercial oil/gas surveys in the North Sea and a 4 to 5 week refit. The *Ernest Shackleton* is a more complex vessel than the *James Clark Ross*. The BAS Marine Engineer and Technology Engineer ashore and the on-board engineers prepare refit specifications for both vessels. Refit is done under five-year contracts (1995-2001 with A&P Tyne, 2002-2006 and again 2007-2011 with FSL Portsmouth). The benefits of five year contracts include identified costs for survey items with agreed indexation; a guaranteed dry-dock space; the yard is aware of the specifications of vessels; allow long term planning for modifications/projects; and reduces annual refit negotiations. The disadvantages are the risks of the yard becoming complacent and the escalating cost of emergent work. BAS spends 50% on programmed annual items and 50% on emergent costs. The budgeted refit cost for 2007/08 for the *James Clark Ross* is £665K and for RRS *Ernest Shackleton* £439K, with estimated costs of spares £180K and £162K respectively. These figures do not include the cost of oil, fuel, instrumentation, communications or IT. Capital projects include a propulsion control upgrade 2006/07 at £800K.

Dr Klaus von Broeckel (Germany – Leibniz-Institute für Meereswissenschaften) informed the ISOM members of the difficulties experienced with **heave compensation system on the new German research vessel *Maria S Merian***. Dr von Broeckel first gave a detailed overview of the need for heave compensation and the various systems commonly applied to overcome hydroelastic effects and equipment damage when deploying equipment from a vessel. While the issues are well understood and the technology advanced, the difficulties with *Maria S Merian*'s system are of a mechanical (strength of piston and material used), hydraulic (leaking valves and washers, incapable pump) and electronics (steering and control) nature. Remedial work is progressing.

Per Nieuwejaar (Norway -IMR) gave a **presentation on lifeboats** and the many accidents that have occurred over the years. Regularly crew are killed or seriously injured during deployment drills. Last year 26 free-fall lifeboats were damaged. Under new IMO regulations drills that include a deployment into the water are illegal. **Capt Masataka Zaitso** said that no lifeboats are fitted on the new Japanese fisheries research vessel. Japanese statistical data shows that the chance of survival in liferafts is much higher than in lifeboats. **Prof Nixon** stated that in recent years lifeboats have taken more lives than saved. With the advancement of communications systems there is no need for sailing or rowing across the oceans. If there is no legal requirement for taking a lifeboat do not do so. An extensive discussion followed by the ISOM members and the unanimous consensus of the meeting is that **on research vessel liferafts should be carried instead of lifeboats**, unless there is a specific reason for a lifeboat, such as that may be required in ice invested waters.

David Blake (UK – BAS) discussed the **increasing cost of energy on vessels and energy savings measures**. RRS *Ernest Shackleton* bunkers 2500 tonnes marine gas oil per year and RRS *James Clark Ross* 5000 tonnes per year. Of this 73% of the fuel is for operating the ships, the remainder 27% for the British bases and consequently the ships are the main users of the fuel. The budget for fuel for the 2003/04 year had been contained, but with the increasing cost of fuel the 2004/05 budget has been overspent by £600K and by £1M in 2005/06. Measures proposed to reduce energy are: keeping the hull clean (paint system, scrubbing), reducing speed, reduce number/size of engines, change engines, change ship, reduce operations and probably most importantly reduce expectations of scientists of the size/volume of research work that can be completed. David suggested that maybe ISOM should do a survey to identify measures applied by the members to reduce energy use.

Steen Silberg (Denmark – DIFRES) reported on the **lessons learned from the Galathea III expedition**. The back ground for the expedition was that the need for research is increasing, but that industry and universities are worried because too few students see a career in science. As research vessels are great platforms for science communication and with modern satellite technology provides online access to the researcher's workplace and illustrate the joy of working in science at sea. The Danish state funded Euro25M for rebuilding and chartering of the ship with crew, while sponsoring was obtained through private funds, by a brewery and a Danish stamp issue. Equipment was sponsored by the manufacturers of satellites, computers, software, and sub sea equipment. Project sponsors also included research institutions and research programmes. The vessel circumnavigated the world, conducted 71 research studies, visited 19 ports with a complement of up to 105: 30 researchers, 8 media persons, 10 students, 3 VIPS and 54 crew together with a vicar. Lessons learned included: an interesting way of selecting projects and funding an expedition; a proper research vessel should be used; use a trained research crew; not enough winches could be placed on the helicopter deck to cover all needs which reduced science output; only equipment proven in known environments should be used; the rear deck was too small for fishing; containerised laboratories are a must; synchronisation with land using satellite communication is the future.

16. Items for the next ISOM

The meeting suggested the following topics for the next ISOM in Wellington, New Zealand:

- Crew Size and Manning Issues
- Energy Saving
- Green Ships
- AUV/ROV Operations, Maintenance, Overhead, Cost, Crew, etc
- Multibeam/Bubble Sweepdown
- ICES 209 revision and Cost of Implementing ICES 209
- Mobile Equipment on Hired Vessels (Fishing, Supply Vessels etc)

17. ISOM Management

Per Nieuwejaar advised that he wishes to resign as Chair and proposed that Fred Smits be the new Chair as from the next ISOM meeting. Marieke Rietveld seconded this proposal and the meeting agreed to this.

Per Nieuwejaar advised that the workload of the Chair of ISOM was quite heavy and suggested that a new Deputy Chair position be created in the management team. Prof Dennis Nixon proposed that such a Deputy Chair be appointed and proposed **Geraint West** in this position, which was seconded by Marieke Rietveld. The ISOM meeting supported this proposal and Per thanked Geraint for his preparedness to take on this new position and welcomed him on the Management Committee.

18. Dates and Place of Next Meeting

Fred Smits presented the ISOM members with an overview of the NIWA Vessel Management and its parent company the New Zealand National Institute of Water & Atmospheric Research Ltd (“NIWA”) in Wellington, New Zealand. Fred also showed short promotional videos on Wellington and New Zealand. All ISOM members were warmly invited to participate in the 22nd ISOM which will be organised by NIWA Vessel Management in January 2009.

Dr Klaus von Broeckel offered to explore the options of Germany hosting the 23rd ISOM.

19. Adjourn

The Chair expressed many thanks to Prof Song Sun and his staff for the excellent meeting and the great hospitality and wonderful food extended by the Institute of Oceanology, Chinese Academy of Sciences during the ISOM 2007 meeting, after which the meeting was adjourned.