

# Future of SOLAS Beyond 2025

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## Ideas in SOLAS Review Report to sponsors in 2021: . Future plans (2021-2025)

- Now, continued coordination is required to address new challenges relating to our interaction with the ocean, whilst developing new approaches to perennial issues, including the physics and biogeochemistry of the air-sea interface and the processes that control the exchange of mass and energy across that boundary. This is essential for understanding of the feedback loops in ocean-atmosphere interactions and their roles in climatic and environmental changes. Enhancing predictive capability of future change in the ocean-atmosphere coupled system by inclusion of these processes into Earth System and Re-gional Models is a primary goal of SOLAS. Finally, SOLAS recognises the need for broader research on the controls and sensitivity of **biological productivity** in the surface ocean, and will explore this further in new initiatives.
- To achieve this, SOLAS will **enhance coordination of global monitoring and measurement systems to more effectively and efficiently increase global coverage of greenhouse gases and other variables of climate sensitivity to address regional gaps and so improve global budgets**. SOLAS will encourage adoption of autonomous technologies, such as sensors, sail drones, floats, voluntary observing ships, and advanced moorings. Remote satellite technology applications for the air-sea interface are underway with ESA and NASA, and applications will be further investigated with other organisations including SOOS and CLIVAR. SOLAS will also investigate shared platforms with other organisations including GEOTRACES (Theme 3) and IGAC (Theme 4). SOLAS has already initiated coordination of a time-series stations network to gain greater understanding of variability, particularly in poorly sampled regions, that will enhance collaboration, standardisation of methods, and data sharing. The time-series network has potential for development in collaboration with IOCCP, OceanSITES, and SOOS.
- SOLAS increasingly addresses the critical role of the air-sea interface in many aspects of sustainability and so contributes to ongoing global efforts, such as the UN Ocean Decade and SDGs. To facilitate this, SOLAS will improve data flow to policy by coordinating and supporting development of databases, products and parameterisations. The SOLAS community has played an active role in coordination and planning within OceanObs'19 and so established directions for implementing the outcome of this de-cadal conference.
- Finally, SOLAS has identified areas that require additional effort in promoting transdisciplinary re-search, community building and coordination that include: further enhancing engagement with atmospheric and social scientists, international community-building in Asia and capacity-building in Africa and SIDS. With the new IPO in China and the revitalised SOLAS-India network, SOLAS is in a good position to improve cross-border collaborations in Asia and other developing regions.

## **Decisions from SSC Meeting in Dec 2022**

- **Decision 1: The (core) of the SOLAS name will be kept. DONE**
- **Decision 2: Discuss with OASIS about a potential merger and invite the co-chair(s) to the SSC meeting. DONE - but decided against it**
- **Decision 3: SOLAS will conduct a restructuring and transformation process from science to solutions and involve social scientists. ONGOING**

## Decisions from SSC Meeting in Sept 2022

- **Decision 4:** SOLAS will continue beyond 2025 and work on the 3<sup>rd</sup> Science Plan (2025-2035), with some extent of transformation of science into solutions.
- **Decision 5:** An online SSC meeting end of 2022 will be organised to continue the discussion on SOLAS beyond 2025.
- **Decision 6:** The SSC will lead the effort with the input from Implementation Teams, Nat/Reg Networks, and Early Career Committee.
- **Decision 7:** The SSC will explore funding options to support SOLAS (Santiago NSF, Tom PML).

# SOLAS 3.0 Beyond 2025?

- **Science & repackaging ? Synthesis/iteration?**
  - Title? SOLAS 3.0? or
- **Innovations in Sciences?**
  - Overarching: Science—earth system science (global and regional) & prediction
  - Outcomes: climate crisis (WCRP?), environmental disasters, economic security, or the new climate intervention initiative
  - Large scale & integrated ocean-atmosphere observations and experiments
  - Transformations of science into solutions
- **Innovations in tools**
  - RS-carbon?
  - AI
  - Biology: Omics?
- **New legacy: data products? Integrated experiments? Tools? Coordination?**
- **Major sponsorship & finance?**
  - SCOR (SCOR sponsorship w/n funding? ) /FE(cross-cutting?EDI?)/WCRP
  - IOC?
  - National/regional funding agencies and foundations
  - New partnership with industrial sectors
  - Consortium of institutions to sponsor IPO/Master Program?

# SOLAS 3.0 Science Plan & Timelines

- Townhall in Xmas in Jan 2023
- Scoping workshops
  - ECS Meeting (March 2023)
  - Scoping workshop (Sept 2023, Xiamen)
  - NSF visit: Dec 2023 or Feb 2024
  - Finalize: late 2024.

# General considerations

- Maintain SOLAS niches: **ocean-atmo**
- Integration/synthesis/focus (SOLAS<sup>3</sup> for SOLA study, synthesis and solutions?)
- Solutions-oriented
- Science-forward looking: balance emerging topics and fundamental issues
- Innovations in designs and approaches/tools

# Roadmap towards SOLAS 3.0

- Needs mapping: solutions-oriented
  - Outputs: Climate (heat/carbon capacity & feedbacks)/SDG(ES)/Ocean Decade:
  - Sponsors: WCRP/FE/SCOR/IOC?
  - Sensitive regions: Small islands
- Gap analysis: Science-forward visions
  - Model: fully coupling ocean-atmosphere (ice-land?) needs what? Process/parameterization? Priority? (ESM vs SOLAS On-line workshop?)
  - Obs: full spectrums of ocean-atmo (SOLAS EMS vs ESOLASVs?)
  - Model-data fusion
- Approach and structure



# Emerging/fundamental issues

- Large scale transport feedbacking to climate changes: fire-carried; micro-plastics; bio-aerosols
- Heat waves, wild fires.....
- OM from the ocean
- Air-sea exchanges of masses: common framework & fundamental theory (not only CO<sub>2</sub>)
- Key variables in common for ocean and atmo & ECVs and EOVs
- .....

# Emerging tools

- RS of whole spectrum of climate-ocean coupled variables;
- AI
- Data-driven and physical based models
- OMICS

# Issues

- SOLAS label/flags
- Contribution # to NSF grants
- Scales: temporal and spatial?

# Feature research activities

- Large scale multiple platforms-ocean-atmo coupled/integrated obs & experiments
- Obs-model
- SOLAS Data Bank
- Regional? Integrated regions?

# NSF Visit

- Led by US Scientists (citizens):

# Framing questions