



## 5<sup>th</sup> Session of the GO-SHIP Committee

### Meeting Minutes - Final Version

**Date:** 14 September 2015

**Time:** 9:30 -17:30 (local time, UTC + 1)

**Venue:** Marine Institute, Oranmore / Galway, Ireland

**Meeting website:** [www.jcomm.info/go-ship5](http://www.jcomm.info/go-ship5) (with background information and documents)

#### **Attendance:**

- *Leif ANDERSON*, Sweden, (U. Gothenburg)
  - Kumiko AZETSU-SCOTT, Canada (BIO)
  - *Stephen DIGGS*, USA (CCHDO)
  - Mario HOPPEMA, Germany (AWI)
  - Katherine HUTCHINSON, South Africa (UCT, also deputizing Isabelle Ansorge)
  - **Masao ISHII**, Japan (JMA)
  - **Gregory JOHNSON**, USA (NOAA-PMEL)
  - Katsuro KATSUMATA, Japan (JAMSTEC, also deputizing **Takeshi KAWANO**)
  - Martin KRAMP, IOC-UNESCO (JCOMMOPS)
  - *Jae Hak LEE*, Korea (KIOST)
  - **Elaine MCDONAGH**, UK (NOC)
  - Toshiya NAKANO, Japan (JMA)
  - Aida F. RIOS, Spain (CSIC-ICM, also deputizing Herlé Mercier/France)
  - **Bernadette SLOYAN**, Australia (CSIRO)
  - **Lynne TALLEY**, USA (SIO-UCSD)
  - **Toste TANHUA**, Germany (GEOMAR, also deputizing Emil JEANSSON/Norway)
  - **Rik WANNINKHOF**, USA (NOAA-AOML)
  - *Mike WILLIAMS*, New Zealand (NIWA)
- (Executive Group, Co-Chair, *remotely*)

## **Agenda as adopted**

- 1) Welcome, logistics (Co-Chairs, Marine Institute)
- 2) National Reports: Hawaii updates (national representatives, use template)
- 3) Publications and bibliography updates (Lynne)
- 4) JCOMMOPS update: Cruises, Website, Monitoring, Action Items (Martin)
- 5) Related projects: IIOE2 (Bernadette), Atlantos (Toste), CLIVAR (Lynne/Rik), JAMSTEC large-scale cruise plan (Kats)
- 6) Define GO-SHIP associated sections - partial reoccupation of GO-SHIP sections and how to handle these, e.g. ARC01 (Co-Chairs)
- 7) GO-SHIP and piggyback projects (Rik)
- 8) Data archive (CCHDO)
- 9) GO-SHIP data requirements and EOVs / ECVs: (Bernadette), and relation to science organizations: GOOS & IOCCP (Toste), OOPC (Bernadette)
- 10) Executive Group and General Committee membership (Co-Chairs)
- 11) Closure of session, plans for next meeting (Co-Chairs)

### **1) Welcome, logistics**

The GO-SHIP Co-Chairs and the Marine Institute as local host welcomed the participants of the meeting. The Co-Chairs thanked the Marine Institute for the excellent hospitality and support in preparation of the meeting.

### **2) National reports (updates since 2014 Hawaii meeting)**

#### **AUSTRALIA**

The new Australian RV Investigator with 35 berth was commissioned in 2014. Also in service is RVS Aurora Australis with 20-25 berth.

P15S will be occupied by Investigator from 19 April - 16 June 2016, with all Level 1 data (T, S, O<sub>2</sub>, nutrients, carbon, LADCP, SADCP, underway obs, CFC/SF<sub>6</sub>). Level 2 data: turbulence (chi-pod), metagenomic (microbial community structure)

SR03 has been funded for 2018 (January-February) with all Level 1 data (T, S, O<sub>2</sub>, nutrients, carbon, LADCP, SADCP, underway obs, CFC/SF<sub>6</sub>). Level 2 data: metagenomic (microbial community structure)

I9S is planned for 2020 (January-February)

P15S and SR3 will also deploy Deep Argo / SOCCOM Floats.

## **CANADA**

Canada has three GO-SHIP lines. ARC02 in the Arctic is occupied annually by the Institute of Ocean Sciences, DFO, in collaboration with the Woods Hole Oceanographic Institution in the USA, to study Arctic processes, specifically the Beaufort Gyre. "Davis" is occupied bi-annually by the Bedford Institute of Oceanography, DFO, in collaboration with the University of Washington in the USA, to understand Arctic-North Atlantic interactions. Cruises for these lines in 2015 are presently underway. AR07W, the oldest GO-SHIP line in Canada, is occupied by the Bedford Institute of Oceanography to study variable deep convection and its influence on AMOC/CO<sub>2</sub> sequestration in the Labrador Sea. AR07W is an annual program: this year's cruise was completed in May. All three programs have measurements for level-1 parameters with some level-2 parameters in some years. Data are submitted to CDIAC and CCHDO within two years for AR07W. Data flow for ARC02 and Davis is slow and needs to be improved.

## **FRANCE**

France (Laboratoire de Physique des Océans, Ifremer, CNRS) and Spain are occupying the Greenland-Portugal A25/Ovide line every other year since 2002. A25 and AR7W (Labrador Line) were successfully occupied in May-June 2014 on the French research vessel Pourquoi Pas?. This cruise was joint with GEOTRACES. A25 will be reoccupied in June-July 2016 on the Spanish research vessel Sarmiento de Gamboa and is funded through the Spanish National project BOCATS, Ifremer and the H2020 project AtlantOS. A25 is planned on a French research vessel in 2018.

A contribution to MED-SHIP is envisioned by the Mediterranean Institute of Oceanology (MIO) and the Laboratoire d'Océanologie de Villefranche (LOV). The first proposal aims at occupying two meridional lines in the western Mediterranean Sea (not funded yet).

## **GERMANY**

Sections A12 and SR4 are operated on a regular basis by the vessel Polarstern. The main objective is to service moorings. Due to ship-time limitations it is increasingly difficult to secure ship-time for regularly spaced CTDs on these surveys. It was suggested that a focus on a proper survey with 30nm station spacing every 6-8 years, and limited sampling (off-line?) for years in between seem like a reasonable way forward.

The MED01 line is being proposed for late 2017/2018, results from proposal expected early 2016.

Action, Toste and Mario, control and support data submission to CCHDO

## **JAPAN**

Japan Meteorological Agency (JMA)

JMA has successfully completed P10 in September 2014 and P04W (137E - 179E) in September 2015. They are planning to conduct a cruise at P09 in July-September 2016.

JAMSTEC

Pacific P01 repeat was successfully completed (17 Jul 2014 - 29 Aug 2014, with 116 CTD stations). Indian I01 repeat is funded and in preparation for 23 Dec 2015 - 11 Jan 2016. The funding for P17E (planned at Feb/Mar 2017) is pending with final decision in March 2016. A proposal for new I7S line (2018) has been submitted to JAMSTEC large-scale cruise plan with a decision to come in March 2016. We have started collecting temperature microstructure using Rockland Scientific's MicroRider since P01. We have contributors to SCOR WG147 "Towards comparability of global oceanic nutrient data" and to Joint Committee on the Property of Seawater.

Action, GO-SHIP EXG, consider if P19 should remain on the design map, given that the planned P19 JAMSTEC cruise was cancelled, and no other occupation or repeat is planned.

## **NEW ZEALAND**

New Zealand currently has no GO-SHIP lines planned, but is happy to partner with other countries that may be interested in co-occupation of lines in the Southwest Pacific or Pacific sector of the Southern Ocean.

## **SWEDEN**

Sweden is planning biennial Arctic cruises, starting in 2018. The data of the recently established Swerus cruise were partly gathered in Russian EEZ and cannot be shared, the cruise can thus not be considered as part of GO-SHIP.

## **NORWAY**

Norway has now joined GO-SHIP with Emil Jeansson (Uni Research Climate) as national representative. Other scientists in the national program: Are Olsen (University of Bergen; UiB), Truls Johannessen (UiB), Siv Lauvset (UiB)

Section 75N (Greenland Sea) is generally repeated with a frequency of a few years (most recent cruises in 2006, 2009, and 2013). The main vessel used on these surveys is the R/V G. O. Sars. Usually there are some free berths for collaborative groups that want to join.

These cruises perform full CTDs, with full-depth chemistry (DIC/TA, oxygen, nutrients, CFC/SF6 (no tracers or oxygen in 2013); in addition C-13 and C-14 sampled for in 2013. Data are available at CDIAC. In addition, part of AR07E was performed in April 2015, with full-depth CTD and chemistry, including ocean carbon and transient tracers (CFC-12 and SF6). However, the data release plan may not meet the GO-SHIP protocol.

Another survey of 75N is planned (and funded) in August 2016 (same parameters as above, and possibly including C-14 in collaboration with Bob Key), while a winter cruise to 75N is planned (funded within ICOS-Norway) in 2018.

Action, Emil, control and support data submission to CCHDO

## **SOUTH AFRICA**

South Africa has three repeat ocean monitoring lines that fall under the South African National Antarctic Programme: GoodHope, Crossroads and SAMBA. GoodHope corresponds to the position of Go-Ship A12 and is overlaid by the NOAA repeat XBT sampling track (so far 27 XBT transects have been completed) – it runs from Cape Town to the Antarctic ice shelf. This line is occupied during December and February on the relief voyage of the SA Agulhas II to and from Antarctica. Currently we do not perform CTDs on this line on a yearly basis but do a full CTD transect approximately every 5 years. The Crossroads line is named so as it crosses the Agulhas Current and Agulhas return current, leaving the South African coastline at 34S; 23E along the ground track of the descending Jason 2 altimeter. This line is occupied every year in May with CTDs every  $\frac{1}{2}$  a degree, doubling up to every  $\frac{1}{4}$  degree over the retroflexion. The third line is named SAMBA, the South Atlantic Basin-wide Array, and runs along the 34.5S latitudinal line from the African coast to 0E. This monitoring line runs along an array of CPIES, ADCPs and tall moorings that are part of the SAMOC project. The CTD transect takes place every year in September with CTDs every 70miles above the position of the CPIES. XBTS are deployed on all three lines approximately every 25-30kms while steaming. None of these monitoring lines currently fall under the primary Go-Ship occupations, but they have been nominated to be considered as “Associated Go-Ship” lines as they fill the requirements for this more relaxed association.

Action, Isabelle with GO-SHIP EXG, investigate which role South Africa could play on A12 and I06S through international cooperation and redefinition of GO-SHIP categories

## **KOREA**

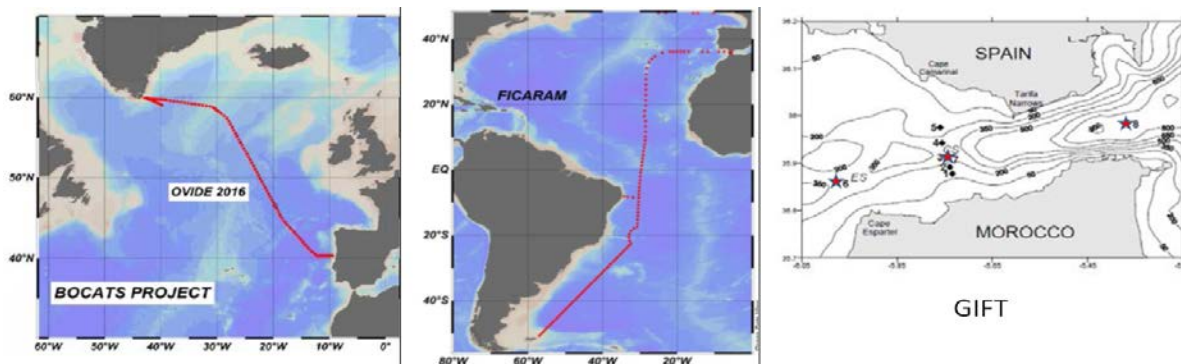
Korea has no activity (yet) for Go-SHIP. Recent cruises conducted by Korea Institute of Ocean Science and Technology (KIOST) and Korea Polar Research Institute (KOPRI) in the tropical (western Pacific) and polar oceans (Amundsen, Ross, Beaufort and Chukshi seas) are focused mainly on regional oceanographic research. A new research vessel (RV Isabu, 5900 ton) is under constructing. It is expected that RV Isabu can be used for research cruises after September 2016.

## SPAIN

Main actors in Spain are Fiz F. Pérez and Aida F. Rios from CSIC-IIM, and Emma Huertas from CSIC-ICMAN. RVs are Sarmiento de Gamboa (total berths 26, at least 6 berths for the technician of the UTM of CSIC, normally no free berths), RV Hespérides (total berths 37, 10 berths for the technicians of the UTM of CSIC). Normally some free berths for collaboration groups that want to join), RV Hespérides, RV Garcia del Cid and RV Socib.

Last occupied lines were OVIDE (with France in 2014; next in June-July 2016 funded by the Spanish project BOCATS) and FICARAM (2013, next in 2018 planned), and GIFT\* stations at the Strait of Gibraltar (4 or 5 occupations each year since 2005). Other activities in Strait of Gibraltar take place in collaboration with Morocco.

For CFC, external groups (Bremen, Exeter) participated. Data are submitted to CDIAC.



\*GIFT stations were included in Med-SHIP during this meeting.

Action, Aida and Herlé, control and support data submission to CCHDO

## UNITED KINGDOM

GO-SHIP reference Section AR28 (Extended Ellett Line) continues to be occupied annually with most level 1 variables excepting transient tracers, and with full Level 1 parameters in June/July 2014. Reference section A5 will be occupied in December 2015-January 2016 on RRS Discovery, it was last occupied in 2010. Reference section SR1b continues to be occupied annually with not all level 1 variables and we are currently seeking funding for full Level 1 parameters in 2019, it was last occupied with level 1 parameters in 2009.

Additional sections of interest are Atlantic section 24S (A9.5) that is being proposed with Level 1 parameters for 2018. This was last occupied in 2009 by the UK. The section ANDREX across the northern weddell gyre is being proposed for 2018 with all level 1 parameters. It was last occupied in 2009/2010. These sections are potential GO-SHIP reference sections. The UK also annually occupy a portion of the A23 section in the Scotia Sea and northern Weddell Basin with level 1 variables excluding nutrients, oxygen, carbon and transient tracers.

## USA

Lynne Talley (UCSD/SIO) continues to serve as a U.S. GO-SHIP Executive Committee (formerly the U.S. Repeat Hydrography Oversight Committee) co-chair, with Gregory C. Johnson (NOAA/PMEL) rotating on for Richard Feely (NOAA/PMEL), who is rotating off after long service. Committee members have also changed as follows:

- Rotating off: Terrence Joyce (WHOI), William Smethie (LDEO), Chris Sabine (NOAA/PMEL), Ken Bruland (UCSC), and Frank Millero (U. Miami)
- Rotating on: Mark Warner (U. Washington), Andreas Thurnherr (LDEO), Alison Macdonald (WHOI), Rik Wanninkhof (NOAA/AOML), and Andrew Dickson (UCSD/SIO)

2015 cruises by U.S. GO-SHIP include P16C, P16N, and P17NE (NOAA-led in 2015) which are now complete, and ARC01 (UNOLS-led in 2015) is currently underway.

NSF has funded a 2015-2020 U.S. GO-SHIP proposal in an ongoing partnership with NOAA with the following cruises:

- 2016 I08S/I09N UNOLS (Boreal Winter 2015/2016)
- 2016 P18 NOAA (Boreal Winter 2016/2017)
- 2017 P06 UNOLS
- 2018 I05 UNOLS
- 2019 A13.5 NOAA
- 2019 I06S UNOLS
- 2020 S04P & P16S to shelf UNOLS

New Level 3 measurements on recent U.S. GO-SHIP cruises have included microstructure (ChiPods); optical imagery (Underwater Vision Profiler); Cesium, Strontium, Iodine Isotopes (P16N); and Pteropod sampling (P16N).

Recent accomplishments include U.S. participation in the completion of the first decadal survey and initiation of the second decadal survey. Continuation of the U.S. contribution to that second survey, as detailed above, is now funded for 2015-2020. In preparation for the most recent proposal, U.S. GO-SHIP completed a US CLIVAR and OCB “white paper” (<http://www.us-ocb.org/publications/USRepeatHydrographyReport-Final.pdf>).

### 3) Bibliography Update

Lynne Talley led an international effort to build on the US white paper to publish a review of international GO-SHIP science accomplishments (Talley et al., 2016, Changes in ocean heat, carbon content, and ventilation: A review of the first decade of GO-SHIP global repeat hydrography. Annual Review of Marine Science, 8, in press, doi:10.1146/annurev-marine-052915-100829).

Regarding the status of the bibliographies, the committee asked Martin and Steve to consolidate and investigate how the US GO-SHIP and international GO-SHIP bibliographies are technically fed at the moment, and to involve in particular PIs from AR28 (Penny) and A25 (Herlé, Aida) to complete the lists.

The committee also recommended a joint and sustained analyses with other programs (Argo, satellites, state estimation, model analysis/metrics) to exploit synergies in updating of the different bibliographies.

Action, Martin / Steve, report on bibliography mechanisms and gather missing publications using in particular A25 and AR28 data.

Action, Greg, propose a standard cruise acknowledgement to EXG for comments.

### 4) JCOMMOPS Update

Martin reported that JCOMMOPS is now hosted by Ifremer in Brest, France, and was inaugurated there on 18 March 2015, in presence of representatives from all ocean observing networks, and IOC/WMO executives. The office comprises now 3 technical coordinators with dedicated observing networks, and 2 IT engineers. A new coordinator “science/communication” will be hired shortly.

Martin introduced the new JCOMMOPS integrated monitoring and registration website, which will be launched at the end of the year and comprises a dedicated GO-SHIP user view. It will in particular facilitate the submission and updating of cruise plans, and in a second step track the timely submission of data through a synchronization with CCHDO. These tools will also help to measure the performance of the GO-SHIP network, as part of a GOOS wide performance measurement system with indicators, metrics etc.

The [www.go-ship.org](http://www.go-ship.org) website will remain active, and Martin updates the pages regularly.

Martin presented the latest status of the action item list, cruise plans, and GO-SHIP maps, which were thereafter all updated with feedback and comments from the meeting.

Martin also reported on a well attended GO-SHIP webinar which Bernadette held earlier in September as part of a GOOS webinar series. The recording is available at: [www.ioc-goos.org/webinar](http://www.ioc-goos.org/webinar)

Action, Martin, update cruise plan, action item list, maps



Action, Martin and Steve, develop synchronization tools CCHDO-JCOMMOPS to track data submission after cruises

Action, Martin with Bernadette, review content on website (e.g. data directory)

## 5) Associated Projects

### AtlantOS (update)

The AtlantOS started formally in April of 2015. AtlantOS is providing funding for the GO-SHIP coordination office (M. Kramp), will develop tools for efficient 1st level quality control of bottle data, and will support carbonate system and transient trace measurements on 2 cruises in the Atlantic Ocean - the community is encourage to make suggestions to Toste Tanhua on where this resource should be used. In addition, AtlantOS is providing support for vmADCP measurements and archiving of the data.

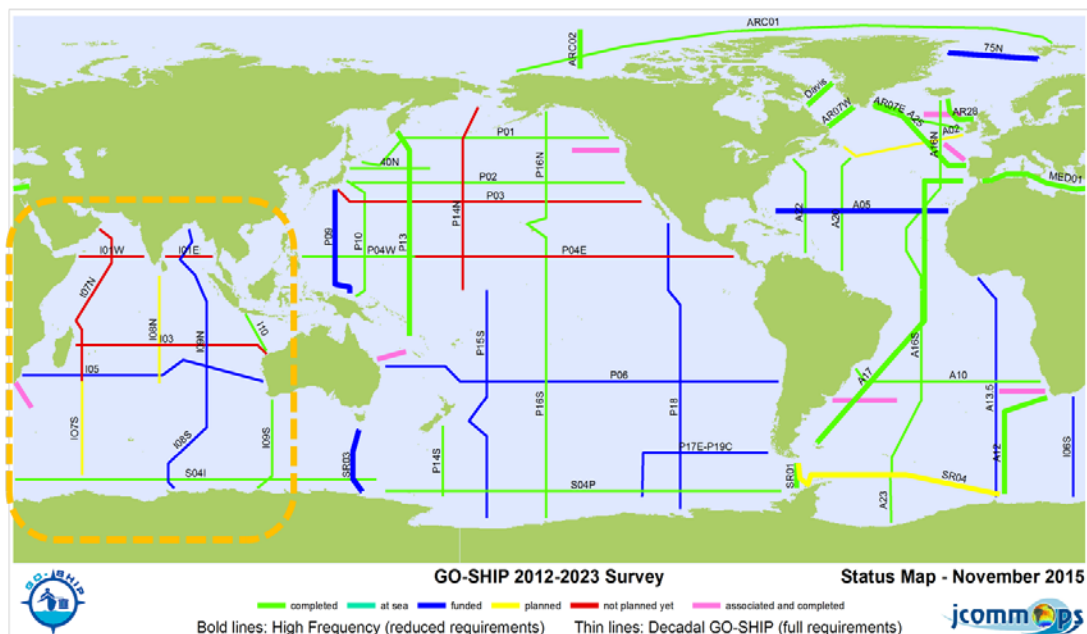
Action, Toste with Edmo and Isabelle, investigate possibilities of joined SAMBA/A10/A9.5 cruise as part of AtlantOS, with Brazil and South Africa.

### JAMSTEC large-scale cruise plan

Kats reported that a decision has not been taken yet (expected March 2016).

### IIOE2

GO-SHIP has previously provided a position paper to the IIOE2 committee. The figure below shows the Indian Ocean GO-SHIP sections.



Bernadette, Rik and Toste provided comments on the draft science/implementation plan. The draft plan did not adequately recognise the GO-SHIP Indian Ocean sections and the potential contribution of GO-SHIP to IIOE2. The GO-SHIP Committee has not seen a copy of the final implementation plan but hope that our comments will be included to properly recognise GO-SHIP contribution to the IIOE2.

Martin attended some IPC teleconferences and JCOMMOPS will provide operational coordination support, but the GO-SHIP Committee has no direct correspondence with the IIOE2 steering committee. The meeting agreed to ask for a GO-SHIP representative to be included into the steering committee to enhance direct communication between the GO-SHIP and IIOE2. Kats is a potential candidate.

Action, Martin, add I07S on maps

Action, Bernadette with Kats and Martin, suggest IIOE2 SC member from GO-SHIP committee to IPC.

## 6) Define GO-SHIP associated sections

The meeting agreed on the following criteria and candidates for associated and high-frequency sections (full level 1 parameters are recommended, but not mandatory on every cruise):

### Associated GO-SHIP

- I) High quality – some full depth stations below 2000m (at least all 240 nm)
- II) Repeated on decadal frequency or more often, on GO-SHIP line or not
- III) Not necessarily coast to coast
- IV) 60 nm resolution minimum
- V) At least once per decade full L1 parameters
- VI) Comply with data access policy

A23, 23W, line P, GIFT

Action, Isabelle, consider if Samba East / Crossroads cruises should be “associated GO-SHIP”

### High Frequency GO-SHIP

- I) On GO-SHIP line end to end
- II) Full depth
- III) Limited parameters

IV) One decadal full GO-SHIP cruise

V) Comply with data access policy

SR3, SR1, Davis, AR7W, P9, P13, ARC02, 75N, A25, A17, A12, SR04, MED01, A5, AR28,

Action, Lynne, add new category definitions to ARMS supplement

Action, Martin, update website (requirements, maps)

### **7) GO-SHIP and piggyback projects**

The Committee agreed that piggyback projects should at least through Level 2 and 3 measurements have a minimum connection to GO-SHIP, given that these measurements takes space on rosettes etc., and they should be no harm to the main GO-SHIP mission. Per GO-SHIP manual, piggyback projects in general should be supported.

Action, Toste / Greg / Rik, propose a clear statement to the GO-SHIP EXG.

### **8) Data archive**

As of 2014, the CCHDO supported 1310 cruises, actively curated roughly CCHDO adds about 2000 pages of documentation each year. Each cruise has a main page with not only the data, docs, and map, but also the complete data history and immediate access to any files submitted but not yet merged or checked (before going on-line in the principal holdings). Priority is given to US HYDRO and GO-SHIP data, and their updates.

Establishing sustained contacts for data submission from some cruises, mostly from a few nations with which the CCHDO is not yet functioning smoothly, remains a main challenge: CCHDO needs to know of a cruise, or often more important, exactly who to contact for cruise information. Obtaining data from a known cruise, i.e. difficulty contacting data originators can also be challenging. Even once contacted some data originators may not be enthusiastic about providing data or helping the CCHDO obtain them.

The CCHDO interoperability has been increased through a number of tools (e.g. API) and relationships (e.g. with JCOMMOPS), the committee asked the CCHDO however to i) continue working on facilitated one-stop shopping features, comprising merged data from various sources in a single file, and ii) to provide data links to other archives. The committee also mentioned that GLODAP allows for good one-stop-shopping.

Action, Steve, develop tool to merge data from several selected cruises in a single file.

Action, Steve, provide data links to other archives (e.g. CDIAC, MGDS)

## **9) GO-SHIP data requirements and EOVs / ECVs**

Bernadette and Toste provided a brief review of the work being undertaken by GOOS, OOPC and IOCCP. This included the progress of OOPC and IOCCP to define the physical and biogeochemical Essential Climate Variables (ECVs) and Essential Ocean Variables (EOVs). The OOPC is currently revising the specification sheets for each of the ocean ECVs such that consistent definitions and terms are used amongst variables. IOCCP has defined the biogeochemical ECVs and EOVs. These are already self-consistent amongst the variables. The final physical and biogeochemical ECV specification sheet should be completed before the end of the year. Based to these ECV specification sheet each of the observations programs (GO-SHIP, Argo, OceanSITES, ...) will be required to complete a program specification sheet outline how the each program addresses the requirements to the ocean global climate observing requirements.

The other main activity of the OOPC and IOCCP will be writing the ocean component of the new GCOS Implementation Plan 2016 – 2026. An initial planning meeting will be held October 2015, and the writing of the plan will be completed in May 2016 for launch in June 2016. Toste and Bernadette are the lead authors of the ocean section. This is an important document as it will define the required ocean observations for climate for the next decade and the action items to assess the progress to completion of the observations network. This document must be a balance of realistic aspirations goals of the required sustained ocean observing system.

## **10) Executive Group and General Committee membership**

Rotate off: Masao Fukasawa, Takeshi Kawano, Mauricio Mata, Richard Feely

Rotate on Executive Group: Katsuro Katsumata, Greg Johnson (before wider Committee)

Rotate on wider Committee: Eleanor O'Rourke (Ireland), Jae Hak LEE (Korea), Emil Jeansson (Norway), Anil Kumar (India), Edmo Campos (Brazil)

The meeting thanked the leaving members for their contributions to GO-SHIP, and welcomed all new members to the group.

## **11) Closure of session**

The 5th session of the GO-SHIP Committee was closed at 17:30.