OOPC report:
Observing Air-Sea Interactions Strategy (OASIS)

Meghan Cronin (NOAA PMEL, co-chair of OASIS)
with contributions from: Christa Marandino, Sebastiaan Swart, Laura Riihimaki, Billy Kessler, Jack Reeves Eyre, Marcel du Plessis, R. Venkatesan, Tony Lee, Adrienne Sutton, Ruth Patterson, Warren Joubert, ...

OOPC meeting - 20 October 2022
Darmstadt, Germany

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GCOS KEEPING WATCH OVER OUR CLIMATE
The Global Ocean Observing System
WCRP World Climate Research Programme

Grand Ideas for 2030

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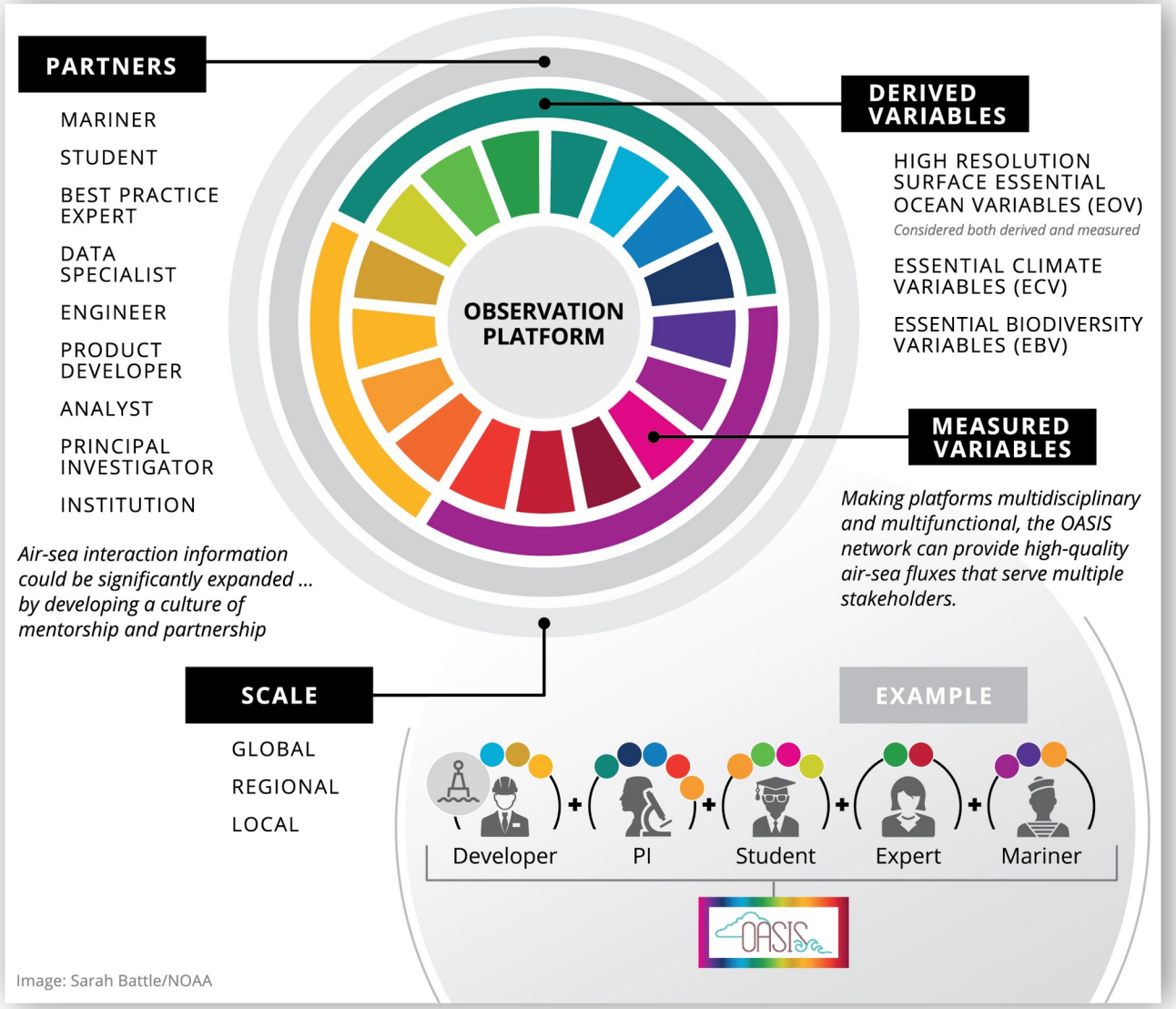
From: Cronin et al. (2022) "Developing an Observing Air-Sea Interactions Strategy (OASIS) for the global oceans"

OASIS Vision for 2030: Air-Sea Interaction Science we need



Observing Air-Sea Interactions Strategy (OASIS)

Theory of Change

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

Observations made globally, and used globally

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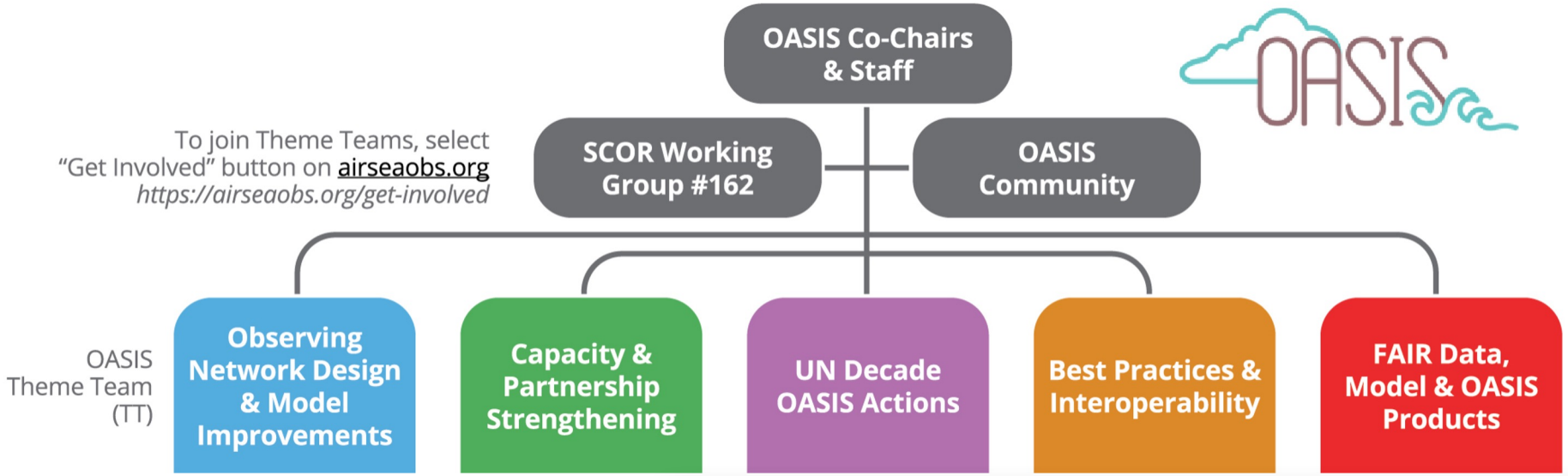
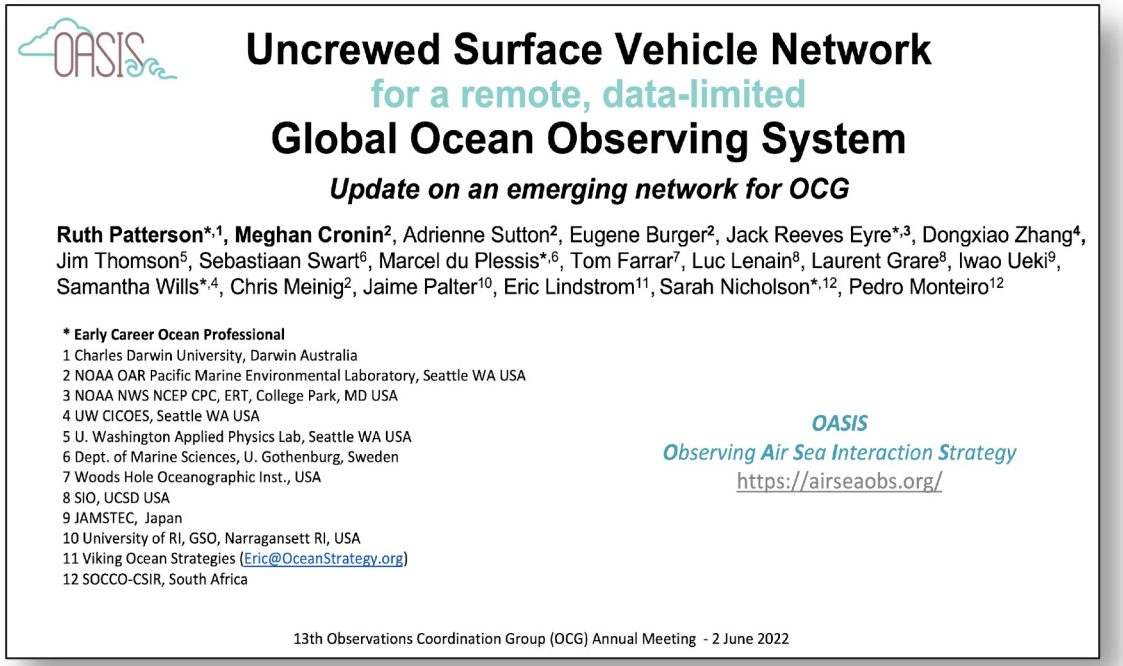
OASIS Theme Team: Network Design & Model Improvement



*"We hope to build a Community of Practice for an **Uncrewed Surface Vehicle network for GOOS** through an endorsed UN Ocean Decade Project"*

-- Adrienne Sutton



Uncrewed Surface Vehicle Network
for a remote, data-limited
Global Ocean Observing System

Update on an emerging network for OCG

Ruth Patterson*[,1], Meghan Cronin[2], Adrienne Sutton[2], Eugene Burger[2], Jack Reeves Eyre*[,3], Dongxiao Zhang[4], Jim Thomson[5], Sebastiaan Swart[6], Marcel du Plessis*[,6], Tom Farrar[7], Luc Lenain[8], Laurent Grare[8], Iwao Ueki[9], Samantha Wills*[,4], Chris Meinig[2], Jaime Palter[10], Eric Lindstrom[11], Sarah Nicholson*[,12], Pedro Monteiro[12]

*** Early Career Ocean Professional**
1 Charles Darwin University, Darwin Australia
2 NOAA OAR Pacific Marine Environmental Laboratory, Seattle WA USA
3 NOAA NWS NCEP CPC, ERT, College Park, MD USA
4 UW CICOES, Seattle WA USA
5 U. Washington Applied Physics Lab, Seattle WA USA
6 Dept. of Marine Sciences, U. Gothenburg, Sweden
7 Woods Hole Oceanographic Inst., USA
8 SIO, UCSD USA
9 JAMSTEC, Japan
10 University of RI, GSO, Narragansett RI, USA
11 Viking Ocean Strategies (Eric@OceanStrategy.org)
12 SOCCO-CSIR, South Africa

OASIS
Observing Air Sea Interaction Strategy
https://airseaobs.org/

13th Observations Coordination Group (OCG) Annual Meeting - 2 June 2022

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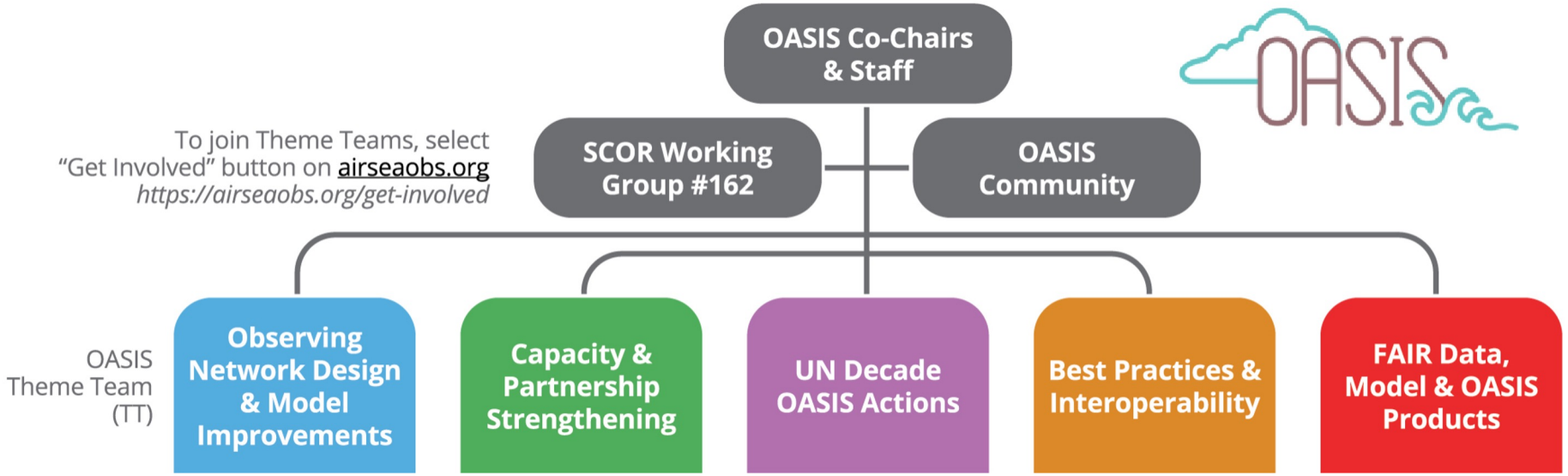
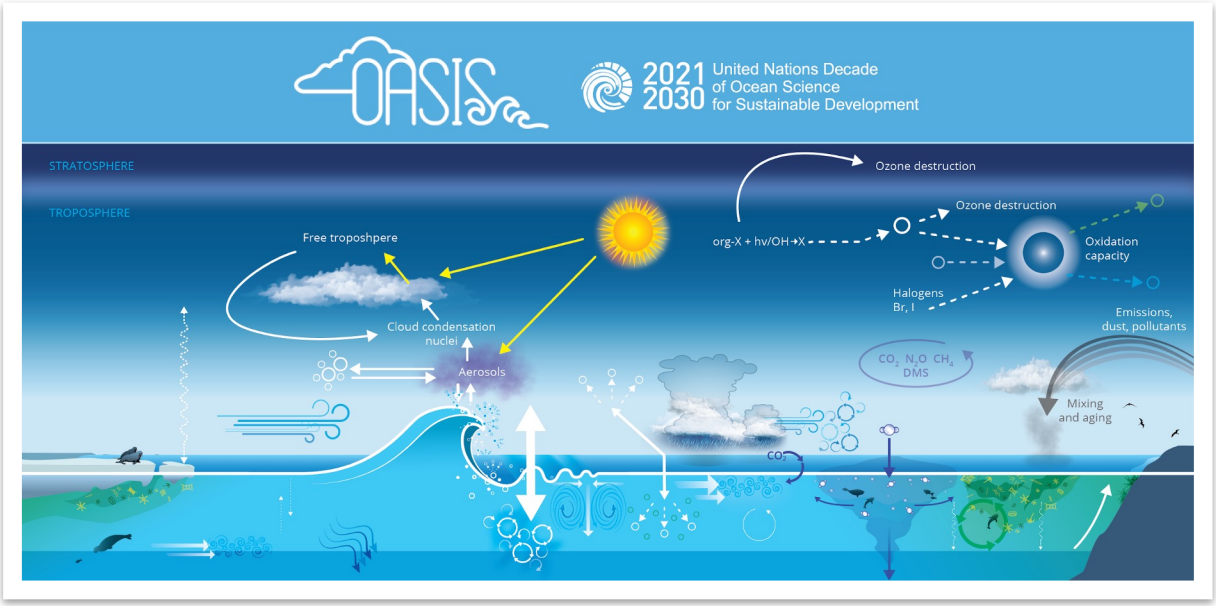
OASIS Theme Team: Network Design & Model Improvement



*"To optimize a observational network to constrain model forecasts & develop good parameterizations, you must have a **process understanding** of the system."*

– Meghan Cronin



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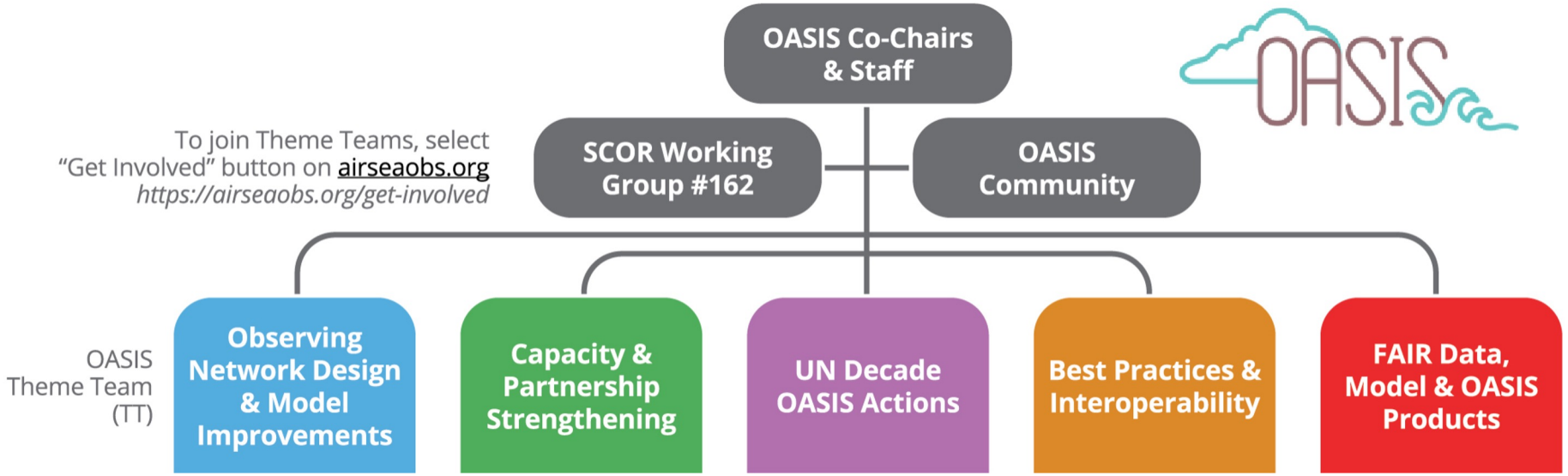
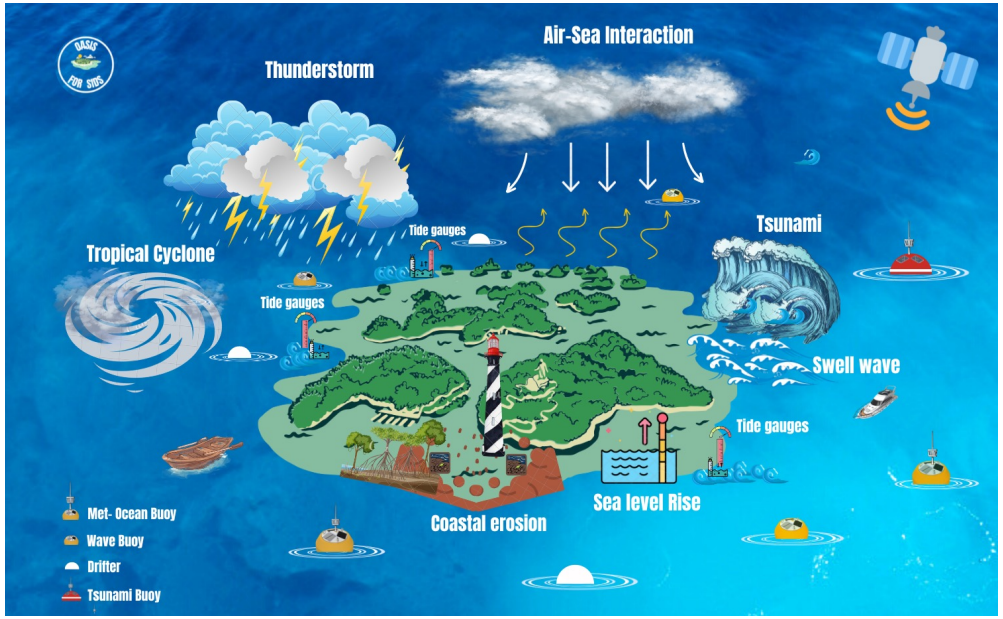
OASIS Theme Team: Capacity & Partnership Strengthening



*"**A Safe Ocean for Small Island Developing States** is just one of many societally relevant outcomes of a **holistic OASIS strategy**"*

-- Venkatesan



From Venkatesan et al. (submitted) "Air-Sea Observations for a Safe Ocean, with focus on Small Island Developing States"

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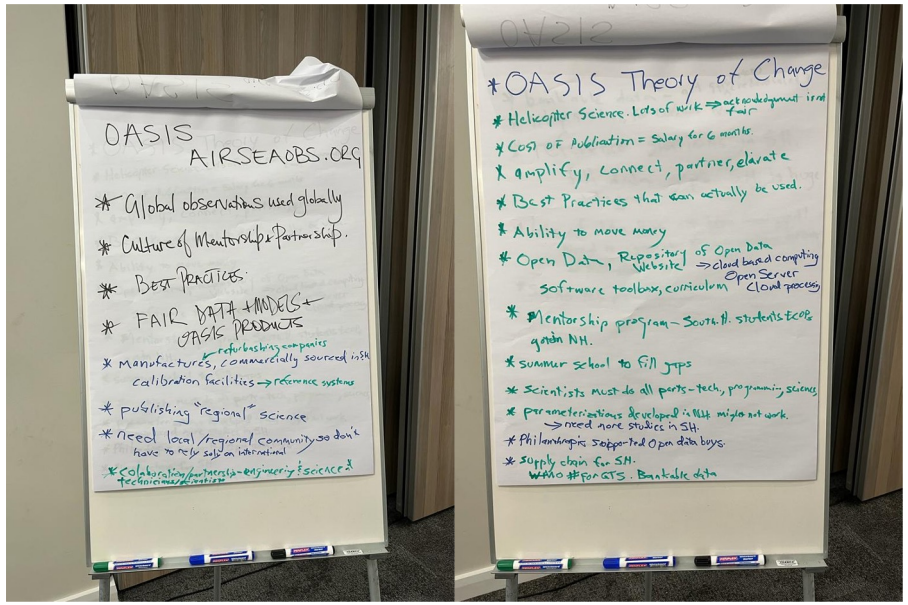
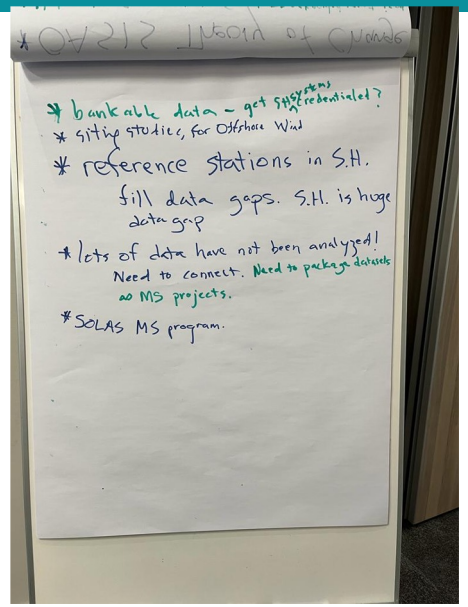
OASIS Theme Team: Capacity & Partnership Strengthening





"A vibrant discussion on strengthening partnerships between OASIS and the Global South highlighted some interesting challenges for scientists."

-- Warren Joubert

SOLAS Open Conference (27 Sep 2022, Cape Town RSA) plenary discussion: "Strengthening partnerships between OASIS and global South".

Ideas from Strengthening Partnerships with Global South discussion. Lobby for:

- Develop an international technician peer group? Technician exchange & mentoring.
- Localize engineering, manufacturing/refurbishing, engineering, calibration standards & technical support facilities.
- Make data and models FAIR & Cloud-computing feasible.
- Acknowledgment "Thanks!" vs co-authorship
- Reduce/waive Page Charges, science & engineering conference registration fees, …

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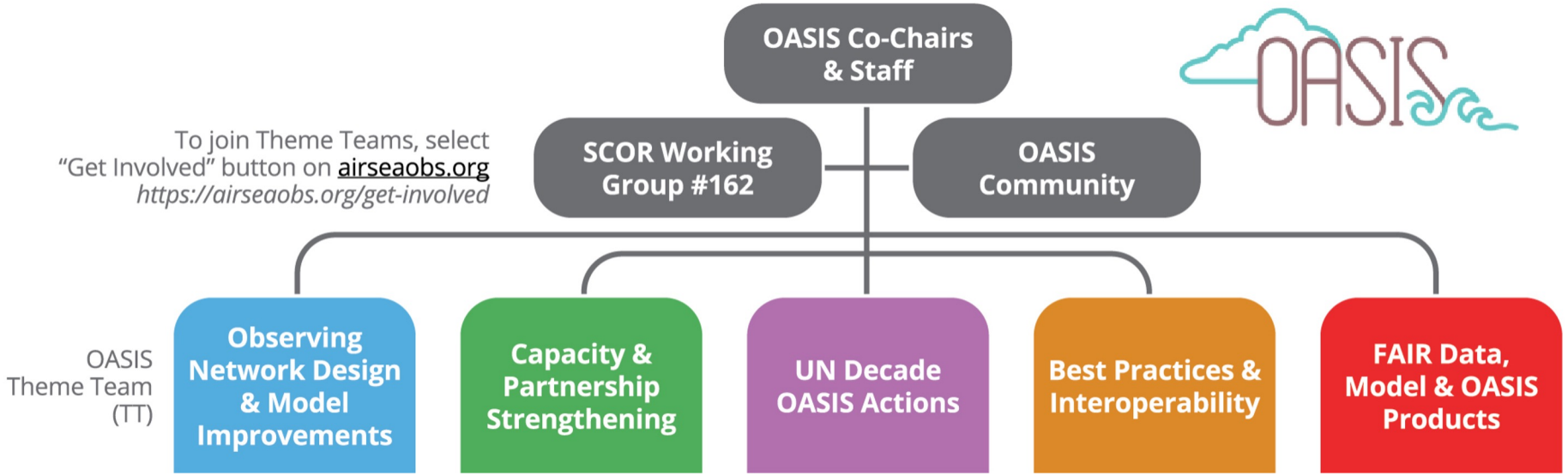
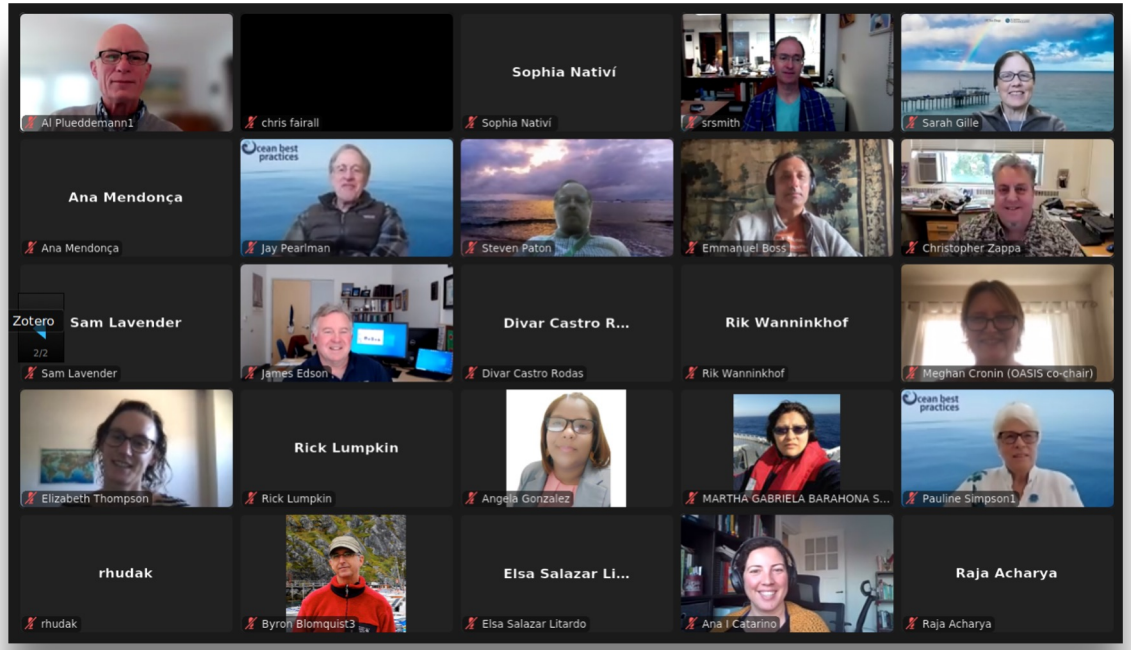
OASIS Theme Team: Best Practices & Interoperability Exp'ts



"Best practices are all about efficient sharing of information and learning. Collaboration and community are central. OASIS can be a focal point in this, bringing together air-sea interaction practitioners from around the world."

-- Jack Reeves Eyre



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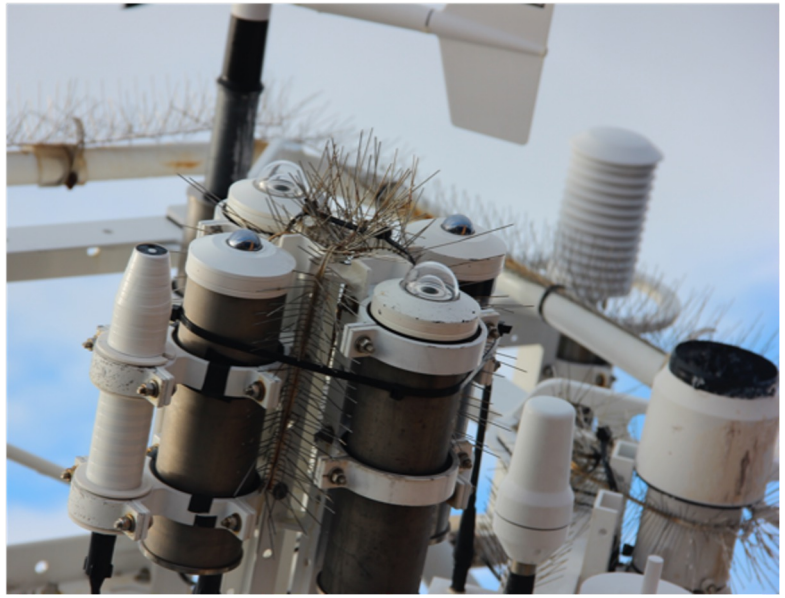
From Ocean Best Practice Systems (OBPS) Air-Sea Interactions workshop, held virtually 11 Oct 2022 at 0700 & 1600 UTC.

OASIS Theme Team: Best Practices & Interoperability Exp'ts

Question for OOPC: We would like OOPC to request GOOS endorsement of radiation best practices. Should BSRN & AOPC request GCOS endorsement too?



Radiometers on buoys one of many platforms for which radiation best practices are developed

Riihimaki et al. Surface Radiation Best Practice paper progress:

- First OASIS theme team EOV best practice. Developed in collaboration with BSRN Ocean Working Group.
- Paper draft to be submitted to *Frontiers in Marine Science* special best practices topic, in early 2023.
- Two OBPS radiation workshops (2020, 2021), and multiple draft iterations with over 30 authors representing a wide range of expertise in the radiation communities
- Results presented (or will be) at BSRN, AMS Radiation/Satellite meteorology, OceanSites, and AGU meetings for feedback

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Slide contributed by Laura Riihimaki

OASIS Theme Team: Best Practices & Interoperability Exp'ts

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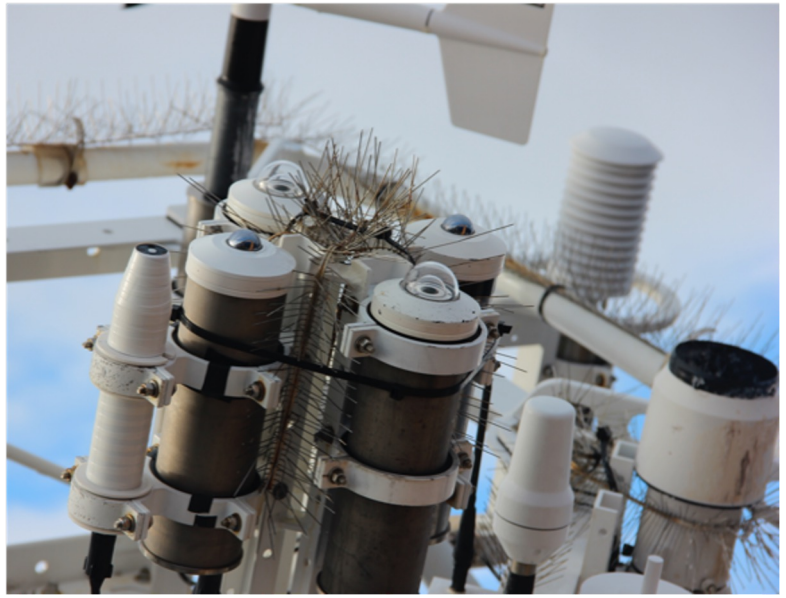

Radiometers on buoys one of many platforms for which radiation best practices are developed

Riihimaki et al. Surface Radiation Best Practice paper includes:

- Scope: Recommendations for broadband radiation measurements on buoys, fixed platforms, ships, drifters, and USVs
- Instrument selection & requirements, correcting for platform motion, calculating upwelling variables
- Handling, installation, and maintenance of sensors
- Calibration
- Data quality & Processing
- A list of needed areas of investigation for intercomparison experiments & other future research

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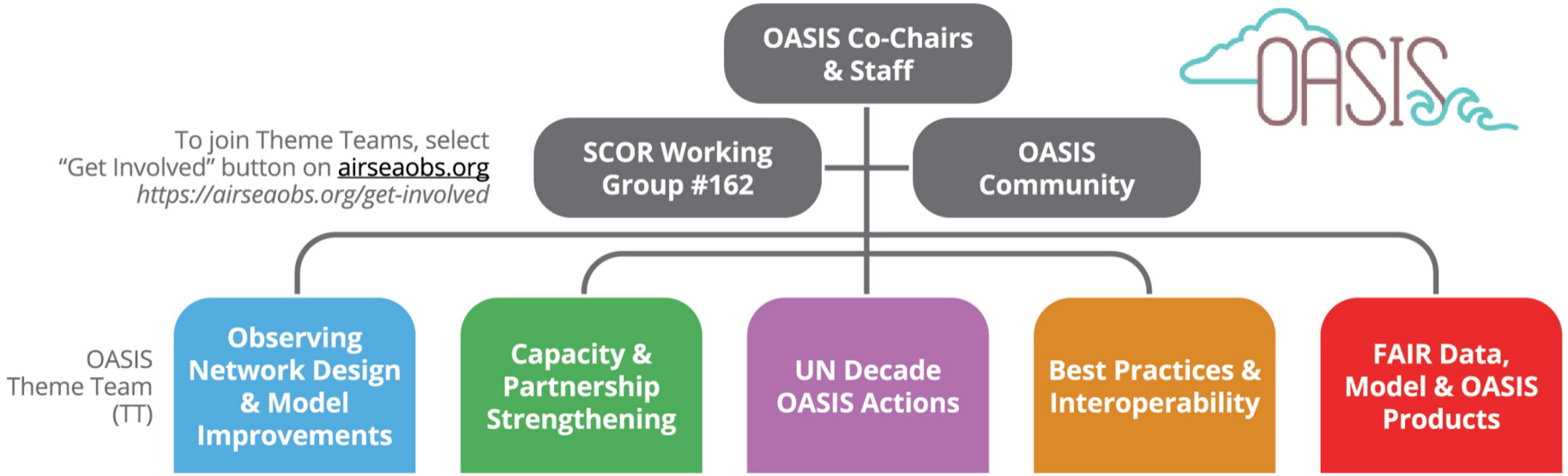
OASIS Theme Team: Best Practices & Interoperability Exp'ts



"Interoperability Experiments could be build around OceanSITES testbeds"

-- Meghan Cronin

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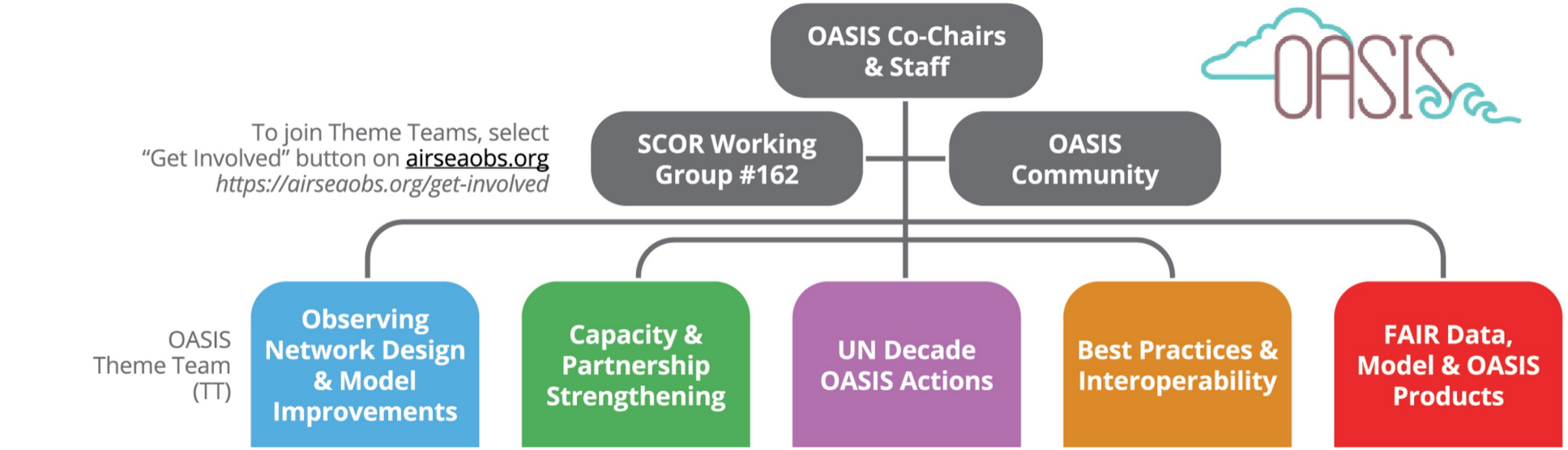
OASIS Theme Teams: FAIR Data, Models & OASIS Products



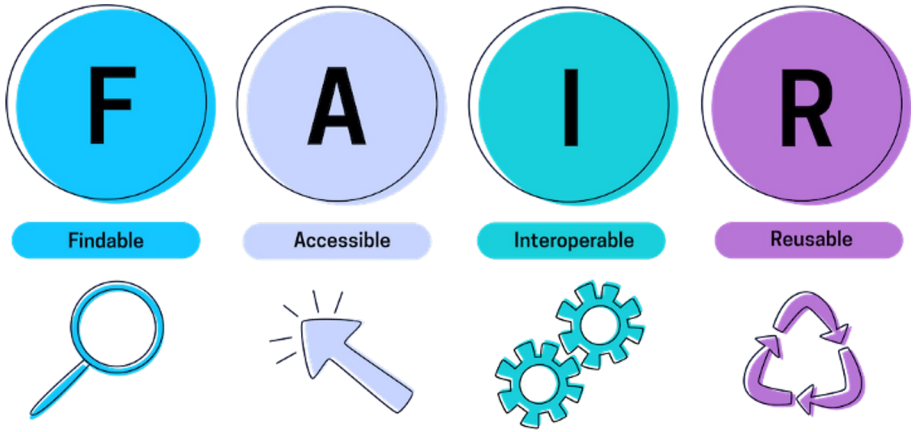


Image: Medium article "Making Data F.A.I.R"

"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

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Grand Idea #3: Improved models and understanding of air-sea interactions

What are key processes that couple the atmosphere and ocean?

?

How to improve understanding and forecasts of **ecosystem** response to stressors?

?

A hierarchy of Earth System models, including ecosystem forecasts, depend upon improved representation of air-sea interaction

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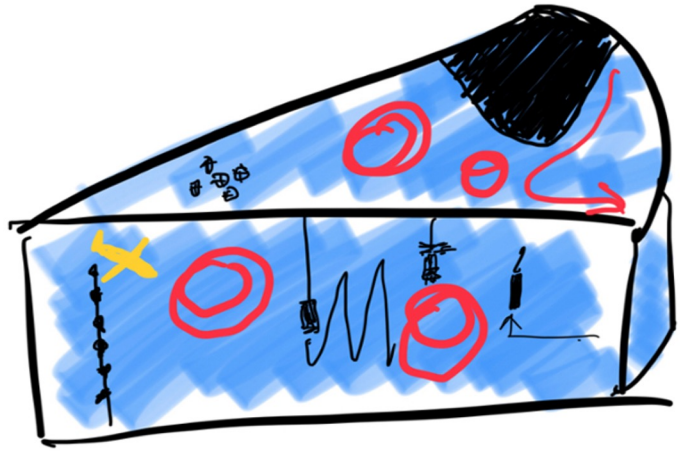
Upcoming Process Studies

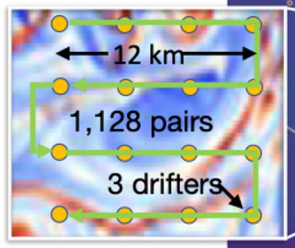


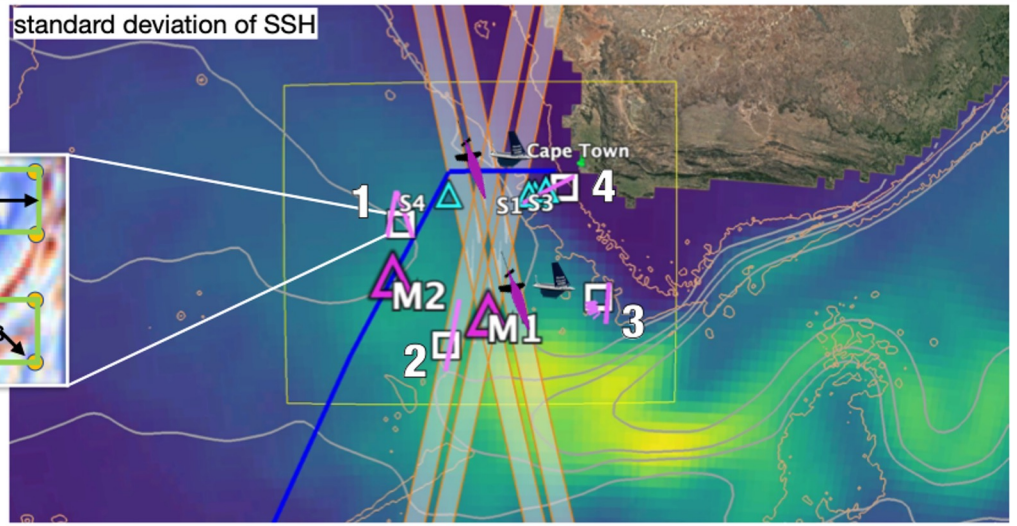
QUANTIFYING INTEROCEAN FLUXES IN THE CAPE CAULDRON HOTSPOT OF EDDY KINETIC ENERGY

QUICCHE | CAPE BASIN | MARCH 2023

Lisa Beal (U. Miami) | **Kathy Donohue** (U. Rhodes Island) |
Yueng Lenn (Bangor U., Wales) | **Seb Swart** (U. Gothenburg, Sweden)

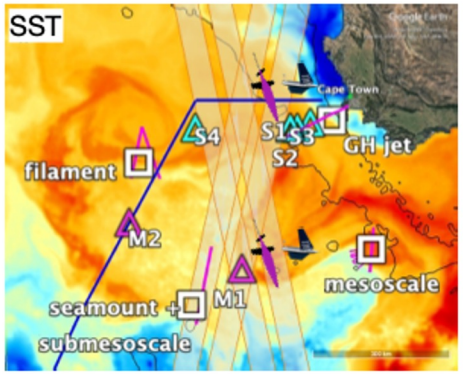
Process study - Cape Basin - RV Revelle March 2023

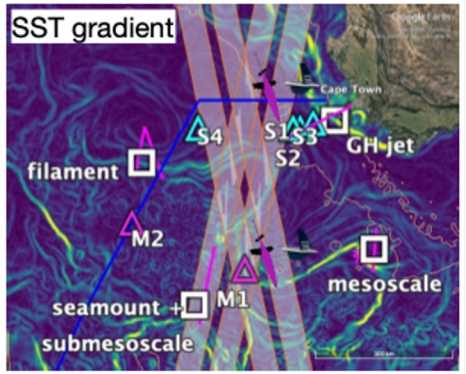




High-res observations by vessels, moorings, glider and USV surveys, many drifters and EM APEX floats to assess:

- characterise the submesoscale features generated by mesoscale strain field
- air sea fluxes modulated by turbulent EKE field
- submesoscale variability and its impact on Agulhas leakage estimates
- relate diffusivity and flux estimates to new SWOT altimetry fields to better estimate leakage.





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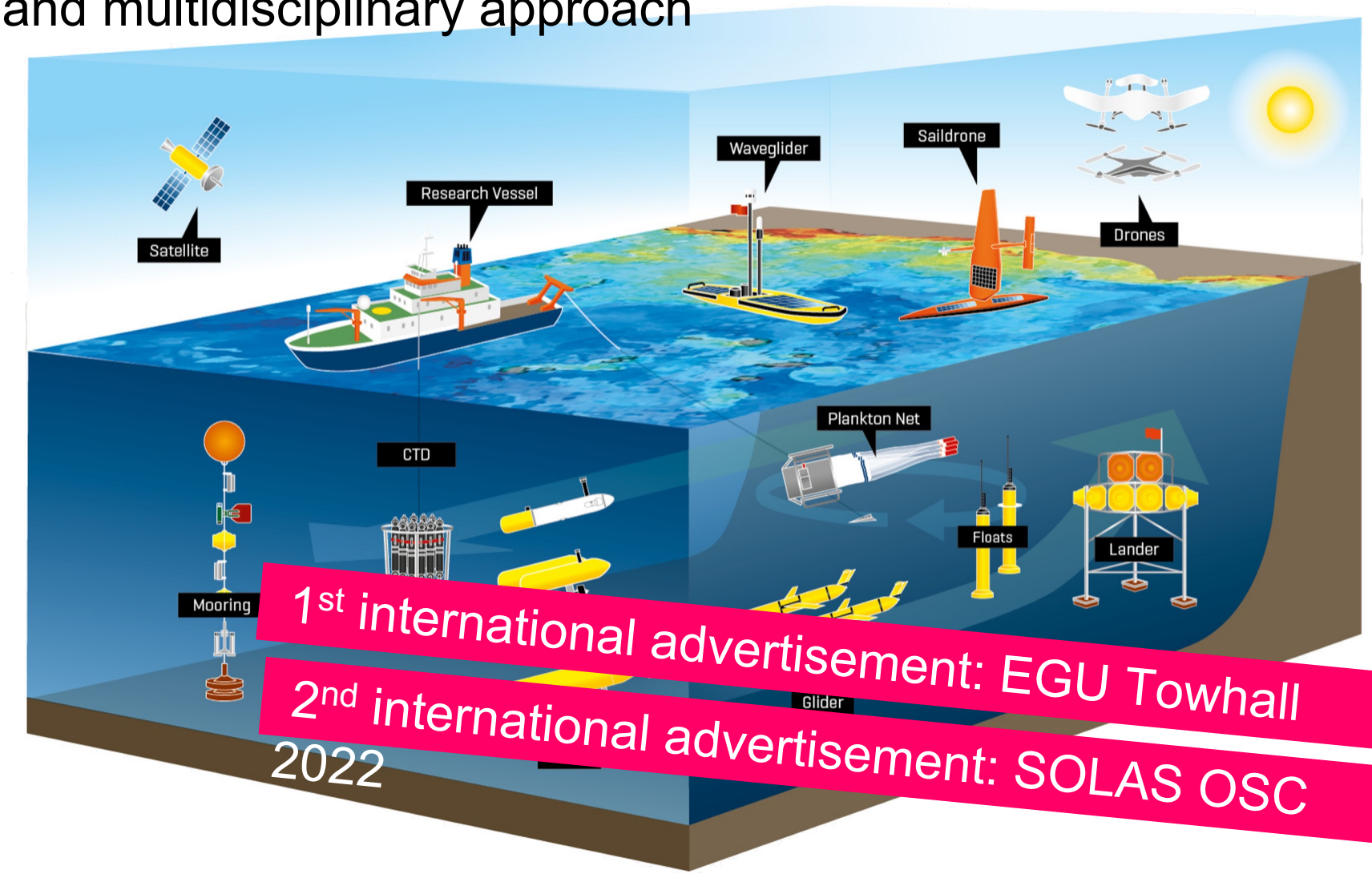
FUTURO – **Fu**ture of **T**ropical **U**pwelling **R**egions in the Atlantic **O**cean

GEOMAR

Eastern Boundary Upwelling System science requires a long-term, concerted, multi-platform and multidisciplinary approach

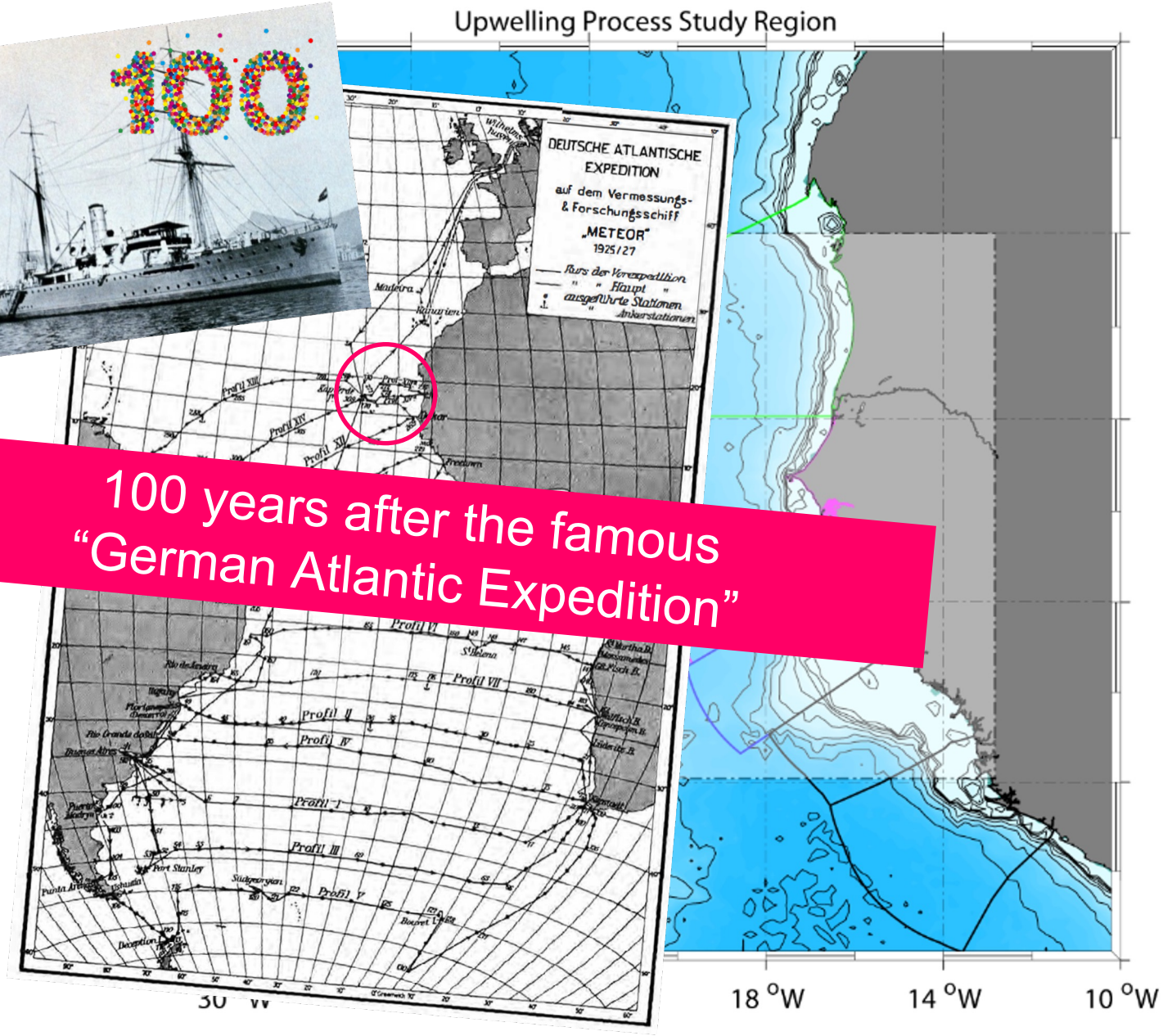
- "Classical" ship-based studies nested into concerted array of autonomous platforms
- Experiment planned, guided and evaluated by high-resolution regional modeling
- Bottom-up planning by international scientific community
- Co-design with regional partners employing regional "Citizen Science" components
- International participation and coordination



Slide by: Arne Körtzinger via Christa Marandino

FUTURO – Future of Tropical Upwelling Regions in the Atlantic Ocean

- Multi-national Field Study
- Time frame: 2025-2027
- Ship: continuous presence of German research vessel(s)
- Mooring array
- Fleets of Saildrones, gliders, etc.
- BGC Argo floats
- Surface drifter program
- Tracer release experiment
- Remote sensing
- High-resolution Modelling
- Citizen Science/ Voluntary Observing Platforms
- Humanities/Transdisciplinary Science



100 years after the famous "German Atlantic Expedition"

Slide by: Arne Körtzinger via Christa Marandino

Eastern Boundary Upwelling Systems – Regional OSCM Hub

Ocean Science Centre Mindelo (Cape Verde) provides multi-facetted support for ambitious long-term observation experiment FUTURO

- OSCM as modern science support hub with labs, offices, workshops, meeting rooms etc.
- Local research vessel opportunities
- Integration with international WASCAL M.Sc. Program

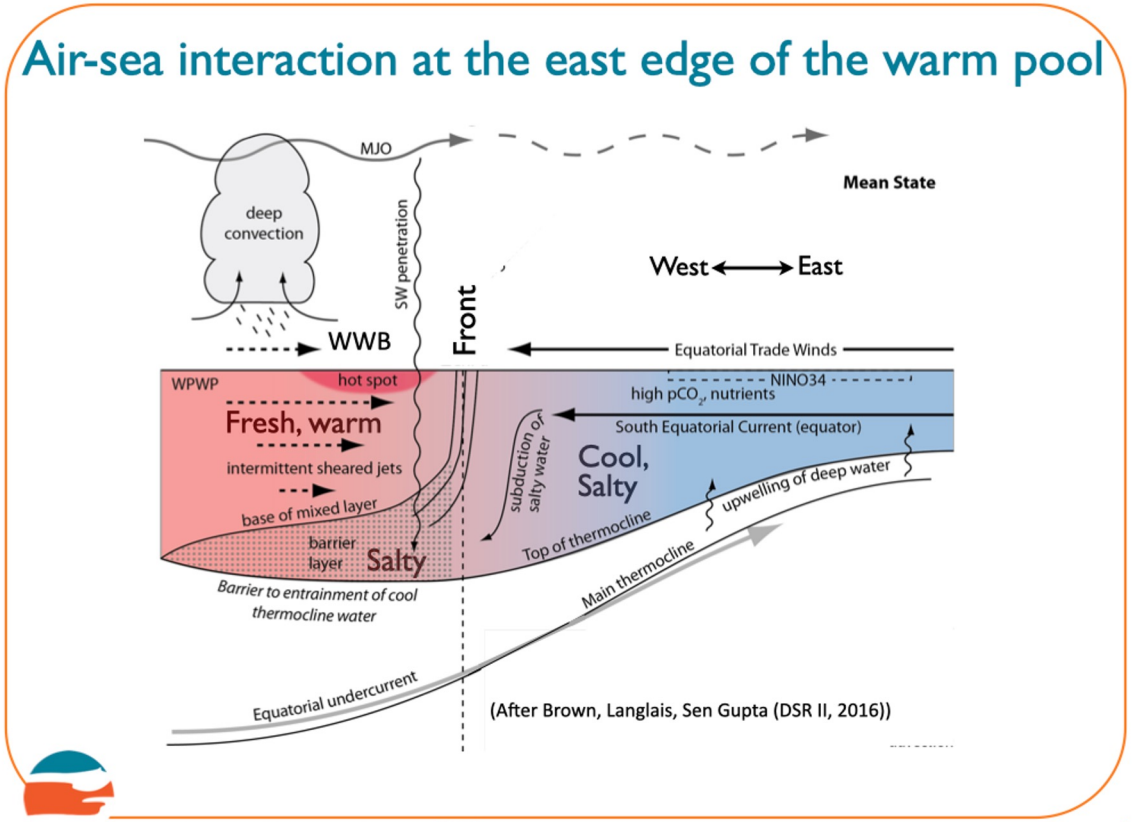
UNIVERSIDADE TÉCNICA DO ATLÂNTICO | CAMPUS DO MAR

- Platform for regional co-design, stakeholder integration and “Citizen Science” formats

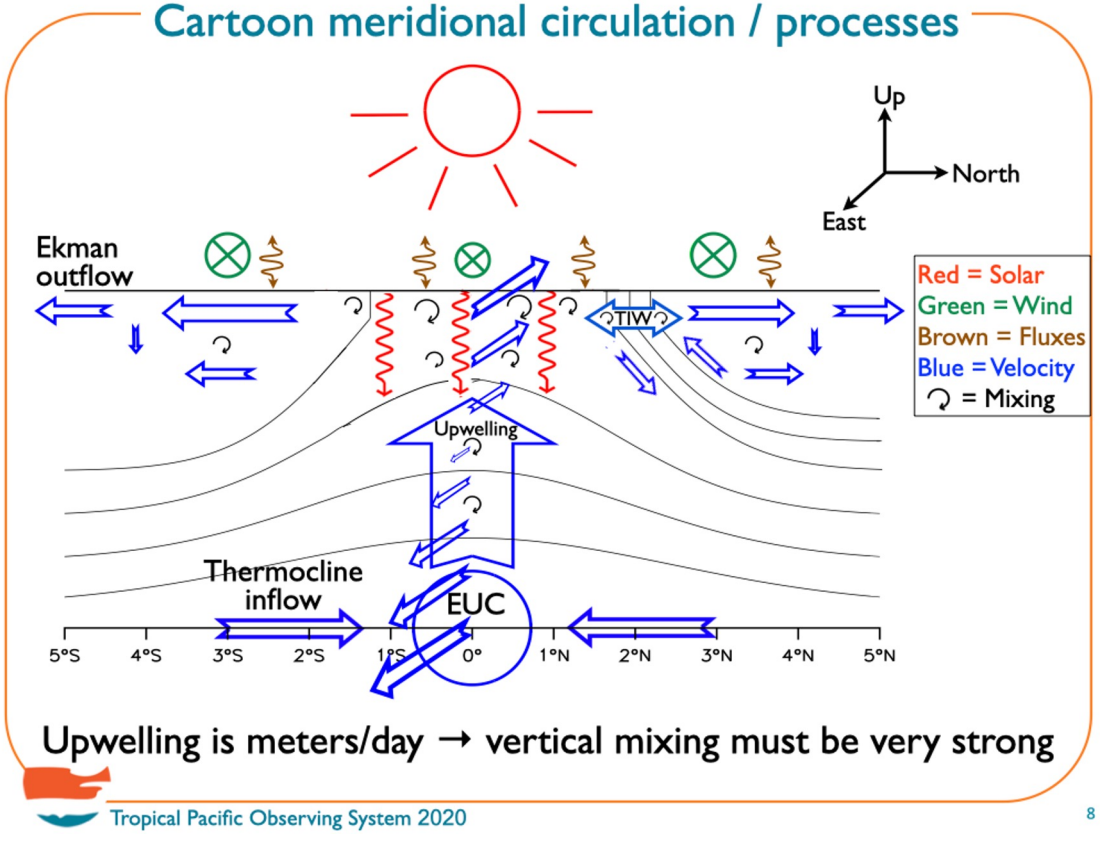
Slide by: Arne Körtzinger via Christa Marandino

Tropical Pacific Process Study starting ~2026

Zonal Processes



Meridional Processes



Lead Agency: NOAA Climate Programs Office CVP (Sandy Lucas). Exact processes targeted will be determined based upon competitive grants. Pre-field modeling studies are underway.

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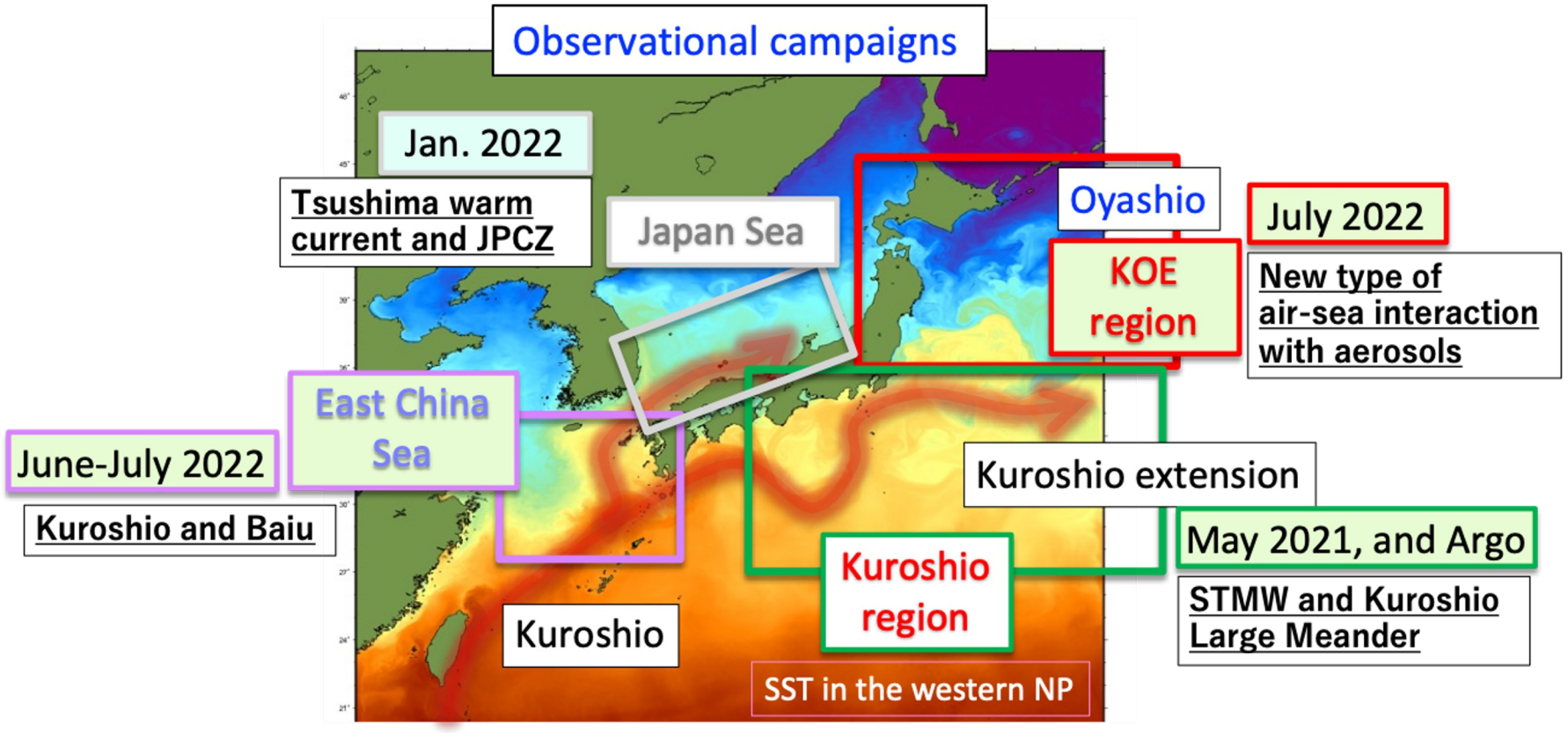
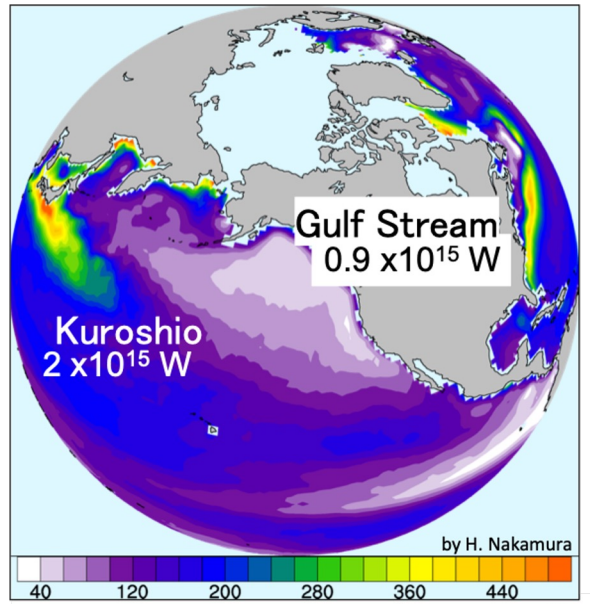
Seeking Interagency and international collaborations !

Japanese North Pacific Climatic Hot Spot-2





Sea surface heat flux (Jan., W/m²)

Huge amount of heat release from the ocean in the western boundary current regions:
Climatic hotspots

Field Campaigns in July 2019-Mar 2024

Lead PI: Masami Nonaka (JASMTEC)

- Further understanding of mid-latitude ocean-atmosphere interaction processes, and
- Predictability of extreme weather, of persistent atmospheric circulation anomalies

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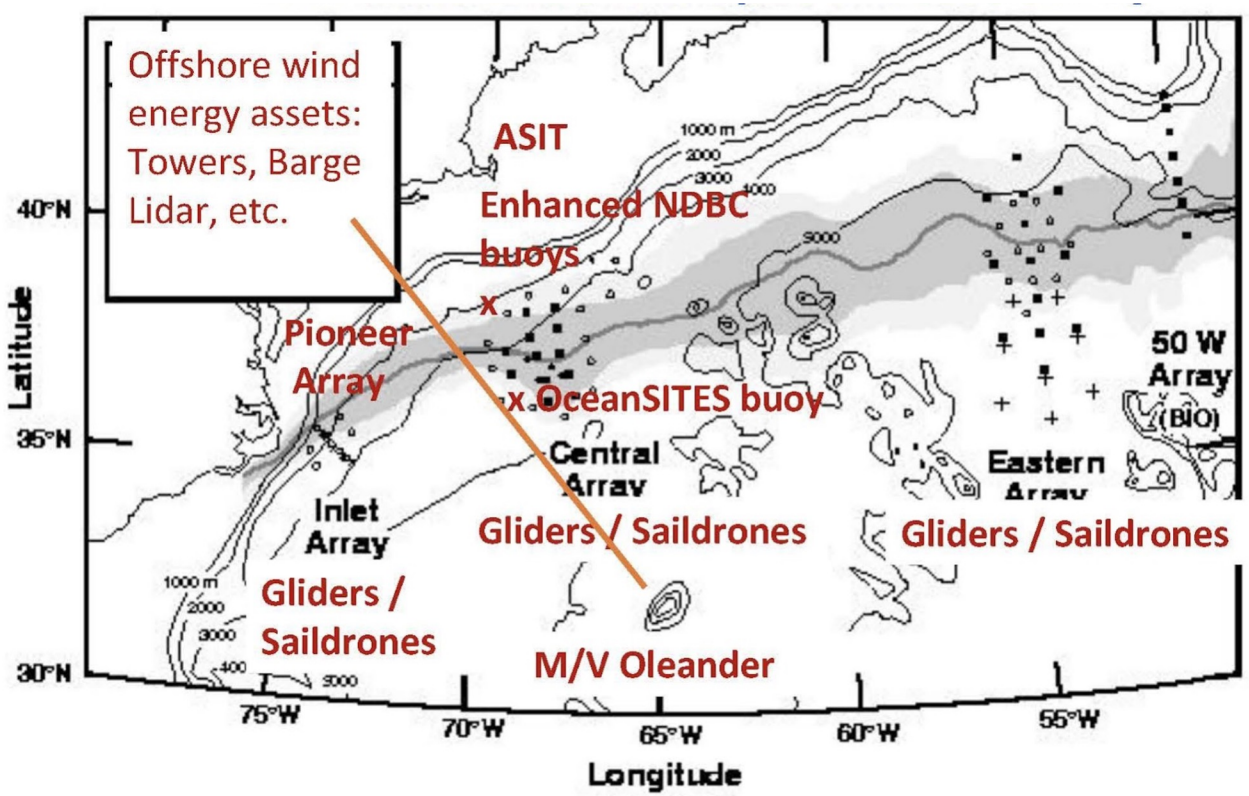
North Atlantic Hot Spot Process Study



2024?

Would be leveraged off of US DOE offshore wind energy assets, NWS OOI, NOAA NWS, …

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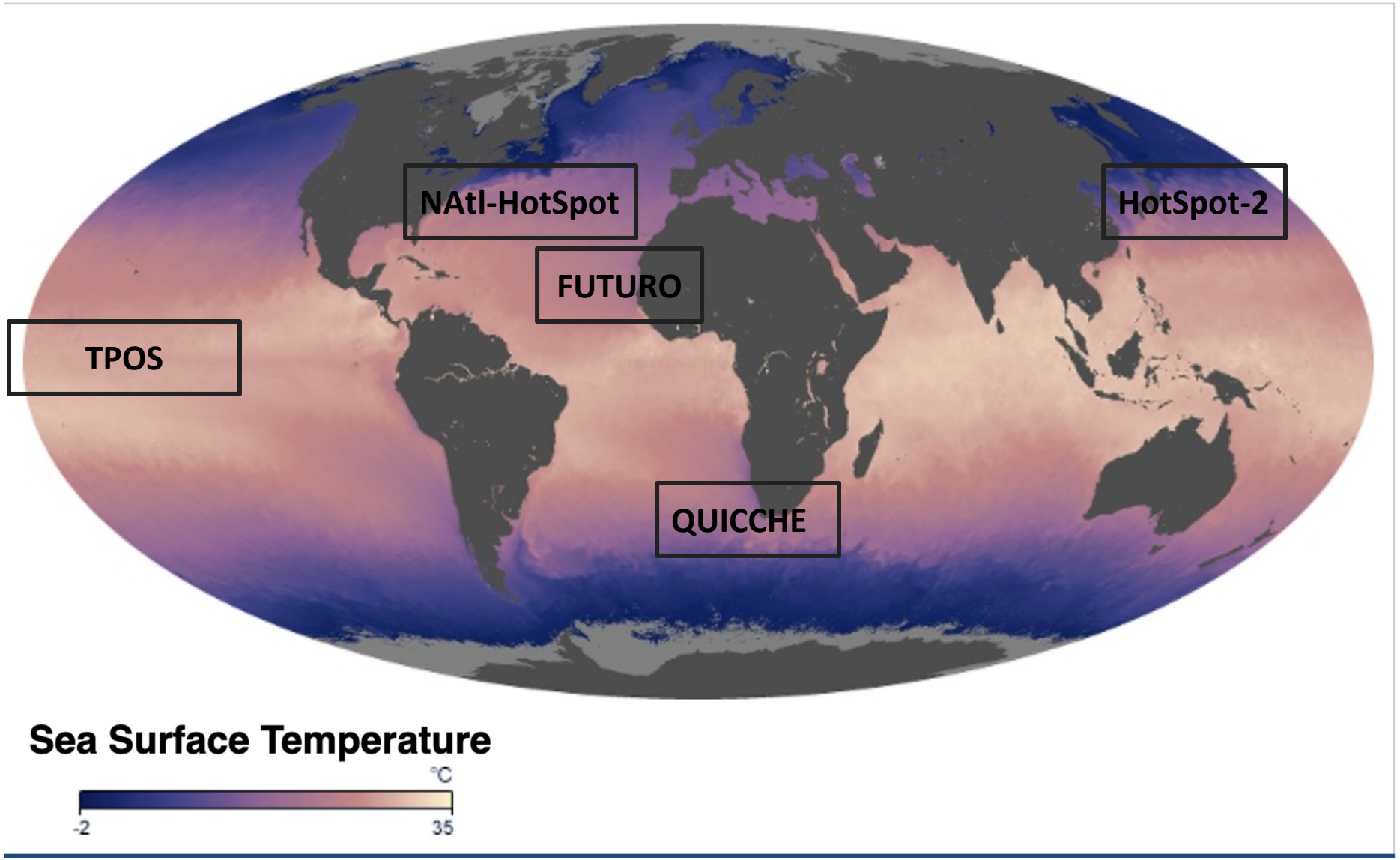
OASIS-relevant (potential) future Process Studies



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Join OASIS Theme Teams and "Get Involved" at:

https://airseaobs.org/get-involved

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