

Annual SCOR Working Group Reports to SCOR

By Malcolm Woodward and Michio Aoyama, May 2018.

1. Name of group

SCOR WG#147 "Towards comparability of global oceanic nutrient data"

2. Activities since previous report to SCOR (e.g., virtual or in-person meetings, email discussions, special sessions). Limit 1000 words

Numerous email contacts have occurred over the year along with telephone and 'skype' type meetings between the co-chairs and members.

1. One of the main exercises in 2017 was an International nutrient training workshop. This was organized by NIOZ and PML and was funded by POGO, SCOR, NIOZ, PML and JAMSTEC. The POGO-SCOR workshop "International Training Workshop for Nutrient Analysis" was held at The Royal Netherlands Institute for Sea Research (NIOZ) in November, 2017. The purpose of the workshop was to give technicians from developing countries, who work in the field of marine nutrients, the possibility to become familiarized with the latest techniques in seawater nutrient analysis. It is increasingly important to produce internationally comparable nutrient data and therefore essential that institutes around the world share as much as possible their knowledge on nutrient measurement methods. This training was set up to show people how to produce reliable data and to how to gain international accuracy through the use of Certified Reference Materials (CRMs). The disadvantage of a practical course is that the number of participants is limited. From 235 application letters, only 9 participants were able to join this workshop due to funding and space considerations. The participants who joined were chosen for their potential capacity building and were all from different institutes and different countries.

In total 13 lectures were presented by mainly the Members of this SCOR Working Group. Lectures covered the role of nutrients in the oceans in general, statistics, how to make proper calibrations, the use of nutrient reference materials and internal lab standards, worldwide nutrient Inter-comparison exercises and much more. These theoretical lectures were followed by the practical part of the workshop. In the laboratory 3 different CFAs were set up and then several runs could be performed so that the participants could learn through hands-on practice. Different groups were covering different issues and at the end of the practical session the results were presented to the other groups. Also some basic lab practices, such as weighing, making stock standards, handling pipettes and preparing reagents were carried out. The informal character of these practical sessions made communication much easier and stimulated question asking and the exchange of information. All participants went home with a lot of information and were all invited to join the 2017/2018 Global Nutrient Inter-comparison exercise. The workshop was very successful and had very good feedback from the attendees.

2. We held the third annual meeting of the Working Group #147 as part of the Ocean Sciences Meeting (OSM) held in Portland, Oregon in February 2018. Thanks to Ed Urban for his help

in organising the venue which was at the Courtyard Portland Downtown/Convention Center, close to the Convention Centre itself. It was held alongside the OSM conference. We had 2 sessions on Wednesday 14th Feb and Thursday 15th Feb.

The agenda was:

Session 1

Opening: Summary of our collaborations: Recent progress how to promote CRM use: SCOR-JAMSTEC CRM distribution, current status and future: NIOZ workshop: Discussion on new GO-SHIP nutrients manual: Ocean Obs19 Community White Papers

Session 2

Discussion on new GO-SHIP nutrients manual (cont.): Freezing Nutrients issues: Silicate SI traceability: IOCCP-JAMSTEC IC current status and future: Final report of our activity to SCOR: The Future, how do we continue the good work of WG #147 ?

The participants of the meeting were Michio Aoyama, Malcolm Woodward (co-Chairs), Toste Tanhua, Karin Bjorkman, Susan Becker and Claire Mahaffey (Full members), and Karel Bakker, Andrew Dickson, Akihiko Murata and Tae-Keun Rho (Associate members) plus Cassie Schwanger (CSIRO) who was an active Observer.

A good constructive meeting took place. One important decision was the agreement to submit a Community White Paper to the Ocean Obs 2019 meeting, this was submitted by the March 15th deadline and entitled: “The importance of high quality inorganic macro-nutrient data and how to get them”. The authors were the attendees of the AGM meeting, and this will effectively continue the work of this Working Group beyond the 3 years of the working group and into 2019.

It was confirmed the SCOR-JAMSTEC CRM's are now available for purchase, and the provision of the final 400 litres of seawater to produce the Atlantic High and Medium CRM's was collected during summer 2017 by Malcolm Woodward on board the RRS James Cook. Much of the meeting then centered about discussions concerning the updating of the GO-SHIP Nutrient manual, being led by Susan Becker from SCRIPPS.

Further drafts have been circulated amongst the group and changes made, and a near final draft was circulated to the Group at the end of May 2018. The ideas discussed were to maybe publish through an online journal, and also to make the document available to the global community for comment before finally publishing the new Manual. The final draft will be hopefully available to the community for comment by October of 2018. This will allow comment back from the global community until the end of 2018. In 2019 there will need to be a final writing meeting to absorb all the comments and recommendations and to then finally produce the new 2019 GO-SHIP manual. We would request that the #147 Working Group could have a final writing meeting funded in early 2019 for a small subset of the Group to complete this task.

At the Ocean Sciences Meeting the Working Group initially had its own Session assigned, but this was then merged into 2 Sessions: BN43A: Biogeochemistry and Nutrients in Open-Ocean Waters: Sustainable Ocean Observations from Profiling Floats and Time Series I: and BN44B: Biogeochemistry and Nutrients in Open-Ocean Waters: Sustainable Ocean Observations from Profiling Floats and Time Series II: Working Group Members acted as Session Chairs, Co-chairs and Moderators, plus we presented 7 Posters and one session talk. Also as part of the OSM, SCOR and WG #147, 200 empty bottles of the SCOR-JAMSTEC CRM was distributed from the SCOR booth to publicise and promote CRM use. We also

distributed forms for labs to apply to receive Free CRMs as part of the SCOR WG 147 Activity. After the OSM then it was agreed 11 new laboratories would receive a set of low and high CRMs free of charge to encourage CRM to new users. This promotion was funded by SCOR.

3. The IOCCP-JAMSTEC International Intercalibration exercise was carried out over the winter of 2017/2018 with final results submitted by participating labs in February 2018. The results have not yet been finalized or fully analysed, and a subsequent report and conclusions will be published about this exercise. The Working Group members agreed that that this exercise should be continued every 2 years into the future, if possible. There is outstanding work to be done with the results of this Global Intercalibration exercise and a further select meeting of the #147 Working Group would also address these results and move to also publishing the Intercalibration exercise results.

3. Documents published since previous report to SCOR (e.g., peer-reviewed journal articles, reports, Web pages) and should be limited to publications that resulted directly from WG activities and which acknowledge SCOR support

4. Progress toward achieving group's terms of reference. List each term of reference separately and describe progress on each one. Limit 1000 words

ToR 1: To establish mechanisms to ensure comparability of oceanic nutrient data in collaboration with International organisations such as ICES and PICES.

The WG#147 has collaborated with JAMSTEC, and has now been providing SI traceable Nutrient CRMs for the global community since November 2016, and the final Atlantic water High and Medium concentration CRM's have just recently become available. At the 3rd WG147 meeting we discussed about how to continue the distribution and sale of the SCOR-JAMSTEC CRM's, and considering the possibility of JAMSTEC stopping supporting the current distribution system. We discussed about a new system which would be supported by international bodies such as IOCCP and others. WG147 has already been in close collaboration with IOCCP and JAMSTEC to conduct the IOCCP-JAMSTEC Inter-laboratory calibration exercise of CRM/RMNS in 2017/18.

ToR 2: To assess the homogeneity and stability of currently available RMs/CRMs: The group needs to determine whether the current producers are achieving a level of precision within and between laboratories which is comparable to or better than 1%.

In the IOCCP-JAMSTEC Inter-laboratory calibration exercise of CRM/RMNS in 2017/18, NMIJ CRM, KANSO CRM and KIOST RM were used. The results of this exercise have not yet been finalised and will be published once complete.

ToR 3: To develop standardized data-handling procedures with common data vocabularies and formats, across producers and users, and will include the future linking of national and

international data archives. The group will seek to involve international data center representatives to contribute to and lead this task.

A part of this ToR3 will be included in the updated GO-SHIP nutrients manual, discussed in ToR6.

ToR 4: To promote the wider global use of RM's by arranging workshops to actively encourage their use, and to provide training in analytical protocols and best practices, including sample preservation protocols, particularly targeted towards developing countries.

WG#147 organised the 'International training workshop on Nutrient analysis', which was held at the NIOZ laboratory in November 2017. This was co-organised by NIOZ and PML. Details of this very successful Workshop are outlined above in Section 2.

ToR 5: To continue regular global inter-comparison studies, following on from the previous exercises in 2003, 2006, 2008, 2012, 2015/16, and the recent one in 2017/18. This with the collaboration of IOCCP-SSG and RCGC-JAMSTEC.

WG#147 collaborated with IOCCP and JAMSTEC and helped to conduct the IOCCP-JAMSTEC Inter-laboratory calibration exercise of CRM/RMNS in 2017/18. The 8 scientists from developing countries who attended the training workshop were also invited to participate in the International Intercalibration exercise.

ToR 6: To update the GO-SHIP nutrient measurement manual, which was originally a product of the IOC-ICES SGONS, (Study Group on Nutrient Standards).

WG147 has a near final draft of the updated GO-SHIP nutrient manual, and this draft is out for comment to the authors. WG147 are continuing this work to finalise this update and it is aimed to have a final version available in 2019.

ToR 7: To publish reports on this WG's activities and workshops.

Updates have been communicated to the other WG members and for the Intercalibration exercise and GO-SHIP manual will be published when completed.

5. WG activities planned for the coming year. Limit 500 words

Even though the initial 3 year funding for the group has ended through SCOR there are a number of activities that will continue on into 2018 and 2019 and beyond.

1. The Ocean Obs White paper has been submitted and the authors will work together on this and continuing promoting the WG#147 aims through that meeting in 2019.
2. The results of the 2017/2018 International Intercalibration exercise will be published later in 2018 or early 2019. Further exercises are planned to take place probably in 2019 and beyond.
3. The updated GO-SHIP nutrient Manual will continue to be finalized over 2018, it will be made available for comment late 2018, and it is hoped to be finally published in 2019.

6. Is the group having difficulties expected in achieving terms of reference or meeting original time schedule? If so, why, and what is being done to address the difficulties Limit 200 words

7. Any special comments or requests to SCOR. Limit 100 words.

We wish to request extending the SCOR support of the Working Group to fund one or more writing workshops in early 2019. This would be a small group with the aim to complete the GO-SHIP Manual, to work towards publication of the results and conclusions from the 2018 Nutrient Intercalibration exercise, and to finalise the submissions to OceanObs 2019.

We also request continued support from SCOR for the distribution of the SCOR-JAMSTEC nutrient CRMs bottles. These were produced through the efforts of the SCOR Working group #147 as a very positive output, making cheaper CRMs available to the global community.

Additional information can be submitted and will be included in the background book for the SCOR meeting at the discretion of the SCOR Executive Committee Reporter for the WG and the SCOR Secretariat.