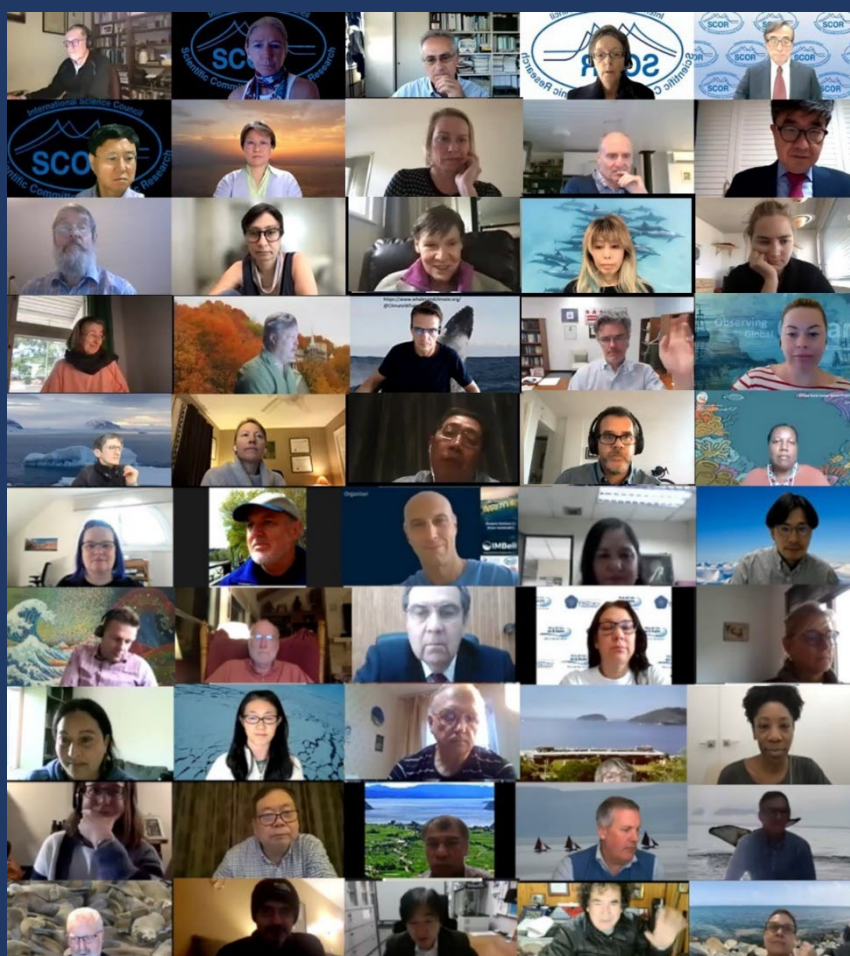




*Proceedings of the 2021 Annual Meeting of the
Scientific Committee on Oceanic Research
47th SCOR Annual Meeting, Volume 57, 2021*



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SCOR Proceedings, Volume 57

Report of the 2021 Annual SCOR Meeting

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SUMMARY

This proceeding summarizes the discussions during the 47th SCOR Annual Meeting held virtually between the 26-28 of October of 2021. Following a decision from the SCOR Executive, this proceeding also provides the links for all the background information for the meeting, including the proposals for new working groups, the reports from current SCOR working groups, projects, capacity development activities, and the reports of affiliated and partner organizations all of which were traditionally included in the SCOR Annual meeting background book until 2019. All of these can also be accessed online through the SCOR website at: <https://scor-int.org/events/scor-annual-meeting-2021/>.

The SCOR 2021 Annual Meeting was attended by more than 200 participants from 56 countries representing all continents. Forty Nominated members from 24 SCOR National Committees and the three affiliated bodies to the Executive Committee (IABO, IAPSO, IAMAS) attended the meeting. All SCOR Working Groups, research, infrastructural, and affiliated projects, along with the affiliated and partner organizations reported on their activities. Some of the main highlights of the SCOR 2021 Annual Meeting include: (1) the approval of three new Working Groups (WGs), (2) to secure NSF funding to continue to support working group and project activities, and (3) the endorsement of SCOR working group and project activities by the UN Decade of Ocean Science for Sustainable Development.

The three new WGs proposals approved were: (1) Coupling of ocean-ice-atmosphere processes: from sea-Ice biogeochemistry to aerosols and Clouds (CIce2Clouds), co-chaired by Nadja Steiner (Canada) and Megan Willis (USA), (2) CoNCENSUS: Advancing standardisation of COastal and Nearshore demersal fish visual CENSUS techniques, co-chaired by Anthony Bernard (South Africa) and Rick D. Stuart-Smith (Australia), and (3) Mixotrophy in the Oceans – Novel Experimental designs and Tools for a new trophic paradigm (MixONET), co-chaired by Aditee Mitra (UK) and George McManus (USA).

SCOR continued to support capacity development activities by extending support to the visiting scholars approved for travel in 2020 and approving four new scholars to travel in 2021 or until travel is possible again. SCOR has continued to approve funding applications from conference organizers to support travel for scientists from developing countries to attend these conferences when they are rescheduled. These commitments will be honored by SCOR when travel is reinitiated.

The 2022 SCOR meeting is scheduled for the first week of October 2022 in Busan, Korea, hosted by the Korean Institute of Science and Technology (KIOST), and will follow the PICES meeting which will take place in the same location the week before. The 2023 SCOR meeting is scheduled to take place in Guayaquil, Ecuador, hosted by the Instituto Oceanográfico y Antártico de la Armada del Ecuador (INOCAR) between September-October.

Narrated presentations reporting on SCOR project and working group activities and progress in 2021 can also be found in the SCOR YouTube channel.

<https://www.youtube.com/channel/UCv-dZLizFYDOC2UTweiWj0Q/videos>

LOGISTICS OF THE SCOR 2021 VIRTUAL MEETING

The SCOR 2021 Annual Meeting was the second SCOR annual meeting to be held virtually due to the COVID-19 global pandemic and all the associated travel restrictions. As in 2020, in this new virtual modality, the time of interaction was reduced to three days with a 3-hour connection per day. This required significant preparation and performing previous actions along with special logistics.

The meeting was organized in three sessions, one for each day. On the first day, the agenda topics included the reports from the SCOR President and from the Executive Director, the report by the Ad Hoc 2021 Finance Committee, and the presentation and discussion of new SCOR working group (WG) proposals. On the second day, the agenda topics included the reporting of all current SCOR working groups and research projects. On the third day, the agenda topics included the reports from infrastructural projects, affiliated projects, partner organizations, SCOR capacity development activities, and setting the venues for the next SCOR annual meetings.

In preparation for the virtual meeting, the logistics were organized as follows:

All written reports and documents were available in advance at the SCOR website (<https://scor-int.org/events/scor-annual-meeting-2021/>).

In preparation for **Session 1**, SCOR Executive Committee (SCOR EC) monitors for the proposed new WGs produced a 10-15-minute narrated presentation of the WG proposal summarizing the proposal and the recommendations from the reviews. These were available for all the Executive Committee and Nominated Members on-line prior to the meeting for everyone to watch at its own convenient time.

In preparation for **Session 2**, SCOR WGs and project chairs produced a 10-15-minute narrated presentation that was available on-line on the SCOR website prior to the meeting.

In preparation for **Session 3**, representatives of infrastructural and affiliated projects and affiliated/partner organizations were also invited to produce a 10-15-minute presentation to be available on-line prior to the meeting.

For the virtual sessions, each of the groups mentioned above (SCOR EC monitors of new WG proposals, current WG and project chairs/representatives and representatives of affiliated organizations, projects, and partner organizations) provided a synthesis of 1-3 slides with the main highlights and the required actions for a maximum of a 5-minute intervention to allow time for discussions. The summary slides for the new WGs included the Terms of Reference, membership and a summary of the reviews/recommendations by the national SCOR committees and affiliated organizations.

All the summary slides for each session were compiled by the SCOR Executive Director in one single file (one summary file /session) to facilitate the discussions during the virtual sessions and avoiding the sharing of multiple screens. The links for the synthesis slides for days 1, 2 and 3 are:

Day 1: https://scor-int.org/wp-content/uploads/2022/08/SCOR_Annual2021_Day1.pdf

Day 2: https://scor-int.org/wp-content/uploads/2022/08/SCOR_Annual2021_Day2.pdf

Day 3, Part A: https://scor-int.org/wp-content/uploads/2022/08/SCOR_Annual2021_Day3-PartA.pdf

Day 3, Part B: https://scor-int.org/wp-content/uploads/2022/08/SCOR_Annual2021_Day3-PartB.pdf

All participants had to register for the meeting and this gave an indication of how many people would be connecting for each of the sessions, helping to plan the connection platform (e.g., GoToMeeting, Zoom).

The sessions were recorded, both in video and audio, and the transcripts of the chat comments were saved to help in the production of the proceedings.

The co-chairing and note taking for each of the three sessions involved several members of the SCOR Executive Committee.

1. INTRODUCTION

1.1. Opening remarks and arrangements

Sinjaee Yoo, the SCOR President welcomed the participants and provided an overview of the logistic arrangements. No further additions to the agenda were suggested. Yoo pointed out that all written reports, documents, and narrated presentations from WGs, projects and affiliated organizations were available at the SCOR website (<https://scor-int.org/events/scor-annual-meeting-2021/>). He thanked the Executive Director for organizing the virtual meeting.

The summary slides for Day 1 of the meeting can be found at:

https://scor-int.org/wp-content/uploads/2022/08/SCOR_Annual2021_Day1.pdf

SCOR pays tribute to the life and contributions of members of the oceanographic community who pass away. Yoo noted those that had died in the past year along with their scientific contributions and involvement with SCOR.

See document: https://scor-int.org/wp-content/uploads/2021/10/Tab-1_In_memoriam_2021.pdf

- **Thomas (Tom) Church († 2021) (USA)** - A long-term faculty member at the University of Delaware where the SCOR office is based and a member of SCOR Working Group #80 aimed to study the role of Phase Transfer Processes in the Cycling of Trace Metals in Estuaries. Tom contributed to writing the atmospheric input section of the GEOTRACES Science Plan and developed and tested the methods used to collect trace element-clean aerosol and rainfall samples on cruises since 2002.
- **José (Pepe) Stuardo (1929-2021) (Chile)** - Emeritus Professor in oceanography at the University of Concepcion, Chile. José Stuardo was instrumental in establishing what are SCOR's Graduate Networks in Oceanography today and was involved for almost two decades in the Ecology and Diversity of marine Microorganism (ECODIM) courses. Pepe was a SCOR nominated member for Chile for many years and he established the basis for the development of oceanography in Chile and in Latin America through the development of regional capacity programs and of the PhD program in Oceanography at the University of Concepción.
- **Chibo Chikwililwa (1980-2021) (South Africa/Namibia)** - A researcher at the University of Namibia, and the GEOTRACES national representative for Namibia since 2019. She was the co-director and member of the SCOR's Regional Graduate Networks of Oceanography (RGNO) committee since 2016, organizing the annual RGNO Ocean discovery camps providing her expertise on harmful algal blooms, seaweeds, and geochemical processes. Chibo was actively engaged in lecturing and in the organization of the 2021 online RGNO seminars at the University of Namibia focused on the Benguela Upwelling System with more than 50 invited speakers.
- **Satya Prakash (1979-2021) (India)** - The coordinator of the Joint Project Office (JPO) - India of the Second International Indian Ocean Expedition (IIOE-2), based at the National Institute of Oceanography (NIO) in Goa, India. Satya Prakash played a key role in planning various activities leading to the formal launching of the Second International Indian Ocean Expedition (IIOE-2) from Goa. Satya also participated in the first research cruise under IIOE-2 (Goa-Mauritius). Since then, Satya served as the JPO coordinator for the India node of IIOE-2 and had been actively involved in numerous activities related to the IIOE-2 including being a part of the Editorial Team of the IIOE-2 newsletter and the Indian Ocean Bubble, as well as

facilitating the hosting of the fourth meeting of the Steering Committee of the IIOE-2 in virtual space in April 2021.

A minute of silence was observed.

1.2. Report of the President of SCOR

The SCOR President briefly reported on his activities for SCOR since the SCOR Annual Meeting in October 2020. Yoo informed that due to the pandemic, many meetings had been cancelled. All the activities related to outside organizations were done on-line. These included meetings with several organizations. The International Science Council (ISC) convened a planning meeting in March 2021 to facilitate exchange among its affiliated bodies which was attended by the SCOR President (Sinjae Yoo) and Executive Director (Patricia Miloslavich). We provided comments to the Science and Technological Community Major Group (STC MG) position paper prepared by the ISC in March. The ISC held the Second Global Forum of Funders (26 - 28 April 2021) where Miloslavich and Yoo participated. Sicre, Miloslavich, and Yoo participated in the 2nd General Assembly of ISC held in Oct 11-15. The IOC/UNESCO postponed its 53rd Executive meeting from June 2020 to March 2021. Miloslavich and Yoo attended the meetings. In May 2021, we had an informal leadership meeting with the IOC Secretary. Sicre, Miloslavich, and Yoo participated in the meeting and discussed how we could improve collaboration between the two organizations. In June 2021, the 54th Exec/General Assembly of IOC was held on-line, and Miloslavich and Yoo participated in the meetings. Since the fourth quarter of 2020, a host for the Ocean Knowledge-Action Network International Project Office has been solicited and selected. Now the IPO has been placed in Paris and its executive director was hired to run the IPO. Sicre and Yoo have attended several meetings of sponsors for this. Proclamation of an International Year of Basic Sciences for Sustainable Development (IYBSSD) is being planned for 2022. An MoU was signed in April 2020 between SCOR and International Union of Pure and Applied Physics (IUPAP) representing the SSC of IYBSSD.

See document: https://scor-int.org/wp-content/uploads/2021/10/Report_President.pdf

1.3 Report of SCOR Executive Director

The SCOR Executive Director (SCOR ED), Patricia Miloslavich reported on the current condition of SCOR and on her activities for SCOR since the 2020 Annual Meeting.

Miloslavich reported that the SCOR community currently has more than 550 active members involved in WGs and project Scientific Steering Committees (SSC) representing 57 countries and five continents, with the USA, the UK, Germany, and Australia, having the largest number of involved researchers followed by Canada and France. Around 38% are female scientists and 62% are male scientists, this proportion being more balanced in the SCOR early career scientists in which the proportion is almost 1:1. Early career scientists represent 10% of the SCOR active community. Nominated members were renovated in Australia, Chile, Italy, Japan, Korea, Netherlands, Russia, and UK SCOR National Committees.

Several members of the SCOR community received international recognition for their work. Ed Urban and Emmanuel Boss were appointed fellows of The Oceanography Society; Claudia Benitez-Nelson received the mentoring award from The Oceanography Society; Dan Costa was appointed to the Society for Marine Mammalogy; Peter Burkill was appointed fellow of the Marine Biological Association of the UK; Marie-Alexandrine Sicre was appointed Vice-chair of the IOC Executive Council; Paul Myers was appointed fellow of the Canadian Meteorological and Oceanographic Society, and Miloslavich was appointed member of the Latin American Academy of Sciences. Miloslavich summarized the meetings held by the SCOR WGs and projects, which were all held online. In summary, the WGs held 47 online meetings of which 82% had the participation of early

career scientists (total of 143 early careers participants). All projects held their Scientific Steering Committee (SSC) meetings as well as their technical group meetings. Miloslavich attended all the project's SSC online meetings and provided secretarial support to the review panels for SOLAS and IMBeR, and for the SOOS new Science and Implementation Plan (SIP). Miloslavich reported on some SSC renovations or IPO changes taking place in the projects GEOTRACES, SOLAS, IMBeR, IIOE-2, COBS, GlobalHAB, the IOCCP, SOOS, and the JCS. Overall, the SCOR WGs produced nearly 30 scientific publications in 2020-2021.

The SCOR Executive Director has continued to make efforts to increase the visibility of SCOR through social media, significantly increasing the number of followers for Twitter and Facebook, producing online Newsletters, and updating the News section on the website more frequently. SCOR has also a collection in the platform AquaDocs to upload and give further visibility to its documents (e.g. annual proceedings). The SCOR Secretariat has also been very active at international meetings, contributing to the Ocean KAN Development Team meetings, giving presentations about SCOR to INOCAR (Ecuador), CSIRO (Australia), the PICES Fishery Science Committee (FIS) Committee Business Meeting, and at the PICES Science Board meeting, the 2nd International Science Council (ISC) assembly, the Early Career Researcher Panel at the 2020 World Conference Marine Biodiversity, the POGO 2021 Annual Meeting, as invited speaker at the IOC 60th anniversary, and providing presentations for the SCOR presentation at the Canadian Meteorological and Oceanographic Society, and for the SCOR presentation for the Senate Commission on Earth System Research in Germany. With regards to policy, the SCOR Secretariat participated at the IOC General Assembly 31 providing Statements for Agenda items 3.5.2 on the GOOS workplan, 3.5.3 on the capacity development strategy, and 3.7 on the UN Ocean Decade implementation. Additionally, SCOR signed an MOU to support the organization of the International Year of Basic Sciences for Sustainable Development (IYBSSD) and had meetings with ICES Science Committee to discuss synergies and a potential MOU for collaboration as well as with the UN Ocean Decade endorsed program "Marine Life 2030".

Miloslavich also reported that several SCOR WGs and projects have been either endorsed by the UN Ocean Decade (e.g. GEOTRACES, WG 162 OASIS), or were contributing to endorsed projects (WG 159 DeepSeaDecade to Challenger 150, the IOCCP to five endorsed programs related to ocean observations, oxygen and acidification).

With regards to finances, Miloslavich reported that dues income from memberships was on ~80%. The membership fees cover the costs of the Secretariat, annual SCOR meetings and some WG activities. SCOR depends on grant funding for large-scale research projects, ocean carbon activities, and some working groups. SCOR is currently on a 'no cost' extension for an NSF three-year grant to fund these activities. A new proposal was submitted this year to NSF for three years to continue to support these science activities and was approved. SCOR is in the second year 'no cost' extension for an NSF grant on capacity building, and in the second year of a three-year grant from NSF to support capacity building in ocean sciences. The 2020 audit of SCOR found no issues: "the financial statement disclosures are neutral, consistent, and clear" and "in accordance with accounting principles generally accepted in the USA". Due to the COVID 19 situation, the 2021 budget was underspent.

Other activities of the SCOR Executive Director included co-authoring several publications (e.g. OceanPanel Blue Papers, WOA-2, journal papers), to be in advisory boards, committees or reviewer for the NASEM/ACAL project Connections to Sustain Science in Latin America, supported by the Lounsbery Foundation; for the event Observing Life in a Changing Ocean: exploring a Census of Marine Life today, organized by the Consortium for Ocean Leadership, and as reviewer of the 1st Interim Report of the Nautilus Project. Miloslavich was also selected as an interviewee for the

MARIPOLDATA project about the Politics of Marine Biodiversity Data: Global and National Policies and Practices of Monitoring the Oceans, an ERC project led by Dr. Alice Vadrot, University of Vienna.

In addition to activities related to SCOR organization, administration and finances, project and WG management, communication, outreach, and other community services, Miloslavich regularly has communication with Ed Urban on SCOR administration and finances.

Full report: https://scor-int.org/wp-content/uploads/2021/10/scor_ed_report_2021.pdf

Narrated presentation:

https://drive.google.com/file/d/1s5A0ed_62qp8IH_qh3a9_2UQRy17qycv/view?usp=sharing

1.4 Report from the ad hoc Finance Committee

The Finance Committee (FC) reviews the administration of SCOR finances during the previous fiscal year and the current year and will propose a budget for 2022 activities and dues for 2023. Members of the 2021 Finance Committee (approved by the Executive Committee through email consultation on the 7th of September 2021) were Peter Croot (Ireland), Naomi Harada (Japan), Ilka Peeken (Germany), and Nuria Casacuberta (Switzerland). The documents reviewed by the committee were (1) the SCOR 2020 auditor's report, (2) the final vs actual 2020 budget, (3) financial reports and charts from the Secretariat, (4) the 2021 revised budget and draft of 2022 budget.

The FC met online twice before the annual meeting to analyse and discuss the documents. Croot, on behalf of the FC explained there was a significant increase in cash balance at the end of 2020 due to underspending. The 2021 planned budget was also being underspent due to the lack of in person activities requiring funds. The WGs spent ~190K less than budgeted. Historically, WGs spend ~70% of allocated funds but in 2021 this figure would be ~7% with an estimate of ~\$413K cash left at end of year. With the 2022 proposed budget, SCOR could fund up to 3 new WGs for the coming year with a cash reserve of ~\$282K. The FC recommended to (1) accept the 2020 audited SCOR budget, (2) accept the revised 2021 budget, and (3) that the finance committee meets online in advance of SCOR meeting as this would also allow for earlier discussions and those not coming to the annual meeting to still contribute to the finance committee. The FC pointed out that it was highly likely that SCOR may be able to fund two new WGs in 2022 and 2023 and that with the current balance, it was not necessary to increase dues of the member countries by 3% for 2023.

Yoo thanked the Croot and the rest of the FC and pointed out that it was fair to say that SCOR finances were in a good condition, even if the reason (pandemic) for it was not good. Bernadette Sloyan (Australia) asked if the unused WG funds were pushed down to following year and Miloslavich replied that WGs were given more time to work/spend their total \$45K like a no-cost extension. Kerry Howell (UK) noted that WGs were learning how to work online and perhaps could use funds for other activities. Peter Croot agreed and added that WGs might become more creative on different types of online meetings which would lead to savings in long run, but likely most WGs still want face to face meetings, as they can get more done. Miloslavich clarified that much of the WG funding comes from NSF grants, which has specific restrictions, and it is to be spent mainly for travel (and associated costs), as well as publications/products. The NSF funds can't be changed to other uses (e.g. salaries). Yoo added that not all activities can be done online, especially if observations and experiments are done together. Kerry Howell added that alternatives to travelling could be considered.

2. WORKING GROUPS

2.1. New Working Group proposals

The SCOR EC monitors for the proposed new WGs produced a 10-15-minute narrated presentation of the WG proposal summarizing the proposal and the recommendations from the reviews. These were available for all the Executive Committee and Nominated Members on-line prior to the meeting for the members and SCOR EC to watch at their own convenient time. During the meeting, each of the SCOR EC monitors presented a 5-minute synthesis of the WG proposals along with a summary of the comments and recommendations received. Yoo explained the selection process: After each new WG presentation, there will time for a few questions, we will look at the rankings to see if there is a clear separation in the weightings. The target is to select 2 to 3 good proposals and have the agreement from the nominated members.

2.1.1. Coupling of ocean-ice-atmosphere processes: from sea-ice biogeochemistry to aerosols and Clouds (Clce2Clouds)

The polar oceans, sea-ice, and atmosphere are a tightly coupled system, where interconnected processes are only poorly represented in climate and Earth system models. However, these Earth system components must be studied together if we are to effectively understand and project the changes underway. Coupled biological, physical and chemical processes drive complex interactions between sea-ice, snow on sea-ice, and the overlying atmosphere in the polar regions. Knowledge of these interactions is key to projecting sea-ice impacts on atmospheric gases and aerosols, and cloud cover over polar oceans, which in turn impact sea-ice melt, freeze-up and biogeochemical activity through nutrient exchange and solar radiation scattering. As the climate and sea-ice at both poles are changing, these core polar processes warrant more focused attention from Earth system scientists. Communities that treat individual system components (ocean, sea-ice, snow, atmosphere) are working in parallel, but not necessarily together, in part because of the inherently disparate spatial and temporal scales of most oceanic and atmospheric in-situ observations. These challenges limit our ability to describe and quantify key processes and develop coupled descriptions for climate and Earth system models. By bringing together the ocean and sea-ice oriented BEPSII (Biogeochemical Exchange Processes at Sea-Ice Interfaces) community and the atmospheric chemistry and sea-ice oriented CATCH (Cryosphere and ATMospheric CHEmistry) community, this working group will (1) synthesize and refine the conceptual representation of relevant processes and, (2) address key uncertainties in the biological and chemical controls on atmospheric chemistry, aerosol, and clouds in polar ocean environments.

Jing Zhang summarized the proposal, as well as the comments from the SCOR National Committees and affiliated organizations. Almost all national committees rated this proposal as “must fund” or “may fund” and found the activity timely, and important for SCOR and the broader ocean science community. The proposal was found to be very relevant as the interaction among atmosphere-ocean-cryosphere-biosphere is an important target in relation to global warming, and as an important step to establish the framework for collaboration among atmosphere, sea ice, snow, and ocean communities. Based on the reviewer’s comments and to the importance that SCOR gives to geographic balance and the inclusion of developing countries in the full membership, it was discussed that the WG should bring additional members from developing countries. As proposed, the WG only has a member from India as full member and a member from South Africa as associate member. It was also suggested that the WG could include additional expertise in biological oceanography, boundary layer cloud modelling, and physical sea-ice dynamics.

The reviews by national SCOR committees before the meeting yielded 14 “must fund”, eight “may fund”, and one “do not fund”. The proposal was selected as one of three to start in 2022 with Paul Myers as the liaison person to the SCOR Executive Committee.

Full proposal at: https://scor-int.org/wp-content/uploads/2021/05/Clce2Clouds_final.pdf

2.1.2. Harnessing global pELagic FISH biochemical data to address Sustainability challenges under climate change scenarios (ELFISH)

Globally, there is concern that climate change and human activities are impacting the availability and distribution of essential nutrients needed to sustain marine ecosystems but also human health through fish consumption. This highlights a growing need for biochemical data, including measurements of macro- and micro-nutrients, and contaminants in fish, that are currently incomplete to address the cross-sector UN Sustainable Development Goals. Specifically, many current databases often lack related spatio-temporal and biological information fundamental to assess and predict the impacts of global change on ocean biogeochemical cycling and nutrient delivery. This WG will bring together an international and interdisciplinary team to (i) develop an open-access global database of compiled and curated biochemical data obtained from research and monitoring programs that include fine-scaled biological, ecological and spatio-temporal information matched to available environmental data; (ii) develop and implement novel predictive models of pelagic-derived biochemical data under climate change scenarios; and (iii) propose a collaborative interdisciplinary framework to further accelerate progress in sharing and using biochemical data. The WG will focus on pelagic fish from nearshore to open-ocean systems, as they are important to global fisheries resources supply, highly sensitive to global change and a critical source of essential nutrients and contaminants. The WG will leverage previously successful climate-ecosystem work and the advances of data analytics to improve our ability to understand, map and predict the availability of nutrients essential to ecosystem and human health. Achieving such ambitious objectives requires a coordinated international effort which the SCOR platform facilitates.

Bradley Moran summarized the proposal, as well as all the review comments. In general, most of the reviews considered this proposal timely considering the growing demand for seafood protein and the sustainable fisheries goals integrated into the UN Sustainable Development Goals and global food security. However, there were considerations against an urgent need for yet another data base, and that IUU fishing is arguably of greater urgency to sustainable pelagic fisheries. For example, with regards to justification, a comprehensive and accessible global database of biochemical parameters associated with seafood protein could be useful as part of monitoring human health impacts associated with fish consumption and for tracking climate change impacts, however, as proposed, it was seen as not to offer solutions to address human activities that are widely known to negatively impact marine ecosystems. The ToRs were generally appropriate for the work as proposed, but more detailed explanation and planning is warranted when considering the global scope of this topic, particularly about forecasting future trends and impacts on pelagic fisheries. The membership was found to have good expertise and gender balance, but with a total lack of representation from Asian countries. Furthermore, the WG had no members from China, India, Japan, Russia, or Korea which are countries with large foreign fishing fleets. Finally, there was an issue of quality control for data obtained from a wide range of global sources. If the QC/QA is questionable across these data sources, then the proposed database will not be defensible, or useful. It was also unclear whether the database would contain sufficient temporal and spatial coverage to detect trends as for example, the variability between individual samples, regions, annual to decadal time scales as this was not explicitly addressed.

The reviews by national SCOR committees before the meeting yielded four “must fund”, 10 “may fund”, and eight “do not fund”. The group was not funded.

Full proposal at: https://scor-int.org/wp-content/uploads/2021/05/SCOR_WG_ELFISH.pdf

2.1.3. Advancing standardisation of COastal and Nearshore demersal fish visual CENSUS techniques (CoNCENSUS)

Fishes play a critical role in the function of coastal ecosystems and provide nutrition and livelihoods for millions of people, but are threatened by numerous anthropogenic pressures. Broad-scale datasets are required to determine the generality of lessons derived from local ecological studies, and ultimately provide the context to evaluate the most important and widespread threats to fish and associated ecosystems globally. Research on coastal and nearshore demersal fishes has been largely carried out at local scales, with limited standardisation or coordination among projects and organisations. This compromises data interoperability, and reduces opportunities to answer pressing broad-scale questions. To identify solutions to this problem, this Working Group aims to (a) advance our understanding of the complementarity and interoperability of data collected by different visual census methods, and (b) undertake parallel evaluations of the status of coastal and nearshore demersal fish assemblages, and the processes structuring them over spatial scales relevant to regional and global reporting. The Working Group will enable the adoption of best practice guidelines and protocols for the collection, management, and curation of fish survey observations based on traditional and novel methodologies in order to provide recommendations on how best to utilise data from multiple methods to monitor and study coastal fish populations from local to global scales. Furthermore, the Working Group will develop workflows and tools for the management, publication and visualisation of open-access data. It aims to lay the foundation for relevant and sustained research that encourages capacity development, furthers our fundamental understanding of coastal ecosystems, and provides essential support for policy and decision makers.

Enrique Montes summarized the proposal, as well as all the review comments. The proposal was found to be very relevant and well overdue in the field of visual fish surveys as the lack of international, standardized guidelines and protocols for these surveys results in lost opportunities for the data to be incorporated at a global scale to understand global and broad-scale patterns and issues more fully. Accurately assessing fish stocks over local, regional, and broad scales in such a manner that the data are intercomparable and usable is an extremely important aspect of determining current populations as well as making projections for the future.

Within the international framework, the WG also has good integration with relevant international bodies, such as the IOC/GOOS/BioEco, OBPS, GEO, Blue Planet and MBON, and will contribute significantly to capacity development and towards other projects and initiatives implemented by the United Nations while addressing four goals under the UN Ocean Decade. Some suggestions to the WG were to bring into the WG membership an additional member from an Asian country, and to consider the inclusion of robotic technologies such as AUVs and Internet Operated Vehicles (IOVs) as potential applications for data collection.

The reviews by national SCOR committees before the meeting yielded 10 “must fund”, 10 “may fund”, and one “do not fund”. The proposal was selected as one of three to start in 2022 with Enrique Montes as the liaison person to the SCOR Executive Committee.

Full proposal at: https://scor-int.org/wp-content/uploads/2021/05/21-05_CoNCENSUS_SCOR-proposal.pdf

2.1.4. Mixotrophy in the Oceans – Novel Experimental designs and Tools for a new trophic paradigm (MixONET)

Traditional and contemporary methods in Biological Oceanography assume a false plant/animal dichotomy. This dichotomy has been the bedrock of marine science, operationally separating organisms into phototrophic or phagotrophic compartments. We now know that most protist plankton at the base of the oceanic food-web can photosynthesise (plant-like-photo-autotrophy) and ingest food (animal-like-phago-heterotrophy) thus contributing to both primary and secondary production. While recent conceptual and quantitative models have been adapted to accommodate this synergistic merging of dichotomies, sampling and monitoring methods have not done so. Thus, a significant knowledge gap remains about the very foundation of the ocean food-web. We propose an international collaborative effort with a multidisciplinary team of experts in ecophysiology and molecular biology of mixoplankton, field sampling and monitoring technology, biological and physical oceanography to propose methods to determine contributions of mixoplankton to primary and secondary productions. We will approach this from the perspective of (1) ocean biogeochemical cycling especially under climate change by identifying methods for an accurate evaluation of mixoplanktonic activities in global oceans; descriptions of new networks of organisms are expected to emerge from our work; (2) global food security by establishing processes for assessing Mixoplanktonic-Harmful Algal Bloom dynamics, specifically associated with anthropogenic factors (e.g., eutrophication, climate warming, invasive species introductions) and impact on fishery and recreational industries. Through educational activities we will train the next generation, highlighting the importance of the mixoplankton paradigm in biological oceanography. MixONET will thus make a solid contribution to addressing priorities of the United Nations Decade of the Ocean.

Jacqueline Uku summarized the proposal, as well as all the review comments. The proposal was found to be relevant and to continue a long history of SCOR working groups for plankton communities and biogeochemical cycles with the new goal of establishing the importance of mixotrophic processes to the carbon pump and the occurrence of harmful algal blooms in an age of climate change. The proposed deliverables will be relevant for five global or regional networks with focus on HABs. In addition, the WG will contribute to the UN Decade of Ocean Science for Sustainable Development by addressing biogeochemical processes under climate change, as well as global food security. Some specific suggestions were (1) To link with the IOC-Ocean Best Practices to make the WG methodologies and protocols accessible and available through this system, as well as with the Ocean Teacher Global Academy (OTGA) to make the WG's capacity development material more visible and to increase its impact, and (2) To link with TARA-Ocean, which maps the global distribution of marine ecosystems in lower trophic level with genetic information, and to BioGeoSCAPES which aims to study the microbial biological and chemical oceanography of the oceans. Heather Benway (US Ocean Carbon and Biogeochemistry, OCB Program) noted that the OCB has a group working in mixotrophy and recommended that MixONET links to them.

The reviews by national SCOR committees before the meeting yielded 12 “must fund”, nine “may fund”, and two “do not fund”. The proposal was selected as one of three to start in 2022 with Charlotte Laufkoetter as the liaison person to the SCOR Executive Committee.

Full proposal at: <https://scor-int.org/wp-content/uploads/2021/05/SCOR-WG-Proposal-MixONET-FINAL.pdf>

2.1.5. From the Ocean to the Lab to the Ocean: best practices for ecologically sound inferences in fluctuating habitats (OLO)

Environmental fluctuations shape the diversity of species, communities, and assemblages in the ocean and is therefore of fundamental importance to ecosystems. Yet fluctuations of the environment are often labelled as noise or completely overlooked, with the risk that effects of environmental change on organisms are mis-estimated. The OLO initiative will bring together a diverse community of scientists to advance research in ocean sciences by providing open access, high quality standards and principles of responsible research and innovation (RRI) to underpin robust ecological inference in fluctuating environments. Specifically, OLO will fulfil the urgent demand for standardized methods and protocols to measure environmental variation in space and time at ecologically relevant scales and establish informative designed experiments by: (i) identifying critically overlooked environmental variables and variance scales, from the organismal perspective; (ii) providing guidelines for appropriate mimicry of environmental variability on laboratory experiments; (iii) implementing realistic models to propagate organismal variation into the dynamics of complex ecological networks in fluctuating environments; (iv) providing practical application of results from laboratory experiments for ecological restoration; (v) informing society on the eco-evolutionary consequences of our inherently fluctuating environment to support active and adaptive management of coastal and marine ecosystems. The OLO initiative, through the publication of high-quality scientific papers, inter-disciplinary guidelines, and training of young scientists, will impact the ocean sciences community at large. By providing concrete guidelines and cross-disciplinary examples, it will accelerate the transition towards the problem-oriented and interdisciplinary science needed to build the new narrative for the ocean.

Stefano Aliani summarized the proposal, as well as all the review comments. In general, most of the reviews considered this topic timely and relevant to improve our understanding of ecosystem dynamics and for helping to improve predictability of ecosystem response and improve management and individual response to a world in which both the mean and variance of the environment are rapidly changing. However, the proposal did not seem to be mature enough, with some lack of focus (e.g. ambitious objectives but unclear implementation, difficult to follow their rationale and understand how these linked with the remaining proposal). The reviewers also argued that incorporating environmental variability is an important aspect of understanding and responding to anthropogenic impacts on the ocean, however, the scientific knowledge base may be too thin at this point to support some of the objectives of the proposal, particularly the modelling.

Some of the reviews also indicated that this topic was more aligned with a research program rather than with a SCOR WG, but in general it was agreed that this topic required a multidisciplinary and interdisciplinary approach which is aligned with SCOR. More specifically, the ToRs were very broad in scope needing a concrete scientific focus making difficult to perceive what was the exact problem to be addressed. For example, it was not clear what kind of organisms will be studied, as well as what kind of environmental factors – climatic, environmental, anthropogenic, urban, etc will be investigated. Asian countries were largely absent from the membership.

The reviews by national SCOR committees before the meeting yielded three “must fund”, nine “may fund”, and 11 “do not fund”. The group was not funded.

Full proposal at: https://scor-int.org/wp-content/uploads/2021/05/Scor-WG-Proposal_OceanLabOcean_OLO.pdf

After the presentations of the five new WGs, Patricia Miloslavich showed the rankings based on the reviews. The WGs fell within two ranking categories: Clce2Clouds, Consensus and MixONET ranked high, with Clce2Clouds slightly higher than the other two which had the same ranking, and ELFISH and OLO ranking significantly lower.

The discussions that followed were to determine if SCOR would approve two or three new WGs. In general, most nominated members agreed that the three proposals should be supported given the recommendations from the Finance Committee about funding availability. Additional rationale to support three WGs included their high quality, i.e. rankings comparable to those funded in 2020 as noted by Chan Joo Jang (Korea) and Paul Myers (Canada), and the resulting geographic expansion of people involved in SCOR activities, especially from developing countries as noted by Kerry Howell (UK). The nominated members supporting the approval of three new WGs were: Chan Joo Jang (Korea), Paul Myers (Canada), Daniel Costa (USA), Kerry Howell (UK), Göran Björk (Sweden), Marcela Cornejo (Chile), Francisco Arias (Colombia), Naomi Harada (Japan), Enrique Montes (IABO), Trevor McDougall (IAPSO), Adam Sokolowski (Poland), Heidi Pettersson (Finland), Peter Croot (Ireland), Isabel Ansoorge (South Africa), Ilka Peeken (Germany), Alessandro Tagliabue (UK), Andrey Kostianoy (Russia), Leonor Vera (Ecuador), Stefano Aliani (Italy), Sabri Mutlu (Turkey), and Marie Alexandrine Sicre (France). Bernadette Sloyan (Australia) supported approving three new WGs but asked for clarification on how the recommendations from the reviewers were addressed by the proponents if the WG was approved and Miloslavich explained that when the proposals were approved, letters were sent to the proponents with the recommendations based on the reviews.

Fangli Qiao (Cjina-Beijing) was supportive of funding only two proposals arguing that three out of five was a too high success rate, and Katja Peijnenburg (Netherlands) also supported approving two proposals because she argued MIXONET could be improved. Trevor McDougall (IAPSO) noted that the ratio of funded number to proposals was not relevant, the key issue was the quality of the proposal and SCOR received three this year of a level and quality worth supporting. Miloslavich also noted that SCOR has too much money not being used, which doesn't look good to funding agencies, so we should support good proposals when we can. Given the arguments, all nominated members present, including China and the Netherlands agreed to approve three proposals.

2.2. Current Working Groups

A designated member of each working group presented an update on working group activities and progress and made recommendations on actions to be taken. Several of the WGs prepared a 10–15-minute narrated presentation which are posted on the annual meeting webpage and also prepared 3-5 summary slides to present live at the meeting.

The compiled synthesis slides with the reports of the current SCOR WGs, as well as the Large-Scale Research and Infrastructural Projects as presented during Day 2 of the annual meeting can be found at the following link:

https://scor-int.org/wp-content/uploads/2022/08/SCOR_Annual2021_Day2.pdf

2.2.1. WG 143 on Dissolved N₂O and CH₄ measurements: Working towards a global network of ocean time series measurements of N₂O and CH₄

Jing Zhang, liaison of WG 143 to the SCOR Executive Committee presented the progress of the group on behalf of Sam Wilson. In the past 12 months the WG has been working on the Standard Operating Protocols (SOP) for dissolved methane and nitrous oxide measurements. Draft documents have been posted on a publicly available website (<https://web.who.edu/methane-workshop/sops/>) for the community to comment on. They are now working with the OCB program to convert the

word documents into reader-friendly pdfs that have consistent formatting. This should be completed by December 2021.

Sam Wilson (co-chair) has also received funding from NSF to produce consensus material which was a task identified at the workshop and in the 2020 publication as being of high importance.

‘Production of consensus material for dissolved methane and nitrous oxide’ National Science Foundation, Chemical Oceanography, Principal Investigator: S. Wilson, \$82,560 (April 2021 – March 2022). They requested to continue as a SCOR WG until the SOPs have been completed and this request was approved.

Full report: https://scor-int.org/wp-content/uploads/2021/07/WG143_N2O-CH4_2021_Final_Report.pdf

Presentation: https://scor-int.org/wp-content/uploads/2021/10/2021_SCORconf_samw.pdf

2.2.2. WG 145 on Chemical Speciation Modelling in Seawater to Meet 21st Century Needs (MARCHEMSPEC)

David Turner presented the update for this group. The Working Group held an online meeting on 21 June 2021 attended by 13 WG members and four guests. The meeting reviewed progress towards the WG’s terms of reference and concluded that the WG is on track to complete its terms of reference in 2022. Reports from collaborative projects were also presented. The meeting discussed the need for further work on model development following completion of the SCOR terms of reference next year. It was agreed to hold the next online meeting in March 2022. The first prototype software for chemical speciation modelling derived from the WGs NSFGE0-NERC project (A Thermodynamic Chemical Speciation Model for the Oceans, Seas, and Estuaries) was completed. The WG is collaborating with several laboratories internationally and with IAPSO and the Joint Committee on the Properties of Seawater and has been asked to contribute to the newly established GESAMP Working Group 45 “Climate Change and Related Impacts on Contaminants in the Ocean”. The WG has identified four activities that will be required to fulfil the Terms of Reference which they plan to complete before the 2022 SCOR meeting.

The WG requests to continue for 1 year to complete their plans after software release (e.g. follow up by model improvement, improve description of key interactions). WG members are keen to maintain contact and hope to find new organisational home after SCOR. Trevor McDougall, the WG liaison to the Executive Committee supported its request for continuation. The group will meet in March 2022, at no cost for SCOR (it will be an online meeting).

Full report: https://scor-int.org/wp-content/uploads/2021/07/WG145_Marchemspec_Report-to-SCOR-2021.pdf

Narrated presentation: <https://scor-int.org/wp-content/uploads/2021/09/SCOR-2021-WG-145-Recording-15Sept2021.mp4>

2.2.3. WG 148 on International Quality Controlled Ocean Database: Subsurface temperature profiles (IQuOD)

Guilherme Castelão presented the updates for this group. Due to the pandemic, there were no in person meetings during the last year. Instead, virtual meetings were held covering topics including funding and interpolation of ocean profiles. Work has progressed on a range of activities. A paper was published on assignment of uncertainties to ocean temperature profiles, and work is ongoing on extending a draft paper on benchmarking of automatic quality control checks with publication anticipated during the coming year. In addition, a community for IQuOD has been set up in the

Ocean Best Practices Repository (<https://repository.oceanbestpractices.org/handle/11329/1590>). A primary focus of IQuOD in the next year is the publication of a paper describing benchmarking of automatic quality control checks for temperature data. The paper will also include recommendations for optimum sets of quality control checks that will be applied to the World Ocean Database (WOD) to generate a new version of the IQuOD dataset. A draft of the paper has already been completed but will be updated to use more data and include more quality control checks before submission. A second focus will be on developing training data and techniques for machine learning to improve quality control of data further. Funding has been obtained for cloud computing to support this activity.

The WG requested extension for 1 year, to finalize software and paper. They believe they have not used up the SCOR funding, and they would like to hold another in-person workshop if possible. Paul Myers, the WG liaison to the Executive Committee supported its request for 1 year extension until products have been completed.

Full report: <https://scor-int.org/wp-content/uploads/2021/07/WG148-IQuOD-Annual-SCOR-Working-Group-Report-to-SCOR.pdf>

Presentation: https://scor-int.org/wp-content/uploads/2021/10/scor_wg148_iquod_2021_longversion.pdf

2.2.4. WG 150 on Translation of Optical Measurements into particle Content, Aggregation & Transfer (TOMCAT)

Sara Giering presented the updates of this group. Members of TOMCAT are planning to host a 1-week summer school in Cape Town, South Africa. The summer school was originally planned for October 2020 but was postponed to 2022 due to COVID-19. The focus of the school is capacity building, so the teaching material will be accessible and hands-on with a focus on optical instruments that are affordable (< US\$ 2,000). The anticipated number of students is 20. SCOR has already kindly approved US\$ 5,000 for travel support of developing country scientist to attend the summer school. The WG hopes to finish the group's official activities next year with the summer school and requests to use left-over funds for the summer school. Charlotte Laufkoetter, the WG liaison to the Executive Committee supported their request to support the summer school.

Full report: https://scor-int.org/wp-content/uploads/2021/08/WG150_TOMCAT_report_2021-08-19-Annual-SCOR-Working-Group-Reports-to-SCOR-WG150.pdf

2.2.5. WG 151: Iron Model Intercomparison Project (FeMIP)

Marcelo Vichi presented the updates of this group on behalf of the co-chairs Alessandro Tagliabue and Stephanie Dutkiewicz. The WG had no in person meetings, but a well-attended virtual meeting was held in Dec 2020. Before the pandemic the group had already discovered that progress outside of in person meetings was very slow. People are busy and are now understandably tired of zoom. They hope that the resumption of in person meetings will stimulate the group further as it remains very enthusiastic and engaging. They plan a final meeting at OSM 2022 to finalize ToR 4 for which they request one more year of continuation. The WG had three main milestones, particularly related to Tor2: (1) released version of tools for validating global models using GEOTRACES data (currently finalising the documents, freely accessible on GitHub, aiming to make it more usable and in different platforms as it is currently only in MATLAB), (2) published a paper Global Biogeochemical Cycles journal, and (3) engaged in the large data synthesis effort (new means to constrain Fe bioavailability, and Fe uptake rates and residence times in upper ocean). The WG plans to have a virtual meeting at

the end of 2021, create a common repository for forcing fields (ToR1), further work on residence time (ToR3), and likely continue in an informal manner after the WG formally ends. The WG requests support for one more in person meeting, and Charlotte Laufkoetter, liaison of this group to the SCOR EC recommended to approve the request.

Full report: https://scor-int.org/wp-content/uploads/2021/07/WG151_FeMIP_Annual-SCOR-Working-Group-Reports-to-SCOR_2021.pdf

2.2.6. WG 152 on Measuring Essential Climate Variables in Sea Ice (ECV-Ice)

Daiki Nomura presented the updates for this group. This working group gathers international experts on chemical and biological measurements in sea ice to design and coordinate required inter-comparison experiments. The group is synthesizing the results of past experiments, identifying what types of new experiments are needed, and supporting the community in executing those experiments. The group will attempt to do the long planned intercalibration experiment in 2022 (late April-middle of May) at The Canadian High Arctic Research Station (CHARS), Cambridge Bay, Canada to target the sea-ice algal bloom in an ascending phase. The WG requested support to meet in conjunction with the intercalibration experiment and Trevor McDougall, liaison of this group to the SCOR EC recommended to approve the request.

Full report: https://scor-int.org/wp-content/uploads/2021/07/WG152_ECV_Ice_Reports-to-SCOR-ECV-Ice2020-2021_Final.pdf

Presentation: https://scor-int.org/wp-content/uploads/2021/08/10-min-talk_WG152_ECV-Ice_SCOR2021.pdf

2.2.7. WG 153 on Floating Litter and its Oceanic Transport Analysis and Modelling (FLOTSAM)

Stefano Aliani presented the updates of this group. The community associated to this WG has grown considerably. The last meeting of the project was planned for summer 2020 in Japan thanks to the hospitality of Japan Agency for Marine-Earth Science and Technology, however the meeting was cancelled. Alternatives are under discussion, including to meeting virtually or elsewhere. FLOTSAM has submitted a proposal for an Innovative Session at OSM 2022 where many partners will likely attend the meeting. A hybrid in-person/remote session was proposed. The WG meeting could potentially take place at OSM 2022. The WG requests for an extension until 2022 to allow for: i) the workplan of WG153 to be fully developed with a 3rd physical meeting and the new gaps in knowledge can be addressed, also within the perspective of the UN Decade that was not under implementation at the time of the proposal; ii) the innovative work they plan for OSM session will fall under SCOR. Their next step is to design and implement the marine debris observing system, expanding the community as much as possible. Paul Myers, liaison of this group to the SCOR EC recommended the WG is allowed to continue to access its funds for next year.

Full report: https://scor-int.org/wp-content/uploads/2021/07/WG153_FLOTSAM_Report_2021-V1.pdf

Narrated presentation: <https://drive.google.com/file/d/1my5p87pYpA9jDipOWIvLoEBsftzOC606/view?usp=sharing>

2.2.8. WG 154 on Integration of Plankton-Observing Sensor Systems to Existing Global Sampling Programs (P-OBS)

Anya Waite presented the updates for this group. Most of the ToRs have been finalized. The GO-SHIP manual for plankton measurements was uploaded at the Ocean Best Practice platform. The

meeting planned in Halifax in fall 2020 and postponed to 2021 could not take place. Since their last report they have been working through the pandemic to write and finalize an Ocean-SITES report like the one published on GO-SHIP. They hope to finalize it by the end of 2021 after a period of public comments. The group tentatively plans to meet in person in conjunction with OSM 2022. COVID, zoom fatigue, other activities of the chairs and declined interest of WG members are all causing their current report to drag out beyond the time they thought it should. The WG requests to continue to operate under SCOR until the last product (the Ocean-SITES report) is completed. Enrique Montes, liaison of this group to the SCOR EC recommended the WG is allowed to continue to access its funds for next year.

Full Presentation: https://scor-int.org/wp-content/uploads/2021/07/WG154_P-OBS_Annual-SCOR-Working-Group-Report-to-SCOR-154-2020-21_AMW.pdf

2.2.9. WG 155 on Eastern boundary upwelling systems (EBUS): diversity, coupled dynamics and sensitivity to climate change

Rubén Escribano presented the updates of the group. The group is actively working on a scientific review paper on the value of ocean observation and modelling in relation to ecosystem services and climate in EBUS and a summary for policy makers. Planned activities include: 1) completing and submitting the review article; 2) continue the organization of the Open Science Conference (September 2022); 3) complete the analysis of the IPCC models and prepare a report/publication; 4) Write up a recommendation for the framework for EBUS observing and modelling systems, and 5) developed the web portal containing information on EBUS (the portal is ready to be published, will be publicly available, and expect the platform to be online by the end of the year). They will be participating in the first forum for South America organized by WCRP Climate Research Forum. Unfortunately, the current situation due to the COVID-19 pandemic has influenced the time dedicated to the work and actions in this WG. They have relied on virtual meetings and e-mail interactions to maintain activities of the WG, however, sometimes the daily days are overfilled without having dedicated time for this activity. The chairs have sent a letter to the SCOR Executive in which they expose their situation:

Over the last 2 years, starting in early 2020, the entire world has been impacted by the COVID-19 pandemic. The impact has been particularly severe in South America, Peru and Chile in particular, basically bringing activities to a standstill. Two key activities of the working group, the 2020 Summer School along with the workshop and meeting of the WG at Dakar, Senegal, and the EBUS Open Science Conference in 2021, were cancelled. While some activities were carried on through video or phone conferences, they could not replace the progress that would have been possible with several weeks of face-to-face meetings. The EBUS Open Science Conference (OSC) has now been rescheduled for September 2022 in Lima Peru with the WG being active in its organization. The EBUS OSC will be an important opportunity for the WG to meet in person and make progress. Therefore, we would like the SCOR leadership to consider extending the WG through June of 2023.

Itahisa Déniz Gonzáles (Project Coordinator, Ocean Science Section of IOC) noted that the conference planned for 2022 will promote exchange as it is expected to be attended by young scientists. Its results will inform the UN Ocean Decade. Marie Alexandrine Sicre, the WG liaison to the SCOR EC, noted that there had been some concerns regarding the first ToR, but it was good to see that the writing had been initiated (expected to be submitted at the end of 2021), as well as progress on website. Sicre recommended a 1 year of extension to complete ToRs 1 and 2. Escribano mentioned that they had already requested additional funding for the conference from the SCOR travel grant scheme. The working group is planning to meet in conjunction with the conference. González noted in relation to ToR2, that the web portal is completely developed, the idea being to bridge the gap between hard and social scientists (teaching them and making them do something

related). Sicre mentioned that ToR 2 had slightly changed compared to the original version and González argued that it didn't make sense to copy already existing databases. They need to connect their community to the science, make knowledge easily available. For example, non-academic people have no access (for instance people from fisheries) to papers etc.; fisheries groups have a lot of data but do not know how to provide it. The idea is to create a bridge to international databases such that the fisheries people can provide their data, and everything is open access. Sicre noted that this was very much the idea of the UN Ocean Decade, to connect people with different backgrounds. Sicre recommended to continue to support the WG as requested.

Full report: https://scor-int.org/wp-content/uploads/2021/08/SCOR-WG155-EBUS_Annual-Report-2021.pdf

2.2.10. WG 156 on Active Chlorophyll fluorescence for autonomous measurements of global marine primary productivity

Nina Schubak presented the updates for this group. Since the last SCOR report (July 2020), their major focus for year 2 has been on working towards completion of the "Best Practice" document and a related manuscript in *Frontiers of Marine Science*. These activities specifically address terms of reference i-iii and v-vii. They have been successful in publishing our group's first peer reviewed article and have made significant progress on the Best Practice Guide, with a working framework document uploaded to the Ocean Best Practices site (<https://repository.oceanbestpractices.org/handle/11329/1585>). They have also continued to make progress (though perhaps slower than would be desired) in the development of open-source Jupyter notebooks for processing FRRF data. They had three virtual teleconferences of the whole group (sometimes grouped into 2 sessions to accommodate all time-zones), as well as several additional smaller meetings of various working-groups. Most meetings have focused on the development of their documents. Like many, the group has been significantly burdened by the COVID-19 pandemic, which has curtailed laboratory and field work. In addition, three WG members (Tortell, Moore and Berman-Frank) are department Head's and were thus forced to take on even higher administrative loads associated with COVID-19 safety planning. They would like to request to use SCOR funds to support a part-time student to help with the development of open-source software for the processing and analysis of FRRf data. They plan to meet at OSM 2022.

Sinjaee Yoo asked if the handbook would identify the best practice. Schubak responded that the handbook will describe the different models, but there was no agreement among the group members to which was the best model. Yoo argued that the original idea was to help the layperson to decide what algorithm to use and asked if the book would help to identify the best algorithm. Schubak responded that different approaches yield similar results. NPP estimate might not be as good as a ^{14}C measurement, but a lot higher resolution will be available when using fluorescence. Ilka Peeken seconded Yoo, as she was hoping they would come up with the final answer for the best algorithm and asked if the instruments had improved dramatically, or why was it taking so long. Schubak argued that people promised too early to get reliable NPP estimates. They got electron transport right and are rather confident about it. A lot of progress has been made given the sensitivity of the new instruments but getting from electron transport to NPP in carbon units is another difficult step, emphasizes the use of electron transport itself and advocates for a change in thinking about productivity. There has been a lot of progress. Jacqueline Uku wondered if the funds originally allocated to travel could be used for other purposes, such as hiring someone, but Miloslavich clarified that the NSF funds to support the WGs are to pay travel and other participants cost and cannot be used to pay salaries. This was confirmed by NSF. Yoo recommended to continue to support the WG as planned.

Full report: https://scor-int.org/wp-content/uploads/2021/07/WG156_Chlorophyl_Anual-SCOR-Working-Group-Report_2021.pdf

Narrated presentation: https://scor-int.org/wp-content/uploads/2021/08/2021_SCORWG156_narrated_updates.mp4

2.2.11. WG 157: Toward a new global view of marine zooplankton biodiversity based on DNA metabarcoding and reference DNA sequence databases (MetaZooGene)

Todd O'Brien presented the updates of this group as Ann Bucklin could not connect due to a power blackout due to a storm in her area. Planning and cooperation among WG157 members were carried out through email, virtual meetings, and shared website workspaces to allow completion of the MetaZooGene Barcode Atlas & Database (MZGdb, <https://metazoogene.org/database>). The effort was led by WG157 member Todd O'Brien (NOAA, USA). Email and virtual meetings also resulted in a multi-authored review paper linked to the MZGdb were led by Ann Bucklin (University of Connecticut, USA). MetaZooGene members chaired SS32 – "Name that species: Toward a new global view of species diversity of marine zooplankton" at ASLO 2021 on June 23, 2021. The WG has three new publications in 2021. Work toward WG157 deliverables has continued despite the challenges of COVID-19 pandemic, except for activities (e.g., Term of Reference #3) requiring molecular benchwork, due to restrictions by most universities and institutes. Private online work-areas were created for WG157 members, including one for all members and another for specific activities. These areas are linked to the website for the group, <https://metazoogene.org/>, and are valuable tools for collaboration by allowing uploading and sharing of files, which is not possible for all WG157 using other web platforms. The WG plans to meet at OSM 2022.

Enrique Montes, the WG liaison to the SCOR EC had 3 recommendations for the WG: (1) to intersect with the OBIS eDNA project, (2) to engage with the Omics Best Practice OBPS task force, and (3) to engage with Marine Life 2030, a UN Decade-endorsed program that would greatly benefit from outputs coming out of WG157. Montes recommended to support the WG meeting at OSM in Hawaii, and congratulated the group for their wonderful work. O'Brien noted that two of the recommendations were already underway as Ann Bucklin had reached out to the respective people (OBIS eDNA project and Omics Best Practice). By email, Ann Bucklin informed that they would follow up with info about engagement with global programs and that their participation at the OSM 2022 would be virtual, but that they would be requesting funding for a WG157 meeting and symposium at ICES ASC September 2022. Montes recommended to continue to support the WG as planned.

Full report: https://scor-int.org/wp-content/uploads/2021/07/WG157-MetaZooGene_Anual-Report-02July2021.pdf

Narrated presentation: <https://drive.google.com/file/d/1oszLjfdurXEbALParHO83rlcUvcDSY-N/view?usp=sharing>

Presentation: https://scor-int.org/wp-content/uploads/2021/10/Bucklin_WG157_SCOR-Annual-Mtg_27Oct2021_Ver1.pdf

2.2.12. WG 158: Coordinated Global Research Assessment of Seagrass System (C-GRASS)

Emmett Duffy presented the updates for this group. The group is making progress in all the ToRs. Throughout 2021 they had separate, smaller meetings of sub-working groups. The C-GRASS leads also had meetings with National Coordinated Alliance for SAV Enhancement (NCA-SAVE), organized by Pew Charitable Trust, to build connections and complementarity. The C-GRASS Data synthesis group co-lead Jonathan Lefcheck (Smithsonian) had a proposal accepted for special session on coordinated research on seagrass at International Seagrass Biology Workshop (re-scheduled for September 2022). Plans are in place for the public release of the SeagrassNet database in late 2021 cross listed with OBIS and a manuscript summarizing the main status and trends from the global SeagrassNet data set will be submitted by December 2021/ January 2022. The group is finalizing the Seagrass Essential Ocean Variable spec sheet, uniting both remote sensing and in situ approaches, for approval by GOOS; developing and implementing a hierarchical structure to guide and establish preferred and recommended data capture approaches; and planning to register the remote sensing and in situ protocols with the IOC Ocean Best Practices system. Their meeting will be rescheduled for 2022 possibly with the ISBW conference adopting a hybrid approach to allow virtual participation. Inability to meet in person because of COVID-19 has significantly impacted progress on their outcomes and partnerships. For instance, they were in advanced stages of planning their May 2020 inaugural workshop at INVEMAR in Santa Marta, Colombia, leveraging collaboration with the MBON Pole-to-Pole group and co-funding by NASA. This co-located workshop would have helped facilitate diversity of partnerships and engagement in the Global South, and they hope to reschedule something similar during the grant period. More generally, it has been challenging to maintain momentum and the progress that would usually be achieved through intensive in-person meetings. On the bright side, adaptation to the COVID-19 world has forced them to build strong capacity to continue work virtually and allowed to engage a much broader audience into the community than would have been able to achieve in person. This will be key to the long-term sustainability of the C-GRASS outcomes.

Jing Zhang, liaison of this group to the SCOR EC recommended the WG is allowed to continue to access its funds for next year.

Full report: https://scor-int.org/wp-content/uploads/2021/07/WG158_C-GRASS-2020-2021.pdf

Narrated presentation: https://scor-int.org/wp-content/uploads/2021/10/C-GRASS_plenary_presentation_20211002.mp4

2.2.13. WG 159: Roadmap for a Standardised Global Approach to Deep-Sea Biology for the Decade of Ocean Science for Sustainable Development (DeepSeaDecade)

Kerry Howell presented the updates for this group. The group held an online meeting (07 Oct 2020) to prepare the submission, in collaboration with DOSI of a global programme of deep-sea biology research - Challenger 150 - to the IOC-UNESCO. After the submission another online meeting was held (02 Feb 2021) to discuss aspects of the implementation of this programme, in particular the management structure, of which the WG159 forms the Steering Committee and the development of standards to ensure data comparability.

An online townhall meeting (09 Feb 2021, >300 participants, ~30% ECs) was held to present Challenger 150 to the wider community; and the Challenger 150 was officially endorsed by the IOC-UNESCO as an Ocean Decade programme. Two online meetings were held on data acquisition, processing and archiving standardization: a general workshop on how to build on the CoML work to further develop standards (14 April 2021, 34 participants) and a meeting on megafauna image data

(14 Jul 2021, 30 participants). Plans for the next year include an online meeting to further address ToR2 and ToR3 and to have the full draft paper for TOR 5 by end of year. Enrique Montes, liaison of the WG to the SCOR EC EM noted that WG is ahead of schedule and has very clear engagements with international efforts, especially with its evolution as a UN Ocean Decade action for its contribution to the Challenger 150 program. Montes recommended that the group interacts with WGs #157 MetaZooGene and #154 P-OBS, and that the WG is allowed to continue to access its funds for next year.

Full report: https://scor-int.org/wp-content/uploads/2021/07/WG159_DeepSeaDecade_Annual-SCOR-Working-Group-Reports-to-SCOR_2021.pdf

Narrated presentation:

<https://drive.google.com/file/d/1I75BuHGk0rG7v9rHdpTb6MYQ9dZ6UdOK/view?usp=sharing>

2.2.14. WG 160: Analysing ocean turbulence observations to quantify mixing (ATOMIX)

Cynthia Bluteau presented the updates for this group. The current WG meets as a full committee virtually every two months for ~1.5h to discuss the dissemination of the group's activities via a newsletter, organization and lay-out of the wiki (e.g., how to capture peer-review comments), and more recently the benchmark datasets format. These meetings have focused on organizing the overall activities across the three subgroups: 'Shear probes' led by co-chair Fer, the 'Velocity profilers' led by co-chair Lenn, and the 'Point-velocity measurements' led by co-chair Bluteau. A rolling roster of three different set times is used to ensure that two thirds of the WG can attend owing to time zone differences. One of the three chairs leads each meeting, while detailed minutes are collected for members in incompatible time zones to comment/address after the meeting. In addition to these full committee meetings, the three subgroups meet every 2 months as well for 1-2h to debate the processing steps for analyzing these unique data streams. A Wiki, <https://wiki.uib.no/atomix> which is still work in progress. A conference abstract was submitted and accepted for the AOGS. This poster will advertise the WG's activities in the Asian-Oceania region where they intend to do capacity building and training for the last planned WG meeting in 2023 (Singapore). The ATOMIX mailing list is now open for new subscribers:

<https://www.subscribepage.com/r7g7r6>. In the next months, the group's main goal is to have the systems and datasets in place to begin testing of algorithms before the 1st WG meeting planned for December 2021 in Germany. This meeting will focus on discussing discrepancies amongst how key processing steps are carried out by different groups, and approve a work plan for testing key processing steps and quality control measures. The group would like to request access to a small budget for virtual meeting resources given some full members from Australia and New Zealand are restricted from traveling in person until mid-2022 (e.g., <https://remo.co/conference-pricing/>).

Trevor McDougall, liaison of this group to the SCOR EC noted that the WG had done well getting through COVID and recommended the WG is allowed to continue to access its funds for next year.

Full report: https://scor-int.org/wp-content/uploads/2021/07/WG160_ATOMIX_2021_SCOR_WG_AnnualReporting.pdf

Narrated presentation: https://scor-int.org/wp-content/uploads/2021/10/atomix_scor_wg160.mp4

Presentation: https://scor-int.org/wp-content/uploads/2021/10/ATOMIX_2021_annual_report.pdf

2.2.15. WG 161: Respiration in the Mesopelagic Ocean (ReMO): Reconciling ecological, biogeochemical and model estimates

Carol Robinson presented the updates for this group. The group recruited an early career scientist from South Africa as suggested by the SCOR Executive. They created a Google site for use within the group and started to organize meetings, holding virtual co-chairs meetings on 18 December 2020 and 12 January 2021 and then the first virtual group meeting on 19 January 2021. Since then, they have met in February, March, April, May, and June 2021 (monthly virtual meetings in two time zones). To advertise the work of the group, they gave a presentation to the Jetzon network of scientists who work in the mesopelagic zone, in November 2020, and wrote articles for the UK Challenger Society for Marine Science and the Canadian Ocean Sciences Newsletter. ReMO is one of several projects contributing to Jetzon, which in June 2021 became a UN Decade programme. They would like to have a face-to-face meeting during 2022, potentially for 2 days immediately before a relevant conference (e.g. OSM 2022, EGU in Vienna or the Gordon Research Conference on Marine Biogeochemistry in Spain – three WG members are keynote speakers). This will also aid in the planning and preparation required for the training course. The group has collected published literature and created the structure for an action plan and position paper. They have a subgroup working on model-data comparison paper, and plan to submit model sensitivity paper (Delivery 3), data compilation (Delivery 4), data comparison paper (Delivery 5), and the methods manual (Delivery 7) in 2022 among other products.

Charlotte Laufkoetter, liaison of this group to the SCOR EC recommended the WG is allowed to continue to access its funds for next year.

Full report: https://scor-int.org/wp-content/uploads/2021/07/WG161_ReMO_Report-2020_21-submitted.pdf

Narrated presentation: <https://scor-int.org/wp-content/uploads/2021/10/ReMO-2021-SCOR-presentation.mp4>

2.2.16. WG 162: Developing an Observing Air-Sea Interactions Strategy (OASIS)

Meghan Cronin presented the updates for this group. OASIS has had regular online meetings in 3 main categories since its start on 1 November 2020. These have been telecons in the form of (1) regular bi-weekly SCOR WG #162 co-chair + COL (Consortium for Ocean Leadership) staff meetings; (2) monthly SCOR WG #162 meetings, several of which have been open to the full OASIS community (approximately 50 attendees); and (3) a webinar series open to the full community. OASIS has a website (www.airseaobs.org) and a newsletter with 165 email recipients. The group also developed a prospectus. Currently the group is preparing a manuscript on best practice towards radiation measurements and another describing 5 main OASIS themes which were distilled from >40 Ocean Obs 19 community white papers, >350 recommendations, >400 authors. During year 2, beginning November 2021, OASIS expects to have a follow up work associated with the “OASIS for a Predicted Ocean” event and the Ocean Best Practice Workshops to be held in September 2021. OASIS will also be hosting more UN Ocean Decade satellite events, including the “OASIS for a Clean Ocean”, and the Ocean Science Meeting 2022 “OASIS Ocean Shots for 2030” and OASIS Townhall. In the second year, they also hope to begin initiating capacity building efforts, including the SOLAS virtual summer school, with an OASIS curriculum. OASIS was endorsed as UN Ocean Decade programme. Elisa Berdalet from the GlobalHABs project asked if the topic of harmful algal blooms (HABs) producing toxins was being considered. Cronin responded that the topic was indeed within the scope of OASIS since air-sea fluxes play a major role as stressors of the marine environment, and they do want to include HABs in their strategy.

Paul Myers, liaison of this group to the SCOR EC recommended the WG is allowed to continue to access its funds for next year.

Full report: https://scor-int.org/wp-content/uploads/2021/07/WG162_OASIS-Annual-SCOR-Working-Group-Reports-2021-final.pdf

Narrated presentation:

<https://drive.google.com/file/d/1nHyiJQctoZGEkE4bYNnVCUB2E9PRYl8c/view?usp=sharing>

3. LARGE-SCALE OCEAN RESEARCH PROJECTS

SCOR currently sponsors five large-scale research projects; four of them are co-sponsored by other organizations. Each project has its own scientific steering committee (SSC) to manage the project. SCOR and other co-sponsors are responsible to oversee the projects, which they do primarily through responsibility for the project SSC memberships and terms of reference, although sponsors also oversee the results of the projects' activities. Each of the projects has an assigned liaison person to the SCOR Executive Committee. Any proposed changes in membership or terms of reference are considered by the SCOR Executive Committee, in partnership with other co-sponsors, throughout the year. The SCOR Secretariat oversees the use of grant funds provided to the projects through SCOR. SCOR uses solely grant funds for IMBER, SOLAS, and GEOTRACES, but is providing SCOR support for IQOE and IIOE-2 until they are self-supporting.

3.1. GEOTRACES

Karen Casciotti presented the updates for GEOTRACES and acknowledged SCOR's and NSF's support to the program. GEOTRACES is under the intensive period of preparing its third Intermediate Data Product, and this is being done on schedule despite the COVID-19 pandemic. The Data product will consist of 1) a compilation of digital trace metal data (100.000 samples from 77 cruises), and 2) the eGeotraces Electronic Atlas. The current reporting period is marked by the pandemic; while several GEOTRACES activities had to be cancelled or postponed as described in their report, however, GEOTRACES has proved resilience and it will release the data product in 2021 as planned. The SSC and all the technical subgroups met virtually in this time period. The project plans a Town Hall at OSM 2022 and a summer school in July 2022 in Bremerhaven, Germany (with the participation of 50 students and 16 lectures). Jinga Zhang, the GEOTRACES liaison to the SCOR EC was excited about progress and asked for clarification regarding the data archive before end of project (an issue raised in the GEOTRACES review held in 2019-2020). Casciotti responded that data from GEOTRACES that is archived in the system will remain there indefinitely, but when GEOTRACES is completed, they will have no longer support to add additional data. Mohamed Adjou assured that all data will be archived indefinitely and there should be no concerns regarding the preservation of the data that's already there. The idea of an Open Ocean Conference was discussed at their steering committee meeting, but there was a consensus that it would be better to take advantage of building synthesis workshops and contributions to existing conferences rather than to have their own conference.

Full report: https://scor-int.org/wp-content/uploads/2021/07/2021_GEOTRACES_AnnualReport_FINAL.pdf

Narrated presentation:

https://drive.google.com/file/d/14APSTHX_CJ7jipNuHFESFzEH4TP3pz_/view?usp=sharing

Report of regional activities: https://scor-int.org/wp-content/uploads/2021/07/2021_GEOTRACES_AnnualReport_Annex_FINAL_June.pdf

3.2. Surface Ocean – Lower Atmosphere Study (SOLAS)

SOLAS is co-sponsored by SCOR and Future Earth with additional co-sponsoring from the World Climate Research Programme (WCRP) and the international Commission on Atmospheric Chemistry and Global Pollution (iCACGP). Jessica Gier presented the updates for SOLAS. The SOLAS IPO will be moving to Ireland and will be linked to an international MSc program on Ocean-Atmosphere-Climate interactions. Cliff Law stepped down as co-chair and Cecile Guieu was nominated as the new co-chair. SOLAS is a partner of the UN Ocean Decade endorsed project Coastal-SOS, the co-organiser of the Satellite Activity Air-Sea Observations for a Clean Ocean, Nov 2021, and co-sponsor of the 53rd International Liège colloquium on Ocean Dynamics, May 2022. SOLAS is organizing their Open Science Conference in hybrid mode in September 2022 in Cape Town, the 2022 Summer Scholl (online) and the 2023 Summer School at Cape Verde. SOLAS prepared a mid-term report with their progress of the last five years and vision for the next five to comply with a review of the project by SCOR and the other sponsors. The SSC met virtually. Joyce Penner, the SOLAS liaison to the SCOR EC asked how were the discussions with International Global Atmospheric Chemistry (IGAC) going. Gier responded that there had been a meeting with IGAC to brainstorm about overlap and synergies between SOLAS and IGAC, but no definitive results yet. Penner noted that SOLAS was doing a great job and recommended to continue support. No further action was required. SOLAS support is provided by specific funding from NSF grants to SCOR.

Full report: https://scor-int.org/wp-content/uploads/2021/07/SOLAS-Report-to-SCOR-2020-2021_final.pdf

Narrated presentation: <https://drive.google.com/file/d/1XWl8zrrFTT-9KsuVtq0RR7GchxNxRaye/view?usp=sharing>

Presentation: <https://scor-int.org/wp-content/uploads/2021/10/SOLAS-2021-for-SCOR-presentation-narrated.pptx>

3.3. Integrated Marine Biosphere Research (IMBeR)

IMBeR is also co-sponsored by SCOR and Future Earth. Carol Robinson presented the updates for IMBeR. Although COVID-19 made in-person meetings, research cruises, and field work difficult over the period of this report, IMBeR was able to make progress towards achieving the objectives of the Grand and Innovation Challenges. IMBeR prepared a mid-term report with their progress of the last five years and vision for the next five to comply with a review of the project by SCOR and the other sponsors. IMBeR is actively looking for new SSC members and for a new co-chair to replace Carol Robinson. The SSC met virtually. The project produced 171 publications, 59 in dedicated research topics, 1 policy relevant report, 2 conferences, and 8 workshops. The two major activities were the Imbizo 6, and ClimEco7 (summer school – attended by 60 early career researchers from 38 countries), both endorsed by UN Ocean Decade. The Marine Data Hub is progressing, it has bio/chemical data but also economic, and political data. Their Priority Research Areas are: 1) Cumulative effects of multiple stressors, 2) integrated data systems, 3) Implementation of International targets for MSP + MPAs. The SSC will meet at the end of the year to create work plan. Some planned events are the IMBeR West Pacific Symposium (virtually in November 2021), the 2nd IMBeR West Pacific (mid 2022, in person), and the ClimEco8 (mid 2022, in person). Stefano Aliani, the IMBeR liaison to the SCOR EC and one of the co-chairs of the IMBeR Review Committee noted that IMBeR was overall great program, and some suggestions would be delivered soon through the review report. One of the recommendations was to improve online communication, and to keep an eye on diversity inclusion (some people don't have reliable internet connections), and a ThinkTank dedicated to ocean decade which was already partly addressed. No further action was required. IMBeR support is provided by specific funding from NSF grants to SCOR.

Full report: <https://scor-int.org/wp-content/uploads/2021/08/IMBeR-2021-Annual-Report-for-SCOR.pdf>

Narrated presentation: <https://scor-int.org/wp-content/uploads/2021/10/IMBeR-SCOR-2021.mp4>

3.4. International Quiet Ocean Experiment (IQOE)

The IQOE is co-sponsored by SCOR and the Partnership for the Observation of the Global Ocean (POGO). Jacqueline Uku, the IQOE liaison to the SCOR EC presented the updates for the IQOE on behalf of Peter Tyack who had connection problems due to a storm. Although the COVID-19 pandemic made it impossible to hold in-person meetings to advance goals of the International Quiet Ocean Experiment (IQOE) from early 2020 until now and hindered acoustic observations related to the project, IQOE continued making progress. The IQOE Experiment Science Plan was released in 2015 and a project Science Committee (SC) was formed that year by the two organizational sponsors, the Scientific Committee on Oceanic Research and Partnership for Observation of the Global Ocean. Ed Urban is the project manager. IQOE is at its mid-term, with a planned completion in 2025. The project has been able to accomplish a variety of useful tasks and produce some notable products. In addition, IQOE has (1) enhanced the visibility of endorsed national and regional projects at an international level, through the IQOE Newsletter and Website, (2) encouraged networking among IQOE-endorsed projects, and (3) increased the visibility of the importance of ocean acoustics in many nations. Plans for 2022 include the creation of MANTA-based data product and synthesis publication of COVID impacts and to finalize the drafting of the Ocean Sound EOV Implementation Plan. Lilian Krug (POGO) will contact Ed Urban regarding a call for hydrophone metadata to be submitted to MANTA. Uku recommended to continue to support 2022 activities (workshop) with unused 2020 approved funds. Uku also recommended a re-evaluation of geographic scope to IQOE observations.

Full report: https://scor-int.org/wp-content/uploads/2021/08/IQOE_2021-Report-for-SCOR-Meeting.pdf

Narrated presentation: https://scor-int.org/wp-content/uploads/2021/10/IQOE_Meeting-with-Peter-Tyack.mp4

3.5 Second International Indian Ocean Expedition (IIOE-2)

The IIOE-2 is co-sponsored by SCOR and the IOC. Marie Alexandrine Sicre replaced Peter Burkill as one of the co-chairs of the IIOE-2 Core Group and presented the updates of IIOE-2 activities. The International Indian Ocean Science Conference 2020 (IIOESC-2020) that was scheduled to take place on the from 16th to 20th March 2020 in Goa, India, had to be postponed and is currently rescheduled from the 14 to 18th March 2022 on hybrid mode. Several cruises and projects were cancelled and there are no clear plans to do them later (e.g., Germany), though some were just postponed (e.g., USA). Our inability to have in person meetings has also had a significant negative impact on IIOE-2 activities. Satya Prakash who has overseen the IIOE-2 Joint Project Office and Co-Secretary of IOGOOS located at the Indian National Centre for Ocean Information Services (INCOIS) in Hyderabad sadly passed away in July 2021. The Joint Program Office (Perth) will no longer operate as the funding from the West Australia government was terminated in September 2021, so now everything is organised by the project office in Hyderabad, India. The IIOE-2 has a structure of three WGs, the first on science and research the second on data and information, and the third in operational coordination. The Chairs are meeting 3-4 times a year. There are 28 countries involved, 17 cruises, 45 projects endorsed, >100 papers published. A special issue in Biogeosciences is ongoing with 6 manuscripts already submitted. There are 5 special issues in deep-sea research published, and the 6th one in preparation. A book is under development with 20 chapters, some already drafted,

lead authors assigned. The Core Group met virtually in January 2021, and the SSC met virtually in April 2021 over 4 days. The presentations are online. The IIOE-2 has a bi-annual newsletter reaching out to nearly 1000 people, 13 issues have been published. The IIOE-2 portal includes data and metadata from the cruises. Sicre recommended to continue to support for 2022 activities at the approved budget.

Full report: https://scor-int.org/wp-content/uploads/2021/09/IIOE-2-annual-report-2021_VFF2.pdf

Presentation: https://scor-int.org/wp-content/uploads/2021/10/IIOE-2-annual-report-202113_slides.pdf

At the end of the three-hour session of Day 2, Sinjae Yoo acknowledged all the work done by the SCOR WGs and the research projects. He thanked the presenters and the participants in the discussions and closed the session.

4. INFRASTRUCTURAL PROJECTS

The summary slides for Day 3 of the meeting can be found at:

https://scor-int.org/wp-content/uploads/2022/08/SCOR_Annual2021_Day3-PartA.pdf

https://scor-int.org/wp-content/uploads/2022/08/SCOR_Annual2021_Day3-PartB.pdf

4.1. The Southern Ocean Observing System (SOOS)

SOOS is co-sponsored by SCOR and the Scientific Committee on Antarctic Research (SCAR). Alyce Hancock presented the updates of SOOS. SOOS developed the new 5-year (2021-2025) Science and Implementation Plan (SIP). The SIP was reviewed by four independent reviewers coordinated by SCAR and SCOR, and the revisions by SOOS are underway. Louise Newman, the SOOS Executive Officer resigned and was replaced by Alyce Hancock. The SOOS international project office (IPO) is based at the University of Tasmania. It is currently half-way through a funding Partnership between the University of Tasmania's Institute for Marine and Antarctic Studies (UTAS-IMAS), the Tasmanian State Government Department of State Growth (DoSG), and the Commonwealth Scientific and Industrial Research Organisation (CSIRO). The funding includes salary for the data officer and Executive Officer, some operational funds for SOOS, and in-kind hosting of the office at UTAS. The Partnership runs from Jan 2020 – Dec 2022. SCOR and SCAR provide \$10k per year each to SOOS to support their SSC meetings. Miloslavich noted that the action was to consider renewing the funding for a 3-year period at the budgeted level as was done in 2018 at the SCOR Annual Meeting in Cape Town rather than on yearly cycles as it had been done before 2018, as the extended approval provides program, stability. Trevor McDougall, the SOOS liaison to the SCOR EC noted the SOOS SIP was being revised and anticipated its approval. He recommended to approve funding for SOOS for three years.

Full report: <https://scor-int.org/wp-content/uploads/2021/08/2020AnnualReport-SOOS.pdf>

Narrated presentation:

<https://drive.google.com/file/d/1IWqkGkcZljqEYtIjMfFM4XzTslhONMM8/view?usp=sharing>

Presentation: https://scor-int.org/wp-content/uploads/2021/10/SOOS_SCOR_2021_Short.pptx

4.2. International Ocean Carbon Coordination Project (IOCCP)

The IOCCP is co-sponsored by SCOR and the IOC. Maciej Telszewski presented the updates for the IOCCP. The IOCCP efforts this year have been focused on 3 activities: (1) Publishing a commentary in Nature alerting a variety of stakeholders to the problem, (2) Organizing a technical workshop focused on building a blueprint of the technical, financial and organizational solutions allowing for

sustainable ocean carbon flux monitoring required to deliver an annual traceable, robust estimate of ocean carbon uptake, and (3) Continuous liaison with stakeholders: at COP 26, UNFCCC SBSTA, UN Oceans Conference. The SSG met virtually in November 2020 and will meet in Sopot in November 2021. A desired goal is to strengthen support for observing networks since observing networks are mostly supported by short term research funding instead of long-term operational funding. They are also contributing to building a global ocean oxygen database and atlas and would like to have more than one lab to develop certified reference material. The need is to have potentially two secondary labs, maybe one in Europe and one in Asia/Australia. No further action was required. IOCCP funding is provided by specific funding from an NSF grant to SCOR. No further comments from Brad Moran, the IOCCP liaison to the SCOR EC.

Full report: <https://scor-int.org/wp-content/uploads/2021/07/2021-IOCCP-report-SCOR.pdf>

Narrated presentation: https://drive.google.com/file/d/16u_gXcaX9adkhu-GTgJbF_NcvqB4hIXZ/view?usp=sharing

4.3. Changing Ocean Biological Systems (COBS)

Sinead Collins presented the updates for COBS. The group has successfully transitioned from WG149 to the COBS SCOR infrastructural project. The new ToRs were revised and approved by the SCOR Executive Committee. COBS has developed 5 new task teams, each of which are working on working documents. A further fledgling task team that links our COBS activities in natural sciences with those in human systems (socio-ecology, see <https://imber.info/>) in the IMBER programme is being developed. Details can be found on the recently updated www site <https://scor149-ocean.com/new-page-1>. COVID has hindered the progress of the COBS in several ways, including restricting our 3 day annual meeting (a key opportunity for discussion and development of new ideas and tools) to a series of 1.5 h Zooms using time zone clusters, over a 2 day window, and by limiting the 'band-width' of our members such that they had much less time for inter-session activities due to having to develop online resources for example lectures at their home institutions. Some highlights presented were: (1) Deployment of multi-stressor experiments workshops and ocean literacy activities, (2) Working on several manuscripts, (3) Working with IMBeR to enhance engagement with social sciences for multi-stressor experiments, and (4) Develop multi-stressor maps at higher resolution following the approach of Gruber et al. 2011. Funding to COBS is provided from NSF specifically for the group through SCOR, no action was required. Sinjae Yoo the COBS liaison to the SCOR EC had no further comments.

Full report: <https://scor-int.org/wp-content/uploads/2021/08/SCOR-COBS-SCAug2021.pdf>

Narrated presentation: <https://drive.google.com/file/d/1My-FDI7Ji9-PQDHComomfGKxClczu-io/view?usp=sharing>

4.4. GlobalHAB

GlobalHAB is co-sponsored by SCOR and the IOC. Elisa Berdalet presented the latest updates of GlobalHAB. All meetings in 2021 were held virtually. Elisa Berdalet is contributing to a working group of ANCA IOCARIIBE with specific focus on the scientific questions concerning HABs in Latin America and to address the main HAB challenges (e.g. Sargassum beachings, and ciguatera food poisoning). GlobalHAB is contributing to the IOCCG (2021) report on Observation of Harmful Blooms with Ocean Colour Radiometry, to the 19th International Conference on Harmful Algae (ICHA 2021) and to Best Practice Guidelines for the Study of HABs and Climate Change. Po Teen Lim has been proposed as the next GlobalHAB vice-chair. SCOR still holds past funds from GlobalHAB to support their activities

in 2021 or in 2022 if needed depending on when face to face meetings are possible again. Sinjae Yoo the GlobalHAB liaison to the SCOR EC had no further comments.

Full report: https://scor-int.org/wp-content/uploads/2021/07/GlobalHAB-Progress-Report2021_to-SCOR-2021-07-03-submitted.pdf

Narrated presentation: https://scor-int.org/wp-content/uploads/2021/10/GlobalHAB_2021-SCOR-Annual-meeting.mp4

4.5. Joint Committee on Seawater (JCS) (IAPWS/SCOR/IAPSO)

The JCS is co-sponsored by SCOR, the International Association for the Properties of Water and Steam (IAPWS), and the International Association for the Physical Sciences of the Oceans (IAPSO). Rick Pawlowicz presented the updates for this group. COVID-19 has disrupted global collaboration in JCS. A planned “virtual” meeting was to have happened summer 2021, will now be in fall 2021. The pH subgroup continues its work (under the aegis of SCOR WG 145). JCS maintains a web site at www.teos-10.org. This site gets 750-1300 visitors per month (9,007 in the past year, with 73311 “unique views” since Oct 2010). Annual downloads are stable. The hosting of TEOS-10 continues to be with Webcentral in Australia (formerly called Netregistry) but the hosting plan was changed to one that is about 50 % cheaper; costs are now being covered by IAPSO. Users should not experience any changes to the site or download speeds. SCOR provides a small amount of funding each year to enable the JCS chair and others to attend annual meetings of the International Association for the Properties of Water and Steam (IAPWS). Trevor McDougall, the JCS liaison to the SCOR EC commented that the group is doing great and recommends to continue SCOR support for JCS activities as approved in the 2021 budget.

Full report: https://scor-int.org/wp-content/uploads/2021/10/JCS_Report_20211013.pdf

5. AFFILIATED PROJECTS AND NON-GOVERNMENTAL ORGANIZATIONS

5.1. International Ocean Colour Coordinating Group (IOCCG)

The IOCCG is sponsored by a NASA grant managed by SCOR. Raisha Lovindeer presented the updates for the IOCCG. IOCCG has a system of working groups that produce scientific monographs to advance the field of ocean color observations from satellites. IOCCG and the SCOR/IOC GlobalHAB project co-sponsor a working group on Harmful Algal Blooms. The IOCCG Executive met on 25 Feb and 2 March 2021, and the Committee met virtually over 2 weeks in May 2021. The next meeting is scheduled for April 26-29, 2022, in Italy (hosted by ESA). With regards to capacity development initiatives, 24 students were selected for the 2020 Summer Lecture Series but it was cancelled due to the pandemic. Lecturers agreed to an online Q&A for selected students. Applications for the 2022 Summer Lecture Series will open in Jan 2022. The application for the Trevor Platt Memorial Scholarship was delayed due to the pandemic and scheduled to open in 2022. There is a possible collaboration with EUMETSAT for a dedicated online course. The next Int’l Ocean Colour Science meeting is scheduled for May 2023 in USA. SCOR manages NASA grants for IOCCG. Sinjae Yoo the IOCCG liaison to the SCOR EC had no further comments.

Full report: https://scor-int.org/wp-content/uploads/2021/07/IOCCG_Annual_report_2021_SCOR.pdf

Presentation: https://scor-int.org/wp-content/uploads/2021/09/SCOR-IOCCG-presentation-Oct_2021.pdf

5.2. InterRidge - International, Interdisciplinary Ridge Studies

Sang-Mook Lee presented the updates for InterRidge. The InterRidge Office transferred from IPGP (Institut de physique du globe de Paris) in France to Seoul National University in Korea in May 2020. The online newsletter is resuming after a year of interruption. The InterRidge website (www.interridge.org) has a new look and new information and data are being added and updated. The newsletter will be sent out monthly and as before will include recent information on mid-ocean ridge studies occurring around the world as well as meetings, student fellowships, and travel bursaries for joining the seagoing cruises. A new important activity of InterRidge is the launch of scientific webinar series on mid-ocean ridge research and deep-sea studies. This will be conducted monthly and will be important for scientific debate and discussion in this age of restricted travel. Lee noted that it had been difficult in the last few years due to disengagement of USA and China followed by COVID-19 pandemic but that hopefully USA and China will re-join by the end of 2021 or in 2022. Jing Zhang, the InterRidge liaison to the SCOR EC recommended to contribute more data into OBIS or other open-access repository. No further action was required.

Full report: <http://www.interridge.org/newsletter/interridgenewsletter202109-2/>

5.3. Global Alliance of CPR Surveys (GACS)

Anthony Richardson presented the updates for GACS through a narrated presentation. GACS will expand observations to the Arctic as the basin progressively becomes ice free. A study found that copepods are generally larger in colder water (mean length negatively correlates with SST). Warming will lead to loss of copepod biomass. This should be parameterized in models for climate forecast. GACS will use Plankton Lifeform Extraction Tool for global assessments. Enrique Montes asked about the plans of GACS to expand plankton observations to tropical seas where there are major observational gaps. He strongly recommended developing a strategy to address lack of coverage in the tropics. Jacqueline Uku, the GACS liaison to the SCOR EC noted that the lack of observations in the tropics leads to the loss of expertise in zooplankton ecology in these areas. No further action was required.

Narrated presentation: <https://drive.google.com/file/d/1xsZjn17OLtKuA0P-tGPZVwvmssCWsdeD/view?usp=sharing>

5.4. International Association for Biological Oceanography (IABO)

Enrique Montes presented the updates for IABO. IABO supports the organization of the World Conference on Marine Biodiversity (WCMB) conferences by reviewing proposals from bidding organizations and providing advice in the planning and scoping of these events. During the past WCMB conference held in December 2020 (online), IABO held a reporting session in which the current Executive Committee and Task Group members were ratified for through 2023. Profs. Edgar and Hawkins were recognized with the Carlo Heip Excellence Award for their outstanding contributions in the field of marine biodiversity during an online ceremony. IABO also evaluated and selected bid proposals for upcoming WCMB conferences. IABO reviewed bid proposals and selected submissions by the Centre for Marine and Coastal Studies at Universiti Sains Malaysian and the Flanders Institute at Ghent for the 6th and 7th WCMB meetings respectively. IABO received \$5,000 USD originally intended to cover travel costs for 3-5 participants to attend the 5th WCBM to be held in Auckland, New Zealand, but due to travel restrictions from the Covid-19 pandemic these funds were used instead to cover registration costs for attending the 5th WCMB in its virtual format. IABO

received a formal invitation to help develop or solicit projects for the Ocean Decade as part of the endorsed Marine Life 2030 Ocean Decade Programme, and the association will soon announce this partnership to IABO's membership to collate expressions of interest to contribute ideas to ML2030. No further action was required but a recommendation was that IABO opens a Twitter account.

Full report: https://scor-int.org/wp-content/uploads/2021/09/IABO_Report_SCOR_2020-2021.pdf

Narrated presentation: https://drive.google.com/file/d/1JVgOebEG570dzhxK8y4-yZ4_OEFpMDde/view?usp=sharing

Presentation: https://scor-int.org/wp-content/uploads/2021/10/IABO_SCOR2021notes.pdf

5.5. International Association for the Physical Sciences of the Oceans (IAPSO)

Trevor McDougall presented the updates for IAPSO. IAPSO works mainly through biennial scientific assemblies, working groups, committees, commissions and services, and website information. Since 2019 IAPSO is sponsoring two IAPSO Best Practice Study Groups every two years. These Study Groups are designed to assess technical and computational choices that are available, and to recommend best practices in the field. IAPSO has an Early Career Scientist Working Group which met for the first time in 2019. The ECS medal winners were Dr. Thomas Wahl (USA) and Dr. Jessica Fitzsimmons (USA). Prof. Carl Wunsch won the 2021 Prince Albert I Medal. In conjunction with IACS, IAPSO is establishing a new Joint Commission: Joint IAPSO/IACS Commission on Ice-Ocean Interaction. Organization for oceanographic standards and services. IAPSO plans to continue to continue its work as new systems need calibration and inter-comparison, to continue with the biannual assemblies and work to encourage scientists from less developed countries, help early career scientists and continue to improve gender balance. No further action was required.

Full report: <https://scor-int.org/wp-content/uploads/2021/09/IAPSO-Annual-Report-21Sep2021.pdf>

Presentation: https://scor-int.org/wp-content/uploads/2021/10/IAPSO_SCOR_EC_Oct2021.pptx

5.6. International Association for Meteorology and Atmospheric Sciences (IAMAS)

Joyce Penner presented the updates for IAMAS. IAMAS had a Virtual Atmosphere-Cryosphere-Oceanography seminar series (VACO 2021) from July 19-23, 2021. The meeting was organized as 5 general topics, with one invited talk from each association. IAMAS established an Early Career Scientist Committee and chose Jing Li (Peking University) as Chair, Sarah Perkins-Kirkpatrick as Vice-Chair who will participate in the monthly Bureau meetings. IAMAS established a Facebook page and Twitter feeds and WeChat. The Early Career Committee has established monthly virtual seminars to help build the community, and IAMAS is planning to have a special Early Career Workshop prior to the next meeting in Berlin in 2023.

Full report: <https://scor-int.org/wp-content/uploads/2021/09/2021-IAMAS-report-to-SCOR.pdf>

Narrated presentation: https://scor-int.org/wp-content/uploads/2021/10/IAMAS_video_report.mp4

Presentation: https://scor-int.org/wp-content/uploads/2021/10/IAMAS_Penner_Slides_for_10_Minute_recording.pptx

6. INTERGOVERNMENTAL AND PARTNER ORGANIZATIONS

6.1. Intergovernmental Oceanographic Commission (IOC)

Salvatore Arico presented the updates for the IOC. The IOC and SCOR have long successfully cooperated and thereby strengthened research and scientific programmes. The IOC Secretariat looks

forward to sharing with SCOR its views on those proposals for new and to-be-renewed SCOR Working Groups that more closely reflect the current priorities of IOC in ocean science and support the UN Decade for Ocean Science and Sustainability. IOC co-supports with SCOR GlobalHAB, the IOCCP, and the IIOE-2, but other activities involving close cooperation between the IOC and SCOR are the COBS project, the International Group for Marine Ecological Time Series (IGMETS), formerly SCOR WG# 137, ocean acidification, and other jointly ocean carbon activities with the contributions of SOLAS and IMBeR. Salvatore Arico focused on the outcomes and challenges for the UN Ocean Decade for Ocean Science and Sustainable Development, and on how to engage with the Decade. Marie-Alexandrine Sicre, the IOC liaison to the SCOR EC noted that several SCOR WGs and Programmes are actively engaged in UN Decade as endorsed programs/projects and looks forward to participating in IOC's sub-commissions.

Full report: https://scor-int.org/wp-content/uploads/2021/10/IOC_Annual_Report_SCOR_2021.pdf

6.2. North Pacific Marine Science Organization (PICES)

Sanae Chiba presented the updates for PICES. COR and PICES have developed cooperative methods that have made it possible for an international non-governmental organization and a regional intergovernmental organization to share their strengths. Continuing and expanding collaboration between PICES and SCOR is based on the recognition that PICES can play an important role in bringing a North Pacific perspective to the global activities of SCOR, and that by participating in and implementing these activities in the region, PICES can advance its own scientific agenda. The three main areas of SCOR and PICES collaboration are: (1) reciprocal representation of executive members at annual meetings and other activities, (2) contribution of scientific expertise to the relevant international scientific projects (through participation to SCOR WGs and co-sponsoring scientific projects and workshop/conference) and (3) capacity development (e.g. Sponsoring Summer School, Promotion of Early Careers, Supporting travel for scientists from developing countries). Sanae Chiba is the new PICES Deputy Executive Secretary and will serve in the SCOR Capacity Development Committee. Opportunities for further collaboration include: expanding activity network beyond NA/NP, science communication, uptake of Indigenous knowledge, involvement of SIDs, empowerment of Women, and a greener ocean science. Sinjae Yoo the PICES liaison to the SCOR EC had no further comments.

Full report: https://scor-int.org/wp-content/uploads/2021/08/PICES-Report-for-SCOR-2021_20210729-.pdf

Presentation: <https://scor-int.org/wp-content/uploads/2021/10/2021-SCOR-Annual-Meeting-PICES.pptx>

6.3. Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP WG38)

Bob Duce presented the updates of the GESAMP WG 38. During the past year GESAMP WG 38 has focused its attention on the following four areas: 1) Carrying out a virtual workshop on the atmospheric transport of microplastics to and from the ocean in collaboration with WG 40; 2) Continuing development of a workshop on the ocean management and policy implications of the air/sea exchange of chemicals; 3) Expansion of interactions with the Future Earth research program Surface Ocean - Lower Atmosphere Study (SOLAS); and 4) Carrying out other WG activities. They present information on peer-reviewed publications of WG 38 in 2020 and 2021 and plans for WG 38 for 2021-2022. The GESAMP WG38 organized the "Workshop on the atmospheric transport of microplastics to and from the ocean" on November 17-19, 2020. For the eighth year in a row WG 38 organized a session on atmospheric input of chemicals to the ocean for the 2021 European Geosciences Union meeting, held in Vienna, Austria in April – "Air-sea Exchanges: Impacts on

Biogeochemistry and Climate”. A number of oral and poster papers at this session were presented by a combination of WG 38 members and other scientists.

Tim Jickells, Robert Duce, Melanie Bergmann, and Peter Liss (all members of WG 38) have organized a session at the American Geophysical Union Fall Meeting in December 2021 in New Orleans, LA entitled “Microplastics in the Atmosphere and Ocean”. WG38 continues to maintain contact with the International Nitrogen Initiative, and Tim Jickells has contributed to their developing nitrogen flux methods publication. SCOR is still holding some funding for GESAMP WG 38 provided by SOLAS and the IOC. Jing Zhang recommended presenting scientific information useful across policy levels in a way that highlights relationships between nutrients and biomass burning/industrial emissions across countries in the Indian Ocean.

Full report: https://scor-int.org/wp-content/uploads/2021/07/WG-38-GESAMP_Annual-Report-to-SCOR-2021.pdf

6.4. Partnership for Observation of the Global Oceans (POGO)

Lillian Krug presented the updates for POGO. SCOR and POGO co-sponsor the POGO-SCOR Operational Oceanography Visiting Scholars, as well as the International Quiet Ocean Experiment (IQOE). The three pillars of POGO are (1) innovation and development of the ocean observing system, (2) capacity development, and (3) outreach and advocacy. The POGO website was recently updated to reflect more accurately these three pillars. Sophie Seeyave explained how to get involved with POGO which may be through becoming a member, becoming an ocean training partner and/or contributing to Oceanscape (Oceanscape.org). Sinjae Yoo the POGO liaison to the SCOR EC had no further comments.

Full report: https://scor-int.org/wp-content/uploads/2021/08/POGO_GeneralReport_SCOR_2021.pdf

Presentation:

https://drive.google.com/file/d/192_LkEKhhWGkQ37jWaD7gl2W4eklZNFT/view?usp=sharing

6.5. International Science Council (ISC)

Mathieu Denis presented the updates for the ISC. The International Science Council (ISC), launched in June 2018 has established a new full governing board; developed and implemented forward-looking strategies, policies and work plans focused on operationalizing the ISC vision and mission; invested in connecting and working much more closely with their members; and built an ambitious, relevant, and responsive portfolio of scientific activities that address major contemporary global challenges for both science and society. ISC has expanded their science and policy networks and improved their communication and outreach capacity. In October 2021 the ISC had the 2nd General Assembly in which the 2022-2024 action plan was adopted along with two resolutions: to have coordinated action in favour of necessary reform of the scientific publishing industry, and to welcome the UN SG’s intention to re-establish the Scientific Advisory Board and to develop a strategy that mobilizes the expertise of members, scientific networks, and partners. The SCOR Executive Committee and Executive Director responded to the ICSC review of SCOR. The ‘International Initiatives Leadership’ (IIL) that was planned for March 2020 in Paris was rescheduled as an online meeting in March 2021. The meeting was aimed to discuss the science needed for sustainability and how the science community can strengthen its collective impact on global decision-making. The IIL and the 2nd General Assembly were attended by Sinjae Yoo, Marie Alexandrine Sicre and Patricia Miloslavich on behalf of SCOR. Under the new ISC structure, SCOR is a “Thematic Organization” under “Affiliated Bodies” (<https://council.science/what-we-do/affiliated-bodies/>). Within ocean science, the ISC is also a co-sponsor of GOOS, the WCRP and GCOS and has an MoU with the IOC for cooperation in support of the development and implementation of the UN Ocean Decade. Marie-Alexandrine Sicre, the ISC liaison to the SCOR EC noted that the UN Ocean

Decade will provide opportunities to expand collaborations between ISC and SCOR, and identify an agenda for collective actions.

Full report: <https://council.science/annual-report-2020/>

6.6. Scientific Committee on Antarctic Research (SCAR)

Yeadong Kim presented the updates for SCAR. SCOR and SCAR currently co-sponsor the Southern Ocean Observing System (SOOS). The Covid-19 pandemic has continued to severely impact SCAR activities. Although SCAR's biennial Open Science Conference in Hobart in August 2020 had to be cancelled, SCAR hosted SCAR 2020 Online, which attracted 2712 participants from 60 countries. In March 2021, the first virtual meeting of the SCAR Delegates took place, welcoming a new member country as well as a new SCAR President and Vice President. Three new Scientific Research Programmes were approved in late 2020, representing the Antarctic research community response to the key current science questions of global relevance. Paul Myers, the SCAR liaison to the SCOR EC asked if SCAR would also commit to continue funding SOOS at the same level as SCOR and the response was positive.

Full report: https://scor-int.org/wp-content/uploads/2021/08/SCAR_Report-to-SCOR-2021.pdf

6.7. Future Earth – Ocean Knowledge Action Network (OceanKAN)

Clément Brousse, the liaison of Future Earth ocean-related activities and Linwood Pendleton, the Executive Director of the OceanKAN presented the updates for Future Earth and the OceanKAN. Future Earth Secretariat is carrying activities related to ocean science on a regular basis. In addition of liaising with the research projects SOLAS and IMBeR (through funding, sharing of opportunities etc.), Future Earth Secretariat worked this year with the Ocean KAN (Knowledge Action Network) to have it become independent, through the installation of an international project office IPO). Since autumn 2020, Future Earth, with the Ocean KAN development team, and a group of individuals from SCOR, WCRP and the IOC-UNESCO (in their individual capacity) released a call for application to find a host for the Ocean KAN International Project Office. After receiving 4 applications, the Selection Committee chose a French Consortium (led by CNRS) to host the Ocean KAN IPO for the coming 3 years. The IPO was officially launched in July 2021. Linwood Pendleton has been hired to lead the IPO.

Full report: <https://scor-int.org/wp-content/uploads/2021/10/Clement-2-2021-FE-Ocean-activity-report-for-SCOR.pdf>

6.8. World Climate Research Program (WCRP)

Hindumathi Kulaiappan presented the updates for the WCRP. WCRP is in the process of implementing its new research strategy (WCRP Strategic Plan 2019-2028). Major elements of the implementation plan are to strengthen support for core research, ensure engagement of the next generation of scientists and improve the diversity of WCRP leaders—across nations, regions, and disciplines, deepen their interaction with partners at the national and international levels, and ensure that society has the climate knowledge that it needs for decision-making. The new WCRP structure was fully approved at the 42nd Session of the Joint Scientific Committee (JSC-42) held in June/July 2021, and will be fully operational by late 2022, with the first step being the development of the Implementation Plan.

WCRP carries most of its activities through four core projects: CLIVAR (oceans and climate - www.clivar.org), CliC (cryosphere and climate - www.climate-cryosphere.org), GEWEX (water and

climate www.gewex.org) and SPARC (upper atmosphere and climate - <http://www.sparc-climate.org>). Both CLIVAR and CliC are endorsers of the SCAR/SCOR Southern Ocean Observing System (SOOS). Of these core projects the work of CLIVAR is of relevance to SCOR. All CLIVAR meetings in the past 12 months have been organised virtually, including the SSG-26 and the WCRP-CLIVAR Workshop on Climate Interactions among the Tropical Basins. To increase the presence of ECS in the CLIVAR community, the CLIVAR SSG suggested each panel to recruit at least one ECS as panel members and build strong link with ECS organizations, such as the Young Earth System Scientists (YESS) community. The CLIVAR-FIO Summer School on Ocean Macroturbulence and Its Role in Earth's Climate is now rescheduled for 19-25 June 2022, in Qingdao, China. The 3rd Summer School on Theory, Mechanisms and Hierarchical Modelling of Climate Dynamics: Tropical Oceans, ENSO and their Teleconnections and the CLIVAR-GOOS Workshop titled 'From global to coastal: Cultivating new solutions and partnerships for an enhanced Ocean Observing System in a decade of accelerating change' are also being rescheduled for August 2022 at ICTP, Trieste, Italy. Joyce Penner, the WCRP liaison to the SCOR EC had no further comments.

Full report: https://scor-int.org/wp-content/uploads/2021/10/WCRP_CLIVAR_to_SCOR_2021_v2_clean.pdf

7. CAPACITY DEVELOPMENT ACTIVITIES

7.1. SCOR Committee on Capacity Development

Patricia Miloslavich reported on SCOR's capacity development activities. The SCOR Committee on Capacity Development (CCD) was renewed in 2021 with Missy Feeley (USA/UK), Venu Ittekkot (Germany), Prasanna Kumar (India), Margareth Kyewalyanga (Tanzania), and Sun Song (China) stepping down. An additional ToR was added to the above list related to time of service: "Members of the SCOR Committee on Capacity Development will be appointed for three years, with one additional renewal for a total period of service of 6 years." New appointed members to the Committee are Ntahondwi Nyandwi (Tanzania), Paula Sierra (Colombia), Sun Xiaoxia (China-Beijing), and Rebecca Zitoun (The Netherlands, and an early career scientist). The renovated committee members would like to be more engaged, providing ideas and feedback as stated in the terms of reference, and contributing to SCOR's capacity development activities within their capabilities. They are also discussing the possibility of having regular virtual meetings to discuss new ideas and initiatives. In the past year, the committee reviewed one set of requests for travel support to scientific meetings and reviewed the 2021 SCOR Visiting Scholar applications.

7.2. SCOR Visiting Scholars

The six SCOR Visiting Scholars approved for 2020 to work in Fiji, Angola, India, Philippines, and India along with the four visiting scholars approved for 2021 to work in Brazil, Malaysia, South Africa, and Vietnam were not able to travel due to COVID-19. SCOR will support their travel when they reprogram for 2022. The call for 2022 Visiting Scholars will be issued in late October 2021 to close in December 2021. The article by Ed Urban and Sophie Seeyave (POGO Executive Director) on the SCOR Visiting Scholar Program and POGO Visiting Professor Program submitted to Oceanography magazine was published (doi:10.5670/oceanog.2021.306).

7.3. POGO-SCOR Fellowships for Oceanographic Observations

In 2020 and 2021, 45 and 42 applications for this programme were received. Applicants represented 25 and 27 countries respectively for 2020 and 2021. For both years, most of the candidates proposed host institutions majorly located in Europe and North America. With the combined available budget from POGO and SCOR, a total of 5 candidates were selected in 2020 and 6 in 2021.

SCOR contributed in 2021 an additional amount to support the sixth candidate. Some of the fellows have been able to complete their training, others are underway, and others are in standby.

7.4. NSF Travel Support for Developing Country Scientists

SCOR currently has two ongoing grants with NSF to support capacity development activities. Grant # 1724881 has a No-cost-extension until July 2022 because of the delays in meetings due to COVID-19, with a balance of ~\$17,000. Grant # 2027831 which was approved in 2020 is on its second year, however the full amount of US\$ 225,000 is available due to the lack of travel. For 2020 and 2021 a total of 11 request for funding events was received. Of the requests approved between the 2020 and 2021 SCOR Annual Meetings, only two were completed: the 5th World Conference on Marine Biodiversity used some of the funding to support registrations for 21 participants from developing countries, and the GEOTRACES SWINGS cruise. The rest of the meetings were either cancelled or postponed. SCOR has had the policy of extending the approved amount to a postponed date.

7.5. Research Discovery Camps at the University of Namibia

The 2020 Research Camp was initially postponed from April to December 2020, and then to 2021 because of the pandemic. However, since the conditions for travel in 2021 had not improved, the online series “Discovery Seminars” was organized by the Namibian Research Graduate Network in Oceanography (RGNO). The Namibian RGNO is an international capacity-development and collaboration-promoting project promoted by SCOR. It is executed in partnership between Namibian and international research and training institutions. RGNO's research-based postgraduate programs offer hands-on experience at sea as well as study sections and lab work on land. This program is supported through grants from the Agouron Institute and the Simons Foundation.

Paul Myers raised the question about how SCOR could help in raising awareness on oceanographic research amongst teachers. A suggestion was that this could be an action item for the SCOR Capacity Development Committee. Claudia Delgado (IOC) noted that the Ocean Teacher Global Academy (OTGA) and its e-platform can support SCOR's CD Committee to deliver training courses.

Full report of capacity development activities at: https://scor-int.org/wp-content/uploads/2021/10/Capacity_development_2021.pdf

Full report of POGO-SCOR Fellowship Programme: https://scor-int.org/wp-content/uploads/2021/10/POGO-SCOR-Fellowships_2021-report.pdf

Full report of the African-Regional Graduate Networks in Oceanography (RGNO): https://scor-int.org/wp-content/uploads/2021/10/rgno_scor_report_2020-2021.pdf

8. SCOR ORGANIZATION

8.1. Membership

Patricia Miloslavich reported on current SCOR Member Nations and Nominated Members and changes in composition of the Nominated Members since the 2019 SCOR Annual Meeting. There are currently 32 countries affiliated to SCOR. Since the 2020 SCOR Annual Meeting, the following changes in the SCOR nominated members were made:

- Australia: Andreas Schiller, Peter Doherty and Trevor McDougall stepped down, replaced by Brett Molony, Lesley Clementson, and Bernadette Sloyan
- Chile: Carmen Morales retired, replaced by Marcela Cornejo D'Ottone

- Italy: Annalisa Griffa retired – seeking for new nominated members
- Japan: Kaoru Kubokawa and Toshio Yamagata stepped down, replaced by Naomi Harada and Toshiyuki Hibiya
- Korea: Eun Young Kwon incorporated
- Netherlands: G.M. (Gerald) Ganssen retired
- Russia: Sergei Dobrolyubov retired, replaced by Peter Zavyalov
- UK: Peter Burkill and Gideon Henderson stepped down, replaced by Kerry Howell and Rosalind (Ros) Rickeby

Membership of the National SCOR Committees can be found at:

<https://scor-int.org/scor/committees/>

8.2. Publications Arising from SCOR Activities

Miloslavich reported that SCOR projects and working groups produced many publications in the past year. Working Groups publications acknowledging SCOR summed 24 papers in 2019 and 14 papers in 2020. The project's publications summed ~320 in 2019 and ~270 in 2020, however most of these publications do not acknowledge SCOR or NSF. Proper SCOR acknowledgement when deserved is an ongoing topic that is reminded to the projects and working groups. While there is no standardized definition of what a "SCOR publication" is for the different projects, we must continue to stress the need of acknowledging the sponsors as this is critical for our own funders (e.g. NSF). All WG publications are updated on the SCOR website (<https://scor-int.org/work/publications/>). Several SCOR working groups have special issues or significant papers under development, which will appear in the next year.

9. SCOR RELATED MEETINGS

The SCOR 2020 and 2021 meetings were originally planned to be in Guayaquil, Ecuador and in Busan, Korea but due to COVID-19, these were held online. The meetings were going to be hosted by Instituto Nacional de la Armada (INOCAR) and by the Korea Institute of Ocean Science and Technology (KIOST) respectively. Both INOCAR and KIOST remain enthusiastic about having a SCOR meeting in Ecuador and in Korea and can host the annual meeting in 2022 and 2023. During the 2020 annual meeting, Colombia and China offered to host the SCOR meetings in the near future (2024 and 2025). Sinjae Yoo noted that Korea is willing and able to host the 2022 SCOR Meeting but it had also flexibility to hold in 2023, same as Ecuador. It was agreed that the 2022 meeting will be hosted in Korea and the 2023 meeting in Ecuador. China celebrates the 40th anniversary of the Chinese SCOR Committee in 2024 and requested to host the SCOR meeting in 2024 for a joint celebration. Colombia agreed to host the SCOR meeting in 2024. Kurt Hanselmann asked if the meetings would be organized in a hybrid format and the answer was positive.

See locations of past SCOR meetings at the SCOR website:

<https://scor-int.org/events/category/annual/>

At the end of the three-hour session of Day 3, Sinjae Yoo acknowledged all the work done by the SCOR infrastructural projects, SCOR affiliated projects, and the affiliated and the partner organizations. He thanked the presenters and the participants in the discussions. He made some concluding remarks on the significant progress achieved by the SCOR community and collaborators

despite the difficult COVID-19 situation, announced the selection of three new SCOR WGs (CIce2Clouds, CoNCENSUS, and MixONET) to start in 2022, and highlighted the contribution of SCOR to the UN Ocean Decade through several working groups and projects which have been endorsed as UN Ocean Decade projects or actions. After these concluding remarks, Sinjae Yoo closed the 2021 SCOR Annual Meeting.

APPENDICES

APPENDIX 1. PARTICIPANTS OF THE SCOR 2021 VIRTUAL MEETING

The SCOR 2021 Annual Meeting was attended by more than 200 participants from 56 countries (Figure 1). On the first day, which was open only to the SCOR Executive Committee and Nominated Members, 24 SCOR National Committees and the three affiliated bodies to the Executive Committee (IABO, IAPSO, IAMAS) were represented.

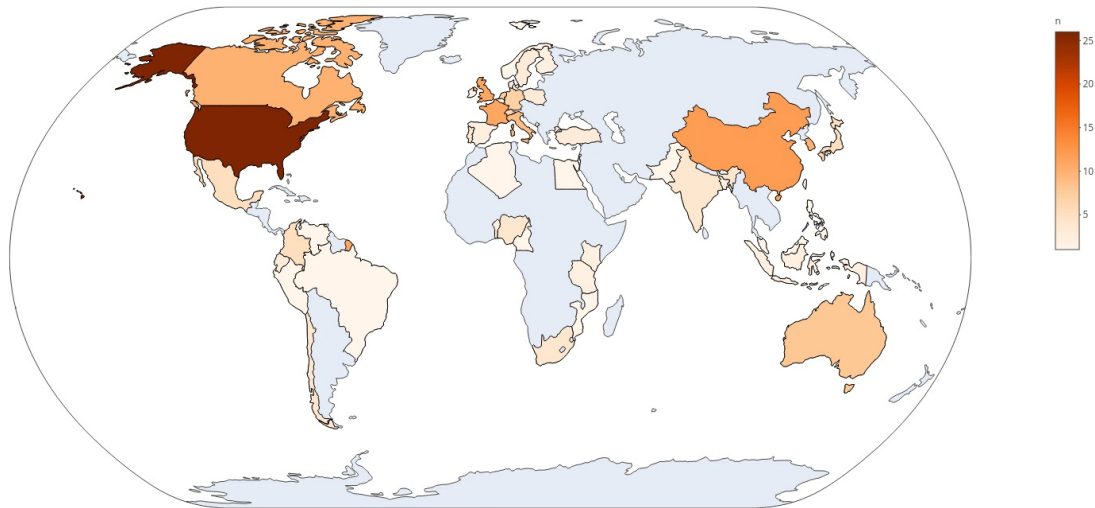


Figure 1. Distribution map of the more than 200 participants to the SCOR 2021 Annual Meeting

Participants – SCOR Executive and staff

Last name	First name	Organization	Country
Aliani	Stefano	ISMAR National Research Council	Italy
Laufkoetter	Charlotte	Bern University	Switzerland
McDougall	Trevor	University of New South Wales / IAPSO	Australia
Miloslavich	Patricia	SCOR	USA
Montes	Enrique	University of South Florida / IABO	USA
Moran	Bradley	University of Alaska Fairbanks	USA
Myers	Paul	University of Alberta	Canada
Penner	Joyce E	University of Michigan / IAMAS	USA
Sicre	Marie-Alexandrine	Centre National de la Recherche Scientifique (CNRS)	France
Uku	Jacqueline	Kenya Marine and Fisheries Institute (KEMFRI)	Kenya
Yoo	Sinjaee	Korea Institute of Ocean Science and Technology (KIOST)	Korea
Zhang	Jing	University of Toyama	Japan

Participants – Nominated Members

Last name	First name	Organization	Country
Aliani	Stefano	ISMAR - National Research Council	Italy
Ansorge	Isabelle	University of Cape Town	South Africa
Arias	Francisco	INVEMAR	Colombia
Arnosti	Carol	University of North Carolina-Chapel Hill	USA
Autio	Riitta	Finnish Environment Institute	Finland
Björk	Göran	University of Gothenburg	Sweden
Casacuberta	Nuria	ETH Zurich	Switzerland
Clementson	Lesley	CSIRO Oceans and Atmosphere	Australia
Cornejo	Marcela	Pontifical Catholic University of Valparaíso	Chile
Costa	Dan	University of California Santa Cruz	USA
Croot	Peter	National University of Ireland Galway	Ireland
Dai	Dejun	First Institute of Oceanography	China
De Nooijer	Lennart	Royal Netherlands Institute for Sea Research (NIOZ)	Netherlands
Hanselmann	Kurt	ETH Zurich	Switzerland
Harada	Naomi	JAMSTEC	Japan
Hibiya	Toshiyuki	University of Tokyo	Japan
Howell	Kerry	University of Plymouth	UK
Inam	Asif	Bahria University	Pakistan
Jang	Chan Joo	Korea Institute of Ocean Science and Technology	Korea
Kostianoy	Andrey	P.P. Shirshov Institute of Oceanology	Russia
Kuparinn	Jorma	University of Helsinki	Finland
Molony	Brett	CSIRO Oceans and Atmosphere	Australia
Moran	Bradley	University of Alaska Fairbanks	USA
Mutlu	Sabri	Istanbul Technical University	Turkey
Myers	Paul	University of Alberta	Canada
Peeken	Ilka	Alfred Wegener Institute	Germany
Peijnenburg	Katja	Naturalis Biodiversity Center	Netherlands
Qiao	Fangli	First Institute of Oceanography	China
Ricaurte	Constanza	INVEMAR	Colombia
Shapovalov	Sergey	P.P. Shirshov Institute of Oceanology	Russia
Sicre	Marie-A.	Centre National de la Recherche Scientifique (CNRS)	France
SierraCorrea	Paula	INVEMAR	Colombia
Sokolowski	Adam	University of Gdansk	Poland
Sloyan	Bernadette	CSIRO Oceans and Atmosphere	Australia
Tagliabue	Alessandro	University of Liverpool	UK
Vera	Leonor	INOCAR	Ecuador
Walczowski	Waldemar	Institute of Oceanology	Poland
Weihs	Daniel	TECHNION	Israel
Zhang	Jing	University of Toyama	Japan

Other participants

Last Name	First Name	Country
Abdelhameed	Ali	Egypt
Aderibigbe	Abiodun	Nigeria
Adjou	Mohamed	United Kingdom
Aktan Turan	Yelda	Turkey
Alam	Md. Wahidul	Bangladesh
Andrade	Selene	Mexico
Aracri	Simona	Italy
Arico	Salvatore	France
Ashraf P	Muhammed	India
Ausubel	Jesse	United States
Bahl	Alexis	Canada
Beniest	Anouk	Netherlands
Benway	Heather	United States
Berdalet	Elisa	Spain
Bluteau	Cynthia	Canada
Borges	Teresa Cerveira	Portugal
Bucklin	Ann	United States
Budillon	Giorgio	Italy
Burca	Mihai	Italy
Campanya -Llovet	Neus	Portugal
Carracedo	Lidia	France
Casciotti	Karen	United States
Castelao	Guilherme	United States
Chen	Arthur	Taiwan
Chiba	Sanae	Canada
Claydon	John	Canada
Clegg	Simon	United Kingdom
Collins	Sinead	UK
Conversi	Alessandra	Italy
Coppolaro	Veronica	Canada
Cotterill	Carol	United States
Coyle	Chris	United States
Cronin	Meghan	United States
Dai	Minhan	China
Delgado	Claudia	Belgium
Denis	Mathieu	France
Deniz Gonzalez	Itahisa	France
Di Capua	Iole	Italy
Diwa	Johanna	Philippines
Djoffon	Dona Morel	Benin
Domingues	Catia M.	United Kingdom
Duce	Robert	United States
Duffy	Emmett	United States
Easley	Regina	United States
Ekpe	Sonigitu	Nigeria

Elegbede	Isa	Germany
Enevoldsen	Henrik	Denmark
Escobar	Elva	Mexico
Espinosa	Liliana	Colombia
Fierro	Juan	Chile
Flynn	Raquel	South Africa
Fourquez	Marion	France
Gali Tapias	Marti	Spain
Gao	Chengcheng	China
Gaona Hernandez	Aurora	United States
Gier	Jessica	Germany
Giering	Sari	United Kingdom
Gobin	Judith	Trinidad & Tobago
Gordon	Nuette	Seychelles
Guan	Shane	United States
Guieu	Cecile	France
Hancock	Alyce	Australia
Hasson	Audrey	France
Hofmann	Eileen	United States
Hong	Gi Hoon	China
Hoogakker	Babette	United Kingdom
Hopkins	Frances	United Kingdom
Hoque	Nymul	Bangladesh
Huggett	Jenny	South Africa
Imbayi	Linnet	Kenya
Jalali	Bassem	China
Kang	Namyoung	South Korea
Kanga Desire	Kouame	Cote D'Ivoire
Katsman	Caroline	Netherlands
Kim	Intae	South Korea
Kim	Yeadong	South Korea
Kiwango	Halima	Tanzania
Kriest	Iris	Germany
Krug	Lillian	Portugal
Kulaiappan	Hindumathi	Switzerland
Kumagai	Hidenori	Japan
Kwon	Eun Young	South Korea
Lakhote	Mandar	India
Lee	Sang-Mook	South Korea
Lepatio Tchieg	Sterve Alain	Cameroon
Li	Jing	China
Li	Li	China
Lim	Po Teen	Malaysia
Lovindeer	Raisha	Canada
Lumban-Gaol	Jonson	Indonesia
Maddison	Lisa	Canada
Mahajan	Anoop	India
Marandino	Christa	Germany

Marchant	Sergio	Colombia
Masferrer	Elena	France
Maske	Helmut	Mexico
Masque	Pere	Monaco
McGregor	Anna	United Kingdom
Meza-Venegas	Manuel	Chile
Mifsud	Carmen	Malta
Montes	Ivonne	Peru
Moreno	Omar	Mexico
Morigi	Caterina	Italy
Moura	Regiane	Brazil
Moeller	Klas Ove	Germany
Nana	Orthy	Congo, Dem Rep
Naranjo	Christian	Ecuador
Niehus	Manfred	Portugal
Nomura	Daiki	Japan
Novitski	Joseph	United States
Nyandwi	Ntahondi	Tanzania
Oguguah	Ngozi	Nigeria
Olapoju	Oluwabukunola	Nigeria
Palanisamy	Hindumathi	Switzerland
Park	Jae-Hyoung	South Korea
Pawlowicz	Rich	Canada
Pendleton	Linwood	France
Pierrot-Bults	Annelies	Netherlands
Poulton	Alex	United Kingdom
Pruckner	Sara	United Kingdom
Robinson	Carol	United Kingdom
Salon	Stefano	Italy
Sangiorgi	Francesca	Netherlands
Santos	Jose	China
Schiller	Andreas	Australia
Schmidt	Jorn	Denmark
Schoo	Katherina	France
Schroeder	Katrin	Italy
Schuback	Nina	Switzerland
Seeyave	Sophie	United Kingdom
Shakirov	Renat	Russian Federation
Shin	Hyoung Chul	South Korea
Simmons	Samantha	United States
Sohou	Zacharie	Benin
Stoclker	Michael	United States
Stuart	Venetia	Canada
Sundaram	Suchithra	India
Susanti	Santi	Indonesia
Swart	Sebastiaan	Sweden
Tapia	Maria	Ecuador
Telszewski	Maciej	Poland

Tollefsen	Dag	Norway
Turner	David	Sweden
Twigg	Emily	United States
Tyack	Peter	USA
Urban	Ed	United States
Verduin	Jennifer	Australia
Vichi	Marcelo	South Africa
Villegas-Mendoza	Josue	Mexico
Voelker	Christoph	Germany
Vukovic	Stefan	Montenegro
Willis	Megan	United States
Yabroudi	Suher Carolina	Venezuela
Yao	Fengchao	China
Yoon	Seung-Tae	South Korea
Yousra	Ghezali	Algeria
Yucel	Mustafa	Turkey
Zeng	Yongqin	China
Zhai	Dongran	United States
Zitoun	Rebecca	Netherlands
Zivane	Francisco	Mozambique
Zuo	Fang	China
Zuniga	Carlos	Chile

APPENDIX 2. MEETING AGENDA

Session 1. Tuesday, 26 October 2021. Chair: Sinjae Yoo / Note taker: Paul Myers
SCOR Executive Committee and National Committee nominated members only

Time (am)	Topic	Presenter
7:00-7:05	Welcome and introduction to agenda – In Memoriam	S. Yoo
7:05-7:10	Report from SCOR President	S. Yoo
7:10-7:15	Report from SCOR Executive Director	P. Miloslavich
7:15-7:45	Report from the SCOR ad hoc 2021 Finance Committee	P. Croot et al.
7:45-8:25	<p>Presentation of new Working Group proposals: Each presentation will be 5 minutes, plus time for a short question/comment (1-2 minutes) at the end of each presentation</p> <ol style="list-style-type: none"> 1. Coupling of ocean-ice-atmosphere processes: from sea-ice biogeochemistry to aerosols and Clouds (Clce2Clouds) 2. Harnessing global pELagic FISH biochemical data to address Sustainability challenges under climate change scenarios (ELFISH) 3. Advancing standardisation of COastal and Nearshore demersal fish visual CENSUS techniques (CoNCENSUS) 4. Mixotrophy in the Oceans – Novel Experimental designs and Tools for a new trophic paradigm (MixONET) 5. From the Ocean to the Lab to the Ocean: best practices for ecologically sound inferences in fluctuating habitats (OLO) 	<p>J. Zhang</p> <p>B. Moran</p> <p>E. Montes</p> <p>J. Uku</p> <p>S. Aliani</p>
8:25-8:30	Break (5 minutes)	
8:30-9:40	Discussion of new Working Group proposals	SCOR Executive and National Committee nominated members
9:40-10:00	Final recommendations and wrap up	S. Yoo

Session 2. Wednesday, 27 October 2021. Chair: Marie Alexandrine Sicre / Note taker: Charlotte Laufkötter
Open to all registrants

Time (am)	Topic	Presenter / EC liaison
7:00-7:05	Introduction to Day 2 session Each presentation will be 5 minutes , plus time for a short question/comment (~1-2 minutes) at the end of each presentation	M. A. Sicre
7:05-8:50	Working Group reports WG 143. Dissolved N2O and CH4 measurements: a global network of ocean time series measurements WG 145. Chemical Speciation Modelling in Seawater to Meet 21st Century Needs (MARCHEMSPEC) WG 148. International Quality Controlled Ocean Database: Subsurface temperature profiles (IQuOD) WG 150. Translation of Optical Measurements into particle Content, Aggregation & Transfer (TOMCAT) WG 151. Iron Model Intercomparison Project (FeMIP) WG 152. Measuring Essential Climate Variables in Sea Ice (ECV-Ice) WG 153. Floating Litter and its Oceanic Transport Analysis and Modelling (FLOTSAM) WG 154. Integration of Plankton-Observing Sensor Systems to Existing Global Sampling Programs (P-OBS) WG 155. Eastern boundary upwelling systems (EBUS) WG 156. Active Chlorophyll fluorescence for autonomous measurements of global marine primary productivity WG 157. Marine zooplankton biodiversity based on DNA (MetaZooGene) WG 158. Coordinated Global Research Assessment of Seagrass System (C-GRASS) WG 159. Deep-Sea Biology for the Decade of Ocean Science for Sustainable Development (DeepSeaDecade) WG 160. Analysing ocean turbulence observations to quantify mixing (ATOMIX) WG 161. Respiration in the Mesopelagic Ocean (ReMO): Reconciling ecological, biogeochemical and model estimates WG 162. Developing an Observing Air-Sea Interactions Strategy (OASIS)	Jing Zhang (for the WG) D. Turner / Sicre C. Domingues / Myers S. Giering / Laufkoetter M. Vichi / Laufkoetter D. Nomura / McDougall S. Aliani / Myers E. Boss / Montes I. Montes / Sicre N. Schubak / Uku A. Bucklin / Montes S. Pruckner / Aliani K. Howell (rec)/ Montes C. Bluteau / McDougall Robinson / Laufkoetter M. Cronin / Myers
8:50-8:55	Break (5 minutes)	
8:55-9:30	Research project reports GEOTRACES – Trace elements and isotopes SOLAS – Ocean/atmosphere interactions IMBeR – Marine biosphere research IQOE – Quiet Ocean	K. Casciotti / Zhang M. Dai / Penner C. Robinson / Aliani P. Tyack / Uku

Session 3. Thursday, 28 October 2021. Chair: Sinjae Yoo/ Note taker: Enrique Montes
Open to all registrants

Time (am)	Topic	Presenter / EC liaison
7:00-7:05	Introduction to Day 3 session Each presentation will be 5 minutes , plus time for a short question/comment (1-2 minute) at the end of each presentation	S. Yoo
7:05-7:35	Infrastructural project reports SOOS – Southern Ocean observing IOCCP – Ocean carbon COBS – Changing ocean on biota GlobalHAB – Harmful Algal Blooms JCS – Joint Committee on Seawater	A. Hancock / McDougall M. Telszewsky / Moran S. Collins / S. Yoo E. Berdalet / S. Yoo Pawlowicz / McDougall
7:35-7:55	Affiliated projects reports IOCCG – Ocean colour InterRidge – Ridge studies GACS – Alliance of Plankton Recorders	R. Lovindeer / Yoo S.M. Lee / Zhang A. Richardson / Uku
7:55-8:15	Affiliated organizations reports IABO – Biological Oceanography IAMAS – Meteorology and Atmosphere IAPSO – Physical Oceanography	E. Montes J. Penner T. McDougall
8:15-8:20	Break (5 minutes)	
8:20-9:15	Partner organization updates IOC – Intergovernmental Oceanographic Commission PICES – North Pacific Marine Science Organization GESAMP – Group on marine environmental protection POGO – Partnership for Observation of the Global Ocean ISC – International Science Council SCAR – Scientific Committee Antarctic Research Future Earth-Ocean/OceanKAN WCRP / CLIVAR – World Climate Research Program	S. Arico / Sicre S. Chiba / Moran B. Duce / Zhang L. Krug / Aliani M. Denis / Sicre Y. Kim / Myers Brousse & Pendleton H. Kulaappan / Penner
9:15-9:20	Report on SCOR capacity development activities	P. Miloslavich
9:20-9:30	Future SCOR meetings / meeting mode Korea 2022, Ecuador 2023, China 2024, Colombia 2025	Open discussion
9:30-10:00	Summary of actions and close of meeting	S. Yoo

APPENDIX 3. LINKS TO WORKING GROUP PROPOSALS

CIce2Clouds: Coupling of ocean-ice-atmosphere processes: from sea-Ice biogeochemistry to aerosols and Clouds

https://scor-int.org/wp-content/uploads/2021/05/CIce2Clouds_final.pdf

ELFISH: Harnessing global pELagic FISH biochemical data to address Sustainability challenges under climate change scenarios

https://scor-int.org/wp-content/uploads/2021/05/SCOR_WG_ELFISH.pdf

CoNCENSUS: Advancing standardisation of COastal and Nearshore demersal fish visual CENSUS techniques

https://scor-int.org/wp-content/uploads/2021/05/21-05_CoNCENSUS_SCOR-proposal.pdf

MixONET: Mixotrophy in the Oceans – Novel Experimental designs and Tools for a new trophic paradigm

<https://scor-int.org/wp-content/uploads/2021/05/SCOR-WG-Proposal-MixONET-FINAL.pdf>

OLO: From the Ocean to the Lab to the Ocean: best practices for ecologically sound inferences in fluctuating habitats

https://scor-int.org/wp-content/uploads/2021/05/Scor-WG-Proposal_OceanLabOcean_OLO.pdf

APPENDIX 4. LINKS TO WORKING GROUP REPORTS

WG 143. Dissolved N₂O and CH₄ measurements: a global network of ocean time series measurements

https://scor-int.org/wp-content/uploads/2021/07/WG143_N2O-CH4_2021_Final_Report.pdf

WG 145. MARCHEMSPEC: Modelling Chemical Speciation in Seawater to Meet 21st Century Needs

https://scor-int.org/wp-content/uploads/2021/07/WG145_Marchemspec_Report-to-SCOR-2021.pdf

Narrated presentation: <https://scor-int.org/wp-content/uploads/2021/09/SCOR-2021-WG-145-Recording-15Sept2021.mp4>

WG 148. IQuOD: International Quality Controlled Ocean Database: Subsurface temperature profiles

<https://scor-int.org/wp-content/uploads/2021/07/WG148-IQuOD-Annual-SCOR-Working-Group-Report-to-SCOR.pdf>

WG 150. TOMCAT: Translation of Optical Measurements into particle Content, Aggregation & Transfer

https://scor-int.org/wp-content/uploads/2021/08/WG150_TOMCAT_report_2021-08-19-Annual-SCOR-Working-Group-Reports-to-SCOR-WG150.pdf

WG 151. FeMIP: Iron Model Intercomparison Project

https://scor-int.org/wp-content/uploads/2021/07/WG151_FeMIP_Annual-SCOR-Working-Group-Reports-to-SCOR_2021.pdf

WG 152. ECV-Ice: Measuring Essential Climate Variables in Sea Ice

https://scor-int.org/wp-content/uploads/2021/07/WG152_ECV_ICE_Reports-to-SCOR-ECV-Ice2020-2021_Final.pdf

WG 153. FLOTSAM: Floating Litter and its Oceanic TranSport Analysis and Modelling

https://scor-int.org/wp-content/uploads/2021/07/WG153_FLOTSAM_Report_2021-V1.pdf

Narrated presentation:

<https://drive.google.com/file/d/1my5p87pYpA9jDipOWIvLoEBsftz0C606/view?usp=sharing>

WG 154. P-OBS: Integration of Plankton-Observing Sensor Systems to Existing Global Sampling Programs

https://scor-int.org/wp-content/uploads/2021/07/WG154_P-OBS_Annual-SCOR-Working-Group-Report-to-SCOR-154-2020-21_AMW.pdf

WG 155. EBUS: Eastern boundary upwelling systems: diversity, coupled dynamics and sensitivity to climate change

https://scor-int.org/wp-content/uploads/2021/08/SCOR-WG155-EBUS_Annual-Report-2021.pdf

WG 156. Active Chlorophyll fluorescence for autonomous measurements of global marine primary productivity

https://scor-int.org/wp-content/uploads/2021/07/WG156_Chlorophyll_Annual-SCOR-Working-Group-Report_2021.pdf

Narrated presentation: [https://scor-int.org/wp-](https://scor-int.org/wp-content/uploads/2021/08/2021_SCORWG156_narrated_updates.mp4)

[content/uploads/2021/08/2021_SCORWG156_narrated_updates.mp4](https://scor-int.org/wp-content/uploads/2021/08/2021_SCORWG156_narrated_updates.mp4)

WG 157. MetaZooGene: Toward a new global view of marine zooplankton biodiversity based on DNA metabarcoding and reference DNA sequence databases

https://scor-int.org/wp-content/uploads/2021/07/WG157-MetaZooGene_Annual-Report-02July2021.pdf

Narrated presentation: <https://drive.google.com/file/d/1oszLjfdurXEbALPArHO83rlcUvcDSY-N/view?usp=sharing>

WG 158. C-GRASS: Coordinated Global Research Assessment of Seagrass System

https://scor-int.org/wp-content/uploads/2021/07/WG158_C-GRASS-2020-2021.pdf

Narrated presentation: https://scor-int.org/wp-content/uploads/2021/10/C-GRASS_plenary_presentation_20211002.mp4

WG 159. DeepSeaDecade: Roadmap for a Standardised Global Approach to Deep-Sea Biology for the Decade of Ocean Science for Sustainable Development

https://scor-int.org/wp-content/uploads/2021/07/WG159_DeepSeaDecade_Annual-SCOR-Working-Group-Reports-to-SCOR_2021.pdf

Narrated presentation: <https://drive.google.com/file/d/1I75BuHGk0rG7v9rHdpTb6MYQ9dZ6UdOK/view?usp=sharing>

WG 160. ATOMIX: Analysing ocean turbulence observations to quantify mixing

https://scor-int.org/wp-content/uploads/2021/07/WG160_ATOMIX_2021_SCOR_WG_AnnualReporting.pdf

Narrated presentation: https://scor-int.org/wp-content/uploads/2021/10/atomix_scor_wg160.mp4

WG 161. ReMO: Respiration in the Mesopelagic Ocean (ReMO): Reconciling ecological, biogeochemical and model estimates

https://scor-int.org/wp-content/uploads/2021/07/WG161_ReMO_Report-2020_21-submitted.pdf

Narrated presentation: <https://scor-int.org/wp-content/uploads/2021/10/ReMO-2021-SCOR-presentation.mp4>

WG 162. OASIS: Developing an Observing Air-Sea Interactions Strategy

https://scor-int.org/wp-content/uploads/2021/07/WG162_OASIS-Annual-SCOR-Working-Group-Reports-2021-final.pdf

Narrated presentation:

<https://drive.google.com/file/d/1nHyIJQctoZGEkE4bYNnVCUB2E9PRYl8c/view?usp=sharing>

APPENDIX 5. LINKS TO RESEARCH PROJECT REPORTS

GEOTRACES – Marine Biogeochemical Cycles of Trace Elements and Isotopes

https://scor-int.org/wp-content/uploads/2021/07/2021_GEOTRACES_AnnualReport_FINAL.pdf

Narrated presentation:

https://drive.google.com/file/d/14APSTHX_CJ7jipNuHFESFZfEH4TP3pz_/view?usp=sharing

Regional activities: [https://scor-int.org/wp-](https://scor-int.org/wp-content/uploads/2021/07/2021_GEOTRACES_AnnualReport_Annex_FINAL_June.pdf)

[content/uploads/2021/07/2021_GEOTRACES_AnnualReport_Annex_FINAL_June.pdf](https://scor-int.org/wp-content/uploads/2021/07/2021_GEOTRACES_AnnualReport_Annex_FINAL_June.pdf)

SOLAS – Surface Ocean – Lower Atmosphere Study

https://scor-int.org/wp-content/uploads/2021/07/SOLAS-Report-to-SCOR-2020-2021_final.pdf

Narrated presentation: [https://drive.google.com/file/d/1XWl8zrrFTT-](https://drive.google.com/file/d/1XWl8zrrFTT-9KsuVtq0RR7GchxNxRaye/view?usp=sharing)

[9KsuVtq0RR7GchxNxRaye/view?usp=sharing](https://drive.google.com/file/d/1XWl8zrrFTT-9KsuVtq0RR7GchxNxRaye/view?usp=sharing)

IMBeR – Integrated Marine Biosphere Research

<https://scor-int.org/wp-content/uploads/2021/08/IMBeR-2021-Annual-Report-for-SCOR.pdf>

Narrated presentation: <https://scor-int.org/wp-content/uploads/2021/10/IMBeR-SCOR-2021.mp4>

IQOE – International Quiet Ocean Experiment

https://scor-int.org/wp-content/uploads/2021/08/IQOE_2021-Report-for-SCOR-Meeting.pdf

Narrated presentation: https://scor-int.org/wp-content/uploads/2021/10/IQOE_Meeting-with-Peter-Tyack.mp4

IIOE-2 – International Indian Ocean Expedition 2

https://scor-int.org/wp-content/uploads/2021/09/IIOE-2-annual-report-2021_VFF2.pdf

APPENDIX 6. LINKS TO INFRASTRUCTURAL PROJECT REPORTS

SOOS – Southern Ocean Observing System

<https://scor-int.org/wp-content/uploads/2021/08/2020AnnualReport-SOOS.pdf>

Narrated presentation:

<https://drive.google.com/file/d/1IWqkGkcZljqEYtIjMfFM4XzTslhONMM8/view?usp=sharing>

IOCCP – International Ocean Carbon Coordination Project

<https://scor-int.org/wp-content/uploads/2021/07/2021-IOCCP-report-SCOR.pdf>

Narrated presentation: https://drive.google.com/file/d/16u_gXcaX9adkhu-GTgJbF_NcvqB4hIXZ/view?usp=sharing

COBS – Changing Ocean Biological Systems

<https://scor-int.org/wp-content/uploads/2021/08/SCOR-COBS-SCAug2021.pdf>

Narrated presentation: <https://drive.google.com/file/d/1My-FDI7Ji9-PQDHComomfGKxClczu-io/view?usp=sharing>

GlobalHAB – Global Harmful Algal Blooms

https://scor-int.org/wp-content/uploads/2021/07/GlobalHAB-Progress-Report2021_to-SCOR-2021-07-03-submitted.pdf

Narrated presentation: https://scor-int.org/wp-content/uploads/2021/10/GlobalHAB_2021-SCOR-Annual-meeting.mp4

JCS – Joint Committee on Seawater (IAPWS/SCOR/IAPSO)

https://scor-int.org/wp-content/uploads/2021/10/JCS_Report_20211013.pdf

APPENDIX 8. LINKS TO AFFILIATED PROJECT REPORTS

IOCCG – International Ocean Colour Co-ordinating Group

https://scor-int.org/wp-content/uploads/2021/07/IOCCG_Annual_report_2021_SCOR.pdf

Presentation: https://scor-int.org/wp-content/uploads/2021/09/SCOR-IOCCG-presentation-Oct_2021.pdf

InterRidge – International Ridge Studies

<http://www.interridge.org/newsletter/interridgenewsletter202109-2/>

GACS – Global Alliance of Continuous Plankton Recorders

Narrated presentation: <https://drive.google.com/file/d/1xsZjn17OLtKuA0P-tGPZVwmssCWsdeD/view?usp=sharing>

APPENDIX 9. LINKS TO AFFILIATED ORGANIZATION REPORTS

IABO – International Association for Biological Oceanography

https://scor-int.org/wp-content/uploads/2021/09/IABO_Report_SCOR_2020-2021.pdf

Narrated presentation: https://drive.google.com/file/d/1JVgOebEG570dzhxK8y4-yZ4_0EFPmDde/view?usp=sharing

IAMAS – International Association of Meteorology and Atmospheric Sciences

<https://scor-int.org/wp-content/uploads/2021/09/2021-IAMAS-report-to-SCOR.pdf>

Narrated presentation: https://scor-int.org/wp-content/uploads/2021/10/IAMAS_video_report.mp4

IAPSO – International Association for the Physical Sciences of the Oceans

<https://scor-int.org/wp-content/uploads/2021/09/IAPSO-Annual-Report-21Sep2021.pdf>

APPENDIX 10. LINKS TO PARTNER ORGANIZATION UPDATES

IOC – Intergovernmental Oceanographic Commission

https://scor-int.org/wp-content/uploads/2021/10/IOC_Annual_Report_SCOR_2021.pdf

PICES - North Pacific Marine Science Organization

https://scor-int.org/wp-content/uploads/2021/08/PICES-Report-for-SCOR-2021_20210729-.pdf

GESAMP – Group on marine environmental protection

https://scor-int.org/wp-content/uploads/2021/07/WG-38-GESAMP_Annual-Report-to-SCOR-2021.pdf

POGO – Partnership for Observation of the Global Ocean

https://scor-int.org/wp-content/uploads/2021/08/POGO_GeneralReport_SCOR_2021.pdf

Presentation:

https://drive.google.com/file/d/192_LkEKhhWGkQ37jWaD7gl2W4eklZNFT/view?usp=sharing

ISC – International Science Council

<https://council.science/annual-report-2020/>

SCAR – Scientific Committee Antarctic Research

https://scor-int.org/wp-content/uploads/2021/08/SCAR_Report-to-SCOR-2021.pdf

Future Earth-Ocean Knowledge Action Network (Ocean KAN)

<https://scor-int.org/wp-content/uploads/2021/10/Clement-2-2021-FE-Ocean-activity-report-for-SCOR.pdf>

WCRP – World Climate Research Program

https://scor-int.org/wp-content/uploads/2021/10/WCRP_CLIVAR_to_SCOR_2021_v2_clean.pdf

APPENDIX 11. LINK TO REPORT ON SCOR CAPACITY DEVELOPMENT ACTIVITIES

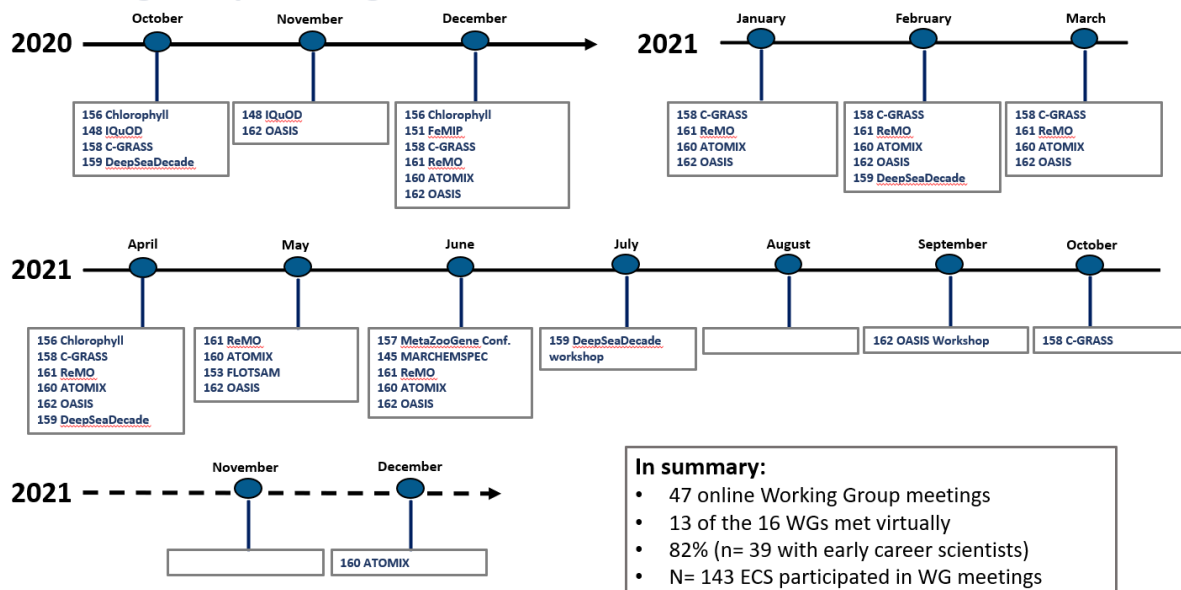
https://scor-int.org/wp-content/uploads/2021/10/Capacity_development_2021.pdf

APPENDIX 12. 2020 AUDITED SCOR STATEMENT OF ACTIVITIES

SCIENTIFIC COMMITTEE ON OCEANIC RESEARCH, INC. STATEMENT OF ACTIVITIES YEAR ENDED DECEMBER 31, 2020			
	Without Donor Restrictions	With Donor Restrictions	Total
SUPPORT AND REVENUE			
Grant revenue	\$ 523,637	\$ -	\$ 523,637
Contribution revenue	6,135	6,976	13,111
Membership dues	401,921	-	401,921
Meeting registration fees and miscellaneous income	28,756	20,924	49,680
Interest income	434	-	434
NET ASSETS RELEASED FROM RESTRICTIONS			
Satisfaction of program restrictions	15,560	(15,560)	-
Total support and revenue	976,443	12,340	988,783
EXPENSES			
Program services			
Scientific programs	572,885	-	572,885
Travel and subsistence programs	11,228	-	11,228
Other conferences and meetings	1,191	-	1,191
Total program services	585,304	-	585,304
Supporting services			
Management and general	298,882	-	298,882
Total expenses	884,186	-	884,186
CHANGE IN NET ASSETS	92,257	12,340	104,597
NET ASSETS			
BEGINNING OF YEAR	178,240	39,396	217,636
END OF YEAR	\$ 270,497	\$ 51,736	\$ 322,233

APPENDIX 13. SCOR RELATED MEETINGS (2020-2021)

Working Group meetings



Project meetings

