

SOLAS Annual Report to SCOR

Reporting period: May 2019 - May 2020

Version of 07 June 2020 by Jessica Gier

I. SOLAS Mission and Organisation

The SOLAS mission is:

To achieve quantitative understanding of the key biogeochemical-physical interactions and feedbacks between the ocean and the atmosphere, and of how this coupled system affects and is affected by climate and environmental change.

The **2015-2025: Science Plan and Organisation** organised this mission around five core themes:

Core Theme 1: Greenhouse gases and the oceans

Core Theme 2: Air-sea interface and fluxes of mass and energy

Core Theme 3: Atmospheric deposition and ocean biogeochemistry

Core Theme 4: Interconnections between aerosols, clouds, and marine ecosystems

Core Theme 5: Ocean biogeochemical control on atmospheric chemistry

In addition, the study of these themes are integrated in efforts to understand key environments, e.g. upwelling systems, polar oceans, and the Indian Ocean, as well as to evaluate the environmental efficacy and impacts of climate intervention proposals, policy decisions, and societal developments.

The SOLAS 2015-2025: Science Plan and Organisation (SPO) is available to download from the SOLAS website (<https://www.solas-int.org/science/science-plan.html>), and hardcopies are available upon request from the IPO.

With the launch of the new science plan in 2015, SOLAS chose to use a pragmatic approach to the implementation strategy with a continually-evolving live document developing plans at least 2 years into the future. This approach means that the document is a moving target that is regularly updated. The implementation strategy is intended to be a live web-based document only and a new version will be available for download from the SOLAS website soon at: <https://www.solas-int.org/science/implementation-strategy.html>

The latest iteration of the Implementation Strategy was released online in April 2018 and the update for 2020 is in progress.

Upcoming SOLAS activities include:

- Future Earth Summit 2020, virtual, **15-17 June, 2020**
- Workshop to organise global scientific oversight community on climate intervention, **summer 2020**
- 6th International Marine Conservation Congress, virtual, **22-28 August, 2020**
- BEPSII annual meeting, virtual, **24-28 August, 2020**
- Annual SOLAS Scientific Steering Committee meeting 2020, virtual or face-to-face, **Sept., Oct., or Nov. 2020**
- AGU, San Francisco, USA, **7-11 December, 2020**

- XMAS-V Symposium on Multidisciplinary Sciences Can Serve a Sustainable and Healthy Ocean, Xiamen, China, **11-14 January, 2021**
- BEPSII & ECV-Ice annual meetings, in conjunction with Gordon Research Conference - Polar Marine Science, Ventura, CA, USA, **May 2021**
- ECV-Ice intercalibration experiment, Cambridge Bay, Canada, **April 2021**
- BEPSII Winter School, Cambridge Bay, Canada, **May 2021**
- 8th International Symposium on Gas Transfer at Water Surfaces, Plymouth, UK, **18-21 May, 2021**
- 8th international SOLAS Summer School, Cape Verde, **7-18 June, 2021**
- Sustainability Research and Innovation Congress (SRI2021), Brisbane, Australia, **12-15 June, 2021**
- GEOTRACES - SOLAS workshop on Iron at the Air-Sea Interface, Ashville, North Carolina, USA, **July 26-29 or August 2-6 2021**
- 16th IGAC Science Conference, Manchester, UK, **12-16 September, 2021**
- SCOR Working Group 155, EBUS summer school, Dakar, Senegal, **2021**
- GESAMP Working Group 38 workshop on Atmospheric Input of Chemicals to the Ocean – Management Implications, Port Elizabeth, South Africa, **2021**
- International Indian Ocean Science Conference (IIOSC), Goa, India, **2021**
- South American SOLAS symposium, **2021**
- Workshop connecting the Southern Ocean Projects, **2021**
- Open workshop on How Can SOLAS Science Best Inform on Climate Intervention Proposals, **2021**
- Synthesis workshop on pan-Arctic expeditions, **2021**
- SOLAS Open Science Conference, Cape Town, South Africa, **2022**

II. Progress on implementation of project science

II.a. Integrated activities across all SOLAS science

SOLAS Summer School

The first SOLAS summer school took place in July 2003 in Cargèse, France. The success of this first school was such that the SOLAS summer school became a regular, highly successful, and productive event. SOLAS is proud to have offered 7 schools between 2003 and 2018, training more than 500 students. The 2021 edition of the school will take place at the Ocean Science Centre Mindelo, Mindelo, Cabo Verde (<https://www.oscm.cv/>), from 7-18 June 2021. It will bring together 70 early career scientists from diverse countries with about 20 world-leading international scientists, for a mix of plenary lectures and hands-on practical workshops. Christa Marandino from GEOMAR, Kiel, Germany will again be the director of the summer school.

SOLAS Network of Integrated Atmosphere-Ocean time-series stations

Numerous efforts are underway around the globe to integrate atmospheric and oceanic time series stations to better understand ocean-atmosphere interactions. To better facilitate collaboration and capacity building between these air-sea observatories, SOLAS has launched an initiative to form a network of scientists running and building such stations. A discussion session at the 2019 SOLAS Open Science Conference brainstormed ways the community should work together (see

SOLAS Event Report, [Issue 14](#)), and SOLAS just implemented a formal endorsement process for integrated air-sea time series programs. In addition, an international collaborative proposal is being prepared, with SOLAS support, to upgrade the observatories at Cape Verde to include a dedicated air-sea interaction spar, providing direct information on fluxes and the sea-surface microlayer.

Collaboration with the European Space Agency (ESA)

The long-standing and fruitful collaboration between ESA and SOLAS is continuing on a number of fronts. An ESA-SOLAS session on “[Remote Sensing of the Ocean Surface and Lower Atmosphere - a SOLAS Session](#)” was held at the ESA Living Planet Symposium at the ESA Living Planet Symposium, Milan, Italy, 12-16 May, 2019. Following that session, a Special Issue in the journal Remote Sensing on ‘Remote Sensing of Air-Sea Fluxes’ is being planned, with deadline on 31 August 2020. An ESA-SOLAS satellite-focused discussion session will be held at the 8th International Symposium on Gas Transfer at Water Surfaces, Plymouth, UK, 18-21 May 2021. Topics of particular joint interest between SOLAS and ESA include the physical and chemical dynamics of upwelling regions and air-sea interactions in polar oceans and coastal waters.

Ocean Carbon & Biogeochemistry (OCB) Ocean-Atmosphere Interaction Subcommittee

<https://www.us-ocb.org/about/ocb-subcommittees/subcommittee-on-ocean-atmosphere-interactions/>

The Ocean Atmosphere Interaction Committee (OAIC) was formed by OCB to coordinate research on ocean-atmosphere interactions and their role in marine biogeochemical cycles. The subcommittee held a workshop on “Ocean-Atmosphere Interactions: Scoping directions for U.S. research”, in October 2019 in Sterling, VA, USA (<https://web.whoi.edu/air-sea-workshop/>). The goal of this workshop was to bring together members of the U.S. air-sea research community to facilitate new collaborations and identify knowledge gaps and high-priority science questions to motivate innovative research and contribute to international SOLAS efforts. The workshop included 59 members of the air-sea research community and representation from NSF, NASA, and the US Carbon Cycle Science Program. The OAIC will assemble a grassroots document to help coalesce the U.S. air-sea interaction research community around a common set of science goals and research priorities. The workshop and its outcomes are expected to strengthen ties between the ocean and atmosphere research communities and foster a more cohesive U.S. contribution to international SOLAS.

II.b. Progress on Core Themes

SOLAS/IMBER Ocean Acidification Working Group (SIOA)

<https://www.solas-int.org/science/sponsored-science.html>

The SOLAS/IMBER Ocean Acidification (SIOA) working group provides a key advisory role to the Ocean Acidification International Coordination Centre (OA-ICC) at the International Atomic Energy Agency in Monaco. In 2019, the SIOA/IAEA OA-ICC continued to act as an international coordination platform for ocean acidification research and collaboration by

- Ensuring that scientists have access to recently updated, state-of-the-art software to calculate ocean acidification parameters, and that ocean acidification data collected across the globe are properly archived, accessible, and comparable. This is particularly relevant in the context

of reporting from countries on the UN SDG 14.3.

- Acting as a hub for global stakeholders interested in ocean acidification, providing unique resources such as a comprehensive bibliographic database and a news stream updated daily with info on ocean acidification scientific articles, media coverage, jobs, and meetings.
- Providing increased awareness about ocean acidification with contributions to major reports and working groups, highly visible international events and meetings, training courses, the OA-ICC web site, news stream, and communication products.
- Contributing to the development of international and regional coordination activities and networks, such as GOA-ON, LAOCA, and OA-AFRICA.
- Contributing to methodology development for UN SDG14.3 on Ocean Acidification and helping countries to get ready to report towards that target.
- The largest OA community meeting, “The Ocean in a High CO₂ World”, has been postponed to 2021.

The 2019 SIOA and OA-ICC annual meeting took place in Monaco on 27-28 May. The 2020 annual meeting has been postponed and will take place in conjunction with “The Ocean in a High CO₂ World” in 2021.

Integrated Ocean Carbon Research (IOC-R)

<https://www.solas-int.org/science/sponsored-science.html>

The Working Group on Integrated Ocean Carbon Research (IOC-R) was initiated in 2018, and is coordinated by the Intergovernmental Oceanographic Commission (IOC), with involvement of the carbon cycle and ocean science expert community. The first in-person workshop of IOC-R, took place at IOC-UNESCO in Paris, France, in October 2019. This expert workshop aimed to:

- Identify critical knowledge gaps in the ocean carbon cycle;
- Identify research activities in order to close this gap;
- Bridge science and policy through contributions to The United Nations Decade of Ocean Science for Sustainable Development (2021-2030), the United Nations Framework Convention on Climate Change and its Paris agreement, and the Intergovernmental Panel on Climate Change 6th Assessment Report.

A high-level white paper is being written that will contribute to the Ocean and Climate Dialogue under the UN Framework Convention on Climate Change’s scientific body (SBSTA). The white paper will outline an IOC-R science plan, and will focus on a range of issues to include: (i) priority research questions and their linkages; (ii) synergies with other initiatives; and (iii) societal and policy implications and applications. A summary of the white paper will be submitted to the UNFCCC call (cf. UNFCCC 1/CP.25 decision, paras. 31, 33, and 34).

Collaborations with GEOTRACES

A discussion session on ‘Atmospheric deposition of iron, ocean biogeochemistry and marine emission of biological aerosols’ was held at the SOLAS Open Science Conference in April 2019 in Sapporo, Japan. Following this session, a GEOTRACES - SOLAS workshop was planned for summer 2020 on Iron at the Air-Sea Interface, in Ashville, North Carolina, USA. This workshop has been postponed to July 26-29 or August 2-6, 2021.

Collaboration with PICES

A SOLAS session on ‘Atmospheric nutrient deposition and microbial community responses, and predictions for the future in the North Pacific Ocean’ has been organised as part of the PICES annual meetings. A virtual session of scientific presentations is planned for the 2020 virtual

meeting, to be followed by a face-to-face meeting at the 2021 PICES meeting, to foster collaborations among the Asian and North American communities.

New Initiatives in Atmospheric Chemistry

In collaboration with the International Global Atmospheric Chemistry (IGAC) program, SOLAS has launched a scoping exercise to identify critical science on which our two organisations should collaborate. Although the discussions are on-going, initial proposals include tropospheric halogen-ozone interactions, atmospheric processing of nutrients and pollutants deposited to the ocean, interactions between marine and anthropogenic aerosols, and photochemical production of climatically-active materials in the surface ocean.

II.c. Progress on Cross-cutting Themes

Biogeochemical Exchange Processes at Sea Ice Interfaces (BEPSII)

<http://www.bepsii.org>

Biogeochemical Exchange Processes at Sea-Ice Interfaces (BEPSII) started in 2011 with a focus on sea-ice biogeochemistry, was a SCOR working group from 2012 until September 2016, and has since been endorsed as a SOLAS-CliC Activity (from 2016) and as a SCAR Action Group (from 2017). Following a workshop in Switzerland in 2018, the BEPSII community submitted a Position Analysis on ‘Arctic sea-ice biogeochemical responses to climate change’ to *Nature Communications*. A targeted 3-day workshop was held in Paris, France, in May 2019 with participants in the intercomparison of 1-D sea-ice biogeochemical models project (8 scientists present). In 2019, 2 early-career scientists (ECSs) were appointed to the SSC. The annual BEPSII meeting took place in Winnipeg, Canada, 16-18 August 2019 (SOLAS Event Report, [Issue 16](#)). A BEPSII winter school is being planned for 27 graduate students to be held in May 2021 in Cambridge Bay, Canada. The annual BEPSII meeting for 2020 has been moved on-line, but SOLAS will support the 2021 annual meeting, which is planned in conjunction with the Gordon Research Conference on Polar Marine Science, in Ventura, CA, USA in May 2021.

Cryosphere and Atmospheric Chemistry (CATCH)

<https://sites.google.com/view/catchscience/home>

Cryosphere and Atmospheric Chemistry (CATCH), cosponsored by SOLAS and the International Global Atmospheric Chemistry (IGAC) program, facilitates atmospheric chemistry research within the international community, with a focus on natural processes specific to cold regions of the Earth. CATCH defined and sharpened its mission and scope during the past year, which resulted in a peer-reviewed commentary (Thomas et al., 2019). A 2-day CATCH science workshop prior to AGU in December 2019 was organised with 44 scientists (SOLAS Event Report, [Issue 17](#)). The CATCH SSC holds monthly tele-conferences to discuss updates and planning of activities, and held their first annual physical meeting right after the CATCH December 2019 workshop. A CATCH working group structure has been developed and will be implemented in 2020 in order to push CATCH actions and science forward. The six working groups are on Data, Models, Lab Approaches, Field Campaigns, Outreach, and Community Building.

Climate Intervention

Following our successful workshop in Sapporo, Japan, in spring, 2019, SOLAS is building a coalition of global research programmes to form a scientific oversight community on geoengineer-

ing. The intent is to provide a forum through which the efficacy and potential side effects of climate intervention proposals can be evaluated, as well as to explore governance concerns. An initial workshop with leaders of key programs is being planned for summer 2020.

Capacity building in Ocean Deoxygenation

In collaboration with the Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific and Cultural Organisation (UNESCO), SOLAS co-sponsored the 1st International Global Ocean Oxygen Network (GO₂NE) Summer School, held in Xiamen, China, 2-8 September 2019 (see SOLAS Event Report, [Issue 15](#)). The summer school was designed to connect young researchers with leading scientists in different components of GO₂NE research, and scientists from small and medium-sized enterprises not only in a theoretical framework, but also through practical exercises, laboratory experiments and special sessions. Altogether, brought together 37 PhD students and early career scientists from 19 countries and 14 world-leading international scientists from 12 countries participated.

The Indian Ocean

A joint SOLAS-IIOE-2 workshop was planned for the International Indian Ocean Science Conference (IIOSC-2020) in Goa, India. The intent was to both discuss SOLAS science being conducted in the Indian Ocean and to revitalise the SOLAS community in India. With the IIOSC postponed to 2021, we are now organising an online event.

Contributions to the UN Ocean Decade

SOLAS participated in the First Global Planning Meeting of the Preparatory Phase of the UN Decade of Ocean Science for Sustainable Development, Copenhagen, Denmark, 13-15 May 2019. In addition, SOLAS SSC members attended the webinar on ‘Introduction to the Draft Implementation Plan for the Ocean Decade’ in March 2020. SOLAS provided feedback to the UN Decade Implementation Plan (Zero Draft) and the organising committee of SOLAS summer school plans to apply for formal UN Ocean Decade endorsement for the event.

III. Summary of 2019-2020 SOLAS activities

III.a. SOLAS events:

- Journée Future Earth, Paris, France, 9 May 2019
- First Global Planning Meeting of the Preparatory Phase of the UN Decade of Ocean Science for Sustainable Development, Copenhagen, Denmark, 13-15 May 2019
- Ocean KAN meeting, Copenhagen, Denmark, 16 May 2019
- iCACGP annual meeting, Montreal, Canada, 6-8 July, 2019
- BEPSII annual meeting at the IGS Sea Ice Symposium, Winnipeg, Canada, 16-18 August, 2019
- Global Ocean Oxygen Network (GO₂NE) summer school, Xiamen, China, 2-7 September 2019
- Shipping & the Environment II, Gothenburg, Sweden, 4-6 September, 2019
- OceanObs'19, Hawai'i, USA, 16-20 September 2019
- SCOR annual meeting, Toyama, Japan, 23-25 September 2019
- IGAC SSC meeting, Mexico City, Mexico, 29-30 October 2019
- CATCH annual meeting at the AGU, San Francisco, USA, 9-13 December 2019

- CATCH Open Science workshop, Berkeley, USA, 7-8 December 2019
- SCOR China annual meeting, Sanya, Hainan, China, 19-20 December 2019
- Ocean Science Meeting, San Diego, USA, 16-21 February 2020
- EGU, GESAMP / iCACGP / SOLAS session on “Air-sea Chemical Fluxes : Impacts on Biogeochemistry and Climate”, virtual, 4-8 May 2020
- WCRP JSC meeting, virtual, 18-20 May, 2020
- SOLAS SSC discussions on SSC membership, virtual, 27 May and 3-4 June 2020

III.b. SOLAS communications

Website, <http://www.solas-int.org/>

The SOLAS website has been redeveloped and updated, with a new design and structure.

Newsletter: 12 SOLAS newsletters have been sent to over 1000 SOLAS scientists since the last SCOR report. The monthly newsletter releases compile scientific highlights, news from SOLAS, opportunities for meetings, abstract submission deadlines, recent publications, vacancies, and news from relevant partner projects and collaborators. Past issues of the e-news can be viewed on the SOLAS website: <https://www.solas-int.org/news/newsletter-archive.html>

Event Report series: Reports on SOLAS sponsored or co-sponsored events are published after each SOLAS-sponsored event. These reports are sent to the SOLAS sponsors and other interested parties and are released in combination with the monthly Newsletters.

<https://www.solas-int.org/publications/event-reports.html>

- [Issue 17, March 2020](#). Cryosphere and Atmospheric Chemistry (CATCH) Open Science Workshop, Berkeley, California, USA, 7-8 December 2019.
- [Issue 16, November 2019](#). Biogeochemical Exchange Processes at Sea-Ice Interfaces (BEPSII) annual meeting, Winnipeg, Canada, 16-18 August 2019.
- [Issue 15, November 2019](#). Global Ocean Oxygen Network (GO2NE) International Summer School, Xiamen, China, 2-8 September 2019.
- [Issue 14 July 2019](#). SOLAS Open Science Conference, Sapporo, Japan, 21-25 April 2019.

Twitter: Regular posts (currently 8020) are being sent out and the number of followers is steadily increasing (currently 786). Twitter: [@SOLAS_IPO](#)

ResearchGate: Connects the SOLAS research network and includes more than 360 SOLAS-related publications with 147 followers and 822 reads.

<https://www.researchgate.net/project/Surface-Ocean-Lower-Atmosphere-Study-SOLAS-2>

Flickr: SOLAS public photo stream shows pictures (currently 52) of the most recent SOLAS events and SOLAS related research. In addition, SOLAS distributes event pictures (currently 369) among participants via private links.

<https://www.flickr.com/photos/182357030@N02>

Outreach: SOLAS figures, conceptual diagrams, 3-fold SOLAS flyer, and logos are available for download from the SOLAS website

<https://www.solas-int.org/publications/downloads.html>

Presentation: A SOLAS presentation for workshop organisers is available upon request from the IPO.

III.c. SOLAS publications

Please see the SOLAS project on ResearchGate for an extensive list of relevant publications from the community: <https://www.researchgate.net/project/Surface-Ocean-Lower-Atmosphere-Study-SOLAS-2>

Key integrative SOLAS publications from 2019 and early 2020 are listed below and summarised on the SOLAS website: <https://www.solas-int.org/publications/publications.html>

- Paper resulting from the SOLAS Science and Society kick-off meeting, which took place in October 2016 in Brussels, Belgium: Marandino, C., van Doorn, E., McDonald, N., Johnson, M., Açma, B., Brévière, E. & Thomas, H. (2020). From Monodisciplinary via Multidisciplinary to an Interdisciplinary Approach Investigating Air-Sea Interactions – a SOLAS Initiative, *Coastal Management*, DOI: 10.1080/08920753.2020.1773208
- ESA Support to Science Element (STSE) initiative, collection of publications (2019 and 2020) (<https://www.solas-int.org/publications/publications-reader/publications-from-esa-support-to-science-element-initiative.html>)
- Special issue: NETCARE (Network on Aerosols and Climate: Addressing Key Uncertainties in Remote Canadian Environments) (2019). Overview paper: Abbatt, J. P. D., Leaitch, W. R., Aliabadi, A. A., Bertram, A. K., Blanchet, J.-P., Boivin-Rioux, A. ... & Yakobi-Hancock, J. D., New insights into aerosol and climate in the Arctic. Editor(s): L. Bopp, K. S. Carslaw, D. J. Cziczo, and L. M. Russell Special issue jointly organised between Atmospheric Chemistry and Physics, Atmospheric Measurement Techniques, and Biogeosciences, 19, 2527–2560. DOI: 10.5194/acp-19-2527-2019
- Gruber, N., Clement, D., Carter, B. R., Feely, R. A., van Heuven, S., Hoppema, M. ... & Wanninkhof, R. (2019). The oceanic sink for anthropogenic CO₂ from 1994 to 2007, *Science*, 363(6432), 1193-1199. DOI: 10.1126/science.aau5153
- Thomas, J. L., Stutz, J., Frey, M. M., Bartels-Rausch, T., Altieri, K., Baladima, F. ... & Gier, J. (2019). Fostering multidisciplinary research on interactions between chemistry, biology, and physics within the coupled cryosphere-atmosphere system. *Elementa Science of the Anthropocene*, 7:58. DOI: 10.1525/elementa.396

III.d. SOLAS national networks

SOLAS has National Representatives in 30 countries around the globe. The national representatives are asked to report annually on SOLAS activities in their countries. To facilitate the reporting effort, a template form is provided. In June 2020, 11 reports from 2019 had been received and are posted on the SOLAS website. The information contained in the reports is a valuable source of information for the IPO to report to sponsors but also to facilitate coordination and dissemination of results and progress from national projects to the rest of the SOLAS community. Information provided through the reports is also used by the Scientific Steering Committee to develop the implementation strategy.

All reports received during the reporting period are available in an Addendum to this document.
Current national networks:

- Australia: Sarah Lawson and Andrew Bowie *
- Belgium: Nathalie Gypens *
- Brazil: Leticia Cotrim Da Cunha
- Canada: Martine Lizotte *
- Chile: Laura Farias
- China (Beijing): Minhan Dai *
- China (Taipei): Chonlin Lee *
- Denmark: Lise Lotte Soerensen and Mikael Sejr
- Finland: Lauri Laakso *
- France: Rémi Losno
- Germany: Christa Marandino and Hartmut Herrmann *
- India: VVSS Sarma
- Israel: Yoav Lehahn *
- Ireland: Peter Croot *
- Italy: Chiara Santinelli
- Japan: Yuzo Miyazaki *
- Korea: Kitack Lee
- Mexico: Jose Martin Hernandez Ayon
- Netherlands: Jan-Berend Stuut
- New Zealand: Cliff Law
- Norway: Siv Lauvset
- Peru: Michelle Graco
- Poland: Timo Zielinski
- Russia: Sergey Gulev
- South Africa: Sarah Fawcett
- Spain: Alfonso Saiz-Lopez
- Sweden: Katarina Abrahamsson
- Turkey: Baris Saglihoglu, Mustafa Koçak, Nazli Olgun
- UK: Tom Bell
- USA: Rachel Stanley *

* SOLAS has received the 2019 report

III.e. Current endorsed projects and time series

- April 2020: Shipping Emissions in the Arctic and North Atlantic Atmosphere (SEANA), www.birmingham.ac.uk/seana
- December 2019: Are marine microorganisms influencing clouds? (Sea2Cloud), <https://www.europeandissemination.eu/sea2cloud-by-karine-sellegr-2/2704>
- November 2019: Atmospheric Composition and Radiative forcing changes due to UN International Ship Emissions regulations (ACRUISE), <https://www.pml.ac.uk/Research/Projects/ACRUISE>

- October 2019: Atlantic Meridional Transect Ocean Flux from Satellite Campaign (AMT4oceanSatFlux), <https://amt4oceansatflux.org/>
- September 2019: Role of Eddies in the Carbon Pump of Eastern Boundary Upwelling Systems (REEBUS), <https://www.ebus-climate-change.de/reebus>
- March 2019: Impact of atmospheric multi-stressors to coastal marine systems in a changing climate scenario (AMBIEnCE), <https://projectambience.wordpress.com/>
- October 2017: Processes Influencing Carbon Cycling: Observations of the Lower limb of the Antarctic Overturning (PICCOLO), <https://roses.ac.uk/piccolo/>
- September 2016: The Great Barrier Reef as a significant source of climatically relevant aerosol particles
- June 2016: Tudor Hill Marine-Atmospheric Observatory, <http://www.bios.edu/research/projects/tudor-hill-marine-atmospheric-observatory/>
- November 2015: North Atlantic Aerosols and Marine Ecosystems Study (NAAMES), <http://naames.larc.nasa.gov/>
- October 2013: Network on Climate and Aerosols: Addressing Key Uncertainties in Remote Canadian Environments (NETCARE), <http://www.netcare-project.ca/>
- August 2011: Marine ecosystems response in the Mediterranean experiment (MERMEX), <https://mERMEX.mio.univ-amu.fr/>

SOLAS has launched a formal process to **endorse integrated atmosphere-ocean time series stations**. Information on all endorsements and the formal application processes is available on the SOLAS website: <http://www.solas-int.org/activities/project-endorsement.html>.

III.f. SOLAS metadata portal

The SOLAS metadata portal was set up by the SOLAS project integration initiative (2007-2013) with the intention to help SOLAS scientists identify what data exist, where they are stored, and the data originators. The portal is hosted by the BODC, and the metadata files are stored on the international standard Global Change Master Directory (GCMD). The resource is freely available at https://www.bodc.ac.uk/solas_integration/research_objectives/metadata_portal/

The SOLAS metadata portal is an ongoing effort. Scientists can help expanding the SOLAS metadata base by completing a simple template available at https://www.bodc.ac.uk/solas_integration/implementation_products/data_submission/

IV. Income and expenses for the past year and budget for the coming year, including funding from all sources (not only SCOR funding)

- Executive director salary, office space and in kind provided by GEOMAR until December 2020, 50% salary in 2021.
- Project officer salary, office space and in kind provided by NSF funding/GEOMAR via SCOR/GEOMAR until December 2021.
- Project officer salary, office space and in kind provided by MEL until September 2020, maybe extended until September 2021.
- US-NSF via SCOR annual grant of 32-35kUSD until September 2021. About half to cover the cost of the SSC meetings.

- Future Earth annual block grant of 15kEUR contributing to the costs of the SSC meetings.

Income, expenses and budget for 2019-2020:

INCOMES		Credit (EUR)	Debit (EUR)
	Funds and in kind from GEOMAR Helmholtz Center for Ocean Research Kiel	90.000	
	Funds from NSF via SCOR for PO salary	51.000	
	Funds from MEL for PO salary	50.600	
	SCOR-NSF Travel (year 2 and 3)	32.000	
	SCOR-NSF Subsistence (year 2 and 3)	16.000	
	SCOR-NSF Publication (year 2 and 3)	5.200	
	SCOR-NSF Other (year 2 and 3)	3.600	
	NSF grant: For SOLAS Capacity building OSC2019	6.600	
	Hokkaido University for SSC meeting 2019	5.000	
	OSC 2019 - Registration	67.000	
	OSC 2019 - Various sources	12.600	
	Future Earth block grants for SSC meeting 2019 and 2020	30.000	
	IUGG fund via iCACGP for South America capacity building	1.400	
Total Income		371.000	
EXPENSES		Credit (EUR)	Debit (EUR)
IPO	Salaries		191.600
	Consumables		500
	Representational travel		15.000
Capacity building	NSF grant: For SOLAS Capacity building SOLAS OSC - SCOR		6.600
Events	SSC meeting 2019		28.500
	SOLAS OSC, Apr 2019		72.000
	SIOA annual meeting, May 2019		4.300
	GO2NE Summer School, Sep 2019		3.100
	Shipping and the Environment II, Sep 2019		2.600
	BEPsII annual meeting, Aug 2019		4.400
	IOC-R annual meeting, Oct 2019		1.000
	CATCH annual meeting, Dec 2019		4.000
	SSC meeting 2020 - cancelled		5.800
Publications	SOLAS Website subscription 2019 and 2020		160
	SCOR business 2019 and 2020		2.500
	SOLAS Website update		4.800
Total Expenses			346.860
Balance			24.140
Note:			
Many SOLAS events and SOLAS co-sponsored events are postponed to 2021. Thus, funds couldn't be used in 2020 but are committed for 2021.			
This does not include the following items:			
In kind from GEOMAR and MEL with office space/computer/printing/administration etc.			

V. Update on the Scientific Steering Committee and International Project Office status since the last report

IV.a. SOLAS Scientific Steering Committee

Lisa Miller (F, Canada) is the 5th SOLAS SSC Chair, acting for 3 years, from January 2018 through December 2020.

In late 2019, a chair search committee was established, which consists of Katy Altieri, Maurice Levasseur, Phil Boyd, and Jessica Gier. Based on suggestions from the community, the committee compiled a shortlist of chair candidates and requested vision statements from them. The SSC gave their feedback on the statements and the chair search committee will make a decision by mid-June.

SOLAS has an Executive Committee composed of the Chair Lisa Miller (F, Canada), Katy Altieri (F, South Africa), Maurice Levasseur (M, Canada), and Jun Nishioka (M, Japan).

The following SSC members rotated off at the end of 2019:

- Phil Boyd (M, Australia)

In January 2020, one new SSC member was appointed:

Andrew Lenton (M, Australia)

Cristina Facchini (F, Italy) and Maurice Levasseur (M, Canada) will complete their second term at the end of 2019. In addition, Laura Gallardo, whose first term will be ending at the end of 2019, has indicated a desire to rotate off the committee. We are currently searching for replacements with relevant expertise.

Arne Körtzinger (M, Germany), Katy Altieri (F, South Africa), Santiago Gassó (F, USA), and Talib Mohd Latif (M, Malaysia) will also finish their first terms at the end of 2019, and we are currently discussing their renewal for a second term.

The current membership of the SOLAS SSC is 17 members including the chair:

Last name	First name	Country of employment	Gender	Scientific expertise	SOLAS expertise	Term	End
Suntharalingam	Parvadha	UK	F	Numerical modelling / C, N, S bgc cycles	Theme 1 and 3	2	2021
Körtzinger	Arne	Germany	M	Carbon cycle, Ocean observation	Theme 1, Upwelling	1	2020
Zhang	Guiling	China	F	Bgc of trace gases	Theme 1, Coastal ocean	2	2022
Minnett	Peter	USA	M	Remote sensing, physical air-sea exchange	Theme 2	2	2021
Rutgersson	Anna	Sweden	F	Air-sea physical interaction	Theme 2, Coastal ocean, Science & society, WCRP rep	2	2022
Latif	Mohd Talib	Malaysia	M	Microlayer, atmosph. aerosols	Theme 2 and 5	1	2020
Altieri	Katy	South Africa	F	Atmospheric molecules, climate policy	Theme 3 and 5, Polar oceans, Science & society	1	2020

Lenton	Andrew	Australia	M	Marine bgc	Theme 3, geoengineering	1	2022
Gassó	Santiago	USA	M	Remote sensing, aerosols, dust transport	Theme 3 and 4, NASA connection	1	2020
Levasseur	Maurice	Canada	M	Ocean bgc, dimethyl-sulfide, Arctic, ice algae	Theme 3 and 4, Polar oceans	2	2020
Gallardo	Laura	Chile	F	Atmospheric modeling, pollutants	Theme 4 and 5, Upwelling, Coastal ocean, Science & society, IGAC	1	2020
Facchini	Cristina	Italy	F	Physical and chemical processes in multi-phase atm. systems	Themes 4 and 5, Coastal ocean	2	2020
Ovadnevaite	Jurgita	Ireland	F	Aerosol chem, physics and cloud processes	Themes 4 and 5	1	2021
Mahajan	Anoop	India	M	Atm chemistry, halogens, climate modeling	Theme 5, Indian Ocean	1	2021
Miller	Lisa	Canada	F	Sea-ice bgc and marine inorganic bgc	Theme 2, Polar oceans, PICES connection	1	2020
Nishioka	Jun	Japan	M	Oc. trace metal bgc cycle, Polar oceanography and sea-ice bgc	Theme 3, Polar oceans , Coastal ocean	2	2022
Van Doorn	Erik	Germany	M	Law of the Sea	Science and Society	2	2022

The current gender and country balance of the SSC for 17 members including the chair:

- 8 female members and 9 male members
- 4 members from developing countries and 13 from developed countries

IV.b. SOLAS International Project Office

IPO at GEOMAR in Kiel, Germany

The SOLAS IPO is hosted at the GEOMAR Helmholtz Centre for Ocean Research Kiel in Kiel, Germany. Jessica Gier was appointed the **Executive Director** in April 2018. The salary of the Executive Director and office space for the IPO, are supported by GEOMAR. However, our current sponsorship agreement with GEOMAR ends this coming December, and they have decided that they cannot continue to host the IPO. In order to facilitate a smooth transition, GEOMAR agreed to allow the office to remain in Kiel for one more year (to the end of 2021), but only at half funding. Therefore, we need to find a new host for the IPO by January 1, 2022, and find half of the executive directors salary for 2021.

A proposal to NSF to maintain a **Project Officer** position at GEOMAR was approved in September 2018, and Esther Rickert was appointed on a half-time basis until December 2021. Every three months, GEOMAR sends an invoice to SCOR, and Esther submits a job description to SCOR. In order to maintain the project officer position, we will apply for it again in the next NSF proposal in spring 2021.

Nodal Office at MEL in Xiamen, China

Minhan Dai (past SSC member) from MEL, Xiamen University supports a **SOLAS regional office** and an additional **Project Officer**, Li Li, until September 2020. There is a high chance to extend the contract until Sept. 2021, but this is still in progress.

Possibilities for a new IPO host

- Minhan Dai submitted a proposal for hosting the IPO at MEL, Xiamen, **China**. He agreed also to the possibility of hosting a 'dual IPO'.
- Jurgita Ovadnevaite, who is at NUIG in Galway, **Ireland**, has the possibility to host the IPO, which would include the salary for 1 executive director. It would be connected to developing and administering a 1-year international SOLAS master's program. The students would spend 3 months at NUIG and then go abroad for a research project. The international SOLAS network would provide hosts for the students.
- The SOLAS community in **UK** (at PML and UEA) is investigating possibilities with NERC.
- The SOLAS-OCB subcommittee in the **US** is investigating possibilities with NASA.
- Anna Rutgersson in **Sweden** is checking options with FORMAS (the national funding agency) and Uppsala University.