



SCOR Annual Meeting 2022

3-6 October 2022

Busan, Korea

Venue: Paradise Hotel Busan

<https://scor-int.org/events/scor-2022-annual-meeting/>

Block Agenda

	Mon. 3 October	Tues. 4 October	Wed. 5 October	Thurs. 6 October
am	SCOR Executive Committee closed meeting	Opening of 2022 annual meeting, reports from SCOR President and Executive Director, results of 2022 elections for SCOR officers and of new early career scientist. Presentation of new working group proposals	Reports/updates from current SCOR Working Groups and projects	Reports/updates from affiliated organizations (Part 2), and capacity development activities, closing of 2022 annual meeting
pm	SCOR-PICES-Korea Early Career Symposium	Discussion of new working group proposals	Reports/updates from current SCOR Working	SCOR Executive Committee closed meeting

		Reports from affiliated organizations (Part 1)	Groups and projects	Visit to KIOST
Evening		Group dinner hosted by KIOST		

Meeting times

9:00 am – 5:00 pm KST (UTC+9) (12:00 pm – 9:00 am)

Background documents:

<https://scor-int.org/events/scor-2022-annual-meeting/>

Reports for each working group, project and organization are hyperlinked in the agenda.

Logistic document:

https://scor-int.org/wp-content/uploads/2022/07/SCOR_Annual_meeting_2022_logistics3.pdf

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SCOR Annual Meeting Day 1. Tuesday, 4 October 2022.

Chair: Sinjae Yoo / Note taker: Paul Myers

Time	Topic	Presenter
9:00	Welcome and introduction to agenda – In Memoriam	Yoo
9:15	Report from SCOR President	Yoo
9:30	Report from SCOR Executive Director	Miloslavich
9:45	Results of the election for SCOR Officers (proposed slate)	Sicre
10:00	Results of the 2022 selection of Early Career Scientist	Miloslavich
10:15	Report from the SCOR ad hoc 2021 Finance Committee	Molony et al.
10:30	BREAK (15 minutes)	
10:45	<p>Presentation of new Working Group proposals: Each presentation will be 12-15 minutes, plus time for questions (3-5 minutes) following each presentation</p> <p>Towards best practices for Measuring and Archiving Stable Isotopes in Seawater (MASIS)</p> <p>Developing resources for the study of Methylated Sulfur compound cycling PROCesses in the ocean (DMS-PRO)</p> <p>Foraminifera in Extreme and Rapidly Changing Environments (FIERCE)</p> <p>Reducing Uncertainty in Soluble aerosol Trace Element Deposition (RUSTED)</p> <p>DEveloping Repositories for carbon FLUX quantification: Th-234 as a case study (DEPOFLUX)</p> <p>DYNamic Approaches for assessing Marine biota responses to fluctuating Oceans (DYNAMO)</p> <p>Impact of biotoxins on marine apex predators in Upwelling Systems (ToxMAP)</p>	<p>Zhang</p> <p>Sicre</p> <p>Uku</p> <p>Laufkoetter</p> <p>Moran</p> <p>Montes</p> <p>Aliani</p>
13:00	LUNCH (60 minutes)	
14:00	Ranking and discussion of new Working Group proposals	SCOR Executive and National Committees
15:45	BREAK (15 minutes)	
16:00	<p>Affiliated organizations reports (Part 1)</p> <p>IABO – Biological Oceanography</p> <p>IAPSO – Physical Oceanography</p> <p>IAMAS – Meteorology and Atmosphere</p> <p>Partner organization updates (Part 1)</p> <p>IOC – Intergovernmental Oceanographic Commission</p> <p>POGO – Partnership for Observation of the Global Ocean</p>	<p>Montes</p> <p>McDougall</p> <p>Penner</p> <p>(Recording)</p> <p>Sicre</p> <p>Recording/Aliani</p>
17:00	Adjourn for the day	
19:00	Group dinner hosted by KIOST	

SCOR Annual Meeting Day 2. Wednesday, 5 October 2022.

Chair: Sinjae Yoo / Note taker: Paul Myers

Time	Topic	Presenter / EC liaison
9:00	<p>Introduction to Day 2 session WG and project presentations will be up to 8-10 minutes, plus time (~3-4 minutes) for questions following each presentation and comments/recommendations by EC liaison.</p>	Yoo
9:10	<p>Group 1. Presenters joining remotely from the Americas</p> <p>WG 155. Eastern boundary upwelling systems (EBUS) WG 163. Coupling of ocean-ice-atmosphere processes: from sea-ice biogeochemistry to aerosols and Clouds (Clce2Clouds) GEOTRACES – Trace elements and isotopes</p> <p>Group 2. Presenters joining remotely from Asia/Australia WG 152. Measuring Essential Climate Variables in Sea Ice (ECV-Ice) WG 157. Marine zooplankton biodiversity based on DNA (MetaZooGene) WG 160. Analysing ocean turbulence observations to quantify mixing (ATOMIX)</p>	<p>I. Montes/Sicre Willis / Myers Casciotti/Zhang Nomura/McDougall Hirai/Montes McDougall</p>
10:30	<p>BREAK (15 minutes)</p>	
10:45	<p>Group 2. Presenters joining remotely from Asia/Australia (cont.)</p> <p>SOLAS – Ocean/atmosphere interactions IMBeR – Marine biosphere research SOOS – Southern Ocean observing GlobalHAB – Harmful Algal Blooms COBS – Changing ocean on biota JCS – Joint Committee on Seawater</p> <p>Group 3. Presenters on site (EC liaison or attending member) WG 148. International Quality Controlled Ocean Database: Subsurface temperature profiles (IQuOD) WG 151. Iron Model Intercomparison Project (FeMIP) WG 153. Floating Litter and its Oceanic Transport Analysis and Modelling (FLOTSAM) WG 162. Developing an Observing Air-Sea Interactions Strategy (OASIS) WG 164. CoNCENSUS: Advancing standardisation of COastal and Nearshore demersal fish visual CENSUS techniques</p>	<p>Dai/Penner Zuo/Aliani Hancock/McDougall Lim/Yoo Boyd/Yoo McDougall Domigues/Myers Tagliabue/Laufkoetter Aliani/Myers Myers Montes</p>
13:00	<p>LUNCH (60 minutes)</p>	

14:00	<p>Group 3. Presenters on site (EC liaison or attending member) (cont.)</p> <p>IIOE-2 – Indian Ocean expedition II</p> <p>Group 4. Recordings</p> <p>WG 154. Integration of Plankton-Observing Sensor Systems to Existing Global Sampling Programs (P-OBS)</p> <p>WG 156. Active Chlorophyll fluorescence for autonomous measurements of global marine primary productivity</p> <p>WG 158. Coordinated Global Research Assessment of Seagrass System (C-GRASS)</p> <p>Group 5. Presenters joining remotely from UK/Europe</p> <p>WG 143. Dissolved N2O and CH4 measurements: a global network of ocean time series measurements</p> <p>WG 145. Chemical Speciation Modelling in Seawater to Meet 21st Century Needs (MARCHEMSPEC)</p> <p>WG 150. Translation of Optical Measurements into particle Content, Aggregation & Transfer (TOMCAT)</p>	<p>M.A. Sicre</p> <p>Recording/Montes</p> <p>Recording/Uku</p> <p>Recording / Aliani</p> <p>Wilson/Zhang</p> <p>Clegg/Sicre</p> <p>Giering/Laufkoetter</p>
15:45	BREAK (15 minutes)	
16:00	<p>Group 5. Presenters joining remotely from UK/Europe (cont.)</p> <p>WG 159. Deep-Sea Biology for the Decade of Ocean Science for Sustainable Development (DeepSeaDecade)</p> <p>WG 161. Respiration in the Mesopelagic Ocean (ReMO): Reconciling ecological, biogeochemical and model estimates</p> <p>WG 165. Mixotrophy in the Oceans – Novel Experimental designs and Tools for a new trophic paradigm (MixONET)</p> <p>IQOE – Quiet Ocean</p> <p>IOCCP – Ocean carbon</p>	<p>Hilario / Montes</p> <p>Robinson/Laufkoetter</p> <p>Mitra/Laufkoetter</p> <p>Simpson/Uku</p> <p>Telszewski/Moran</p>
17:00	Adjourn for the day	Yoo

SCOR Annual Meeting Day 3. Thursday, 6 October 2022.

Chair: Sinjae Yoo / Note taker: Paul Myers

Time (am)	Topic	Presenter / EC liaison
9:00	<p>Introduction to Day 3 session</p> <p>Presentations will be 8-10 minutes, plus time (~3-4 minutes) for questions following each presentation and comments/recommendations by EC liaison.</p>	Yoo
9:10	<p>Affiliated projects reports (Part 2)</p> <p>IOCCG – Ocean colour</p>	Yoo

	InterRidge – Ridge studies Partner organization updates PICES - North Pacific Marine Science Organization GESAMP – Group on marine environmental protection ISC – International Science Council SCAR – Scientific Committee Antarctic Research Future Earth-Ocean/OceanKAN WCRP / CLIVAR – World Climate Research Program	S.M. Lee / Zhang Chiba / Moran Zhang Recording / Sicre Griffin / Myers Fenn & Pendleton Kulaiappan / Penner
10:30	BREAK (15 minutes)	
10:45	Report on SCOR capacity development activities	Miloslavich
11:00	Future SCOR meetings / meeting mode Ecuador 2023, China 2024, Colombia 2025. Host for 2026	Open discussion
11:15	Summary of recommendations and close of meeting	Yoo
12:00	LUNCH (60 minutes)	
13:00	SCOR closed Executive Committee meeting	Executive Committee
14:00	Visit to KIOST	All invited

SCOR Virtual Annual Meeting 2022

ANNOTATED AGENDA

DAY 1. Tuesday, 4 October 2022

Chair: Sinjae Yoo / Note taker: Paul Myers

1. OPENING TOPICS

1.1 Opening Remarks: welcome, agenda, and virtual session logistics - Yoo

The agenda along with all written reports, documents and narrated presentations from WGs, projects and affiliated organizations are available at the SCOR website (<https://scor-int.org/events/scor-2022-annual-meeting/>) to be reviewed before the meeting. During this hybrid meeting, there will be 8-10-minute presentations by Working Groups, projects and partner organizations representatives showcasing the main highlights and the required actions. When a representative is not participating in the meeting, the updates will be provided by the appointed liaison Executive Committee member.

The new WG proposals are available on the SCOR website (see link above) and each will be presented by a member of the SCOR Executive Committee who will also present the summary of the reviews and recommendations provided by the SCOR National Committees.

In Memoriam

SCOR pays tribute to the life and contributions of eight members of the oceanographic community who passed away in the last year:

Philip Roy Pugh, UK († 24 November 2021)

Philip Roy Pugh was Emeritus Professor at the National Oceanography Center (NOC) in the UK. He was a full member of SCOR Working Group #87 on Fine-Scale Distribution of Gelatinous Planktonic Animals established in 1986. During his incredible career, and even after his retirement in 2004, most of Phil's work was on siphonophores, a group of cnidarians. Phil described a quarter of all known siphonophores (43 new species), more than anyone who has ever lived. His reviews and taxonomic syntheses were extremely important as they brought order to several confused siphonophore families, stimulating further discovery. During his long career, Phil took part in over 50 research expeditions and published more than 100 papers and reports, becoming the world authority on siphonophores (a title he retains to this day).

Raymond Pollard, UK († 14 December 2021)

Raymond Pollard was a physical oceanographer affiliated to the National Oceanography Center (NOC) in the UK and a member of the Scientific Steering Committee of the Integrated Marine Biosphere Research (IMBeR) program from 2004-2006. He led the formation of the James Rennell Centre for Ocean Circulation in 1989 to deliver the World Ocean Circulation Experiment (WOCE), which integrated observations and ocean modelling. This ultimately led to the Institute of Oceanographic Sciences (IOS) moving to the then newly built Southampton Oceanography Centre in 1995, which would later become the National Oceanography Centre.

Raymond led numerous major seagoing expeditions, some of which include the Crozet Islands and in the Southern Ocean and Southwest Indian Ocean. Raymond was also an innovator, creating new measurement techniques and playing a crucial role in the development and use of towed undulating CTDs. He was also an early user of Acoustic Doppler Current Profilers (ADCPs) and he played a critical role in bringing scientific computing onboard ships – most notably on the RRS Discovery – to process the vast quantities of data quickly and to adaptively adjust sampling to what was developing in the ocean.

Robie Macdonald, Canada († 13 February 2022)

Robie was a Senior Research Scientist with Fisheries and Oceans Canada, Institute of Ocean Science and adjunct professor at the University of Manitoba's Centre for Earth Observation Science. Robie was actively involved in the Canadian SCOR National Committee (CNC-SCOR) for over a decade, beginning in 2002. He was the Canadian Chair from 2009-2012. Rob also played a significant role in shaping the present form of the Canadian National Committee, broadening its membership across the country, and including more university academics on the committee. His great intellect, multidisciplinary expertise, and ability to make connections and see the 'big picture' meant that over his long career Robie conducted, spearheaded, and published ground-breaking research in areas such as marine geochemistry, oceanography, and contaminant sciences. His contributions to the work of the Arctic Monitoring and Assessment Programme (AMAP) covered a range of issues: contaminants including mercury and POPs, climate change, Arctic Ocean acidification and the melting of the Arctic cryosphere. He conceived and led the first AMAP assessment addressing the impacts of Arctic climate change on contaminant pathways.

Viktor Akulichev, Russia († 27 February 2022)

Viktor Akulichev was an Academician of the Russian Academy of Sciences, Professor, and Doctor of Physical and Mathematical Sciences. He was a Russian Nominated Member for SCOR and Vice President of the Executive Committee of SCOR from 2004-2008. He was also an associated member of Working Group #96 on Acoustic Monitoring of the World Ocean established in 1991. For many years, Viktor Akulichev was the director of the Pacific Oceanological Institute of the Russian Academy of Sciences. He created a well-known scientific school on ocean acoustics and hydrophysics in the Far East, and he headed the Department of Hydrophysics at the Far Eastern State University. In 2008, he was elected President of the Russian Acoustic Society. He was a full member of the American Acoustic Society (since 1989), a member of the Russian National Committee on Theoretical and

Applied Mechanics, a member of the Interdepartmental National Oceanographic Commission of the Russian Federation.

Timothy (Tim) Parsons, Canada († 11 April 2022)

Tim was a retired professor from the University of British Columbia in Canada. He was the chair of Working Group #24 on Estimation of Primary Production under Special Conditions established in 1964 and jointly sponsored by SCOR and the International Biological Program (IBP). He was also the Vice-chair of Working Group #85 on Experimental Ecosystems established in 1986, as well as an Ex-officio member of the SCOR Executive Committee from 1976 to 1982 as President of the International Association for Biological Oceanography (IABO). He became a Fellow of the Royal Society of Canada in 1979 and an Officer of the Order of Canada in 2005. In 2001, he became the first and only Canadian to receive The Japan Prize (Japan's equivalent of the Nobel Prize) for his work in biological and fisheries oceanography. In 2005, the Dept. of Fisheries and Oceans established a medal in his name, the Timothy R. Parsons Award, which is awarded annually to an outstanding scientist in ocean sciences.

Jordi Garcia Orellana, Spain († 5 July 2022)

Jordi was a professor at the Department of Physics of the Autonomous University of Barcelona in Spain. He served as member of the GEOTRACES Scientific Steering Committee from 2011 to 2016. Jordi's research focused on using radionuclides to study the oceans, leading research on the biological carbon pump and on dating of sediment cores to assess marine pollution, and on assessing the accumulation and distribution of radionuclides in Naturally Occurring Radioactive Material (NORM) industries. For the last two decades, he was a driving force on the research on submarine groundwater discharge in coastal areas using radon and radium isotopes. At the University, he taught both at the undergraduate and graduate levels and had numerous management roles.

Myriam Sibuet, France († 26 July 2022)

Myriam was a deep-sea researcher and a pioneering woman in science. She led numerous cruises and led the deep-sea lab at IFREMER for years. Myriam was a member of the Scientific Steering Committee of the Census of Marine Life, a decadal program affiliated to SCOR between 2000 and 2010. She was also a full member of Working Group #76 on Ecology of the Deep-Sea Floor established in 1983. Myriam was a meticulous echinoderm taxonomist and deep-sea ecologist. With the discovery of cold seeps on continental margins in the late 80s, her career had a turning point as she focused on topics such as chemosynthesis, biodiversity, ecology, and other processes in these rare and heterogenous ecosystems. Myriam was always pushing for methodological improvements and technological innovations from beam trawl to submersibles. Myriam first dived in a submersible in 1976 during a technical test of Cyana, and she later contributed to the specifications of the submersible Nautile and the ROV Victor 6000. Myriam has been instrumental for the development of deep-sea science, in France and beyond. She was an

example who marked us with her curiosity, her dynamism, her team spirit, and her humanity.

David Pugh, UK († 1 August 2022)

David Pugh was an Emeritus Fellow at the National Oceanography Center (NOC) in the UK. In 1984, David became Head of Oceanography, Hydrology and Meteorology for the UK Natural Environment Research Council (NERC). Part of that work involved serving as Secretary to the UK Government Inter-Agency Committee on Marine Science and Technology (IACMST) from the early 1990s until 2003. David spent considerable time working on international aspects of oceanography, including leading the UK delegation to the Intergovernmental Oceanographic Commission (IOC) Assemblies, and becoming the Chairman of IOC in 2003-2007. He contributed much to the planning of IOC's 50th anniversary in 2010 and, linked to this, co-edited the book "Troubled Waters", which identifies the challenges facing international marine science and IOC's position within the UN system. The book explained how governments use science to establish ocean policies in issues such as marine pollution, exploitation, and hazards. SCOR, through former Executive Director Liz Gross led the book chapter on non-governmental organizations.

Michio Aoyama, Japan († 5 September 2022)

Michio Aoyama was a Visiting Professor at the University of Tsukuba since 2019 and before that a Professor at the Institute of Environment Radioactivity at Fukushima University. Michio contributed extensively to a variety of activities across marine biogeochemistry and radioactivity. He was a full member of SCOR WG #146 on Radioactivity in the Ocean which revisited progress 50 years after the first SCOR WG was established in 1959 on this topic. He was the co-chair of SCOR WG #147 working on the comparability of global oceanic nutrient data (COMPONUT) harmonizing global oceanic nutrients observations and data, and a member of the Scientific Steering Group of the International Carbon Coordination Project (IOCCP) from 2013 to 2018 focusing on Nutrients Essential Ocean Variables for achieving global consensus on obtaining comparable and accurate nutrients data. His inexhaustible energy in organizing large international workshops, several global inter-comparison exercises and eventually successful lobbying for development, production, distribution and use of nutrients Reference Materials, changed our ability to understand the geochemistry of deep oceanic waters in relation to carbon and dissolved nutrients.

1.2 Report of the President of SCOR - Yoo

Sinjae Yoo will briefly inform of his activities for SCOR since the 2021 SCOR Annual Meeting held virtually in October 2021.

Due to the pandemic, most meetings have been held on-line during the first half of the year. Yoo gave a keynote speech on SCOR's activities to support blue economy at the 3rd Research Symposium on "Aquatic Research for Prosperity of the Nation" held in November

2021 at the Ocean University of Sri Lanka. Sri Lanka had an intention to join SCOR, but Sri Lanka's joining is delayed due to its economic crisis. In December last year, Yoo gave a talk introducing SCOR's scientific activities at the Pohang University of Science and Technology, Korea. In June 2021, the 55th Executive Assembly of IOC was held in Paris. Yoo attended this meeting held offline after two years' break. Last year, Yoo reported that SCOR participates in the proclamation of an International Year of Basic Sciences for Sustainable Development (IYBSSD) as a member of its SSC. IYBSSD was inaugurated successfully in July this year to be continued for a year.

1.3 Report of SCOR Executive Director - Miloslavich

The Executive Director will report on her activities for SCOR since the 2021 SCOR Annual Meeting held virtually in October 2021 and on the current condition of SCOR.

1.4 Results of the 2022 Elections for SCOR Officers - Sicre

The SCOR President and all three Vice-President positions were open for nominations for the 2022 elections. The Nominating Committee chaired by Past President Marie Alexandrine Sicre and with Samuel Mafwila (Namibia), Constanza Ricaurte Villota (Colombia) and Peter Burkill (UK) as members reviewed the nominations, prepared a final slate of candidates, and confirmed their availability to serve in the SCOR Executive Committee. The slate of candidates was sent to all nominated members for their comment and/or approval.

Action: Approve new slate of officers proposed by the Nominating Committee.

1.6 Report of the ad hoc Finance Committee – Molony/Abrantes/Croot/Petersson

The Finance Committee reviews the administration of SCOR finances during the previous fiscal year and the current year and will propose a budget for 2023 activities and dues for 2024. Members of the 2022 Finance Committee (approved by the Executive Committee through email consultation on the 15th of July 2022) are Peter Croot (Ireland), Fátima Abrantes (Portugal), Brett Molony (Australia), and Heidi Petersson (Finland). The documents reviewed by the committee were (1) the SCOR 2021 auditor's report (**pending**), (2) the final vs actual 2021 budget, (3) financial reports and charts from the Secretariat, (4) the 2022 revised budget and draft of 2023 budget.

Action: Approve the report of the ad hoc Finance Committee

2. WORKING GROUPS

2.1. New Working Group proposals

2.1.1. Towards best practices for Measuring and Archiving Stable Isotopes in Seawater (MASIS) – Zhang

Seawater stable isotopic composition and the carbon isotopic composition of dissolved inorganic carbon are essential ocean tracers that have been widely measured since the

1960s. They are particularly important to measure well in times of wide-spread changes in the hydrological cycle, the bio-geochemical cycles, as well as the anthropogenic carbon penetration and induced acidification of the oceans, because they serve as a fingerprint of these ongoing changes in the ocean. However, substantial issues of data collection, quality control, and compilation exist: common reference materials in seawater are not widely available, analysis methods have strongly diversified, and intercomparison exercises are lacking, to the extent that large differences exist between different data sets. These differences currently prohibit the community from making full use of the potential of stable isotopes to identify climatic changes.

This working group is dedicated to remedy the current issues of data collection, quality control, and compilation of stable isotopes in seawater. First, we will assess the validation stage of the available stable isotopic datasets, as well as corresponding metadata and where and how they are communicated. This effort will lead to a report of best practices from sample collection to measurement and quality control. Second, we will review methods for adjustment of biases in archives and reassess these biases. Third, we will work towards complementing existing databases, with particular effort on missing surface ocean sampling data, either discrete or continuous. In parallel with the aforementioned tasks/efforts, the working group will promote and carry intercomparison exercises, and will actively carry out capacity-building.

Action: Consider as new SCOR working group.

2.1.2. Developing resources for the study of Methylated Sulphur compound cycling PROCesses in the ocean (DMS-PRO) - *Sicre*

Organic methylated sulphur compounds (MSCs) play key roles in planktonic food webs as important carbon and sulphur substrates and also as infochemicals that facilitate biological interactions. In addition, the oceanic emission of biogenic volatile MSCs (dimethylsulfide and methanethiol) to the atmosphere acts as a source of aerosols, which impact cloud formation and properties, and hence climate. Understanding the role of MSCs in the Earth system requires accurate rate measurements to capture the rapid biotic and abiotic cycling processes responsible for the turnover of MSCs in the surface ocean. However, we currently lack both standardized protocols for the analytical determination, and a quality controlled database for process rate measurements of MSCs. Therefore, the DMS-PRO SCOR working group proposes to address these knowledge gaps by compiling a comprehensive, open-access database of quality-controlled, existing and future MSC cycling rates; and publishing standardized operating practices on analytical procedures involved in the determination of MSCs rates. The overarching goal of this proposal is to stimulate research on the oceanic MSCs cycle, building capacity, and sharing knowledge and skills with the oceanographic and Earth system science communities. The resulting work will actively engage diverse perspectives which will critically expand our current understanding of MSCs and our ability to predict their roles in a future changing ocean.

Action: Consider as new SCOR working group.

2.1.3. Foraminifera in Extreme and Rapidly Changing Environments (FIERCE) – *Uku*

The information contained in foraminifera shells is essential in understanding Earth's past climate system. Yet, most foraminiferal proxies (indicators of, for example, temperature, productivity, chemistry) and calibration efforts have focused on tropical-subtropical planktic species that live primarily in the sunlit ocean. FIERCE aims to provide a robust synthesis of

research methods to improve our understanding of the biology and ecology of planktic foraminifera living in more extreme and rapidly changing environments such as oxygen minimum zones, the ice-ocean interface, high-latitude, and 'deeper' habitats (below the mixed layer). Without this, foraminiferal proxies in these environments are anecdotal, limiting past reconstructions and future climate change projections. Moving forward requires a multi-disciplinary, international effort, incorporating state-of-the-art research methods and input from across the ocean sciences. FIERCE WG members will test and fine-tune state-of-the-art research methods for studying FIERCE species at an international workshop in Peru and with WG members in the Norwegian Arctic. The resulting best practice 'standard operating procedures' (SOPs) for studying FIERCE species will be published in an open access, online platform. The SOPs will be broadly applicable to all planktic species and many benthic foraminifera, which expands the outcomes of this project well beyond FIERCE species. Furthermore, by focusing on foraminifera from understudied habitats, we will close a critical research gap and extend foraminifera utility in the fossil record beyond the ocean's sunlit mixed layer. Given the interdisciplinary and international nature of our vision, a SCOR working group is the best and most practical choice to achieve the proposed goals.

Action: Consider as new SCOR working group.

2.1.4. Reducing Uncertainty in Soluble aerosol Trace Element Deposition (RUSTED) – Laufkoetter

The availability of iron and other trace elements (TEs), is central in controlling biological activity and CO₂ sequestration in many ocean regions. Atmospheric deposition provides an external source of TEs to the ocean, but most fluxes are currently poorly understood. To predict how ocean ecosystems respond to changes in soluble TE fluxes, it is vital that models represent and reproduce current TE distributions. This Working Group proposes to bring together a diverse group of experts from the ocean biogeochemistry and modelling communities to focus on assuring the quality of TE solubility data from aerosol leaches and improving the handling of soluble iron in Earth System models. This will be facilitated through the creation of a new, comprehensive database of atmospheric TE measurements taken across the world's oceans, allowing easier evaluation and calibration of global models than is currently possible. This WG is important and timely as the transfer of micronutrients and pollution across the air-sea interface is a current research priority of large international programmes such as SOLAS and GEOTRACES. Furthermore, this WG addresses many challenges laid out in the UN Decade of Ocean Science for Sustainable Development. Capacity building is at the heart of this proposal; the database will be open-access and a proposed workshop-seminar series will be held in India with the aim of widening participation and creating a strong, global network of scientists working at the air-sea interface. A SCOR Working Group is the only practical way to achieve the aims detailed in this proposal.

Action: Consider as new SCOR working group.

2.1.5. DEveloping Repositories for carbon FLUX quantification: Th-234 as a case study (DEPOFLUX) – Moran

The ²³⁴Th-²³⁸U radioactive pair has been extensively used to evaluate carbon fluxes in the upper ocean, the fluxes of other elements as well as other parameters such as the efficiency of the carbon exported from the surface ocean through the Biological Pump. Since the 70's,

a large number of vertical profiles of ^{234}Th have been collected using a variety of sampling instruments and analytical strategies that have changed along years.

An extensive global oceanic data set of ^{234}Th measurements, including all the ^{234}Th data in the published literature as well as non-published data up to 2019, was compiled by Ceballos-Romero et al. and published in open access in PANGAEA repository and discussed in Ceballos-Romero (2022)

<https://doi.pangaea.de/10.1594/PANGAEA.918125?format=html#download>.

The amount of ^{234}Th data collected can be used to address key questions on carbon export on a basin or global scale. To achieve this, it requires us to have an extensive dataset that brings together all available observations in a robust, consistent and accessible manner. We aim to make the ^{234}Th dataset a growing data compilation, open to the participation and improvements by the whole thorium community, updated yearly and used in as many applications as possible, broadening its scope and including estimations of Particulate Organic Carbon (POC) export fluxes, among others. And most important, we would like to use this thorium repository as a seed to grow a wider repository of carbon flux estimates in the ocean.

This will be the first coordinated effort to generate a global, standardized, and comprehensive repository of all existing ^{234}Th data in the ocean. DEPOFLUX main goals are i) the creation of a web repository to host an updated compilation of ^{234}Th data and metadata, from the first ^{234}Th measurements, up to present and into the future. This repository would be user friendly, CQ checked, accessible, easy to upload/download, visible to the community and will serve as a focal point for the thorium community, modellers and flux evaluation experts ii) The development of the first approach to a forthcoming integrated harmonized repository of carbon flux results including variables, data and metadata from the different techniques that provide, direct or indirectly, measurements of the carbon flux in the ocean, such as sediment traps, particle imaging (e.g. underwater cameras) or gliders.

Action: Consider as new SCOR working group.

2.1.6. DYNamic Approaches for assessing Marine biota responses to fluctuating Oceans (DYNAMO) – Montes

Environmental fluctuations and their predictability play a fundamental role in determining diversity of species, communities, and assemblages in the ocean. Yet, fluctuations of the environment are often labelled as noise or ignored with the risk that effects of environmental change on organisms are mis-estimated. The DYNAMO (DYNamic Approaches for assessing Marine biota responses to fluctuating Ocean) will bring together a diverse community of scientists to advance research in fluctuating environments and provide standards for empirical research which will develop new actions for the effective management of marine ecosystems. Specifically, DYNAMO will quantify to what extent fluctuations of environmental drivers (i.e., temperature, oxygen, pH) and their predictability shape the marine benthic communities (i) physiology and (ii) ecological interactions. DYNAMO will (iii) be able to provide guidelines for appropriate 'mimicry' of environmental variability in controlled laboratory experiments and (iv) implement realistic models to account for organismal variation in fluctuating environments. Additionally, DYNAMO will (v) develop a set of new indicators to capture the ecological relevant environmental variability and provide guidance on environmental data retrieval, analysis, and storage. Lastly, DYNAMO will (vi) ensure outreach with society, policymakers, and science communicators

to produce peer-reviewed and media outputs to disclose the role of environmental fluctuations in shaping marine life and ecosystem services under changing ocean. By providing concrete evidence produced by qualified experts, DYNAMO will accelerate the transition towards problem-oriented and interdisciplinary science needed to build a new narrative for the ocean.

Action: Consider as new SCOR working group.

2.1.7. Impact of biotoxins on marine apex predators in Upwelling Systems (ToxMAP) – Aliani

Unusual vertebrate mortality events may result from changes to the marine environment and those associated with harmful algae blooms (HABs) are increasing. Algal blooms can be exacerbated by human activity such as eutrophication and rising water temperatures linked to climate change. The ecosystem and public health threats posed by HABs are well recognised in some parts of the globe. For example, within the California upwelling system along the west coast of North America, the diatom genus *Pseudo-nitzschia* is known to impact fish, bird and marine mammal health, and result in shellfish fishery closures to protect human health. Although HABs are documented in eastern boundary upwelling systems in the Southern Hemisphere (e.g. Benguela, Humboldt), trophic effects in these systems are largely undocumented. In recent years there have been several unexplained mortality events affecting marine life across the Benguela Upwelling Ecosystem indicative of toxicosis via the biotoxin domoic acid (DA). Initial testing has identified DA in seals from South Africa (Gridley, unpublished data). This working group will establish connections between expert biotoxin scientists from regions where the effects are well understood, and those in the Southern Hemisphere where the impacts of biotoxin exposure are relatively unknown and only recently emerging. Expected outputs include knowledge transfer, training in optimal sampling and detection methodology, and collaboration on globally relevant scientific research articles. We will generate preparedness for toxic events affecting wildlife, aquaculture, and fisheries in light of the climatic changes which are predicted to increase HAB occurrence and frequency across the globe.

Action: Consider as new SCOR working group.

Day 2. Wednesday, 5 October 2022

Chair: Sinjae Yoo / Note taker: Paul Myers

2.2. Current Working Groups

The chairs or a member of each WG will present an update on working group activities and progress, and the WG reporter to the Executive Committee will make recommendations on actions to be taken.

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 – Sam Wilson / Zhang

In the past 12 months WG 143 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. Completion of the SOP document has taken longer than originally timetabled. This is because the lead author, Sam Wilson, moved from the USA to UK and has been extremely busy. The coauthors have been very supportive, and the final editing has resumed.

Action: Consider disbanding when the SOP documents are completed in 2023.

2.2.2. WG 145 on Chemical Speciation Modelling in Seawater to Meet 21st Century Needs (MARCHEMSPEC) – *Simon Clegg / Sicre*

WG145 is working towards the first release of freely available software for chemical speciation calculations, including uncertainty estimates, in late 2022. Full documentation of the chemical speciation models is in the process of publication: papers on artificial seawater and Tris buffers are published; a paper on the seawater electrolyte has been submitted for publication and a paper on the GEOTRACES core elements is in preparation.

WG145 will have fulfilled its terms of reference with this first software release and will then be disbanded. To maintain a respected international affiliation for further development of the software and the model parameters, it has been proposed that the IAPWS/SCOR/IAPSO Joint Committee on the Properties of Seawater (JCS) establish a new Taskgroup on chemical speciation. JCS, SCOR and IAPSO have approved this proposal: a decision from IAPWS is expected this autumn

Action: Consider disbanding after the WG releases the software.

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

Due to the pandemic, WG 148 only held virtual meetings. The paper describing work on benchmarking automatic quality control checks has been revised and is currently undergoing additional revisions following further comments from co-authors. In the past year, activity in the task team focussed on detecting duplicate profiles has increased. This collaboration has begun by understanding methods that are in use in different institutions.

Next year, the primary focus of IQuOD will be the publication of the paper describing benchmarking of automatic quality control checks. Once published, its recommendations for optimum sets of quality control checks will be applied to the World Ocean Database (WOD) to generate a new version of the IQuOD dataset. It is expected that other work will include developing training data and techniques for machine learning to improve quality control of data further, and continuation of the collaboration on detection of duplicate profiles. The WG is planning an in-person IQuOD meeting will next year.

Action: Consider a one-year extension of the WG until the products planned for 2022 have been completed.

2.2.4. WG 150 on Translation of Optical Measurements into particle Content, Aggregation & Transfer (TOMCAT) – *Sara Giering (TBC) / Laufkoetter*

Members of WG 150 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 first to 2022 due to COVID-19 and now to 2023 due to the lack of volunteers to organize the course. 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 requests that this travel support is carried over to 2023.

Action: Consider disbanding after the Summer School.

2.2.5. WG 151: Iron Model Intercomparison Project (FeMIP) – Alessandro Tagliabue / Laufkoetter

The WG had no in person meetings and work has progressed offline. The WG reports to have fully completed their objectives 1-3, partially completion of Objective 4, and the work to complete objective 4 is underway completing the goals set by the WG.

Action: Consider disbanding the WG when ToR 4 has been completed.

2.2.6. WG 152 on Measuring Essential Climate Variables in Sea Ice (ECV-Ice) – D. Nomura / McDougall

WG 152 members carried out a sea ice inter-comparison experiments for air-sea ice CO₂ flux and sea ice primary production in Cambridge Bay at the Canadian High Arctic Research Station (CHARS), May 2022. Based on the information obtained during ECV-Ice inter-comparison activities, the WG will start to create a guide of best practices hosted on the ECV-Ice website as a living document. The first entry will be the Miller et al. (2015) methodological review from SCOR WG 140, and the results of additional methods evaluations and intercalibrations will be added, as they become available. The Inter comparison experiment in the Cambridge Bay was the final ECV-Ice activity.

Action: Consider disbanding the WG until after the intercalibration products are completed.

2.2.7. WG 153 on Floating Litter and its Oceanic Transport Analysis and Modelling (FLOTSAM) – Stefano Aliani / Myers

The original WG 153 FLOTSAM group has grown to become a wide global network and ECOPs are an important part. ECOPs actively participate to WG works and designed and executed a virtual workshop on “The Future of Ocean Plastics: Designing Diverse Collaboration Frameworks”. The new efforts of FLOTSAM are toward the creation of an Integrated Marine Debris Observing System (IMDOS). IMDOS is based upon the FLOTSAM framework to dynamically integrate shoreline and at-sea in situ observations, remote sensing and numerical modelling (Maximenko et al., 2019). The idea has been thoroughly discussed with relevant people and organizations such as TGML, GEO Blue Planet, GOOS, UNEP, and IOCCG being clear that an observing system dedicated to plastic pollution does not exist yet.

FLOTSAM network of experts has the potential to grow and become the leading reference to the global program dedicated to Marine Litter observation that is so much needed. In the last year, the IMDOS interim Steering Committee was defined involving FLOTSAM people. IMDOS has been officially presented at UN Ocean Conference in Lisbon and the Interim Steering Committee is going to meet in the next months to plan future activities. The FLOTSAM leadership group asks SCOR to consider supporting the development of the IMDOS program. A possible practical contribution could be to allow the use of remaining FLOTSAM funds to support the participation of selected people to IMDOS planning events in 2022.

Action: Consider request to use FLOTSAM remaining funds at SCOR to support the WG participation in IMDOS meetings.

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

WG 154 finalized, submitted, and published a manuscript focusing on the plankton measurements that have been and could be done on moorings such as those of OceanSITES and the data infrastructure that is needed to exploit them to the fullest. The manuscript includes, beyond a detailed account of available commercial sensors, a description of two polar mooring systems that have pioneered the use of such observations. A workshop for early career scientists funded by NSF (SCOR supported travel for two participants from developing countries) and including international participation focused on how to install, maintain, and analyse data from flowthrough systems instrumented with optical sensors (one of the focuses of our P-OBS report regarding GO-SHIP) took place the first week of August 2022.

P-OBS has completed its terms of reference and deliverables and may be disbanded.

Action: Disband the WG.

2.2.9. WG 155 on Eastern boundary upwelling systems (EBUS): diversity, coupled dynamics and sensitivity to climate change – *Ivonne Montes / Sicre*

WG 155 has held virtual meetings and several discussions by e-mail over the last months to make progress on the review article and in the modelling paper. Five of the WG members are involved in the organization of the EBUS conference to take place in September 2022 in Lima, Peru (<https://www.ebus-lima2022.com/>). The conference will provide an opportunity to meet and see what new information can be incorporated into the two papers. The Summer School in Dakar in planning since 2019 and continuously postponed has been cancelled along with a meeting of the WG associated with this event. The EBUS conference will be a major contribution from the WG. During the Conference the WG will hold an in-person meeting to review pending tasks and set a strict timeline to achieve the TORS by mid-2023.

Action: Consider a one-year extension of the WG until the products planned for 2022/2023 have been completed.

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

WG 156 has largely focused the past year towards completion of the “Best Practice” document – a key deliverable for many of our terms of reference – intended as a new central resource for existing and new ocean-based users of active chlorophyll fluorometry. A soft launch was held through a Town Hall event at ASLO Ocean Sciences 2022, and final edits are underway for a final community consult. Field work has begun to resume after lengthy delays and challenges from the global pandemic, where activities have centred on evaluating further improved practices in accurate retrieval of active chlorophyll fluorescence-based primary productivity across diverse environmental gradients. A major new review article was published to synthesise how further developments in our field are transforming capacity to use active chlorophyll fluorescence as a measure of ocean health and productivity over space and time. The WG will begin planning an in-person meeting for 2023 to reconnect on key activities. In addition, it is anticipated some WG representatives (Oxborough, Schuback) will attend Ocean Optics XXV (Vietnam) in October 2022, in part to advance discussions of aligning active fluorometry measurements to remote sensing (and other optical) platforms.

Action: Consider funding 2023 WG meeting.

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

WG 157 members organized a special issue the ICES (International Council for the Exploration of the Sea) Journal of Marine Science entitled, Patterns of biodiversity of marine zooplankton based on molecular analysis, was organized (https://academic.oup.com/icesjms/pages/themed_sets). The WG members chaired a session at the 2022 Ocean Sciences Meeting, Zooplankton diversity through space and time, with significant participation of early career scientists and WG members as co-authors. MetaZooGene was endorsed as a new UN Ocean Decade Action (No.102.2) linked to Marine Life 2030 (<https://marinelife2030.org/>). An announcement is posted on the MetaZooGene website (<https://metazoogene.org/ocean-decade-action>).

WG157 members have organized and will convene a special MetaZooGene Symposium, New insights into biodiversity, biogeography, ecology, and evolution of marine zooplankton based on molecular approaches, in association with the ICES Annual Science Conference (Hybrid; Dublin, Ireland; September 23, 2022). The program currently includes 26 presentations, of which 14 are by Early Career Scientists (ECS), and 16 include WG157 members as co-authors (see: <https://metazoogene.org/planned/symposium2022>).

Action: Consider funding for ongoing activities in 2023.

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

Over the last year WG 158 has made significant progress on several goals: (1) Synthesized data from around the world, including curation and QAQC of the global SeagrassNet

database, toward a comparison of remotely sensed versus in situ monitoring of changes in seagrass density, the first MS from which should be submitted in 2022; (2) Worked with the Global Ocean Observing System toward formalization of the seagrass Essential Ocean Variable specifications and Darwin-Core-based data schema; (3) Worked with the World Seagrass Association toward incorporation of C-GRASS themes into the renovated WSA website to appear in 2022. A major activity this year was the first in-person C-GRASS workshop held in association with the bi-annual International Seagrass Biology Workshop in Annapolis, MD, USA, on 13-14 August 2022. The WG hosted approximately 10 members of the C-GRASS working group at the workshop, along with several associates, to advance these continuing goals, develop additional MSs, and to discuss proposals for extending C-GRASS themes and collaborations beyond the scope of the SCOR working group.

Action: Consider funding for ongoing activities in 2023.

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) – Montes

WG 159 is part of the steering committee of the Challenger 150 programme endorsed by the UN Decade. The operationalization of this Programme 150 has taken time but is essential to achieving TORs 2 and 5 as well as aspects of the other TORs. The WG is confident that they can deliver to the original time schedule plus covid extension. The WG is planning to meet in September/October 2022 to focus on capacity development plans. The WG is seeking funding to support a core programme team (programme manager, programme support officer, comms and fund-raising officer, data standards and management support officer, capacity building officer, support for the 10 ERCs who co-ordinate the regional scientific working groups) and to support the development of further technical working groups dealing with standardisation. The WG aims to have regional working group meetings every 3 months.

The WG would like to approach SCOR to continue support for the working group which directs the Challenger 150 programme and recognize Challenger 150 as a SCOR endorsed programme (like GEOTRACES). This will enable the working group to continue to direct the programme and make further gains around TORs 2 and 5.

Action: Consider funding for ongoing activities in 2023 and to their request of recognizing Challenger 150 as a SCOR endorsed programme.

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

Over the last 12 months, WG 160 has met as a full committee in December 2021 and again face to face in June 2022 at Boston (USA), with subgroups meeting on a more regular basis to fulfil their terms of reference. The WG produced an operational Wiki along with some of the benchmark datasets which are available on the wiki now. The Wiki includes flow charts for processing epsilon from shear probes, velocity profilers and velocity point measurements, and remains a work in progress as the WG tests the benchmark datasets. The WG achieved agreement on the format and key NetCDF variable names for the benchmark datasets that will serve the community by allowing them to test their algorithms

and learn about common issues with processing turbulence data. The WG did some testing of the benchmark datasets and results of this ongoing exercise are guiding refinements in the best practice flow charts and NetCDF benchmark format, which result in modifications to the wiki.

COVID impacted the ability to meet in person and placed additional professional burdens on many working group members. Consequently, although the wiki and benchmark datasets are currently live, they have not yet engaged the community for independent benchmark dataset testing or feedback on the wiki. Nonetheless, the WG introduced ATOMIX at the Asia Oceania Geoscience Society (AOGS) Meeting 2021, a Townhall discussion at AGU Ocean Sciences 2022, and the Gordon Research Conference on Ocean Mixing, 2022. The WG has also used these opportunities to advertise the mailing list for the ATOMIX newsletter. Planning has also begun for the capacity-building workshop that they plan to host next year alongside the 2023 AOGS meeting.

Action: Consider funding for ongoing activities in 2023.

2.2.15. WG# 161: Respiration in the Mesopelagic Ocean (ReMO): Reconciling ecological, biogeochemical, and model estimates – *Carol Robinson / Laufkoetter*

WG 161 has started an internal seminar series among the members. There have been three presentations, and four more are planned this year. The seminars are recorded, and potentially to be made available to the wider community through their website and YouTube. The WG launched a ReMO mentoring scheme. Four early career mentees (from Mexico, India, China and France) were chosen from applicants to the open call. They gave presentations to the WG, and are now paired with WG mentors and are working on collaborative objectives which include progressing data interpretation, learning and setting up the facilities for a new analytical method and progressing a fellowship proposal. The WG aims to open another call for mentees before the end of 2022.

The WG plans to hold a combined annual meeting, training course and methods intercomparison workshop in Las Palmas de Gran Canaria in May next year. The training course will be open to early career researchers from developing and developed nations and focus on hands-on experience with methods used to measure and model mesopelagic respiration. During the training course, a series of online learning materials including recorded lectures, method demonstrations and data analysis and modelling exercises will be produced. During the intercomparison workshop, WG members will compare methods which estimate mesopelagic respiration and prepare the results for publication.

Action: Consider funding for ongoing activities in 2023.

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

WG 162 was endorsed as a UN Ocean Decade Programme in June 2021. During the last year, OASIS has facilitated several UN Ocean Decade Laboratory events via virtual presentation, poster and discussions sessions. OASIS has held regular meetings as telecons in the form of (1) weekly to 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); (3) OASIS Theme Team meetings occurring regularly (approximately 1-2 monthly) that progress the 5 core themes of OASIS, (4) approximately quarterly newsletters distributed to a broad mailing. The WG published the 10 year OASIS strategy in a paper in ICES Journal of Marine Science (in press),

established a website (www.airseaobs.org) and completed reports as part of the UN Decade Laboratories. The WG activities have been presented at several international meetings including the UN Ocean Conference in Lisbon, June 2022.

Several conferences and meeting opportunities are planned for the year ahead, including: (1) the SOLAS Conference in Cape Town in September which will include a side event aimed at the SCOR WG and OASIS engaging with the local flux community in South Africa and other 'Global South' participants to see how to engage these communities into OASIS activities and themes, and (2) an OASIS session at AGU Fall 2022 Science Meeting. WG 162 continues to seek the right opportunity to meet in person and is contemplating how this is done to minimize the WG's carbon footprint and whether this would be help alongside another meeting in the future.

Action: Consider funding for ongoing activities in 2023.

2.2.17. WG# 163: Coupling of ocean-ice-atmosphere processes: from sea-ice biogeochemistry to aerosols and Clouds (Clce2Clouds) – Myers

Following the approval of WG 163, Clce2Clouds, the community got to work quickly. To ensure a smooth spin-up despite the remaining pandemic-related travel restrictions, all members posted a short presentation of their research interests in Clce2Clouds for the group to watch. This allowed the group to take the first steps and efficiently move forward on the TORs. To address the development and refinement of conceptual models for key chemical compounds in the coupled ocean-ice-snow-atmosphere system, three sub-working group (a) sulphur cycle, (b) nitrogen cycle and (c) primary aerosol) have been set up. The groups meet regularly online and are working toward drafting bi-polar and seasonal conceptual schematics on relevant processes. These schematics will inform the basis of conceptual models of known and constrained processes and point toward knowledge gaps to inform future research. Approximately equal representations of atmospheric and ocean biogeochemical experts ensure that both sides of the ice/snow interfaces are represented adequately. Clce2Clouds held a day of sessions at the CATCH Open Science Workshop and is looking forward to a first hybrid meeting connected to the SOLAS Open Science conference (Sept. 2022, South Africa). An open discussion session on differences in ocean-ice-snow-atmosphere processes in the Arctic and Antarctic is also planned for the SOLAS Open Science Conference.

Action: Consider funding for ongoing activities in 2023.

2.2.18. WG# 164: CoNCENSUS: Advancing standardisation of COastal and Nearshore demersal fish visual CENSUS techniques – Montes

Over the last year, WG 164 CoNCENSUS has focussed on introducing the team, and finalising the different Terms of Reference (ToR) and work plans; initiating capacity development and engaging with the broader underwater visual census community; developing an interactive shared workspace; and sourcing additional funding to allow increased participation by the full working group and to recruit early career scientists, in the form of postdocs and PhD students, to assist with the WG activities. The WG kick-off meeting was held on-line in May and provided a great opportunity for the WG members to meet for the first time and discuss the details of the ToRs. Leads and teams for each ToR were appointed during the meeting and these groups are now in the process of developing detailed work plans and starting the required work. Consensus has secured funding for one PhD student, a postdoc, and a

research assistant to join the WG. One funding proposal is currently under review to provide co-funding to support the CoNCENSUS objectives. The WG has made some good initial progress with the proposed capacity development plans and engaging with key role players in the global community of practice.

Action: Consider funding for ongoing activities in 2023.

2.2.19. WG# 165: Mixotrophy in the Oceans – Novel Experimental designs and Tools for a new trophic paradigm (MixONET) – Mitra / Laufkoetter

WG 165 MixONET started activities in January 2022. The MixONET launch WG meeting was held in silico (February 2022); this was the first opportunity for the WG members to e-meet each other. The second hybrid meeting (June 2022) was held in-person in Baiona (Galicia, Spain) and via Zoom. The WG is currently working on establishing a meta-database of databases to aid delivery to ToR1, for ToRs 2 and 3, reviews of extant guides and manuals are ongoing with a view to identify gaps. Since the inception of this WG, they have published an article in the IOC-UNESCO Harmful Algae Newsletter #70; a poster introducing the group has been presented at a conference. Their next meeting is planned in September 2022 (online) along with an in-person/hybrid meeting at either the Association for the Sciences of Limnology and Oceanography (ASLO) in Mallorca or International Society Of Protistologists (ISOP) in Vienna in 2023. There were a few renovations of membership in the WG with some members resigning due to personal circumstances and new members approved by SCOR.

Action: Consider funding for ongoing activities in 2023.

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. 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 / Zhang

Despite the COVID-19 pandemic, GEOTRACES launched its third Intermediate Data Product in November 2021. The IDP2021 represents a significant expansion in data available compared to the previous version released in 2017. The product contains now hydrographic and marine geochemical data from 77 cruises and 3191 stations. The IDP2021 consists of a digital data package for bulk data download and an eGEOTRACES Atlas for visualization. The GEOTRACES field programme has continued to progress successfully with 4 cruises completed in the last year including 2 new section cruises from Germany and India and 2

process studies from Australia and The Netherlands. Three new compliant data sets have been endorsed. The SSC and all the technical subgroups met virtually in this period and plan to have their first in person meeting in late September 2022. During the reporting period, 534 new peer-reviewed papers were published, including the publication of one special issue.

Action: None. GEOTRACES funding is provided by specific funding from an NSF grant

3.2. Surface Ocean – Lower Atmosphere Study (SOLAS) (SCOR/Future Earth) – *Minhan Dai / Penner*

During this reporting period, SOLAS completed a thorough report of its major achievements since 2016, and its plans for the next phase. This report was reviewed by an Ad Hoc Review Panel representing SCOR and Future Earth. The Review Panel highly regarded SOLAS's achievements during the past 5 years and the panel also made some valuable recommendations which SOLAS has been implementing in its strategy. SOLAS organised its first virtual summer school in June 2022, which hosted 62 students and involved 31 lecturers. An in-person school will be held in June 2023 on Cape Verde and the first hybrid Open Science Conference will take place on 25-29 September 2022 in Cape Town, South Africa. SOLAS and the National University of Ireland (NUI) Galway launched a new structured Research Master of Science (MSc) programme on Ocean, Atmosphere and Climate. The MSc bridges the boundaries between ocean and atmosphere and provides graduates with a broad understanding of how this coupled system works, affects, and is affected by climate and human activities. The first students will start in September 2022.

SOLAS has also engaged in COP26 and other activities of the UUNFCCC to ensure the effective transformations of science into policy and decision-making on climate and environmental health and is collaborating with three UN Ocean Decade programmes and co-organised four Ocean Decade events.

Action: None. SOLAS funding is provided by specific funding from NSF and NASA grants

3.3. Integrated Marine Biosphere Research (IMBeR) (SCOR/Future Earth) – *Fang Zuo / Aliani*

Over the past year, the Integrated Marine Biosphere Research project (IMBeR) published 96 papers, making significant progress in understanding, and predicting the marine environment, and proposing future research directions. The 'Southern Ocean Action Plan 2021-2030' also a contribution to the UN Decade of Ocean Science for Sustainable Development 2021-2030 (UNDOS), was co-authored by Integrating Climate and Ecosystem Dynamics in the Southern Ocean (ICED; an IMBeR Regional Programme) and developed through a stakeholder-oriented process. A paper led by Eugene Murphy outlined how lessons from the COVID-19 pandemic can inform a risk-based approach to developing plans for mitigating and adapting to ocean change. IMBeR's Interdisciplinary Marine Early Career Network (IMECaN) proposed blinded review in scientific publishing to help reduce biases that negatively affect under-represented and minority scientists. Three special issues were published: 'Solving Complex Ocean Challenges Through Interdisciplinary Research: Advances from Early Career Marine Scientists'; 'The Second International Indian Ocean Expedition

(IIOE-2): New Exploration in a Poorly Understood Ocean Basin (volume 4)'; and 'Marine Ecosystem Assessment for the Southern Ocean: Meeting the Challenge for Conserving Earth Ecosystems in the Long Term'. IMBeR also held three large events which were endorsed by UNDOS and collectively convened more than 1000 participants from over 80 countries. These were the IMBIZO6 Conference – 'Marine Biosphere Research: Buoyant Solutions for Ocean Sustainability', the IMBeR West Pacific Symposium – 'Changing West Pacific Ocean: Science and Sustainability', and the ClimEco7 Summer School – 'Interdisciplinary Ocean Science for Sustainable Development'. Diana Ruiz Pino (France) was approved as chair to replace Carol Robinson. The SSC met virtually.

Action: None. IMBeR support is provided by specific funding from NSF and NASA grants to SCOR.

3.4. International Quiet Ocean Experiment (IQOE) (SCOR/POGO)– Steve Simpson / Uku

IQOE work has proceeded without pause during the COVID travel restrictions and has been productive through Zoom meetings, but they are beginning to plan some in-person meetings later in 2022. The membership of the IQOE SC was renewed, with Steve Simpson (UK) and Peter Tyack (USA) as co-chairs, and other new members from the Netherlands, Norway, Namibia/South Africa, Canada, Australia, Iceland, Germany, and the USA. The SC met virtually in June 2022 and will be working in the coming months to follow up on topics from the low-cost hydrophone meeting, additional analysis of changes in ocean sound from the COVID pandemic, reviewing IQOE working group activities, and potentially forming a WG to help establish a global hydrophone system. The implementation plan for the Ocean Sound EOV is being reviewed by the IQOE Science Committee before releasing it to the ocean acoustics community for comment by the end of August. A new book edited by C. Erbe and J. Thomas, entitled Exploring Animal Behavior Through Sound: (Volume 1) is scheduled to be published on 23 August 2022 by Springer Nature. The Lounsbery Foundation contributed funding to make the book open access. The Global Library of Underwater Biological Sounds (GLUBS), a project of the IQOE WG on Acoustic Measurement of Ocean Biodiversity Hotspots had a workshop in Berlin on July in conjunction with the Aquatic Noise 2022 Meeting to broaden the GLUBS community and to advance planning for the activities mentioned in the previous bullet point. The SC will meet again virtually in a few months, and in person in late 2022 or early 2023.

Action: Consider supporting the 2023 activities as proposed in the budget.

3.5 Second International Indian Ocean Expedition (IIOE-2) (SCOR/IOC) – Marie A. Sicre

The goal of IIOE-2 is to advance our understanding of the Indian Ocean and its role in the Earth System to enable informed decisions in support of sustainable development and the well-being of humankind. Delivery of IIOE-2 occurs through national activities which are coordinated by a Core Group comprising the Co-Chairs, who represent the sponsors, and 3 Working Groups (WG1 Science & Research; WG2 Data & Information Management & WG3 Operational Coordination). They interact with each other. After the end of functions of the Project Office in Perth, the Office in Hyderabad deals with a day-to-day issues within IIOE-2.

The fifth meeting of the Steering Committee of IIOE-2 (SC5) was organized virtually during March 21-22, 2022 by the IIOE-2 Project Office at the Indian National Center for Ocean Information Services (INCOIS), Hyderabad. The SC5 meeting was held in conjunction with the integrated meetings of IOGOOS, IORP, SIBER, IRF, IIOE-2, and IOCINDIO. The meeting was co-chaired by Dr. Vladimir Ryabinin (IOC), Marie-Alexandrine Sicre (SCOR) and Srinivas Kumar (INCOIS), co-chairs of the Steering Committee of the IIOE-2. A full agenda and links to the background documents, including the presentations can be found at: <https://iioe-2.incois.gov.in/IIOE-2/SC5.jsp>.

The inability to have in person meetings has had a significant negative impact on IIOE-2 activities. They plan to have the next joint meeting of IIOE-2/IORP/SIBER/IRF/IndOOS in person in Perth, Australia from 6 to 10, February 2023. Progress for each of the IIOE-2 WGs is presented in the report. The IIOE-2 requests that SCOR agrees to allocate \$15k to underpin T&S at the IIOE-2023 conference in Perth, Australia, that should take place in person after two years of on-line meetings.

Action: Consider supporting the 2023 activities as proposed in the budget.

Day 3. Thursday, 6 October 2022

Chair: Sinjae Yoo / Note taker: Paul Myers

4. INFRASTRUCTURAL PROJECTS

4.1. The Southern Ocean Observing System (SOOS) (SCOR/SCAR)– *Alyce Hancock / McDougall*

The new SOOS Science and Implementation Plan 2021-2025 was approved in early 2022 by SCOR and SCAR after completing the review process. There has been some renovation in the IPO based at the University of Tasmania with two new officers replacing the former Science and Communication Officer, and Data Officer. SOOS continued to partner with polar organizations to make data more findable and accessible. The SOOSmap data portal has been undergoing continuing development and version 2 will be released in 2022. DueSouth, which SOOS developed to help researchers find future opportunities, has been further developed in partnership with the European Polar Board and is now part of Polardex. SOOS had a lead role in the organization of a side-event at the 26th United Nations Climate Change conference (COP26), in Glasgow, UK in October 2021. SOOS established a new Task Team on Polar Technologies aimed to develop a polar technologies group focused on addressing challenges and exploiting synergies in technology targeted at Southern Ocean and Antarctic marine research. SOOS continued active publication of science papers and reports in 2021-2022. SOOS core sponsorship for the IPO is provided by a partnership between the Institute for Marine and Antarctic Studies, University of Tasmania (IMAS/UTAS), Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Tasmanian State Government Department of State Growth. Discussion for the ongoing sponsorship and hosting of the SOOS International Project Office in Hobart progressed significantly through 2021 and an agreement is expected in mid-2022.

Action: Continue to support 2023 activities as proposed in the budget (SOOS funding was renewed in 2021 for a 3-year period).

4.2. International Ocean Carbon Coordination Project (IOCCP) (SCOR/IOC)– *Maciej Telszewsky / Moran*

The IOCCP is involved in several activities aimed at transforming the existing, mostly research-funded pilot activities into an integrated operational global ocean carbon observing system. Their current focus includes contribution to policy and decision makers through close collaboration with G7-FSOI (Future of the Seas and Oceans Initiative) or providing input to interventions at the UNFCCC COP26, involvement in endorsed programmes of the UN Ocean Decade, as well as leadership at the more technical level, working to increase the observing system's readiness level for becoming operational. Throughout 2021, the IOCCP managed to further strengthen or initiate several close collaborations for the benefit of establishing global coordination of IMDOS and sustained observations of Marine Plastics Debris as a new EOV and helped organize the "Integrating Marine Litter Monitoring to Inform Action" Official Side Event to the 2022 UN Ocean Conference. The SSG met in hybrid mode in November 2021 and will meet in November 2022.

Actions: None. IOCCP funding is provided by specific funding from an NSF grant to SCOR.

4.3. Changing Ocean Biological Systems (COBS) – *Philip Boyd / Yoo*

COBS activities in 2021-2022 focused on three key areas. First, to facilitate discussions within the scientific community on multiple driver research by organizing a session at the Ocean Sciences 2022 conference, as well as by building a collaboration with IMBeR to examine the socio-economic aspects of multi-driver change in ocean systems. Second, to develop new or improved training materials and opportunities around our online bank of resources (meddle-scor149.org), including developing slide decks for educators, and offering online in an in-person workshop. Finally, COBS members played pivotal roles in preparing high-level documents informing policy, such as the Multiple Ocean Stressors: A Scientific Summary for Policy Makers (UNESCO-IOC (2022) and the chapter section on multiple stressors in the 2022 IPCC WG2 AR6 Chapter 3 on ocean systems.

In the coming year, COBS will continue to offer workshops aimed at Early Career Researchers (ECRs) and expand this focus to better reach scientists from developing countries by expanding our national advocate network, and improving the coordination and crosstalk within this network. We will also coordinate with members of research-active communities (such as coral reef researchers) to discuss multiple driver experimental design in the context of these specific systems. COBS will strengthen the collaboration with IMBeR on multiple drivers and changing socio-economic systems. Potential for shared activities include publications, workshops within the IMBeR summer school or open sciences meeting, or a jointly run seminar with the IMBeR ECR network. Finally, COBS will re-invigorate several projects on surveys and high-level peer reviewed publications that were put on hold during the pandemic.

Action: None. Funding is provided from NSF specifically for the group through SCOR.

4.4. GlobalHAB (SCOR/IOC) – *Elisa Berdalet / Yoo*

From June to November 2021, GlobalHAB organized an online monthly series of open seminars and discussions to address the challenge of predicting HABs. The topics were size-based models, acclimation models, model validation, and machine learning. The webinars provided the basis for the in-person Marine Workshop on Modelling and prediction of harmful algal blooms, from event response to multi-decadal projections conducted in May 2022 in Glasgow, UK. The GlobalHAB modelling workshop was aimed at increasing awareness of the range of modelling and observational tools that are in our community toolbox, and help scientists and technologists develop creative approaches to meeting the needs of coastal communities, governments, and industry worldwide. A mini symposium on automated in situ observations of plankton, will be hosted at Kristineberg Marine Research Station, Sweden, in August 2022. The aim of the symposium is to bring together experts on, and users of, automated in situ imaging systems to present methods, recent results and to share experiences. A comparison of results when analysing plankton communities quantitatively will also be conducted. Early career scientists are particularly encouraged to attend the symposium and a special follow-on workshop on data processing and report/article writing.

GlobalHAB published the "Best Practice Guidelines for the Study of HABs and Climate Change" which is available at: <https://unesdoc.unesco.org/ark:/48223/pf0000380344>. The guidelines are intended to communicate standardized strategies, tools, and protocols to assist researchers studying how climate change drivers may increase or decrease future HAB prevalence in aquatic ecosystems.

Action: None. SCOR still holds past funds from GlobalHAB to support the activities in 2023.

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

JCS held two virtual meetings over the past year, during which members caught up on each other's activities for the past several years, including progress on several different projects that began since the last full meeting. A highlight was the development and approval of a new Chemical Speciation task group in JCS, to carry on the work started in SCOR WG 145. Discussions have also begun on the development of a new website specifically for JCS, separate from the existing TEOS-10 website which continues to serve software and pedagogical material related to the TEOS-10 standard.

Action: Consider supporting the 2023 activities as proposed in the budget.

5. AFFILIATED PROJECTS AND NON-GOVERNMENTAL ORGANIZATIONS

5.1. International Ocean Colour Coordinating Group (IOCCG) – Yoo

Shubha Sathyendranath (UK) was appointed as the new chair of IOCCG to replace Cara Wilson (USA). The 26th IOCCG Committee meeting took place in a hybrid format in June 2022 hosted by the European Space Agency at their ESA-ESRIN facilities (Frascati, Italy). Agenda topics included a review of all current IOCCG working groups and task forces, as well as updates from the 12 participating space agencies. Participants engaged in several discussions including the establishment of IOCCG working groups on ocean colour system vicarious calibration, ocean colour hyperspectral missions and carbon-from-space. Other discussions included seasonal biases in ocean colour, requests for full resolution OCR data over coastal waters, generating water quality products from high resolution satellites and establishing an efficient international database of match-up data points.

From the IOCCG Protocol Series, one protocol is available on the IOCCG website for comment (Aquatic Primary Productivity Field Protocols for Satellite Validation and Model Synthesis), another is in draft stage (Measurement Protocol of Absorption by Chromophoric Dissolved Organic Matter) and another is already available through the IOCCG website (Particulate Organic Carbon Sampling and Measurement Protocols: Consensus Towards Future Ocean Color Missions, volume 6.0).

The 2022 edition of the advanced IOCCG Summer Lecture Series (SLS) covering topics at the frontier of ocean optics and ocean colour science took place in July 2022 at the Laboratoire d'Océanographie de Villefranche, France. The application for the Trevor Platt Memorial Scholarship delayed in 2021 due to the pandemic is now open.

IOCCG currently has two active working groups, one on benthic reflectance and the other on atmospheric correction. though the working group. SCOR manages NASA grants for IOCCG.

Action: None.

5.2. InterRidge - International, Interdisciplinary Ridge Studies – Sang-Mook Lee / Zhang

InterRidge which depends heavily on face-to-face meetings and gatherings has been greatly affected by travel restrictions both by air and sea. The InterRidge Office has managed to collect only 60% of the proposed budget during the last three years. Even among those countries that contribute to InterRidge, for many, the possible development of seafloor mineral resources appears to be a selling point, directly or indirectly. Sang Mook Lee, chair of InterRidge has expressed his concerns for these recent developments, and at the same time, has raised the question of whether InterRidge (which was created some thirty years ago when member countries had their own ongoing national scientific programs such as RIDGE, RIDGE2000, BRIDGE, Dorsales, InterRidge-Japan) has outlived its lifetime.

The chair suggests going back to the drawing table, to look at what has been achieved in the past decade (InterRidge Third Decadal Plan 2014-23), and review what objectives have been achieved and what have not, including an assessment of those issues that need further

studies. This task can be an opportunity to come up with a new InterRidge decadal scientific plan (2024-33). This will also allow the program to change the governance of InterRidge (if necessary) to better manage the international collaboration in their effort to understand ocean basins and adjust to the new set of global circumstances, including new ways to pull together much-needed resources. The Chair intends to announce the timeline for such an effort in the next few months.

Action: None

5.3. Global Alliance of CPR Surveys (GACS) – Uku

Anthony Richardson was unable to provide an update on GACS activities due to many other commitments and requested to drop GACS for the agenda for this year. The plan is for GACS to organise a meeting in early 2023 and reinvigorate it. All the regional coordinators have been working separately supporting their surveys but not networking much together.

Action: None

5.4. International Association for Biological Oceanography (IABO) – Enrique Montes

During this reporting period, IABO activities focused on five key areas: 1) plans for the upcoming 6th WCMB meeting planned for 2023; 2) reviewing of SCOR Working Group proposals; 3) progress toward implementing the PeerJ-IABO Hub; 4) formalizing IABO's membership; and 5) selection of Carlo Heip awardee. In collaboration with PeerJ Publishing Group, a collection of selected papers from the 5th WCMB was launched. More information about the collection is available on the web. IABO has partnered with PeerJ Publishing Group to develop the PeerJ-IABO Hub, an online platform for IABO members to submit their contributions to PeerJ open access journals. This online interface seeks to drive membership growth of IABO, highlight social media feeds for the current and prospective members of the Association, promote IABO announcements (e.g. Carlo Heip Excellence Award notifications, WCMB conferences, community workshops), and collect funding in the form of tokens that can be used toward publishing fees of submissions from registered IABO members from developing and least developed nations. More information about the PeerJ-IABO partnership can be found on the web. Furthermore, IABO is now collecting membership information to better serve its community. A 'Join IABO' tab has been added to website for people interested in joining the Association to input their affiliation information and request to become active members of IABO. The list generated by this Google Form will be used to verify membership for benefits such as travel grants, notification information about fellowships, job opportunities, international collaborations, and publishing discounts on the PeerJ-IABO Hub. Finally, IABO received four nominations to the Carlo Heip Award. The Recognition Task Group selected Prof. Pablo Penchaszadeh for the 2021 Carlo Heip Award. The award ceremony is planned to be at the 6th World Conference on Marine Biodiversity in Penang, Malaysia, during the IABO's General Assembly.

Action: Identify areas of future cooperation with IABO.

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

IAPSO has the prime goal of ‘promoting the study of scientific problems relating to the oceans and the interactions taking place at the sea floor, coastal, and atmospheric boundaries insofar as such research is conducted by the use of mathematics, physics, and chemistry.’ IAPSO works mainly through 1) biennial scientific assemblies; 2) working groups; 3) commissions; 4) services; and 5) website information. Of special importance to IAPSO is the involvement of early career scientists as well as those from least developed countries.

The IAPSO Bureau was renewed in July 2019 during the IUGG General Assembly in Montreal, and two additional members were added in 2020 after an online election. Main activities in 2021-2022 include: (1) the Virtual Atmosphere-Cryosphere-Ocean seminar series (VACO-21), 19-23 July 2021, (2) planning for the 2023 General Assembly to take place in Berlin in 12-19 July, (3) a new IAPSO website, (4) expanded and increased visibility of the IAPSO Early Career Scientist Working Group, (5) funding a IAPSO Best Practice Study Groups, expecting to fund two every two years, (6) provided support to scientific meetings (e.g. the Second World Conference on Meteotsunamis), and (7) established a new IAPSO/IACS joint Commission on Ice-Ocean Interactions.

IAPSO maintains formal liaison with other scientific commissions and committees. These include the ISC's Scientific Committee on Oceanic Research (SCOR), and UNESCO's Intergovernmental Oceanographic Commission (IOC). For more information see <https://iapso-ocean.org/>.

Action: Identify future areas for SCOR cooperation with IAPSO.

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

The work of IAMAS Bureau this past year continued to advance the IAMAS Strategic Plan, which was adopted at the Montreal 2019 meeting. Some highlights include: (1) The IAMAS Early Career Scientist Committee, has initiated a set of monthly webinars: <https://www.youtube.com/channel/UCacNFbyJf3O7jyukKS6BKoQ>; (2) IAMAS has received a 5013c which will allow it tax-exempt (not-for-profit) status in the U.S. They are working towards a more stable financial status so that several Bureau officers will have access to our funds; (3) IAMAS has set up several joint sessions with other Associations at the IUGG meeting in Berlin for 11-20 July 2023. In addition, many of their Commissions are organizing their own sessions, and (4) The IAMAS Bureau continues to have regular monthly meetings for planning purposes. IAMAS continues to track their performance on their Strategic Plan initiatives and are making good progress.

The next meeting of IAMAS is planned to take place together with IUGG in Berlin, Germany in July 2023. The initial planning for this meeting took place at the September 2021 IUGG Executive Meeting. Currently, it is unclear, but the local organizing team is planning on an in-person meeting. IAMAS commissions hold several high-profile conferences either alone or in conjunction with other organizations. Many meetings were postponed early in the pandemic, however several activities were organized during this year by the International Commission on the Middle Atmosphere, the International Ozone Commission, the

International Radiation Commission, International Commission on Planetary Atmospheres and their Evolution, and the International Commission on Polar Meteorology.

Actions: Identify future areas of cooperation with IAMAS.

6. INTERGOVERNMENTAL AND PARTNER ORGANIZATIONS

6.1. Intergovernmental Oceanographic Commission (IOC) – *Sicre*

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, and common topics of interest are harmful algal blooms, plankton time series, coastal eutrophication, microplastics, deoxygenation, multiple stressors, and Eastern Boundary Upwelling Systems. Other IOC activities of potential interest to SCOR include research in ocean acidification, blue carbon, integrated ocean carbon, and invasive species.

Actions: None

6.2. North Pacific Marine Science Organization (PICES) – *Sanae Chiba / Yoo*

In October 2021, PICES held its annual meeting virtually for the second consecutive year, with China as the local host. The virtual meeting option resulted in the substantial reduction of the PICES carbon footprint over two years (saving 3,254 tonnes of carbon which is equivalent to 7,324 barrels of oil). PICES 2022 will be held face to face in Busan, Korea in late September 2022. The experience during the pandemic brought the benefits of an environmentally sustainable, cost-effective, and less time-consuming alternative to the traditional in-person meeting structure which led PICES to establish a new Study Group: Generating Recommendations to Encourage Environmentally- Responsible Networking (SG-GREEN) to consider how best to balance the benefits of each option.

The ICES/PICES joint programme “Sustainability of Marine Ecosystems through global knowledge networks (SmartNet) was endorsed as a UN Ocean Decade programme in 2021. SmartNet will establish a global knowledge network for ocean science by strengthening and expanding the collaboration of ICES/PICES and partner organizations. It will support and leverage ICES/PICES member countries' activities related to UNDOCS, by emphasizing areas of mutual research interest including climate change, fisheries and ecosystem-based management, social, ecological, and environmental dynamics of marine systems, coastal communities and human dimensions, and communication and capacity development. PICES hopes to explore the opportunities to further synergise the activities of SCOR and PICES through the implementation of SmartNet, particularly in the UNDOCS cross-cutting challenges such as capacity development, promotion of early career ocean professionals (ECOP). The newly established PICES Advisory Panel: AP-ECOP has been working across PICES Expert Groups and expanding the ECOP network at a global scale, for example, through the participation in the ECOP event at UN Ocean Conference held in Lisbon in July 2022. SCOR, PICES and KIOST (Korea Institute of Ocean Science and Technology) plan to hold

a joint one-day ECOP Session “Towards a better capacity for ECOPs” on October 3rd in Busan, Korea, where Annual Meetings of both organizations are held back-to-back. Collaboration between PICES and SCOR is implemented through (1) Contribution of scientific expertise to the relevant international scientific projects, (2) Reciprocal representation of the SCOR and PICES Executives at annual meetings, and (3) Capacity development. Sanae Chiba, the current PICES Deputy Executive Secretary, is a member of the SCOR Capacity Development Committee since 2021.

Actions: As determined from presentation and discussions at the SCOR Annual Meeting.

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

During the past year GESAMP WG 38 has focused its attention on the following four areas: 1) Completion of a paper published in Nature resulting from the GESAMP WG 38 and WG 40 joint workshop on microplastics and nanoplastics in the marine-atmosphere environment; 2) Continuing development of a workshop in South Africa on the ocean management and policy implications of the air/sea exchange of nutrients; 3) Carrying out other WG activities; and 4) publishing results from the previous WG 38 workshops. The plans for WG 38 activities for 2022-2023 include (1) carrying out the workshop on the ocean management and policy implications of the air/sea exchange of chemicals at Gqeberha, South Africa in October 2022, (2) Developing several peer reviewed papers resulting from the workshop in South Africa, and (3) Developing a GESAMP Reports and Studies document on the results from the WG 38/40 workshop on the atmospheric transport of microplastics to and from the ocean. SCOR holds funds to support the workshop in South Africa provided by SOLAS and IOC before the pandemic.

Action: None. Funding for this activity is provided by an NSF grant to SCOR has been completed.

6.4. Partnership for Observation of the Global Oceans (POGO) – Recording / Yoo

SCOR and POGO co-sponsor the POGO-SCOR Visiting Fellowship programme, as well as the International Quiet Ocean Experiment (IQOE). POGO is organized in three pillars: (1) innovation in ocean observing, (2) capacity development targeted primarily at scientists from developing countries and economies in transition, and (3) outreach and advocacy aims to articulate the societal benefits of ocean observing to people at all levels – from the general public to policy makers. POGO co-organized with SCOR, the ISC and the IODE the UN Ocean Conference Side Event: Developing the capacity we need for the ocean we want which was held online in June 2022. Jointly with SCOR, the POGO-SCOR fellowship supported 2 trainees in 2021 and 6 trainees in 2022.

Action: None

6.5. International Science Council (ISC) – Mathieu Denis (TBC) / Sicre

The ISC has continued to expand their science and policy networks and improve 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. 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.

The ISC has partnered with BBC StoryWorks for "Unlocking Science" to continue to reach new communities interested in science and improve public engagement. Such engagement will be critical to addressing the urgent challenge of accelerating action to reduce greenhouse gas emissions while advancing human development. A step forward towards this goal was the publication in 2021 of Unleashing Science: Delivering Missions for Sustainability, which makes a compelling case for going beyond business-as-usual approaches towards structuring, funding, and carrying out scientific research. To meet these aims, the ISC has established the Global Commission on Science Missions for Sustainability.

Actions: Identify topics for further collaboration.

6.6. Scientific Committee on Antarctic Research (SCAR) – (TBC) / Myers

SCOR and SCAR currently co-sponsor the Southern Ocean Observing System (SOOS). In February 2022 SCAR was enlisted by The Prince Albert II of Monaco Foundation (PA2F) as a partner along with the International Arctic Science Committee (IASC) and the Oceanographic Institute of Monaco in the Polar Initiative. The 10th SCAR Open Science Conference (www.scar2022.org) was held online from 1-10 August 2022, the second such online meeting following SCAR 2020 Online. The first hybrid format SCAR Delegates meeting took place in Goa, India from September 5-7th.

Action: Confirm co-support for SOOS in 2022.

6.7. Future Earth Ocean / Ocean Knowledge Action Network (Ocean KAN) – Linwood Pendleton

This past year was a busy one for the Future Earth Ocean networks. SOLAS and IMBeR International Project Offices moved to new country homes. The Future Earth Coast International Project Office in Germany also completed its term, and the Ocean Knowledge Action Network enjoyed the first full year of its International Project Office in France. The year saw numerous remote, hybrid and in-person meetings in which Future Earth Ocean networks were active and was highlighted by the UN Oceans Conference in June and the launch of the new Intergovernmental Panel on Ocean Change (IPOC). The year also included a half-day innovative session at the Ocean Sciences Meeting organized by the Ocean KAN and its partners. Over the course of the year, the Ocean Knowledge Action Network welcomed 28 new partners including on-the-ground partners, science networks, universities, UN Decade of Ocean Science Programs, and private sector partners.

Actions: As determined from presentation and discussions at the SCOR Annual Meeting.

6.8. World Climate Research Program (WCRP) – Hindumathi Kulaiappan / Penner

WCRP is in the process of implementing its new research strategy (WCRP Strategic Plan 2019-20282). Major elements of the Science and 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 our interaction with partners at national and international levels, and ensure that society has the climate knowledge that it needs for decision-making. The new WCRP structure was approved in 2021 and is currently being made fully operational.

WCRP carries most of its activities through four core projects: CLIVAR (oceans and climate), CliC (cryosphere and climate), GEWEX (water and climate), and SPARC (upper atmosphere and climate). 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.

Many CLIVAR meetings in the past 12 months were held online. CLIVAR organized the Regional Training Workshop on Observing the Coastal and Marginal Seas in the Western Indian Ocean (June 2022, Maputo, Mozambique, hybrid mode), and more hybrid activities are being prepared and expected to be organised in the second semester of 2022.

CLIVAR organized several capacity development activities such as the 3rd Summer School on Theory, Mechanisms and Hierarchical Modelling of Climate Dynamics: Tropical Oceans, ENSO and their Teleconnections (July 2022, Trieste, Italy), CLIVAR-FIO Summer School on Ocean Macroturbulence and Its Role in Earth's Climate (August 2022, Qingdao, China), and Arctic Processes in CMIP6 bootcamp (October 2022, Sømminestationen, Denmark).

CLIVAR has strong connection and contribution to the UN Decade of Ocean Science for Sustainable Development (2021-2030), particularly with the Digital Twins of the Ocean (DITTO) programme; Ocean Observing Co-design programme, Ocean to Climate Seamless Forecasting System (OSF). In addition, the CLIVAR-GOOS Workshop entitled 'From global to coastal: Cultivating new solutions and partnerships for an enhanced Ocean Observing System in a decade of accelerating change' (August 2022, Trieste, Italy), was endorsed as an UN Ocean Decade Activity.

Actions: As determined from presentation and discussions at the SCOR Annual Meeting.

7. CAPACITY BUILDING ACTIVITIES - Miloslavich

SCOR Committee on Capacity Development

The renewed SCOR Committee on Capacity Development (CCD) has been quite engaged, providing ideas and feedback, and contributing to review numerous travel support applications, and the two calls for visiting scholars (the regular and the "exceptional" calls). In addition, the committee took this year the task of reviewing the Namibian Regional Graduate Network in Oceanography (RGNO) and will provide recommendations for its continuation in the next years.

SCOR Visiting Scholars

Travel of the visiting scholars was reinitiated in mid-2022. Of the six scholars approved for

travel in 2020, three either declined or were unresponsive, and the other three still have plans to make the visit either in late 2022 or early 2023 (Hailong Liu from China traveling to the Philippines, Teresa Cerveira Borges from Portugal traveling to Angola, and Hidenori Kumagai from Japan traveling to India). Of the four scholars approved for travel in 2021, only one has completed the visit (Enrique Montes from the USA traveling to Brazil), one has declined (Marina Ross from Greece), and two are pending (Julia Sigwart from Germany traveling to Malaysia, and Louise Firth from the UK traveling to South Africa). For travel in 2022, the CD committee approved three scholars approved for travel in 2022, two have completed their visit (Nubi Olobunmi from Nigeria traveling to Cape Verde, and Vyacheslav Lyubchich from the USA traveling to Brazil), and one is pending (Elva Escobar-Briones from Mexico traveling to Costa Rica).

In 2022, the SCOR Committee on Capacity Development approved an “**Exceptional Call**” (<https://scor-int.org/2022/05/16/exceptional-call-for-scor-project-and-working-groups-scholars/>) specifically for the SCOR community which resulted in the approval of eight candidates who will either train or receive training. The selected candidates were Amii Usese (Nigeria), Luciana Santoferara (USA), MaryMar Payne (Philippines), Micaela Trimble (Uruguay), Natalia Osma (Chile), Nina Schubak (Switzerland/UK), Saumya Silori (India), Frances Gulland (USA). These will travel in 2023.

POGO-SCOR Fellowships for Oceanographic Observations

In 2022, 29 applications (45% female and 55% male) were received from Latin American (41%), African (28%), Asian (28%) and European (3%) candidates. Applicants proposed trainings of one, two or three months in oceanographic centres in Europe (48%), North America (28%), Oceania (10%), Africa (7%), Asia (3%) and Latin America (3%). With the combined available budget from POGO and SCOR, a total of 6 candidates were selected in 2022 and 6 in 2021. As in 2021, SCOR contributed in 2022 an additional amount to support an additional candidate. The fellows will start their training between September 2022 and March 2023. Currently, due to COVID international travel restrictions, three of the fellows appointed in previous years are still completing their trainings. The 2022 fellows can be found at: <https://pogo-ocean.org/capacity-development/pogo-scor-fellowship-programme/>

The POGO report with further information can be found at: https://scor-int.org/wp-content/uploads/2022/08/POGO-SCOR-Fellowships_2022-incl-20202021-fellows.pdf.

NSF Travel Support for Developing Country Scientists

During this last year, SCOR currently had two ongoing grants with NSF to support capacity development activities. The oldest of the two grants was on a No-cost-extension until July 2022 because of the delays in meetings due to COVID-19. In August 2022, the final report of this grant was submitted to NSF. Since October 2021, SCOR approved travel support for more than 30 early career scientists from developing countries to attend 16 international conferences, or summer schools taking place in 11 countries.

Research Discovery Camps at the University of Namibia – Regional Graduate Network in Oceanography (RGNO)

After two years of operating as an online series of “Discovery Seminars”, the Discovery Research Camp in Namibia was again held onsite in April-May 2022. Since 2016, the African-

RGNO Ocean Discovery Camps was co-directed and coordinated on-site by Dr. Chibo Chikwililwa, a researcher at the University of Namibia (UNAM) who organized the courses and had the additional responsibility of locally administering the funds. Sadly, Chibo passed away on June 2021 due to complications of COVID-19, and UNAM appointed Dr. Margit Wilhelm to take the coordination of the course. Under the new scenario, an agreement (Memorandum of Understanding – MoU) was drafted between SCOR and UNAM establishing the scope of cooperation between both parties and the administrative terms. The MoU was signed for one year (2022) and its renewal (and terms of renewal) will be conditioned to the recommendations of the SCOR Committee on Capacity Development after reviewing the program. As the A-RGNO enters the last phase of funding, the SCOR Committee on Capacity Development is reviewing the program to (1) evaluate the A-RGNO's major achievements since its implementation in 2014, (2) stimulate the A-RGNO to plan for its major activities until 2025 (conditioned to the funder's approval of a no cost extension until then), and (3) determine whether and how we should proceed with further funding and applying for future RGNO-type programs. The review process is intended to be useful for the parties involved, both SCOR and the University of Namibia (UNAM) along with the many partners to the program, by providing the opportunity to reflect on past achievements, on limitations, and to envision future paths.

Actions: Funding for these activities are provided by an NSF grant to SCOR, by POGO and by the Agouron Institute and Simons Foundation.

8. SCOR RELATED MEETINGS

During the 2021 annual meeting, the following schedule was proposed for the next SCOR annual meetings if travel was reinitiated: 2022 in Busan, Korea hosted by KIOST; 2023 in Guayaquil, Ecuador hosted by the INOCAR; 2024 in China hosted by the SCOR Chinese Committee in conjunction with their 40th anniversary of joining SCOR; and 2025 in Santa Marta, Colombia hosted by the INVEMAR. Locations of past SCOR meetings can be found at the SCOR website (<https://scor-int.org/events/category/annual/>).

Actions: Confirm 2023, 2024 and 2025 venues with Ecuador, China, and Colombia respectively. Invite proponents to host the 2026 annual meeting. Set tentative date for 2023 annual meeting.