2021 2030 United Nations Decade of Ocean Science for Sustainable Development

International Science Council SCOR Scientific Committee on Oceanic Research

OASIS

Observing Air-Sea Interactions Strategy (OASIS)

SCOR Working Group # 162 (November 2020 – December 2024)

airseaobs.org

OASIS Co-Chairs: **Meghan Cronin (NOAA PMEL, USA), Christa Marandino (GEOMAR, Germany) & Sebastiaan Swart (University of Gothenburg, Sweden)**
SCOR Working Group & OASIS community

SCOR Annual Meeting | Qingdao, China | 17 October 2024

SCOR WG 162 members

SCOR WG Member	Institution
Meghan Cronin*	NOAA Pacific Marine Environmental Laboratory, **US** (co-chair)
Sebastiaan Swart*	University of Gothenburg, **Sweden** (co-chair)
Nadia Pinardi	University of Bologna, **Italy**
R. Venkatesan	National Institute of Ocean Technology, **India**
Phil Browne ^	ECMWF, **UK**
Warren Joubert ^	South African Weather Service, **South Africa**
Ute Schuster	University of Exeter, **UK**
Christa Marandino*	Geomar, **Germany** (co-chair)
Shuangling CHEN ^	Second Institute of Oceanography, **China**
Clarissa Anderson	Scripps Institution of Oceanography, **US**
Jim Edson	Woods Hole Oceanographic Institution, **US**
Zhaohui CHEN	Ocean University of China, **China**
Juliet Hermes	South African Environmental Observation Network, **South Africa**
Fabrice Ardhuin	University Brest, CNRS, IRD, Ifremer, LOPS, IUEM, **France**
Oscar Alves	Bureau of Meteorology, **Australia**
Hiroyuki Tomita	Institute for Space-Earth Environmental Research (ISEE), Nagoya University, **Japan**

Co-chairs ECOPs

SCOR WG #162 Deliverables are Delivered!

1. Consolidated recommendation report (TOR #1; 6-months): This synthesis report, based upon more than three dozen OceanObs19 CWP (see KEY REFERENCES) will be made publicly available and will guide all activities undertaken by the WG. **✓ Cronin et al. (2023)**

2. OASIS publication and submissions to Ocean Decade Action calls (TOR #1-6; 36-months): The OASIS will be published as an open-access peer-reviewed publication. The OASIS SCOR WG #162 will periodically submit consensus OASIS Big Ideas through national and international UN Decade of Ocean Science for Sustainable Development action calls. **✓ OASIS became a UN Decade Programme in June 2021 and is now linked to 6 UN Decade Projects**

3. Best practice papers (TOR #2-5; 18-36-months) for ocean surface flux measurements, platforms, standards, analysis, array design for publication as part of the special Section Ocean Best Practices of Frontiers in Marine Sciences. **✓ Riihimaki et al. (2024) "Ocean Surface Radiation Best Practices", Gutiérrez-Loza et al. (2024) MTS commentary**

4. Air-sea flux toolbox (TOR #2, 4-6; 12-36-months) will be made available as open source code through github and published in code-themed journals (where needed) that includes well-documented, easy-to-use bulk flux algorithms, asset mapping, direct covariance flux code for physical fluxes with the possibility to extend to trace gas fluxes (especially CO2 and DMS), and numerical 1-D (vertical) model codes. **✓ CF standard names for flux variables (github), toolbox & data portals compilation**

5. Air-sea flux curriculum (TOR #2, 4-6; 12-36-months), including a library of How-To manuals relevant to air-sea fluxes, will be geared towards early career scientists and Summer Institute students in developing nations. **✓ OASIS youtube channel has over 125 videos, with over 6109 views. 65 videos added since July 2023**

6. Website, webinars and newsletter (TOR #1-6; Ongoing): Focused webinars (1-2 per year) will allow the community to 'meet' and discuss WG's deliverables. Pending COL support, an OASIS website will be launched that will host an electronic newsletter, sent out to email subscribers, that will highlight OASIS news. **✓ quarterly newsletters, website: airseaobs.org, OASIS on LinkedIn, #airseaobs social media posts, nearly two dozen briefings in past year**

First In Person OASIS Meeting!

OASIS Mission is to develop a practical, integrated approach for observing air-sea exchanges associated with the Energy, Water, Carbon and Life Cycles

In February 2024 (prior to OSM24), hybrid Face-to-Face OASIS workshop had more than 54 in person participants, with Early Career Ocean Professionals from Africa, South America, Asia, Australia, Europe, and North America

OASIS envisions a pathway to Get Involved in Ocean-Atmosphere Interaction Science for Sustainable Development. **www.airseaobs.org/get-involved**

OASIS

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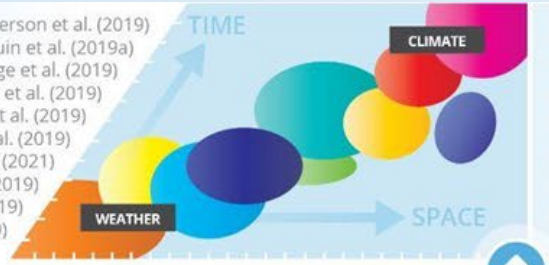
Observing Air-Sea Interactions Strategy (OASIS) is harmonizing community recommendations from OceanObs'19 and UN Decade Laboratories...

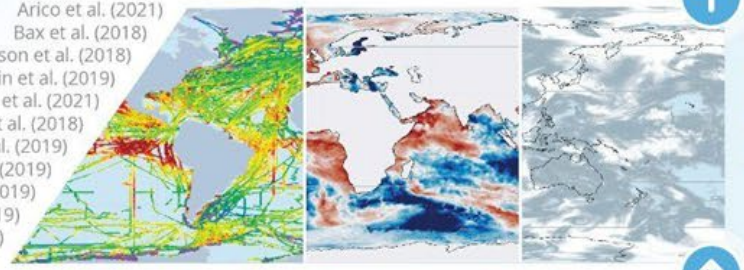
...into three Grand Ideas

Anderson et al. (2019)
Ardhuin et al. (2019a)
Bange et al. (2019)
Bax et al. (2019)
Canonico et al. (2019)
Domingues et al. (2019)
Estes et al. (2021)
Penny et al. (2019)
Pinardi et al. (2019)
Powers et al. (2019)



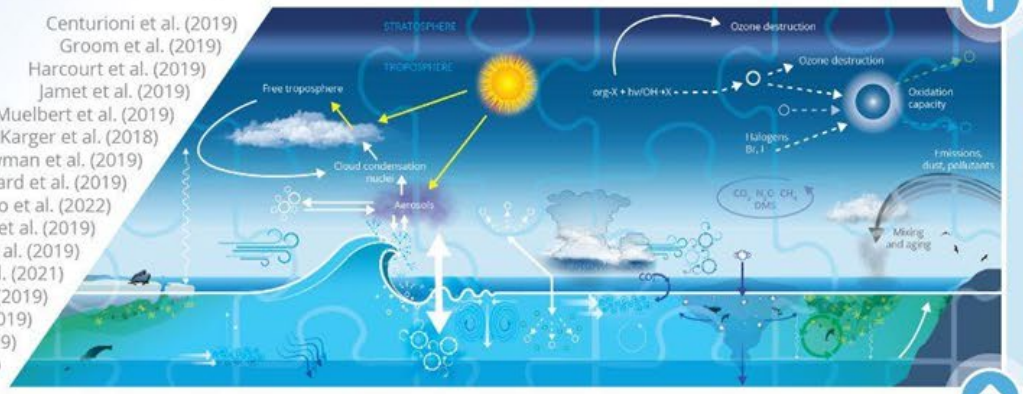
Improved Earth system *(including ecosystem)* forecasts for a predicted, clean, accessible, healthy, safe & productive ocean

Arico et al. (2021)
Bax et al. (2018)
Benson et al. (2018)
Cronin et al. (2019)
Cronin et al. (2021)
Fennel et al. (2018)
Foltz et al. (2019)
Hermes et al. (2019)
Maximenko et al. (2019)
Smith et al. (2019)
Speich et al. (2019)
Wanninkhof et al. (2019)



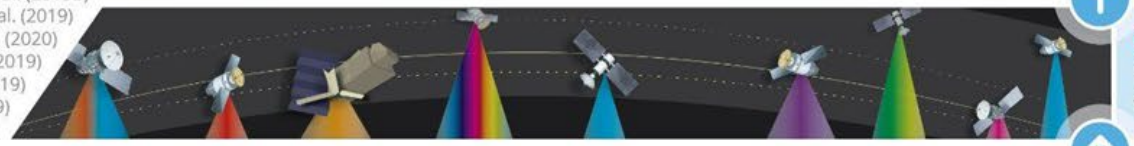
Improved ocean information serving stakeholders around the world

Centurioni et al. (2019)
Groom et al. (2019)
Harcourt et al. (2019)
Jamet et al. (2019)
Muelbert et al. (2019)
Muller-Karger et al. (2018)
Newman et al. (2019)
Lombard et al. (2019)
Marandino et al. (2022)
Kent et al. (2019)
O'Carroll et al. (2019)
Sequeira et al. (2021)
Steinhoff et al. (2019)
Subramanian et al. (2019)
Swart et al. (2019)
Villas Bôas et al. (2019)



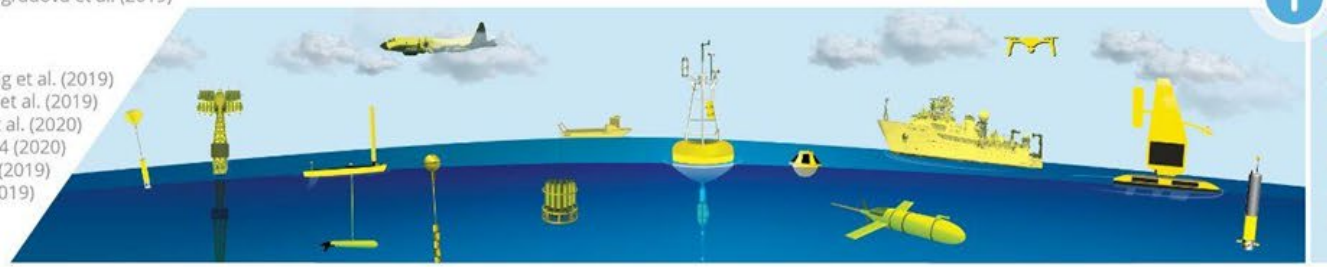
Grand Idea #3
Improved models & understanding of air-sea interaction processes

Ardhuin et al. (2019b)
Bourassa et al. (2019)
Gentemann et al. (2020)
Gommenginger et al. (2019)
Morrow et al. (2019)
Rodríguez et al. (2019)
Shutler et al. (2020)
Vinogradova et al. (2019)



Grand Idea #2
Satellites optimized for air-sea fluxes

Meinig et al. (2019)
Pearlman et al. (2019)
Sabine et al. (2020)
SCOR Working Group 154 (2020)
Smith et al. (2019)
Wang et al. (2019)



Grand Idea #1
A globally distributed in situ air-sea observing network built around an expanded array of time series stations

Image: Sarah Battle/NOAA visit: airseaobs.org

Based on Fig 1 from Cronin et al., 2023

OASIS Theory of Change

Right image below is Fig 2 from Cronin et al. 2023

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OASIS Observing Air-Sea Interactions Strategy

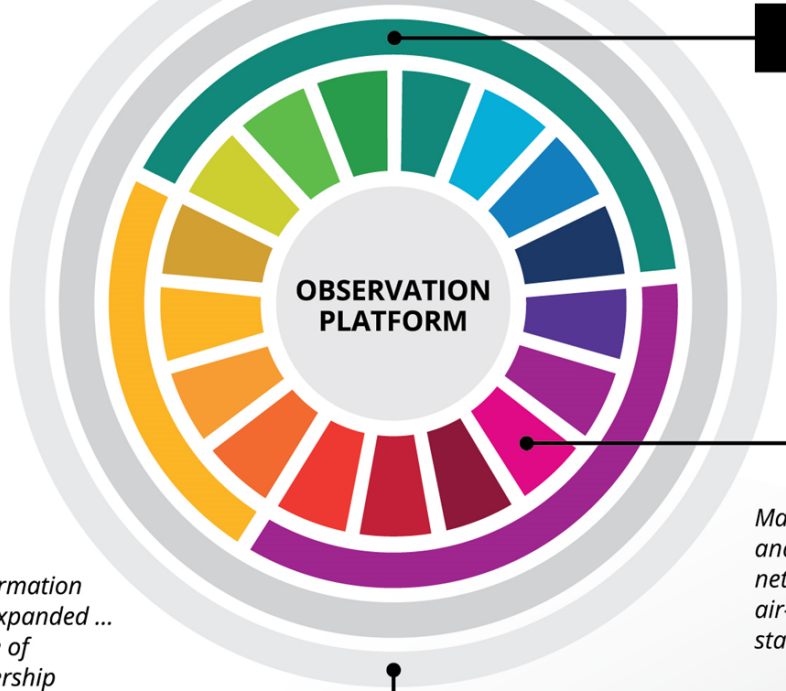
Credit: Polar Glider, Gothenburg University, (c) Louise Biddle

2018 SOLAS summer school
© Jesssica Gier

PARTNERS

MARINER
STUDENT
BEST PRACTICE EXPERT
DATA SPECIALIST
ENGINEER
PRODUCT DEVELOPER
ANALYST
PRINCIPAL INVESTIGATOR
INSTITUTION

Air-sea interaction information could be significantly expanded ... by developing a culture of mentorship and partnership



DERIVED VARIABLES

HIGH RESOLUTION SURFACE ESSENTIAL OCEAN VARIABLES (EOV)
Considered both derived and measured

ESSENTIAL CLIMATE VARIABLES (ECV)

ESSENTIAL BIODIVERSITY VARIABLES (EBV)

MEASURED VARIABLES

Making platforms multidisciplinary and multifunctional, the OASIS network can provide high-quality air-sea fluxes that serve multiple stakeholders.

SCALE

GLOBAL
REGIONAL
LOCAL

EXAMPLE

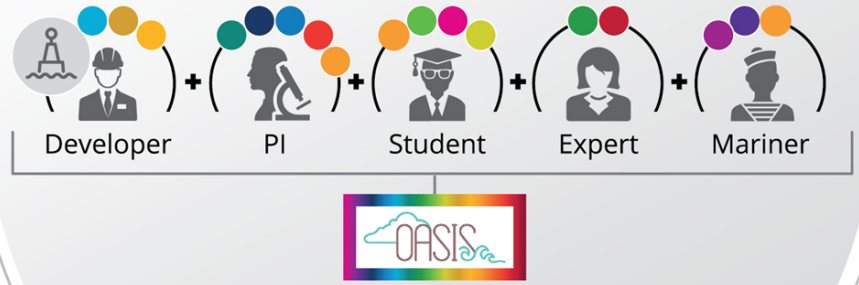


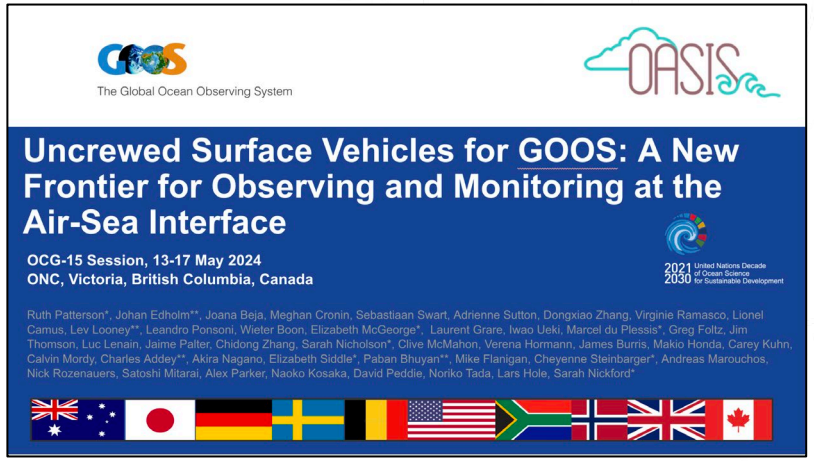
Image: Sarah Battle/NOAA

Grand Idea #1: Fill Gaps in GOOS
An Emerging Uncrewed Surface Vehicle Network

Ruth Patterson (Australia)

"The endorsed UN Ocean Decade Project's goal is to build an **Observing Air-Sea Interaction Strategy (OASIS)** & **Community of Practice** for this emerging **Uncrewed Surface Vehicle (USV) network**"

-- Ruth Patterson (Australia)
ECOP PI representing Emerging USV Network



"Join our OASIS **webinar series** for developing a **Community of Practice** for the emerging **Uncrewed Surface Vehicle (USV) network**"

Patterson et al. Community of Practice paper in prep

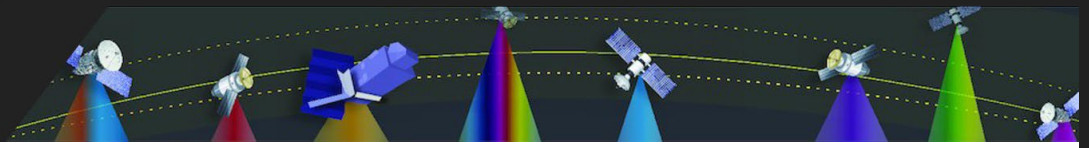
Webinar Series: airseaobs.org/resources/webinars

Grand Idea #2: Optimize Satellite Observations

Emerging Opportunities for Air-Sea Fluxes from Space

Town Hall, Friday, 23 Feb. 2024, 12:45 CT
Ocean Sciences Meeting 2024, Room 217-219

Organized by Sarah Gille (SIO)
Moderated by Meghan Cronin (NOAA PMEL), co-chair of OASIS
Overview of opportunities to optimize satellites for air-sea fluxes
Discussion



*"Let's continue this discussion at our weekly '**OASIS Air-Sea Fluxes from Space' webinar** on Tuesdays 11 AM EST. Register to get the zoom link at* https://forms.gle/KjHQ7BvjHtJ97TjT6.

-- Bia Villas Bôas *(CSM, USA)*

May 7, 2024 NASA announced the selection of four proposals for concept studies of missions to benefit humanity through the study of Earth science, including:

The Ocean Dynamics and Surface Exchange with the Atmosphere (ODYSEA)

This satellite would simultaneously measure ocean surface currents and winds to improve our understanding of air-sea interactions and surface current processes that impact weather, climate, marine ecosystems, and human wellbeing. It aims to provide updated ocean wind data in less than three hours and ocean current data in less than six hours. The proposal is led by Sarah Gille at the University of California in San Diego

Agenda

I. Welcome: Objectives of town hall
   A. OASIS vision – Meghan Cronin, NOAA PMEL
   B. In situ air-sea fluxes (OOI & OceanSITES) – Jim Edson, WHOI

II. Lightning talks
   A. Multiple satellites: Vector winds – Tony Lee, JPL
   B. CIMR: High resolution SST, winds, etc. – Fabrice Collard, Ocean Data Lab
   C. Butterfly: Turbulent buoyancy fluxes (future NASA) – Carol Anne Clayson, WHOI
   D. Harmony: Winds, currents, waves (ESA, launch in ~2029) – Paco Lopez Dekker, TU Delft
   E. SeaSTAR: Coastal & MIZ currents, winds, waves (seeking funding) – Christine Gommenginger, NOC
   F. ODYSEA: Winds and currents (under review, NASA/CNES) – Sarah Gille, SIO

III. Discussion: The big picture & community objectives.

Grand Idea #3: Improve Earth-System Models
TPOS Equatorial Pacific Experiment (TEPEX)

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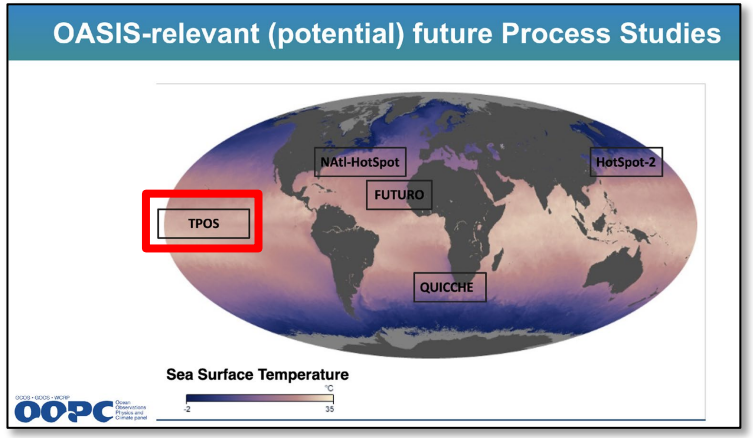
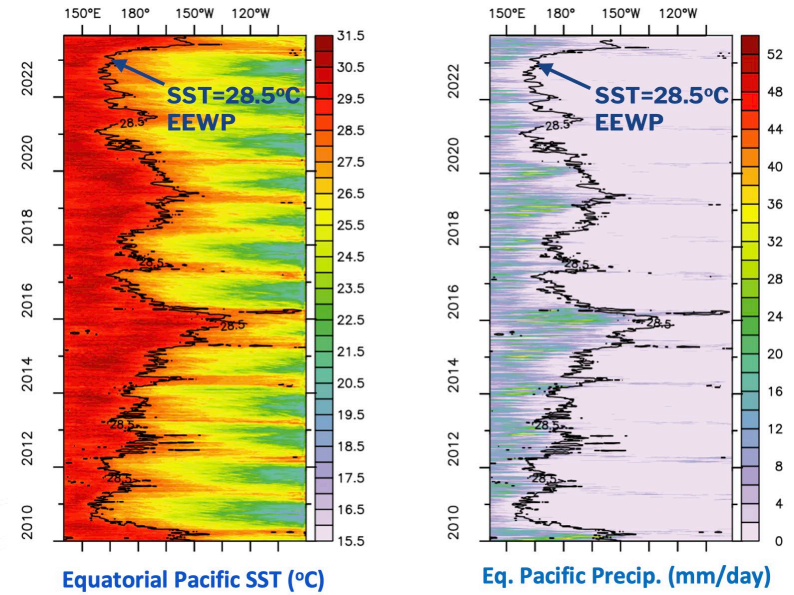
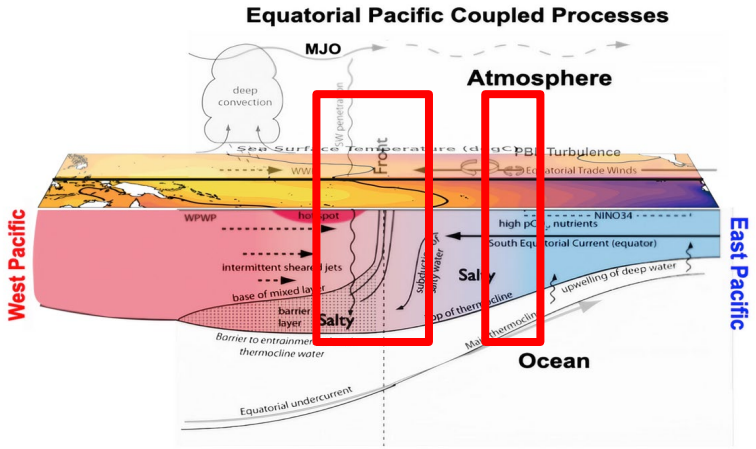
OASIS Observing Air-Sea Interactions Strategy



Prediction of ENSO and its world impacts would be improved if we had a better understanding of physics governing:

- *Zonal movement of the Eastern Edge of equatorial Pacific Warm Pool*
- *Equatorial Pacific upwelling & mixing*





OASIS is working to help build international support for TEPEX

OASIS Theory of Change: Partnership & Capacity Strengthening

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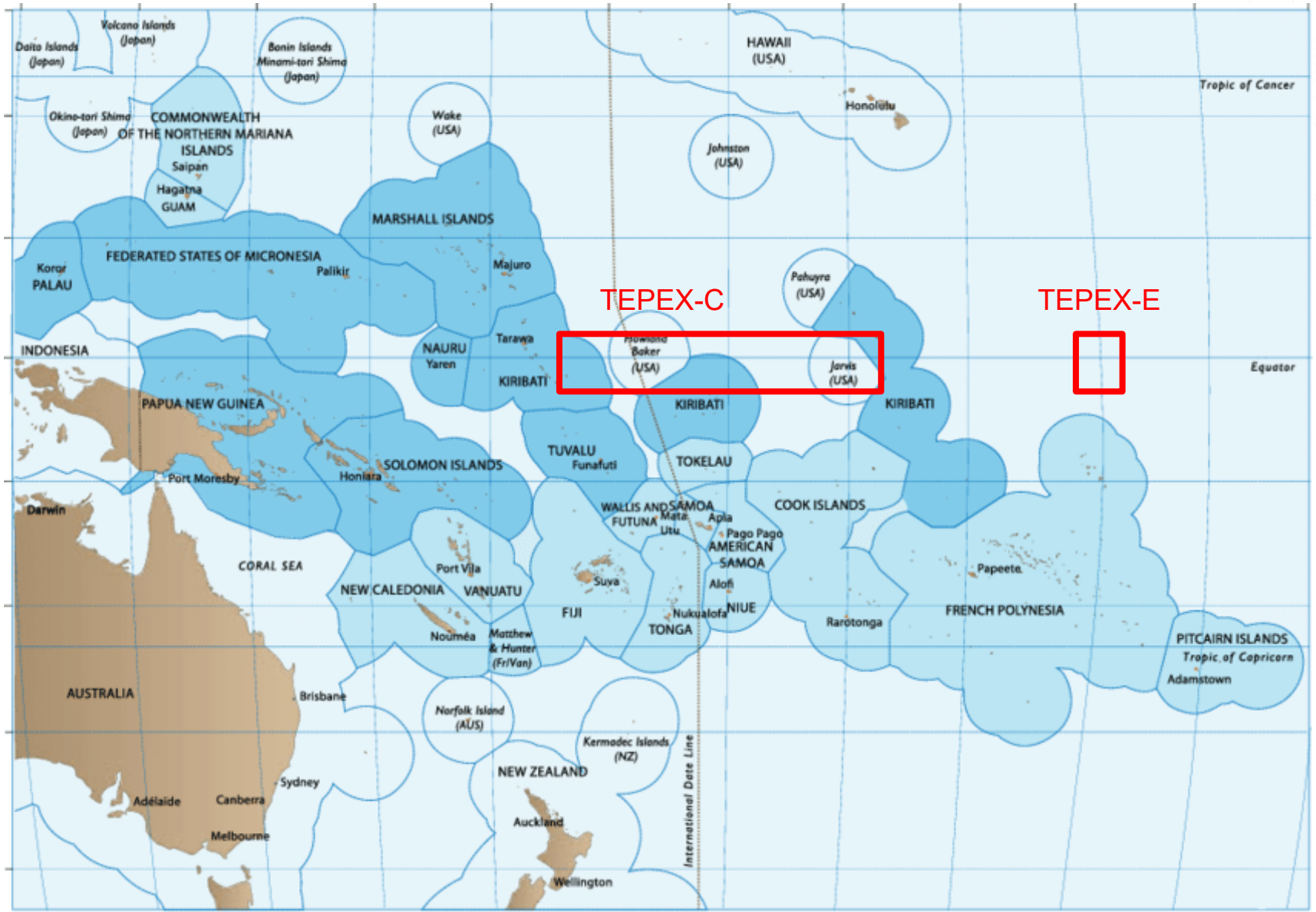
OASIS Observing Air-Sea Interactions Strategy



OASIS Theory of Change: Best Practices

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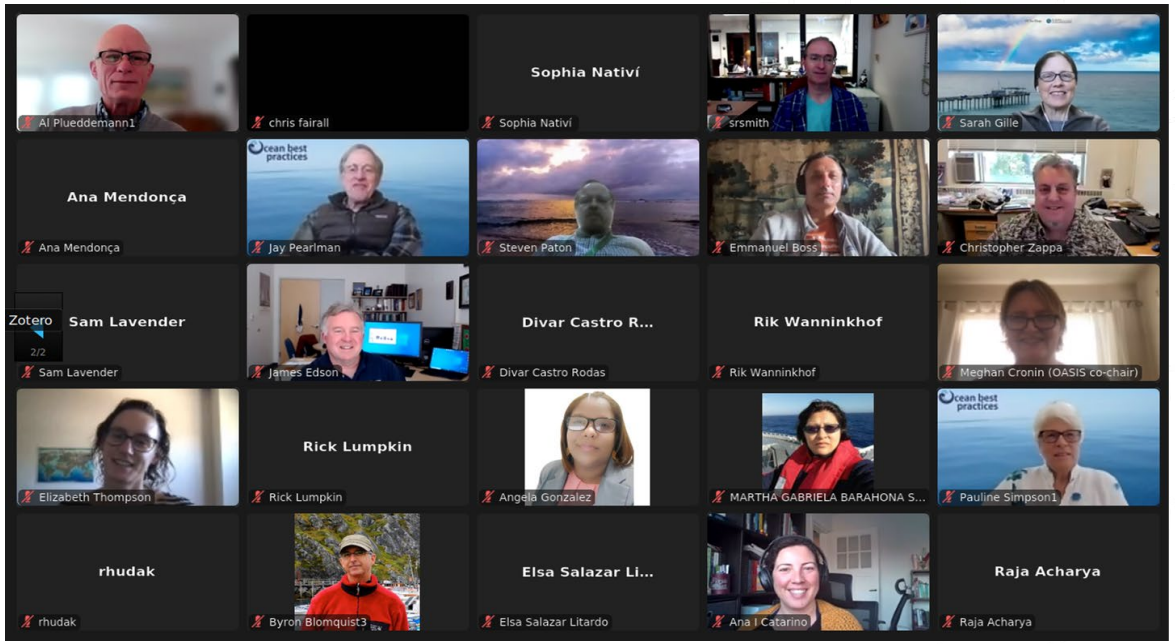
OASIS Observing Air-Sea Interactions Strategy

"The October 2024 OASIS sessions at the Ocean Best Practice Systems workshop will focus on (1) skin temperature observations and (2) surface radiation observations. Please register to come to these virtual workshop."

-- Lucia Gutierrez Loza, Best Practice Theme Team ECOP co-lead

Lucia Gutierrez Loza (Norway)



From Ocean Best Practice Systems (OBPS) Air-Sea Interactions workshop, held virtually 11 Oct 2022 at 0700 & 1600 UTC.

Gutierrez Loza et al. (2024) Commentary MTSJ Decade issue

Riihimaki et al. (2024) Ocean Surface Radiation Measurement Best Practices

Get Involved: airseaobs.org/get-involved

OASIS Theory of Change: FAIR data

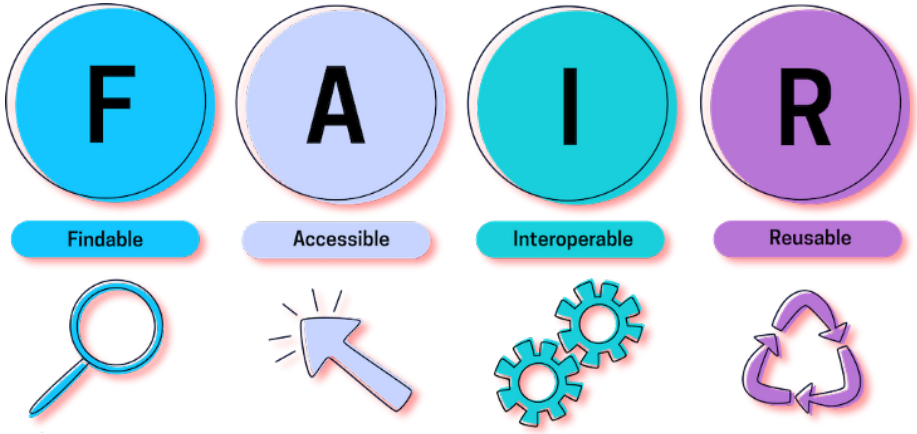


Image: Medium article "Making Data F.A.I.R."

"Our aim is to tackle the grand challenge of standardising air-sea flux terminology, making flux data products and open source code findable and accessible, and elevating the visibility from observation to user data."

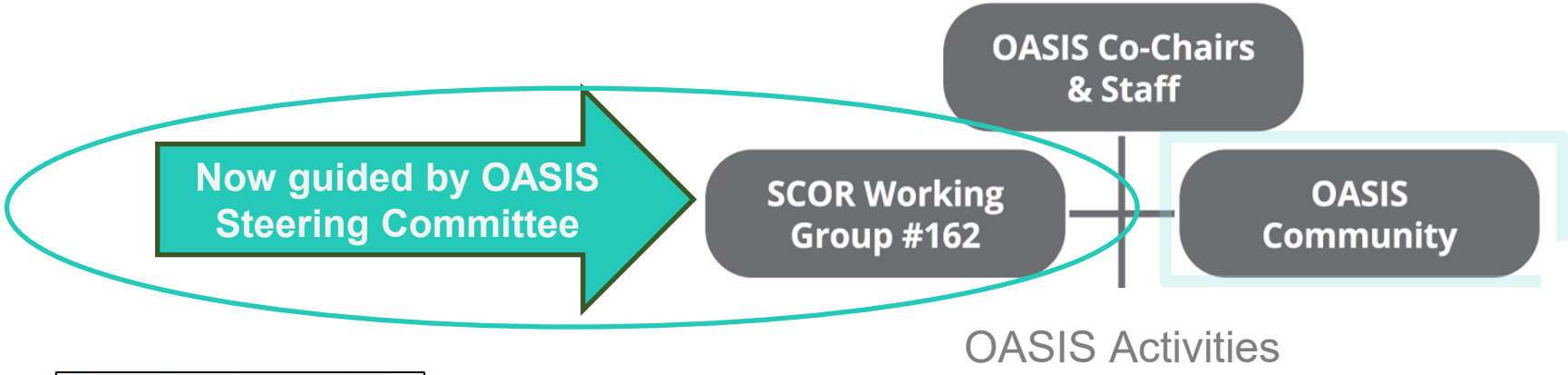
-- Marcel du Plessis
FAIR data ECOP co-lead

github link for Discussion about adoption of CF standard names for flux variables:
https://github.com/cf-convention/discuss/issues/206

Compilation of Air-Sea Flux data products and toolboxes:
https://airseaobs.org/FAIR-data

Get Involved: airseaobs.org/get-involved

Get Involved!



OASIS - SOLAS Scholars from the Surface Ocean-Lower Atmosphere Studies (SOLAS) Open Science Conference in Cape Town South Africa, Sep 25-29, 2022

Join OASIS Community and "Get Involved" at:

https://airseaobs.org/get-involved