February 2022 SCOR Newsletter # 47

SCOR at Ocean Sciences 2022

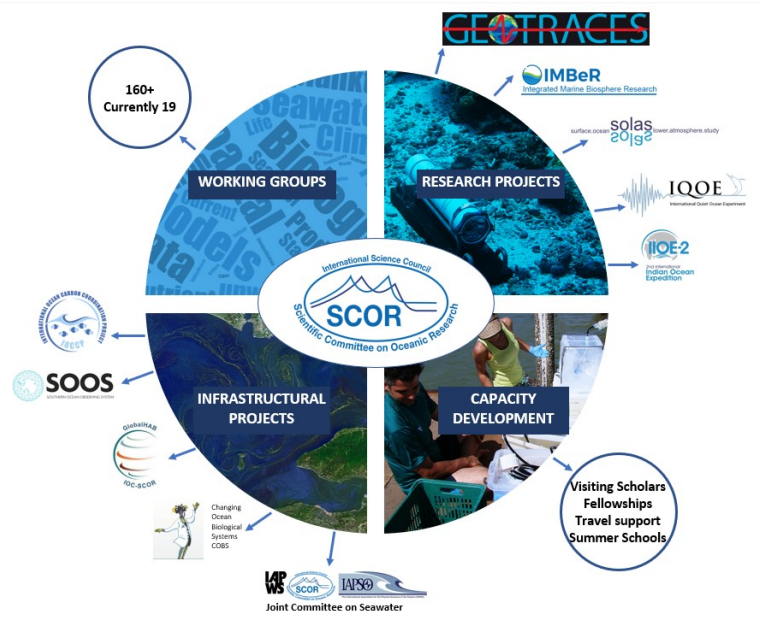
The 2022 Ocean Sciences Meeting will take place online between the 24th of February and the 4th of March. Several SCOR Working Groups and projects are participating in the conference and have organized Town Halls and other special sessions. SCOR will also have a virtual booth showing the SCOR community in action.

If you are attending OSM2022, we invite you to take a look at the booth and to participate in the many SCOR related activities.

Please check the program for the time schedule at: https://www.aslo.org/osm2022/

SCOR Booth

Come visit us at the SCOR booth to see SCOR's scientists in action and some nice posters of SCOR's projects and activities.



List of sessions

CT01 Temporal Variability of Bioactive Trace Elements in the Ocean: Towards Constraining Drivers, Mechanisms and Timescales

Organizers: Peter Sedwick, Erin Black, Alessandro Tagliabue, Simon Ussher

In the past decade, our understanding of the distribution of bioactive trace elements has improved greatly, advancing the development of numerical models that provide mechanistic insight and predictive capability. However, in addition to establishing the spatial distribution of biologically active trace elements, it is equally important to understand their temporal variability. Such information provides critical constraints on the mechanisms that control the biogeochemical cycling of these elements, and allows the assessment and expansion of numerical modeling efforts. In this session, we invite interdisciplinary contributions from both observationalists and modelers that examine the time variation of bioactive trace elements in the ocean, from both chemical and biological perspectives, over timescales ranging from daily to millennial.

CT03 Advances in understanding of the biogeochemical processes shaping the basin-scale distributions of trace elements and their isotopes

Organizers: Tim Conway, Lauren Kipp, Jessica Fitzsimmons, Greg Cutter

A range of important trace elements act as micronutrients, toxins, or tracers throughout the global oceans. The distributions of these trace elements are shaped by a range of biotic and abiotic processes including external sources and sinks, microbial uptake and regeneration, exchange with particles, and physical circulation of the oceans. In recent years, field programs such as GEOTRACES, CLIVAR, and SOLAS have hugely expanded the available datasets of trace elements and their isotopes (TEIs) throughout the oceans. These and other datasets are being used to determine the processes, sources, and sinks that control observed TEI distributions, and the transformations and rates of input, removal, and exchange associated with each process. Here, we invite submissions of abstracts using ocean transect, field, laboratory, or modelling datasets that focus on the distribution, isotopic composition, speciation, and cycling of TEIs at the basin-scale, as well as abstracts which use geochemical tracers to interrogate the internal cycling and source/sink processes which shape these basin-scale distributions or transform TEIs within the ocean. In addition to studies that yield insights into the current distributions and cycling of TEIs, we also invite submissions that investigate how the oceanic cycling of TEIs may change in response to the changing oceans and warming climate.

CT10 Sources, sinks, and cycling of trace elements in coastal and near-shore systems

Organizers: David Janssen, Veronique Oldham, Emily Estes

The terrestrial-ocean continuum regulates the delivery of trace elements to the global ocean; however, important gaps remain in understanding the complex cycling of trace elements in coastal systems. Further, coastal systems face significant pressure from anthropogenic climate change, nutrient loading, and inputs of environmental toxins. This session aims to connect GEOTRACES-style studies on distributions of trace elements with studies examining processes and cycling of trace elements in nearshore environments to better bridge the terrestrial-ocean continuum. We invite contributions examining the cycling of trace elements and their isotopes in rivers, wetlands and estuaries; inlets, marginal seas and inland seas; and the near-shore coastal ocean. Field, laboratory, and modelling studies of trace element distributions, speciation, biological transformations, sources and sinks, and pollution & remediation are welcome. We particularly encourage studies (1) on the transport of terrestrially-sourced metals and dissolved organic matter to near-shore environments; (2) on metal fluxes to and from shelf sediments; (3) linking processes regulating near-shore trace element availability and their impact on the biosphere; and (4) investigating natural and anthropogenic perturbations on trace element cycling in these systems.

CT11 Mercury transformations in marine ecosystems

Organizers: Eric Capo, Amina Schartup, Heyu Lin, Lars-Eric Heimbürger

Mercury (Hg) is a naturally occurring element that has been mined and released by humans for millennia. Inorganic Hg is released by natural processes such as volcanic activity, and also by human activities which have largely outweighed natural ones. We have known for half a century that methylmercury is naturally formed in marine sediment and water column from inorganic Hg and is a potent neurotoxicant. The majority of global methylmercury exposure for human populations is from marine ecosystems due to its bioaccumulation in predatory fish at levels that are a million times, or more, higher than seawater. Yet our understanding of abiotic and biotic Hg transformations in marine systems is still limited. A greater understanding of the microbial reactions and geochemical conditions conducive to the formation and

degradation of methylmercury is needed to mitigate its impacts on the health of fish-consuming wildlife and human populations. This session invites presentations on Hg transformations in marine ecosystems.

OB20 Towards BioGeoSCAPES: Linking cellular metabolism with ocean biogeochemistry

Organizers: Adrian Marchetti, Yoshiko Kondo, Naomi Levine, Dalin Shi

BioGeoSCAPES is an international program initiative aimed at integrating knowledge on organism identity and physiology within frameworks of community ecology and global ocean biogeochemistry. It is envisioned that an improved, predictive, and quantitative understanding of ocean metabolism on a changing planet can be achieved by combining detailed information on plankton (i.e., virio-, bacterio-, phyto- and zoo-) cell status, biochemical processes, and species interactions with intercalibrated measurements of nutrient fluxes, concentrations, and speciation (e.g., macronutrients, including inorganic and organic carbon, micronutrients and vitamins). We invite contributions describing research that can serve as inspiration for this nascent program. Appropriate abstracts could include: studies that integrate cellular metabolism through physiological and 'omics approaches (e.g., genomic, transcriptomic, proteomic, metabolomic, metallomic, lipidomic, etc.) with biogeochemical measurements, including fluxes; or studies that scale from the cellular to the ecosystem level through integrated field measurements or mechanistic models of interactions. With the COVID-19 pandemic significantly impacting field research opportunities, we are particularly interested in laboratory and modelling studies that provide new insights into BioGeoSCAPES-related topics across different scales of time and space.

HL11 Arctic Ocean processes, progress, and potential explored through synthesis supported research

Organizers: Laura Whitmore, Laramie Jensen, Ryan McCabe

The Arctic Ocean is changing rapidly as a result of global climate change at rates disproportionate to other ocean basins. Changes in stratification, circulation, and ice cover are giving way to a cascade of biogeochemical and ecological changes that are altering the character of the Arctic Ocean. These changes influence the global ocean by modulating freshwater export from the Arctic Ocean to the North Atlantic Ocean, the transfer of chemical constituents, and the connectivity of organismal populations. Because of continued annual sea ice coverage and accessibility barriers; data collection across small (seasonal) and larger (annual to decadal) timescales has been historically difficult. In order to elucidate and ultimately predict the impacts of climate change on the Arctic Ocean system a synthetic and trans-disciplinary effort is valued. In this spirit, we encourage submissions across ecological, chemical, physical, and geological sub-disciplines with special consideration to interdisciplinary approaches and to studies investigating spatial and/or temporal scales.

TH33 Accessing and utilizing the GEOTRACES 2021 Intermediate Data Product (IDP2021)

Lead Organizer: William Landing

Date and Time: 2/25/2022, 11:00AM to 12:00PM
Location: Room 02

The international GEOTRACES program (https://www.geotraces.org/) aims to identify processes and quantify fluxes that control the distributions of key trace elements and isotopes in the ocean, and to establish the sensitivity of these distributions to changing environmental conditions. GEOTRACES has just released a new intermediate data product (GEOTRACES IDP2021), combining data acquired during the first 10 years of the program. It contains datasets on trace elements that serve as micronutrients, tracers of continental sources to the ocean (e.g., aerosols and boundary exchange), contaminants (e.g., Pb and Hg), radioactive and stable isotopes used in paleoceanography and a broad suite of hydrographic parameters used to trace water masses. IDP2021 expands on, and includes, the collection of results from the Atlantic, Pacific, and Southern Oceans (IDP2014 and IDP2017) and includes new data from the Pacific, Arctic and Indian Oceans. In addition, IDP2021 includes a significant amount of BioGEOTRACES data on ligands, enzymes, and single cell quotas. IDP2021 will be of value to chemical, biological, and physical oceanographers, especially those interested in biogeochemical cycles and the impact of micronutrients on marine carbon cycling. This Town Hall will introduce IDP2021, explain how to access IDP2021, and include some highlights on the use of GEOTRACES data. The goal is to intensify collaboration within the broader ocean research community but also seek feedback from the community to help us improve future data products.

Air-Sea Interactions theme

AI01 Air-Sea Interaction and Climate Variability in the Atlantic Ocean: Observations, Modeling, and Theories
Organizers: Laifang Li, Nicholas Foukal, Feli Li, Kimberley Drouin

AI02 Under the Weather: Using Active and Passive Microwave Observations to Study Atmosphere-Ocean Interactions
Organizers: George Duffy, Juan Crespo, Brent Roberts, Derek Posselt

AI03 Fluxes and Physical Processes Near the Air-Sea Interface: Observations and Modeling
Organizers: David Ortiz-Suslow, Sophia Brumer, Luc Deike, Heather Holbach

AI04 Extratropical climate variability and change associated with air-sea interactions
Organizers: Yoshi Sasaki, Rhys Parfitt, Aixue Hu, Noel Keenlyside

AI05 The role of ocean-atmosphere dynamics in global climate
Organizers: Robert Jnglin Wills, Dillon Amaya, Elizabeth Maroon, Natalie Burls, Kaushal Gianchandani

AI06 Tropical Cyclone-Ocean Interactions: From Weather to Climate
Organizers: Il LIN, Karthik Balaguru, Gregory R Foltz, Christina M. Patricola, Chunzai Wang

AI08 Towards an understanding of how multiscale ocean-atmosphere interactions modulate fluxes in the air-sea boundary layer
Organizers: Alex Ayet, Ana Beatriz Villas Boas, Delphine Hypolite, Nicholas Pizzo

AI09 Tropical Pacific process study experiments: Improved understanding through observations, modeling and data assimilation
Organizers: Anna-Lena Deppenmeier, Deepak Cherian, William Kessler, Alma Vazquez-Lule, Aneesh Subramanian

AI10 Global atmosphere-ocean coupled simulations at km-scale resolution and the application to the design of future satellite missions that focus on surface winds and ocean currents
Organizers: Jinbo Wang, Hector S. Torres, Ping Chang, Niklas Schneider

AI11 Subtropical Air-Sea Interaction
Organizers: Malte Stuecker, Ning Zhao, Masami Nonaka, Niklas Schneider

CT03 Advances in understanding of the biogeochemical processes shaping the basin-scale distributions of trace elements and their isotope
Organizers: Tim Conway, Lauren Kipp, Jessica Fitzsimmons, Greg Cutter

CT04 Chemical methods to understand marine plastic pollution quantities, sources, transport, fate, impacts, and solutions
Organizers: Jennifer Lynch, Katherine Shaw, Sarah-Jeanne Royer, Sanghee Hong

ED11 Global capacity development in ocean science for sustainable development
Organizers: Brian Arbic, Tan Shau (Aileen) Hwai, Edem Mahu, Tashiana Osborne

HL17 The Arctic Ocean Carbon Cycle: Past, present and future
Organizers: Mike DeGrandpre, Brent Else, Claudine Hauri

OC14 Beyond a research dialogue: progress in testing marine CO2 removal methods
Organizers: Lennart Bach, Phil Renforth, Deborah Iglesias-Rodriguez, Philip Boyd

OD11 The uptake of data by citizen scientists, aggregators and end-users: successes, challenges and gaps in the dataflow
Organizers: Patrick Gorringe, James Sprinks, Peter Thijsse, Emilie Breviere

OS14 Observing Air-Sea Interactions Strategy (OASIS) Ocean Shots for 2030
Organizers: Meghan Cronin, Sebastiaan Swart, Brian Arbic, Samantha Wills

Data and time series

TH38 FAIR data solutions to support a global observing system of marine ecological time series

Lead Organizer: Heather Benway

Sustained marine ecological time series (METS, activities which generate multi-year records comprising biotic and abiotic data) are critical for characterizing marine ecosystem shifts in a time of accelerating changes. Historically, these distributed time series efforts each evolved with local reporting and data curation practices and bilateral interactions with community repositories, making it exceedingly difficult for potential users to discover, access, and integrate these unique datasets, thus severely limiting their applications. There is an urgent need to develop consensus on community-adopted data and metadata reporting standards that would make these data more Findable, Accessible, Interoperable, and Reusable (FAIR). This town hall will include an overview of a new NSF EarthCube-funded METS Research Coordination Network (RCN) that will bring together a cross-section of the ocean and data sciences communities for a sustained dialog to address long-standing METS challenges, most prominently the lack of consistent and FAIR data practices and approaches. METS RCN activities are focusing on consensus-building and aligning with FAIR implementation in related communities; broadening users and applications of METS data; and building capacity to ingest, analyze, and integrate METS data with other complementary data sets to accelerate scientific discovery. This session will provide an opportunity to seek feedback and engage prospective participants in RCN activities. Data synthesis and modeling efforts across ocean time series represent important and necessary steps in broadening our view of a changing ocean, and maximizing the return on our continued investment in METS programs. This town hall will also highlight a new effort to develop an integrated data product based on high-quality biogeochemical data across several global METS programs to assess biogeochemistry trends and variability across ocean biomes.

SCOR Working Groups

Working Group #154: Integration of Plankton-Observing Sensor Systems to Existing Global Sampling Programs (P-OBS)

TH48 Bio-GO-SHIP: Sustained Global Scale Biological Observations

Lead Organizer: Jason Graff

Bio-GO-SHIP (Biological-Global Ocean Ship-based Hydrographic Investigations Program) is a recently

awarded pilot study that aims to incorporate globally consistent and repeatable biological observations into the existing GO-SHIP framework. Bio-GO-SHIP aims to create a sustained set of high-quality measurements driven by scientific questions that are best answered by a global scale sampling program which also serves the greater ocean science community by providing relevant data and sampling opportunities. Bio-GO-SHIP draws upon technological advancements and community-derived best-practices to collect samples and measurements ranging from phytoplankton pigments and particulate organic matter to optics and plankton imaging to multiple 'omics approaches. The data will be curated to an established set of standards and will be complemented by concurrent physical and chemical information collected through the ongoing GO-SHIP program. With existing support for biological measurements from GO-SHIP and initial seed funding from NOAA's Marine Biodiversity Observation Network, NASA's Ocean Biology & Biogeochemistry Program, and WHOI's Ocean Carbon and Biogeochemistry Program, the time is right to create a systematic and consistent global biological ocean observing program with the ability to observe the impacts of a changing climate on marine plankton communities and related parameters. This Town Hall seeks to introduce Bio-GO-SHIP and prior successful efforts integrating biological measurements on GO-SHIP cruises, provide details on existing activities, describe opportunities for collaboration, and to open up discussions that will help inform and improve Bio-GO-SHIP's future endeavors and abilities to meet the needs of the ocean science community.

SCOR Working Group #156: Active Chlorophyll fluorescence for autonomous measurements of global marine primary productivity

TH47 Towards Community Standards of Practice in the Use of Variable Chlorophyll Fluorescence for Phytoplankton Productivity and Photo-Physiological Measurements

Lead Organizer: Philippe Tortell

Single-turnover variable chlorophyll fluorescence (ST-ChlF) approaches have been used for more than three decades as a tool for autonomous and non-destructive measurement of phytoplankton photosynthetic capacity. In recent years, improvements in sensor technology have extended ST-ChlF observations to autonomous platforms and oligotrophic waters, while conceptual advances have led to a better understanding of the environmental and taxonomic effects on derived ST-ChlF parameters. With maturing technology and a strengthening theoretical framework, ST-ChlF measurements are now poised to contribute significant new insights into the variability of phytoplankton photosynthesis over a range of time and space scales, yielding information on organismal and ecosystem-level responses to global change. However, the field now sits at a crossroads, as operational, computational and conceptual approaches are rapidly diverging, creating confusion and uncertainty among potential end-users. To address this challenge, SCOR Working Group 156 was created with the aim of building consensus recommendations and standards of practice for the use of ST-ChlF to examine in situ phytoplankton productivity and photo-physiology. In this Town Hall, we will launch a major deliverable from our work; A User Guide for the Application of Single Turnover Active Chlorophyll Fluorescence for Phytoplankton Productivity Measurements. This document provides guidance on the appropriate use of ST-ChlF under a range of conditions, with a particular focus on field-based instrument deployment, and data retrieval, interpretation and archiving. Our goal is to stimulate wide-spread application of ST-ChlF measurements, and facilitate the sharing of inter-comparable datasets collected by different researchers and instrument types. This, in turn, will support the creation of a global data compilation to better resolve broad-scale patterns of aquatic photosynthesis and phytoplankton photo-physiology.

SCOR Working Group 157: Toward a new global view of marine zooplankton biodiversity based on DNA metabarcoding and reference DNA sequence databases (MetaZooGene)

ME20 Zooplankton diversity through space and time

Lead Organizer: Katja Peijnenburg

"Marine zooplankton play vital roles in pelagic food webs, ecosystem functioning, and global biogeochemical cycles and are useful indicators as rapid responders to global change. Yet, the distribution of zooplankton diversity and links to ecological function across space and time remain poorly known throughout the global ocean. We invite contributions investigating marine zooplankton diversity, from individual species to whole communities, and across both ecological and evolutionary timescales. This session will explore new insights into zooplankton, their diversity and roles in the ecosystem, which are being revealed through emergent approaches, such as 'omics and/or environmental DNA methods, imaging techniques combined with machine learning, and/or trait-based or distribution modelling, while also being inclusive of studies using more conventional methods. This session welcomes contributions from field, laboratory, experimental or theoretical studies and aims to encourage multidisciplinary approaches as well as highlight recent work to better understand the impacts of anthropogenic stressors (e.g. climate change, ocean acidification, aquaculture, deep-sea mining…) on marine zooplankton.

SCOR Working Group #160: Analyzing ocean turbulence observations to quantify mixing (ATOMIX)

TH43 Analyzing Ocean Turbulence Observations to Quantify Mixing

Lead Organizer: Arnaud Le Boyer

The 20 members of the ATOMIX working group (SCOR group 160) are designing a framework that will allow the Ocean Mixing community (OMC) to converge toward best practice procedures and quality-control indicators to obtain the turbulent dissipation rate of kinetic energy (epsilon) - a critical turbulence quantity for estimating mixing - from shear probes and velocity sensors. These best practices will support observations from commonly deployed platforms such as profilers, fixed and moored instruments, and self-propelled gliders. To enable validation of existing (and future) algorithms, benchmark datasets with agreed-upon estimates will be made available for a variety of platforms and ocean environments, along with quality metrics. These benchmarks are designed to remain relevant irrespective of the programming language used for data processing, as a lasting legacy for the OMC. The panelists will discuss the progress made over the first year (e.g., creation of a Wiki, benchmark data set, algorithm comparison) of the project and the expected timeline. Following a long list of “community building” projects, ATOMIX is part of a broader effort to connect the different members of the OMC. To that end, community feedback on the working group plans will be welcome, as well as any discussion on the way the OMC should coordinate in order to make ocean turbulence measurements an “off-the-shelf" component of the ocean instrumentation.

SCOR Working Group 162: Developing an Observing Air-Sea Interactions Strategy (OASIS)

TH18 Get Involved! Observing Air-Sea Interactions Strategy (OASIS)

Lead Organizer: Meghan Cronin

The Observing Air-Sea Interactions Strategy (OASIS), with SCOR Working Group #162 leadership, has been endorsed by the UN Decade of Ocean Science and Sustainable Development as an end-to-end Ocean Decade Programme. OASIS brings together communities across disciplines to harmonize observational strategies and develop a practical, integrated approach to observing air-sea interactions. OASIS activities are organized across five Theme Teams: (1) The Network Design and Model Development Theme Team will identify what physical and biogeochemical air-sea interaction processes and ecological stressors should be included in the OASIS; what process studies are needed to improve models and parameterizations; and what transformational “Ocean Shots” are needed for the OASIS. (2) The Capacity Building and Sharing Theme Team will ensure that OASIS is truly global through capacity building and sharing. Near-term goals include developing curriculum, and working with summer schools and mentoring programs. (3) The Ocean Shots and UN Decade Theme Team will work through the UN Decade and national committees to implement OASIS "Ocean Shots" that will make a sea-change in observing, understanding and modeling air-sea interactions over the coming decade. (4) The Best Practices and Interoperability Theme Team will develop and promote best practices for observing air-sea interactions. OASIS already has a track within the Ocean Best Practices Systems for surface radiation. What next? and (5) The Findable-Accessible-Interoperable-Reusable (FAIR) Data, Models, and OASIS Products Theme Team will help develop products for the global OASIS community. Please come to this Town Hall to discuss how you can Get Involved in these OASIS Theme Teams. By working together, OASIS hopes to produce transformative observational-based knowledge to fundamentally improve weather, climate and ocean prediction, and promote healthy oceans, the blue economy, and sustainable food and energy.

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Dr. Patricia Miloslavich
SCOR Executive Director