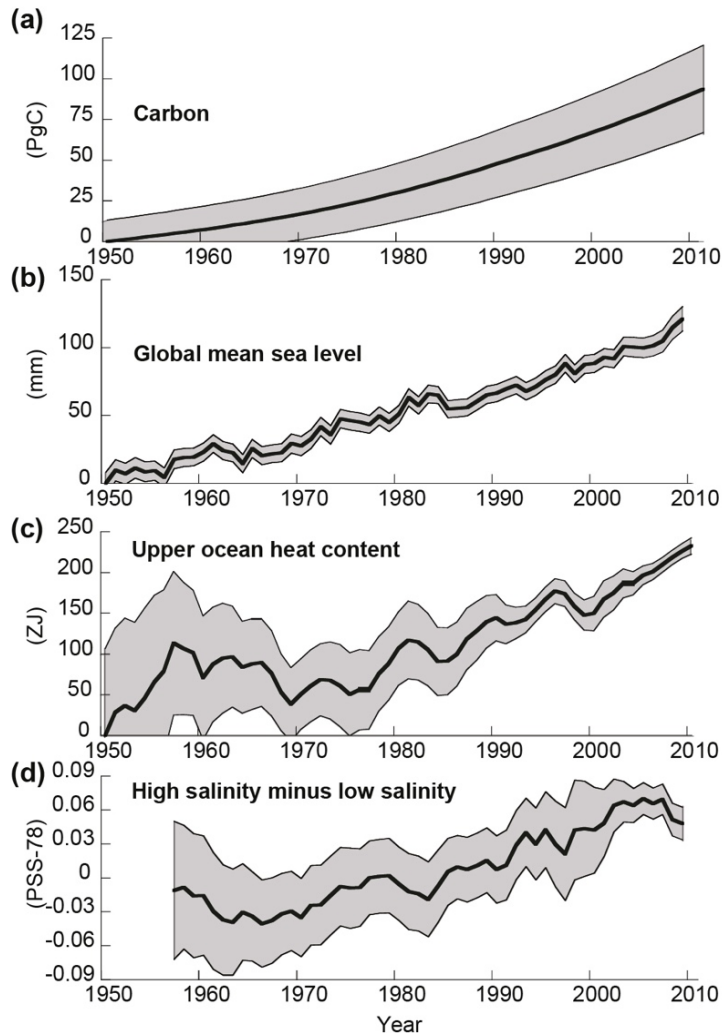


Ocean Observations Physics and Climate panel (OOPC)

Bernadette Sloyan, CSIRO Oceans and Atmosphere, Hobart

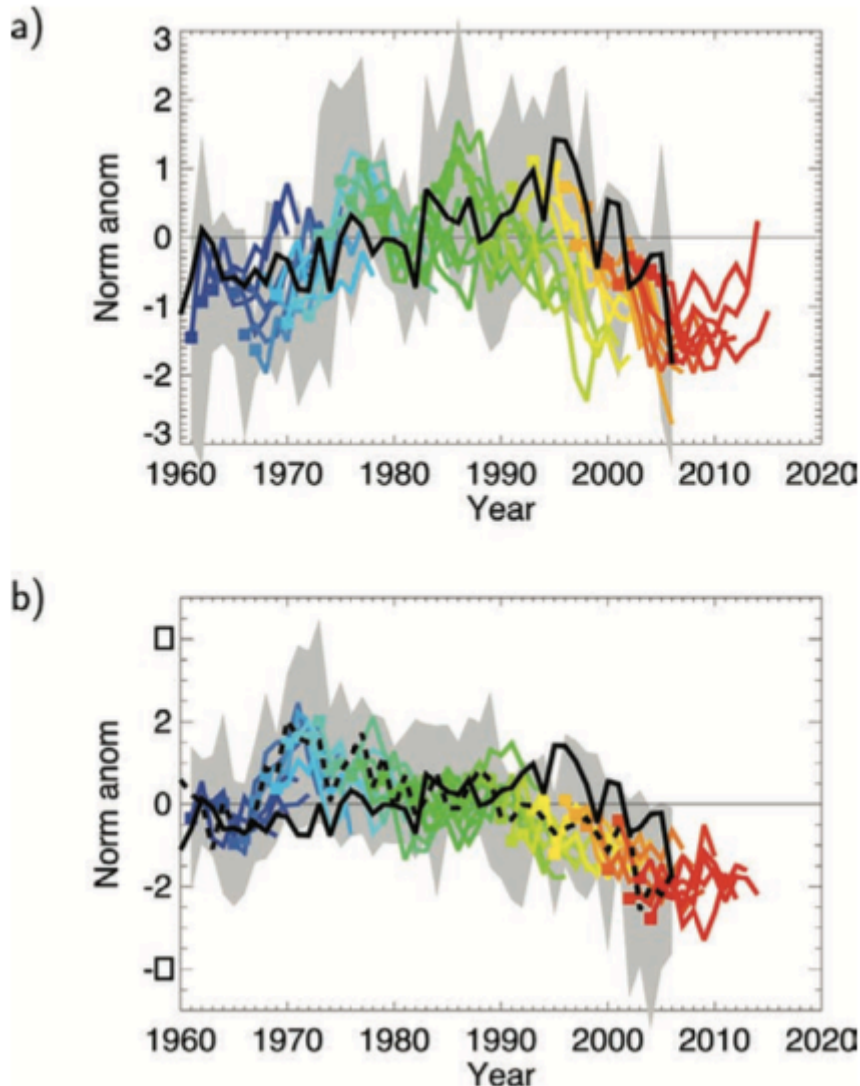


Use of Ocean Observations



Changes in large-scale ocean climate properties. From top to bottom: global ocean inventory of anthropogenic carbon dioxide; global mean sea level; global upper ocean heat content anomaly; the difference between salinity averaged over regions where the sea surface salinity is greater than the global mean sea surface salinity and salinity averaged over regions values below the global mean. (From IPCC 2015).

Use of Ocean Observations



Decadal predictions of the AMOC. (a) Multi-model annual mean AMOC at 45° N of retrospective predictions (colored, each color representing a different start year), multimodel mean analysis (black). gray shading represents their 95% ensemble range. (b) As in (a) but for uninitialized retrospective predictions with HadCM3 (Pohlmann et al. 2013).

The Ocean Observing System: Elements

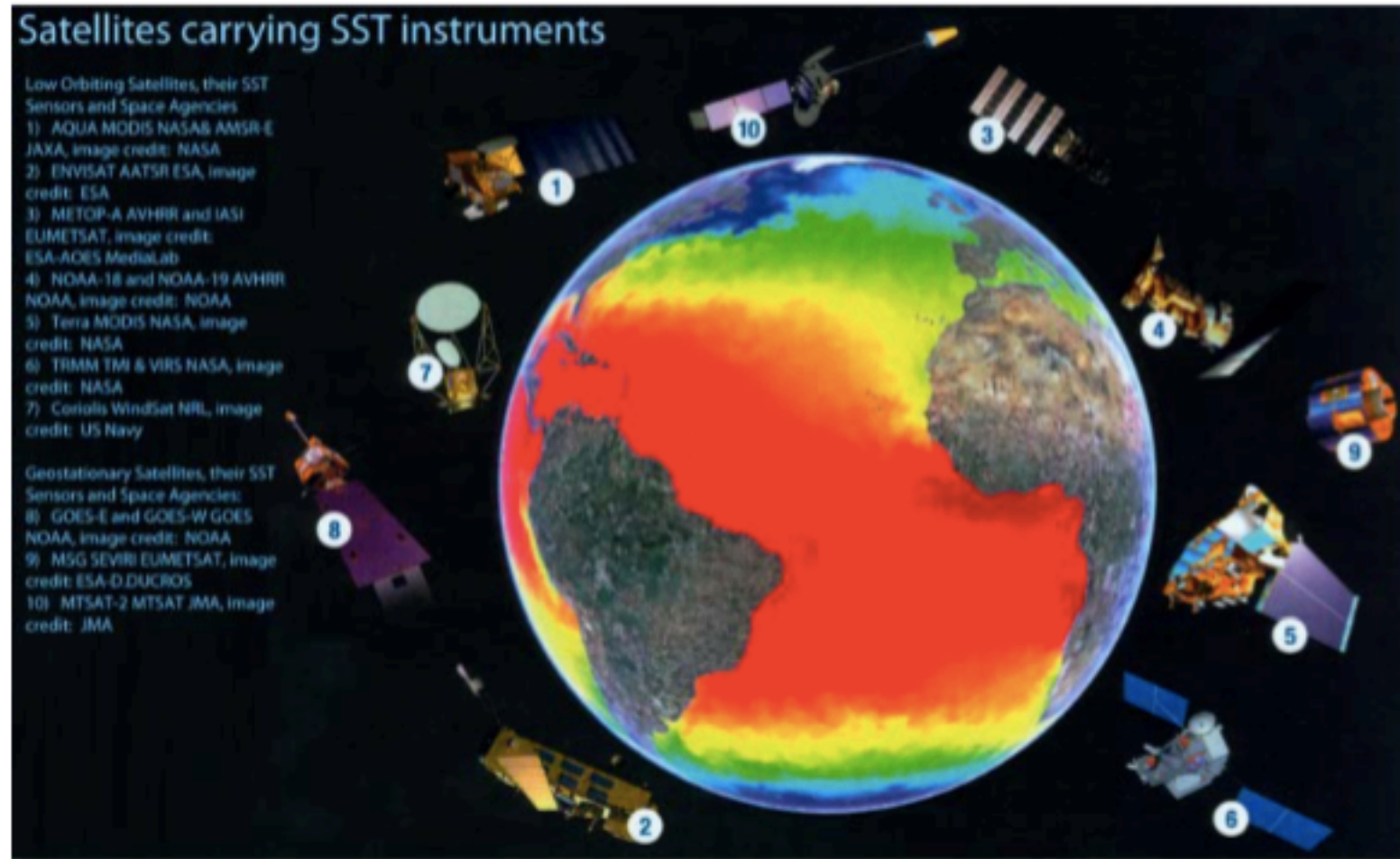
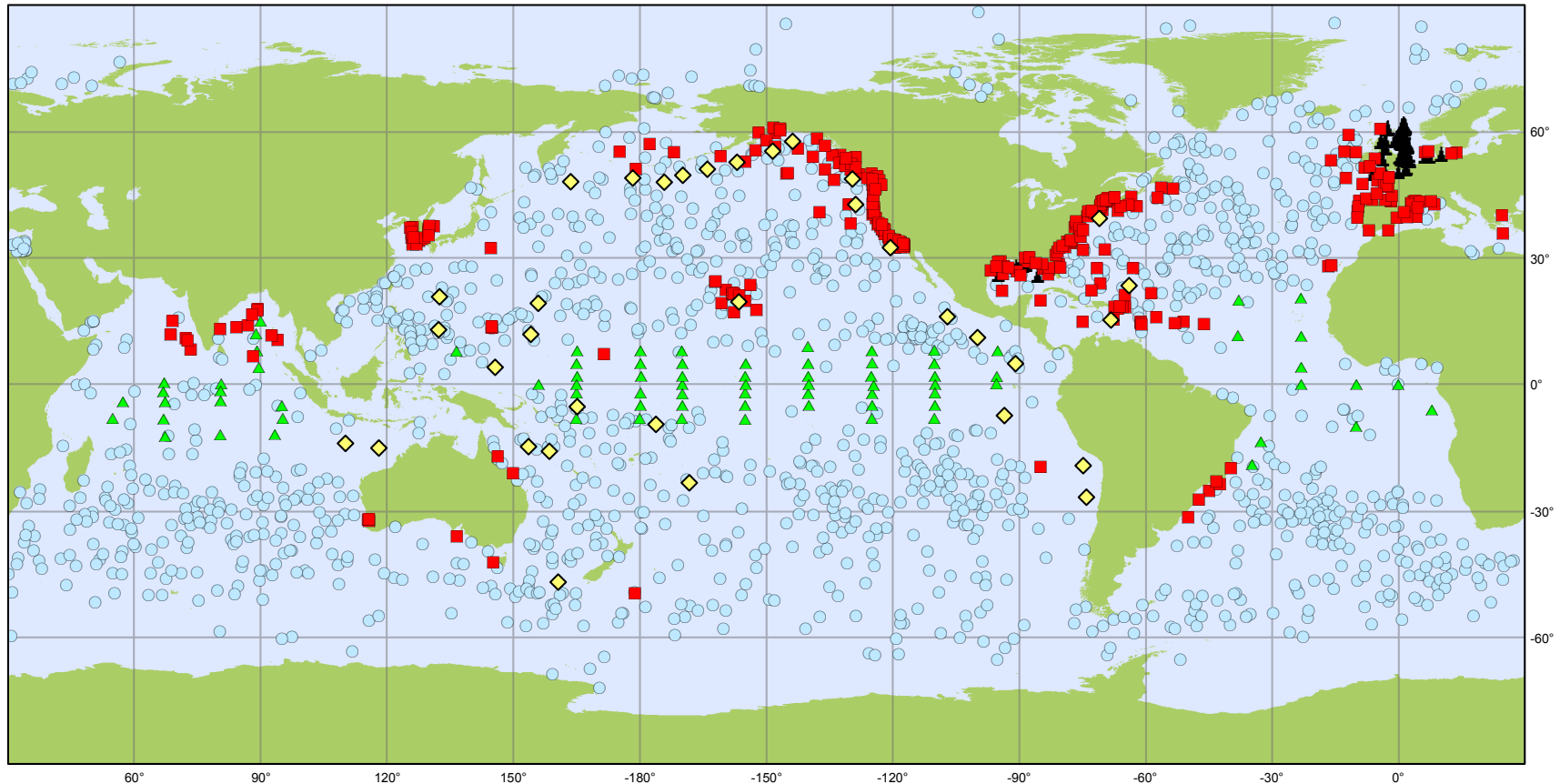


Figure 12. A schematic of the Satellite Constellation for SST

The Ocean Observing System: Elements



Data Buoy Cooperation Panel

Operational Platforms

February 2017

Platforms operational during the month. GTS data as received by Meteo France.

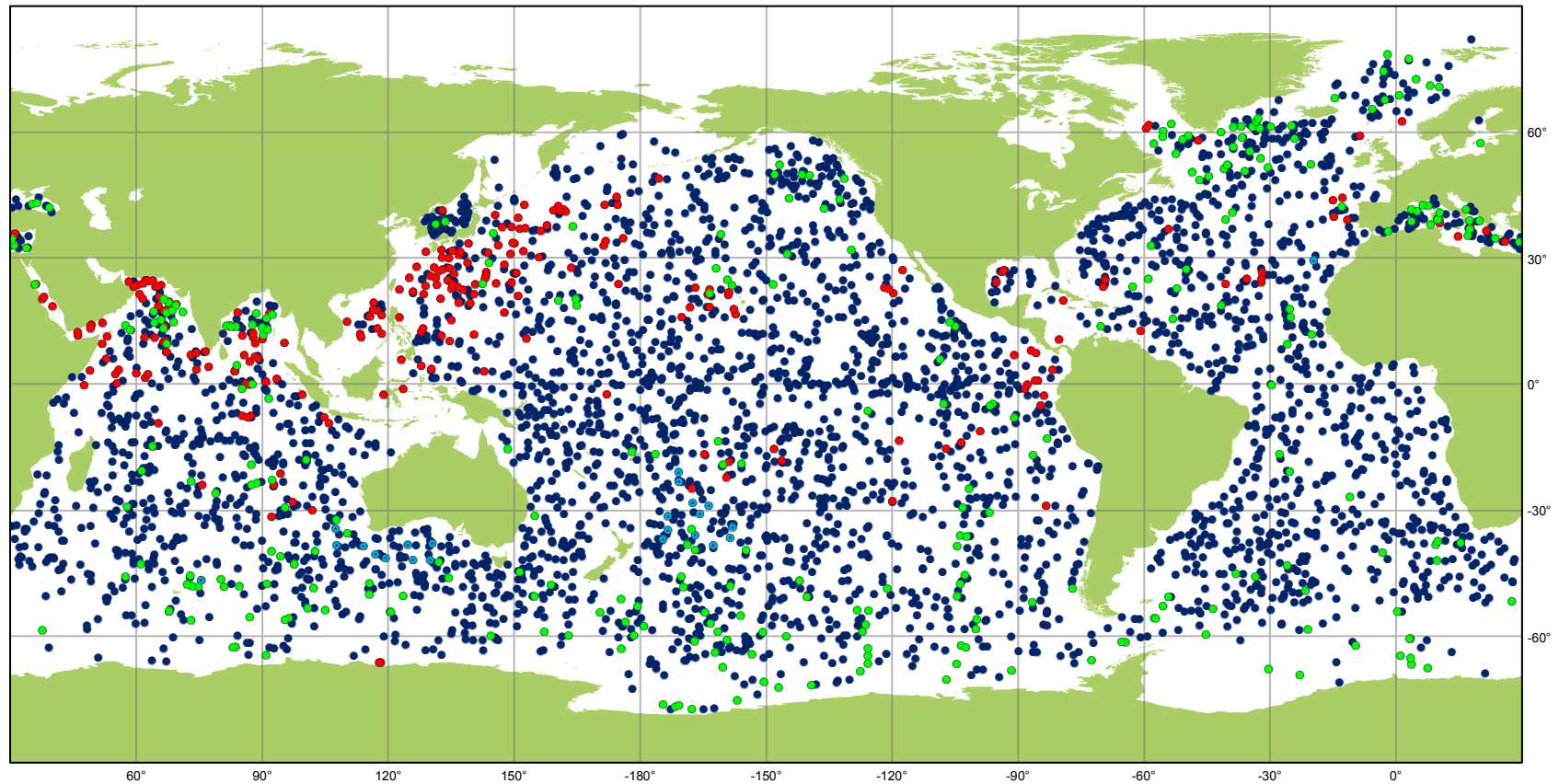
- ◆ Tsunameters (34)
- ▲ Tropical MB (81)
- Coastal/National MB (293)
- ▲ Fixed Platforms (103)
- Drifting Buoys (1 434)



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GCOS • GOOS • WCRP **OOPC**

The Ocean Observing System: Elements



Argo

Networks

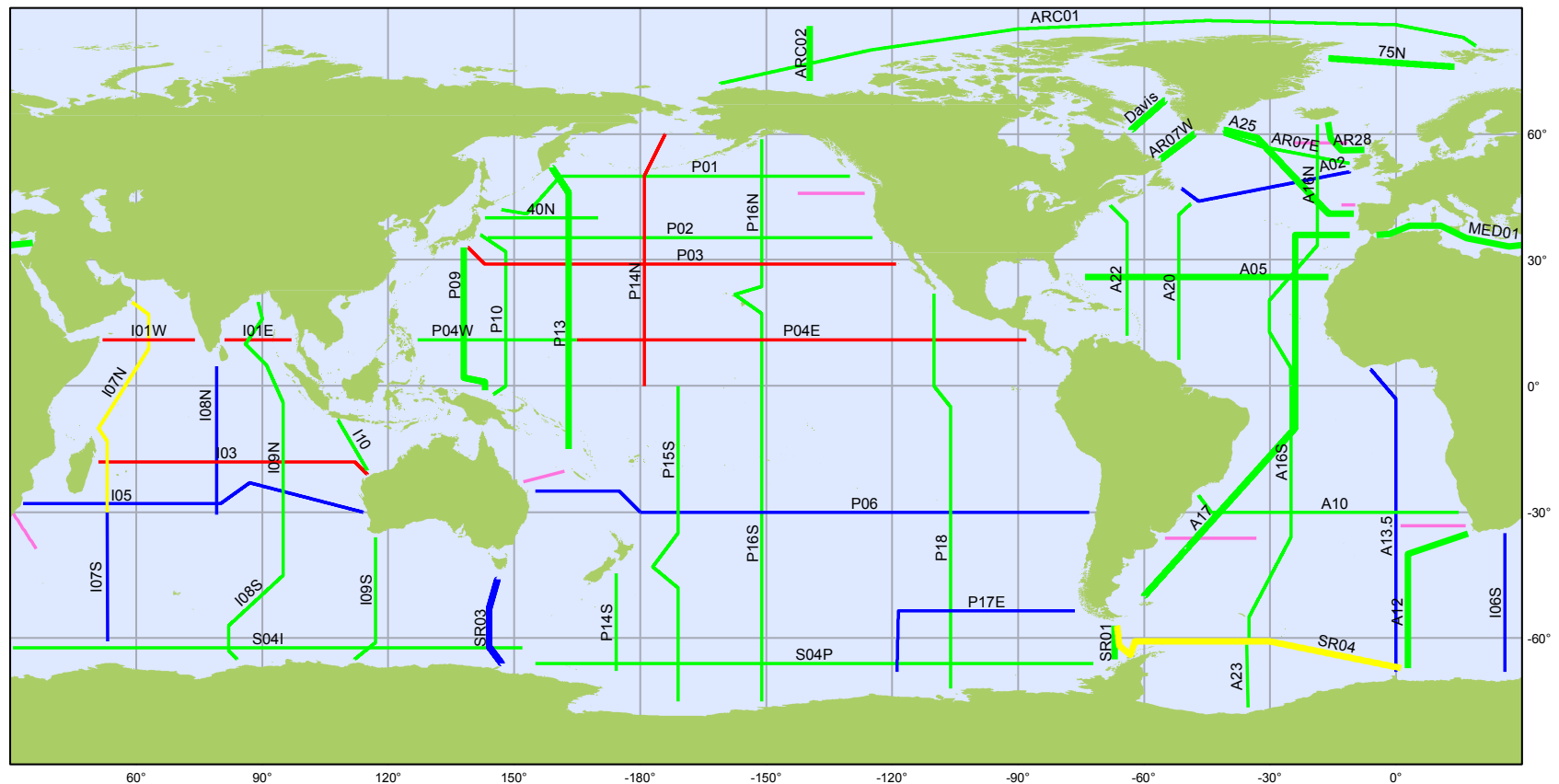
February 2017

● BioGeoChemical (297) ● Deep (26) ● Equivalent (257) ● Argo (3992)



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The Ocean Observing System: Elements



GO-SHIP

Status of 2012-2023 Survey (61 Lines)

January 2017

Bold lines: High Frequency (reduced requirements) Thin lines: Decadal GO-SHIP (full requirements)

— completed — at sea — funded — planned — not planned yet — associated & completed

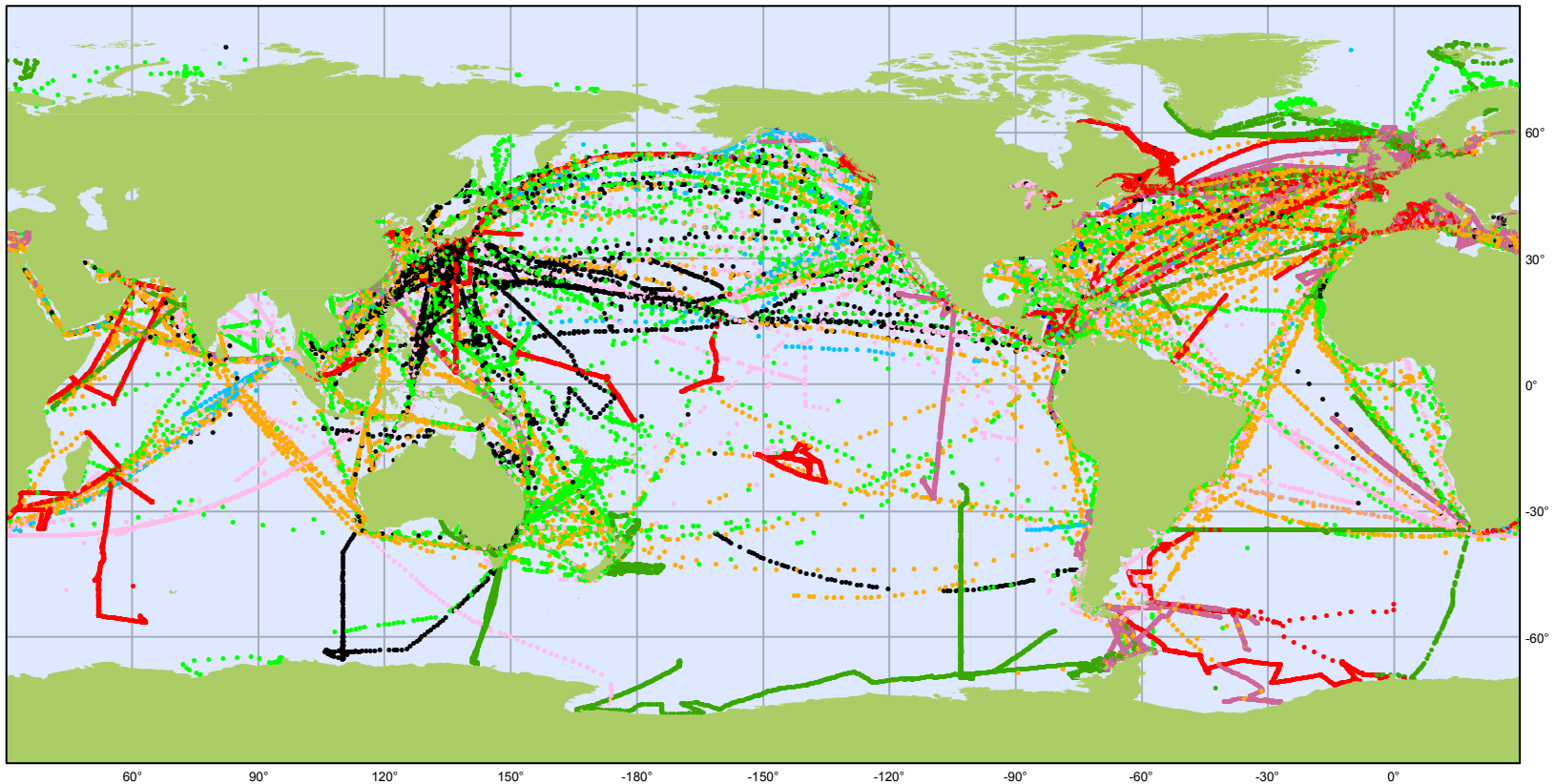


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GCOS • GOOS • WCRP

GOOS

The Ocean Observing System: Elements



Ship Observations Team

VOS Scheme: Classes

January 2017

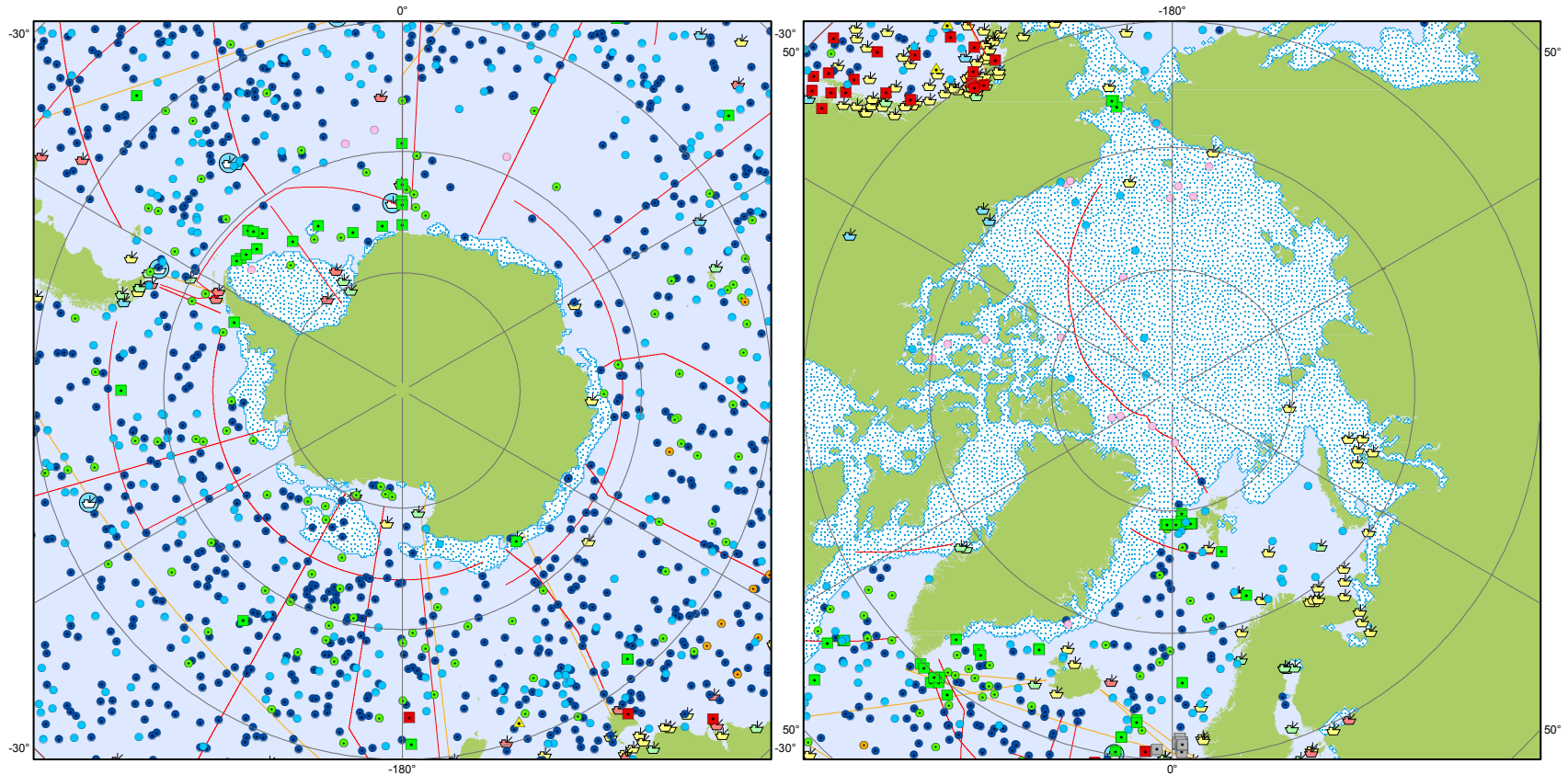
Position and Number of Reports per VOS Class in TAC

- VOS Clim (12513)
- VOS Clim AWS (43580)
- Selected (14915)
- Selected AWS (22326)
- Supplementary (12280)
- Supplementary AWS (38391)
- Auxiliary (1376)
- Auxiliary AWS (1507)
- 3rd Party (454)
- 3rd Party AWS (0)
- Unknown (5430)



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The Ocean Observing System: Elements



Main in-situ Elements of the Global Ocean Observing System

January 2017

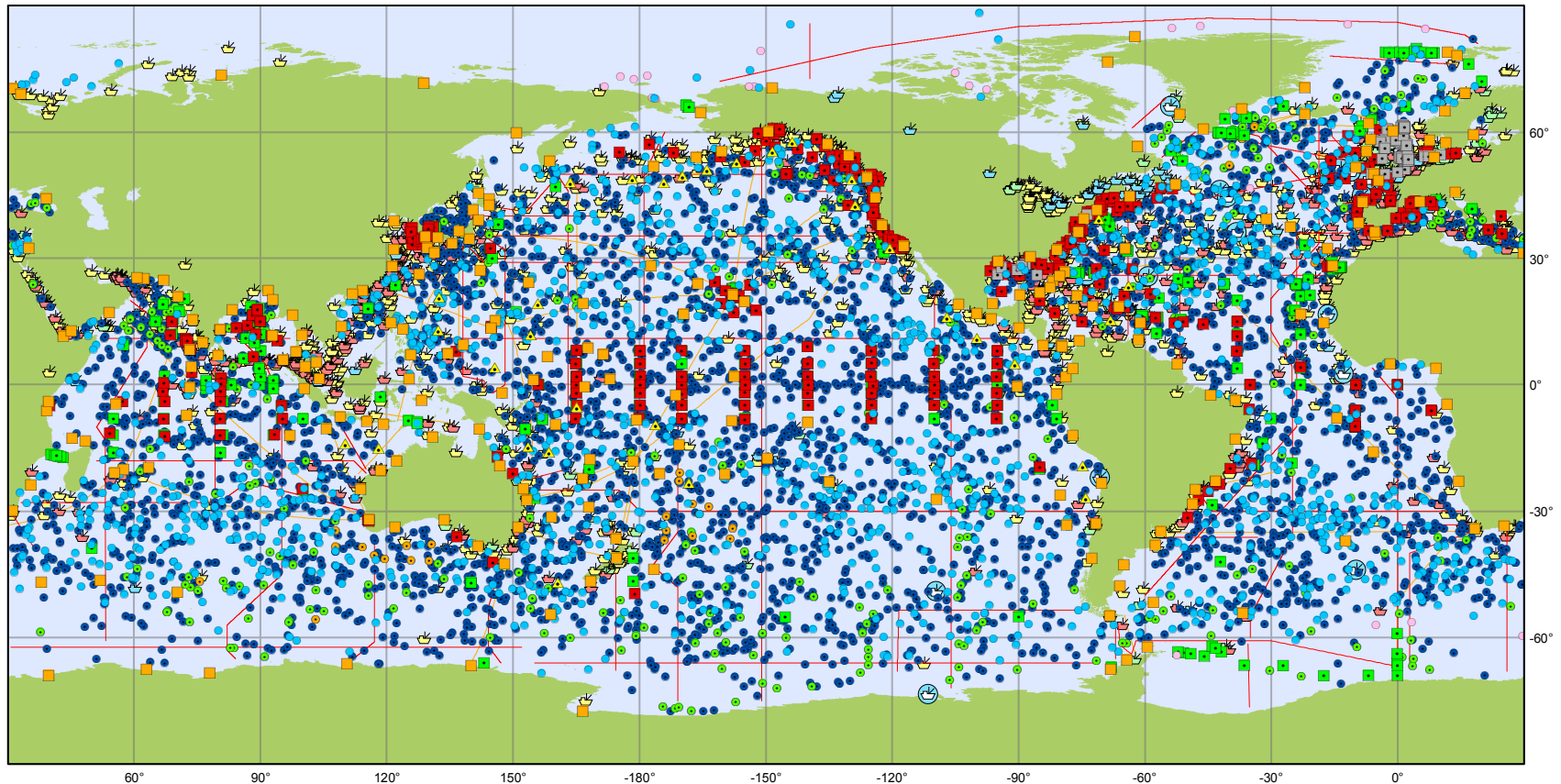
Argo	DBCP	OceanSITES	SOT
● Argo (873)	● Surface Drifters (240)	■ Platforms (27)	🤖 VOS-Clim-Automated (4)
● Deep-Argo (8)	● Ice Buoys (4)	GO-SHIP	🚢 VOS-Clim-Manned (17)
● BGC-Argo (107)	■ Moored Buoys (3)	— GO-SHIP (22)	🌿 VOS-Automated (12)
▲ Tsunamirometer (1)			👤 VOS-Manned (23)
			📡 ASAP Radiosondes (5)
			— SOOP XBTs (6)

Argo	DBCP	OceanSITES	SOT
● Argo (171)	● Surface Drifters (86)	■ Platforms (44)	🤖 VOS-Clim-Automated (7)
● Deep-Argo (1)	■ Fixed Platforms (20)	GO-SHIP	🚢 VOS-Clim-Manned (3)
● BGC-Argo (36)	● Ice Buoys (18)	— GO-SHIP (13)	🌿 VOS-Automated (18)
	■ Moored Buoys (21)		👤 VOS-Manned (102)
	▲ Tsunamirometer (2)		📡 ASAP Radiosondes (1)
			— SOOP XBTs (5)



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The Ocean Observing System



Main in-situ Elements of the Global Ocean Observing System

February 2017

Argo

- Argo (3999)
- Deep-Argo (26)
- BGC-Argo (301)

DBCP

- Surface Drifters (1401)
- Fixed Platforms (103)
- Ice Buoys (22)
- Moored Buoys (376)
- Tsunameter (32)

OceanSITES

- Platforms (331)
- GO-SHIP**
- GO-SHIP (61)
- GLOSS**
- Tide Gauges (252)

SOT

- VOS-Clim-Automated (107)
- VOS-Clim-Manned (358)
- VOS-Automated (152)
- VOS-Manned (1056)

- ASAP Radiosondes (21)
- SOOP XBTs (37)



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Essential Ocean Variables and readiness level

CONCEPT PILOT MATURE

Physics

- Sea State
- Ocean surface stress
- Ocean Heat Fluxes
- Sea Ice
- Sea level
- SST
- Subsurface temperature
- Surface currents
- Subsurface currents
- Sea Surface Salinity
- Subsurface salinity

Biogeochemistry

- Oxygen
- Nutrients
- Inorganic Carbon
- Tracers
- Suspended particulates
- Nitrous oxide
- Carbon isotope (^{13}C)
- Dissolved organic carbon
- Ocean Colour

Biology and Ecosystems

- Phytoplankton biomass and diversity
- Zooplankton biomass and diversity
- Fish abundance and distribution
- Marine turtles birds and mammals abundance and distribution
- Live coral
- Seagrass cover
- Mangrove cover
- Microalgal canopy

EOVs mapping to ECVs

Physics

- Sea State
- Ocean surface stress
- Ocean Heat Fluxes

Biogeochemistry

- Oxygen
- Nutrients

Biology and Ecosystems

- Phytoplankton biomass and diversity
- Plankton
- Zooplankton biomass and

The adoption of ECVs/EOVs will provide the mechanism to bring together existing systems and international coordination groups into a holistic ocean observing system.

- Surface currents
- Subsurface currents
- Sea Surface Salinity
- Subsurface salinity

- Carbon isotope (^{13}C)
- Dissolved organic carbon
- Ocean Colour

mammals abundance and distribution

- Live coral cover
- Seagrass cover
- Marine Habitat
- Mangrove cover
- Properties
- Microalgal canopy

OOPC and the Ocean Observing System

The OOPC role is to:

- Develop recommendations for a sustained global ocean observing system, in support of WCRP, GOOS, and GCOS objectives;
- Help develop a process for ongoing evaluation and evolution of the observing system, from process studies or community efforts, and recommendations for continued evolution;
- Support global ocean observing activities through liaison and advocacy for the agreed observing plans.
- Provide advice on scientific requirements to the Joint WMO-IOC Technical Commission on Oceanography and Marine Meteorology (JCOMM), which is responsible for the coordination of implementation of platform-based observing system components.

OOPC and WCRP WDAC

- OOPC has traditionally had an interest in the observing of and use of air-sea fluxes. It has championed air-sea heat flux and wind stress to be recognized as Essential Ocean Variables in the GCOS/GOOS context.
- Over the years OOPC members have reached out to groups such as WGNE about the role of observed air-sea fluxes in validating models and motivating/guiding improvements to models.
- Some OceanSITES flux sites withhold data from GTS and thus can serve as independent data to evaluate operational models. It is less clear what if any of the OceanSITES data get into reanalyses so it less clear how to interpret differences between reanalyses and in-situ time series.
- OceanSITES and OOPC are working up a draft write up of the present strategy to observe air-sea fluxes on a global scale as part of GOOS/GCOS.
- SURFA continues at NCEI and there is the GEWEX Seaflux project but there no active dialog between observing efforts and modelers.

OOPC and WCRP WDAC

- OOPCs mandate is to "provide science-based recommendations for an fit-for-purpose, sustained and prioritized ocean observing system, focusing on physical variables that maximize support climate monitoring, forecasting, and research". The WRCP Grand Challenges all require observational data, particularly ocean data (surface and subsurface), however, the documentation on many of the Grand Challenges doesn't highlight the connection to observational data or actively engage with OOPC.
- OOPC is working toward more active engagement with the range of modeling communities, from NWP to climate, to high resolution local/regional.

OOPC and WCRP WDAC

OOPC would like to know how WDAC wants to engage with us, including WDAC's connection to other WRCF project/programs (e.g WDAC air-sea flux group, obs4MIPS, and Grand Challenges).