The Global Ocean Observing System

Global Ocean Observing System (GOOS)

Observations Coordination Group (OCG)

Data Activities

Ocean Observatories Initiative Facility Board (OOIFB) and Data Systems Committee (DSC) Meetings Wednesday, and Thursday, November 13-14, 2024

Kevin O'Brien
UW/CICOES, NOAA/PMEL
GOOS OCG Vice-chair for Data and Information

GOOS Observations Coordination Group (OCG)

The Observation Coordination Group (OCG) works to **efficiently operate, maintain**, **coordinate** and **integrate** a comprehensive *in-situ* global ocean observing system

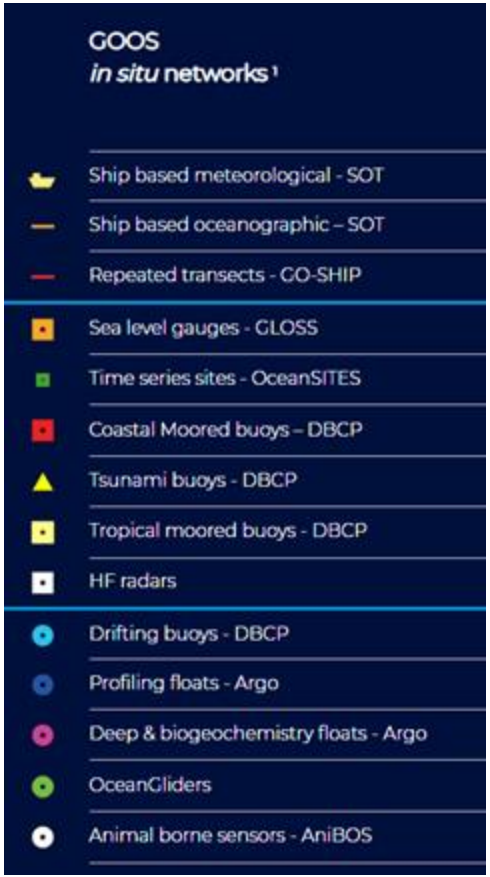
Observation Coordination Group Executive
Chair, Vice Chairs
WMO/Technical, Standards and Best Practice, OceanOPS, Data Management, Developing Community representative

Among the FOCI for the GOOS OCG are:

- Data Management
- Standards and Best Practices

Current Data Management Activities:

- Completed first attempt at mapping data/metadata flows for the Global Ocean Networks
- Released a Data Strategy Implementation Plan to support GOOS, WMO and IODE Data Policies/Services, FAIR data principles and improved interoperability of data
- Developing a cross-network Data Task Team
- Improve data links to Bio Eco communities



OCG Cross-Network Data Implementation Strategy Released

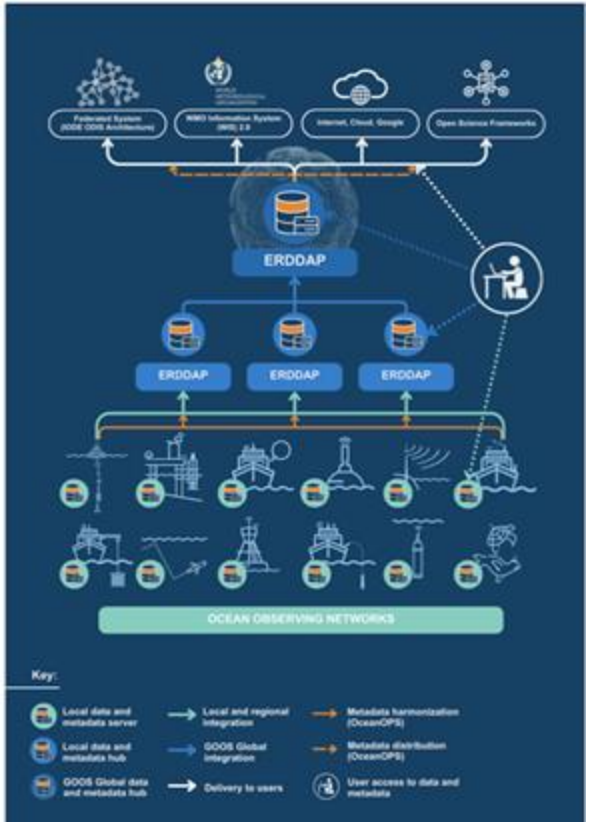
The Global Ocean Observing System

This Implementation Plan is an effort to define specific and actionable ways OCG network/programs can move towards FAIR compliance

- Improve (meta)data discovery, exchange, accessibility and usability for all stakeholders
- Improve access to distributed (meta)data endpoints through federated, uniform data services

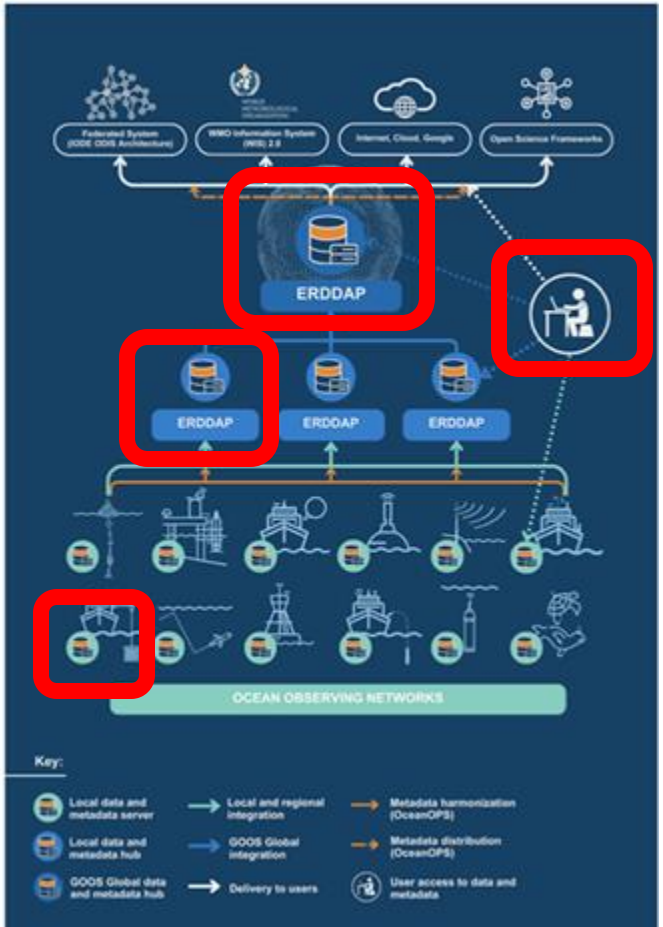
GOOS OCG Data Implementation Requirements

Real Time Data		**Metadata**	
OCG-R1	Data shall be exchanged in real time (with minimum delay) via the WIS/GTS of the WMO in approved formats/templates.	OCG-R7	Networks shall have a defined uniform metadata content that includes at least the minimum OceanOPS requirements, thereby ensuring that they are compliant with the WIGOS metadata requirements. Note that OceanOPS is the authoritative source through which WIGOS metadata are submitted to OSCAR for all oceanographic and marine meteorological platforms.
OCG-R2	Data shall be available in real time or near-real time on the Internet through interoperable services (preferably ERDDAP) freely and without any restriction. Community agreed quality control procedures shall be applied in real-time and adjusted values made available when possible.	OCG-R8	Discovery and Use metadata shall be based upon a well-documented community standard, including a persistent and unique WMO/WIGOS identifier allocated by OceanOPS and use controlled vocabularies.
		OCG-R9	Platform and Discovery metadata shall be exchanged with OceanOPS utilizing machine-2-machine services.
Delayed Mode Data		**Best Practices**	
OCG-R3	Each network shall have at least one identified Global Data Repository. This Global Data Repository may be one or multiple (mirrored) repositories, or they may be data endpoints that can be federated into a virtual global repository.	OCG-R10	Each network should have an active data team.
OCG-R4	Data and data products shall be available through publicly accessible ERDDAP services. These distributed ERDDAP services will be federated under a single OCG ERDDAP focal point.	OCG-R11	Each network should have identified best practices on data infrastructure and workflows and data Q.C.
OCG-R5	NetCDF is the preferred data file format, though ERDDAP services can act as a data format translator if needed.	OCG-R12	Raw/real-time data, delayed mode data and data products should be archived and have unique identifiers created [i.e., Digital Object Identifier (DOI)] for citation and reuse.
OCG-R6	Additional platform metadata should be available through the Global Data Repository and harvestable by machine-2-machine services.		



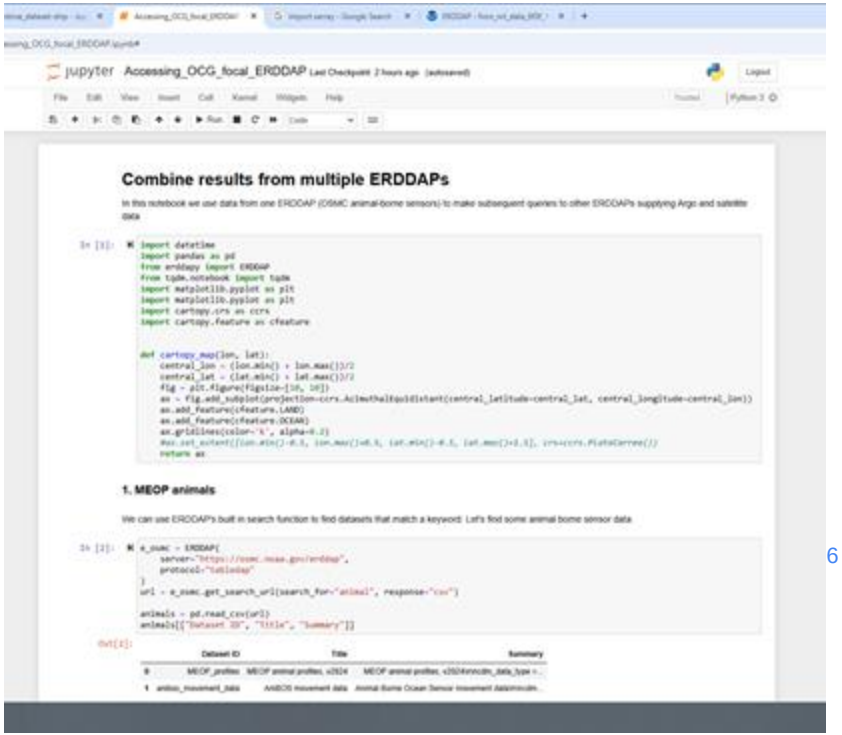
GOOS OCG Data Users and ERDDAP Federation

- Members of the GOOS Networks
- Cross-network projects
- Global stakeholders
  - World Meteorological Organization (WMO)
  - Ocean Data Information Service (ODIS)
  - UN Decade projects (DiTTO, etc)
- Who knows?



OCG Federated ERDDAP Node

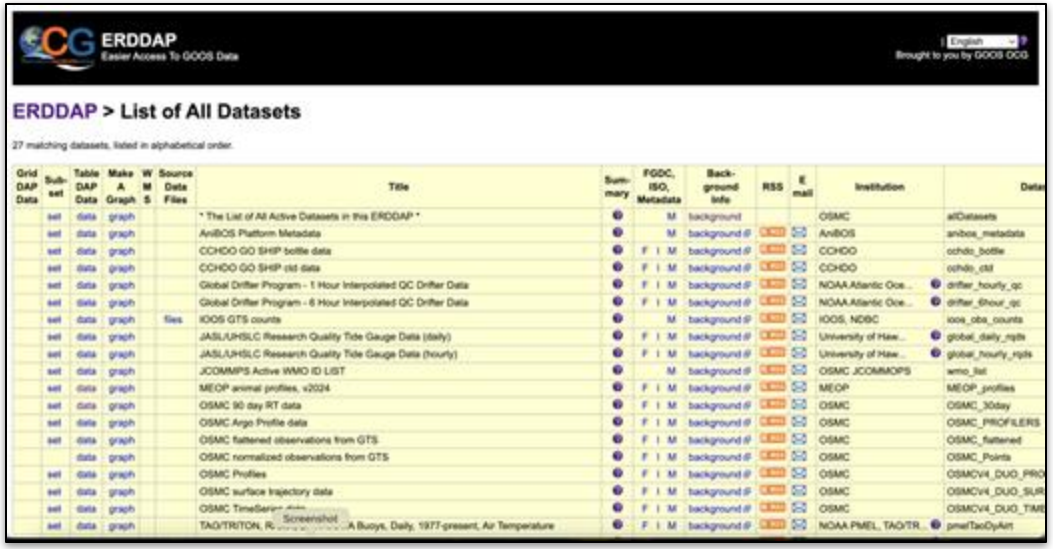
OCG Federated ERDDAP Node - Example



Integration with IODE* Ocean Data and Information System (ODIS)*

**International Oceanographic Data and Information Exchange*

**Federation of distributed metadata catalogs to further discovery and access of ocean data*



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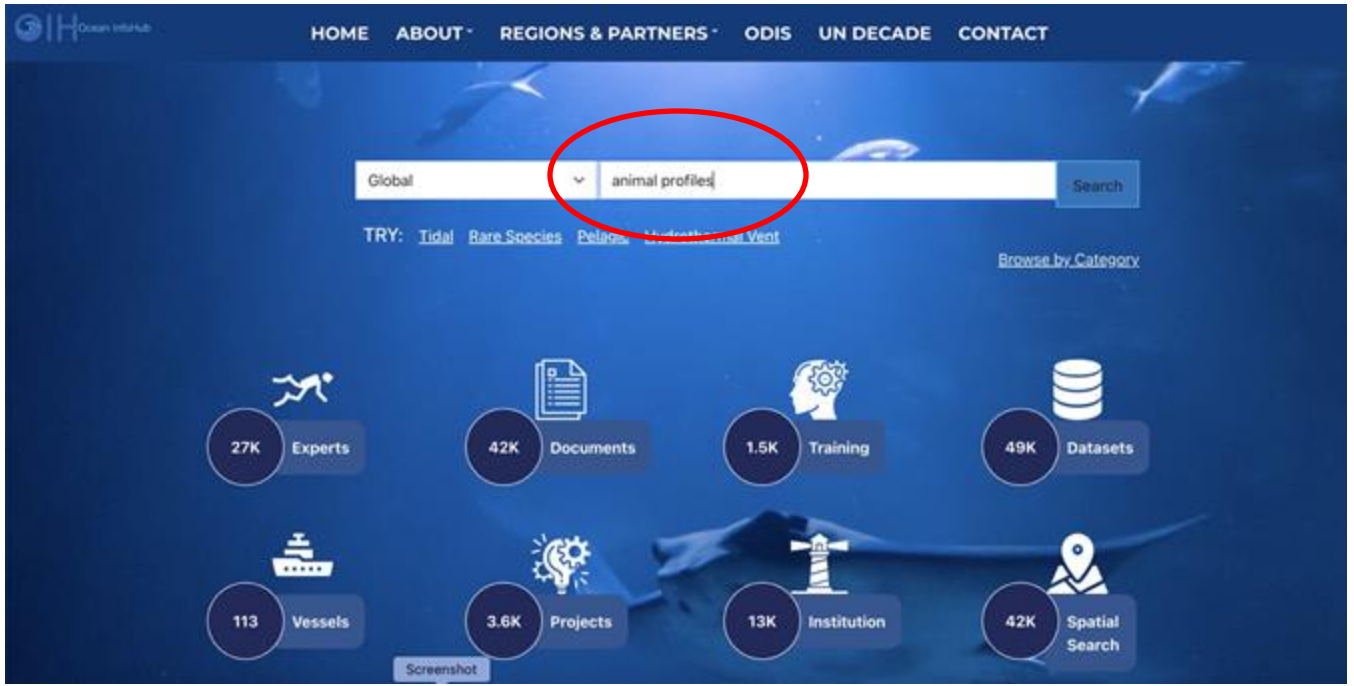

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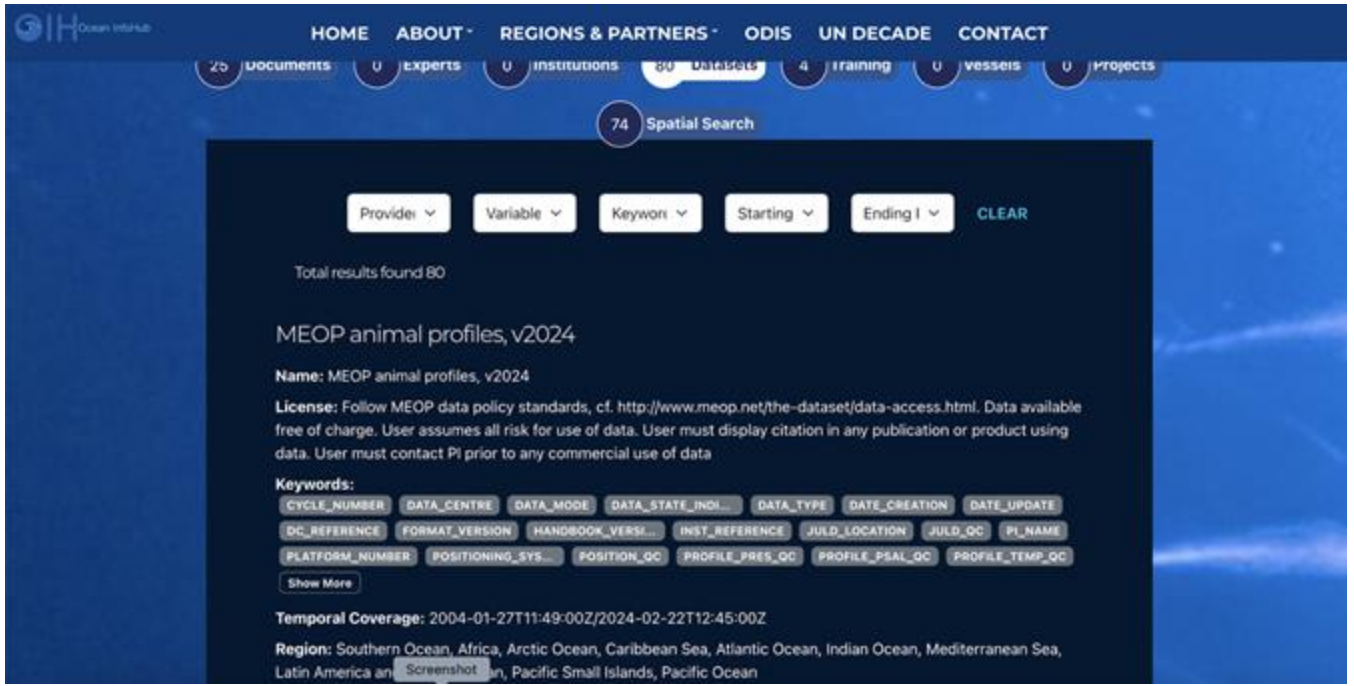

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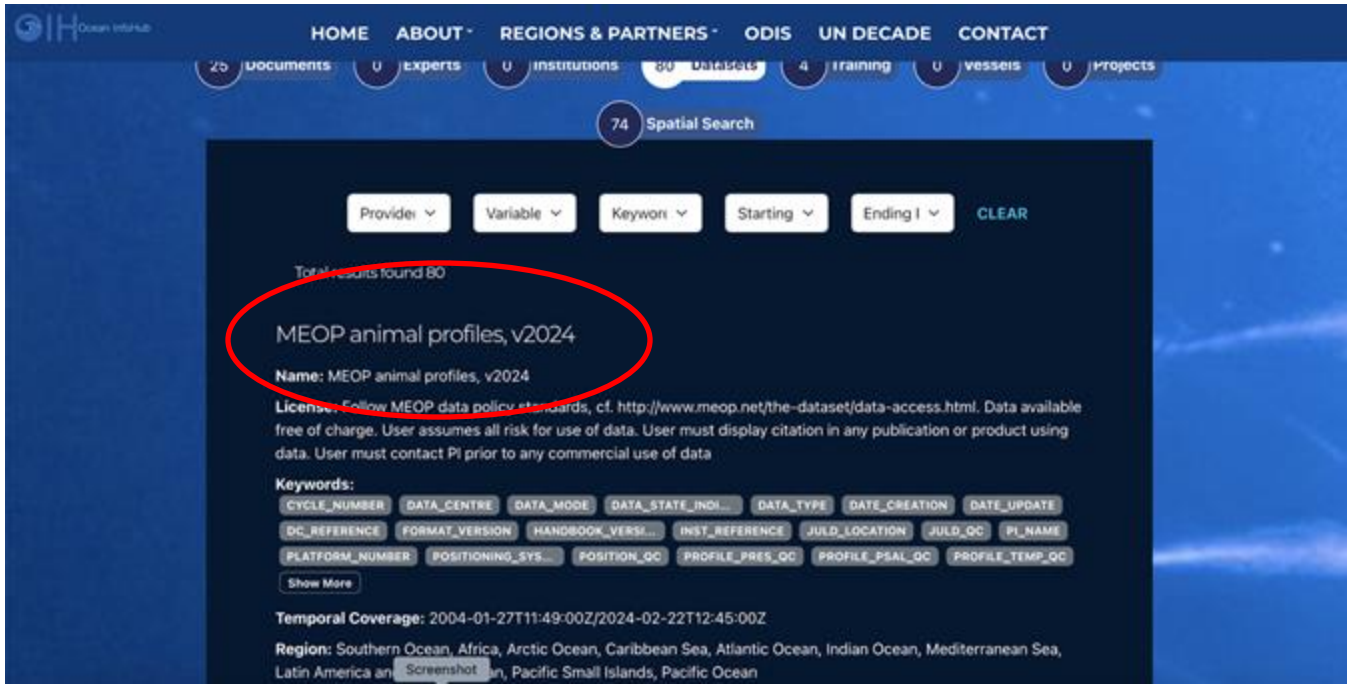

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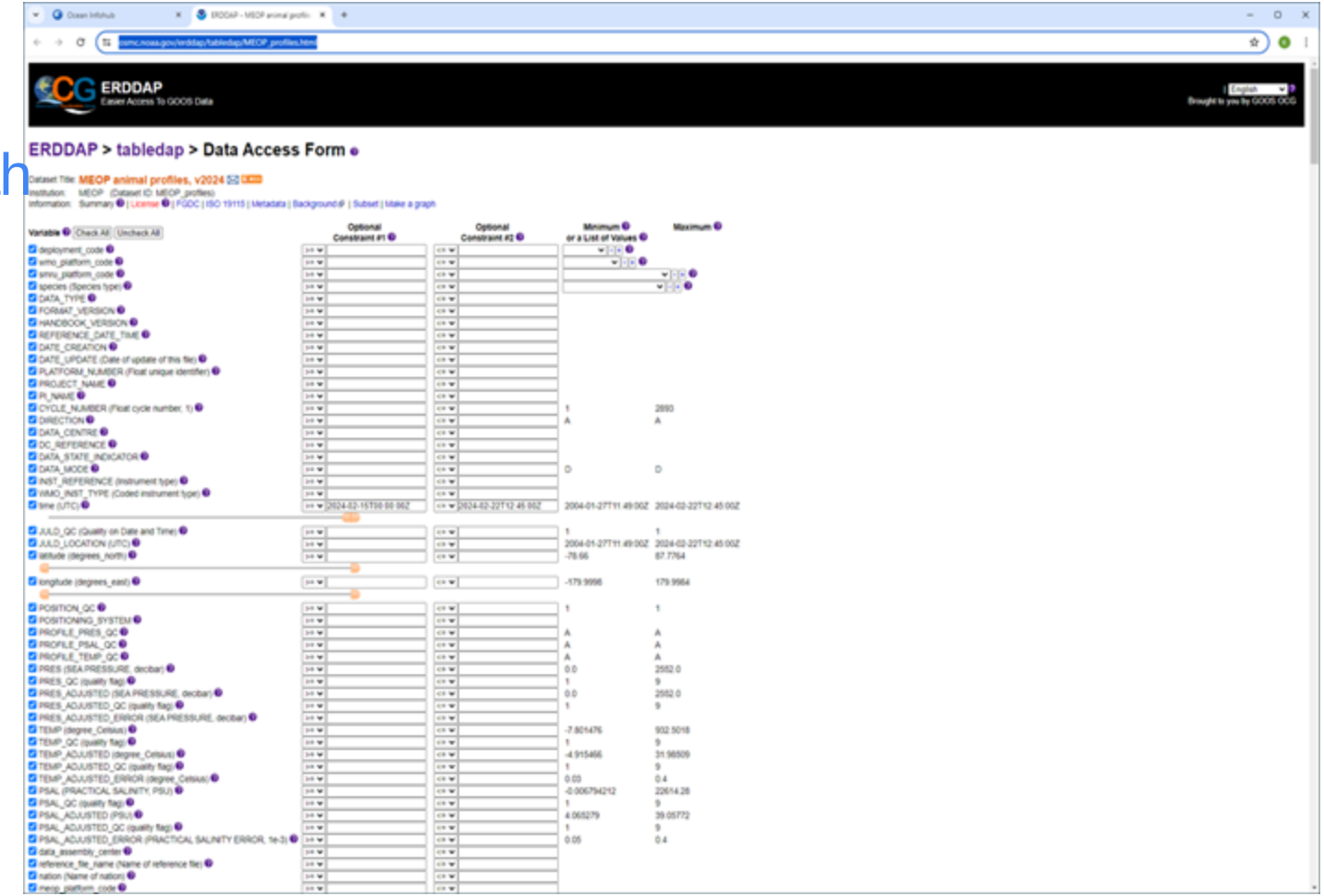
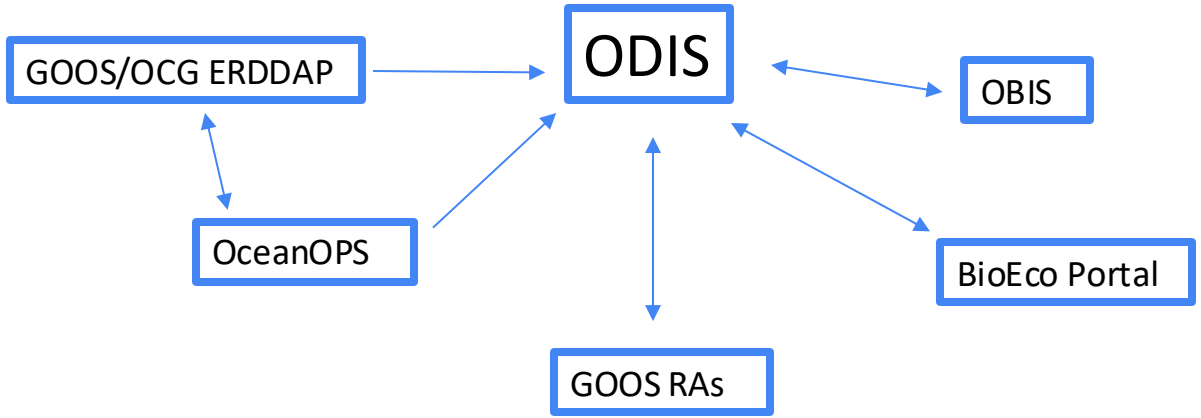


What could a cross-GOOS infrastructure look like?

Within GOOS, we will harness the power of ERDDAP to provide easy federation of distributed data nodes

ODIS seems well placed to act as the glue between disparate systems



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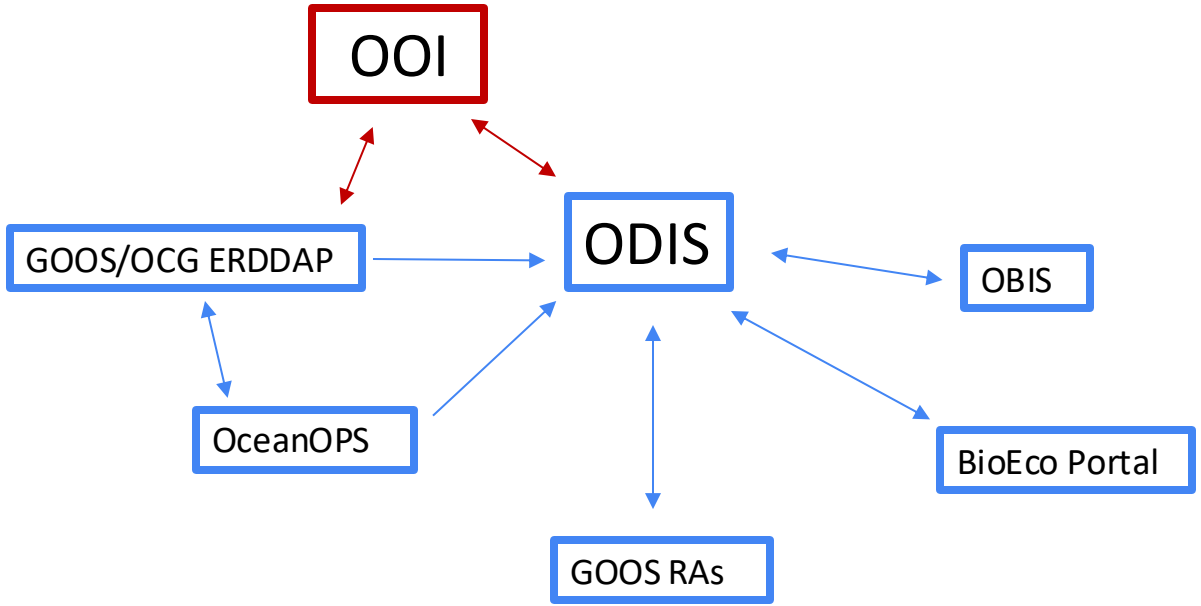


ERDDAP - integration with WIS 2.0

1963 World Weather Watch

1970s Global Telecommunication System (GTS)

2007 WMO Information System (WIS)

2019 WMO Reform (Earth System Approach)

2021 WMO Unified Data Policy (Core, Recommended)

WIS 2.0

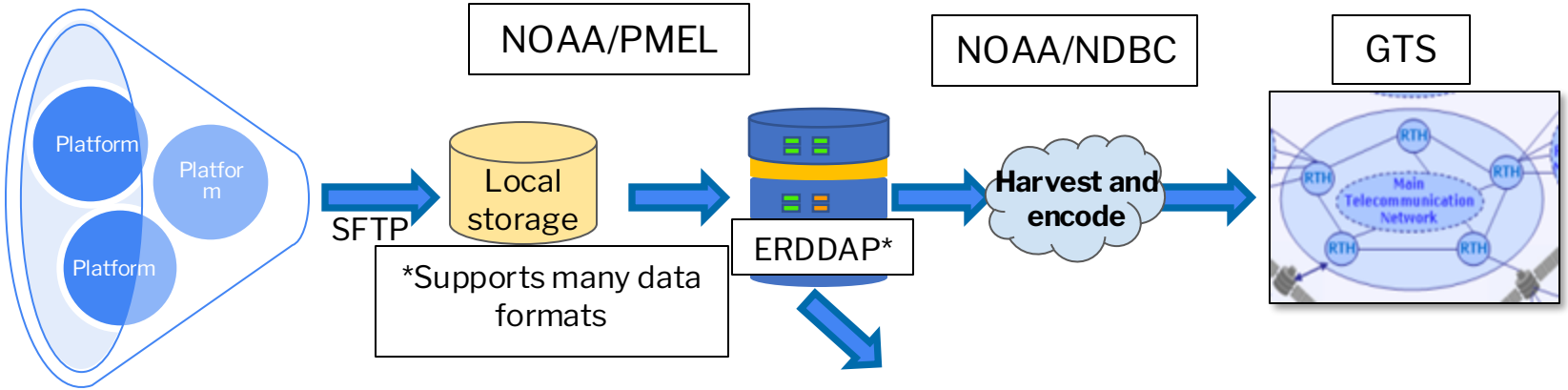
… collaborative system of systems using Web-architecture and open standards to provide simple, timely and seamless sharing of trusted data and information …

- Open Standards (OGC, W3C, IETF, …)
- Free and Open Source tooling
- Data sharing through Web and real-time notifications with publication/subscription (Pub/Sub) protocols
- Cloud ready (turn-key solutions)
- Web APIs (Application Programming Interface)

Slide courtesy Tom Kralidis

GOOS Open Access to the GTS Data Exchange Workflow

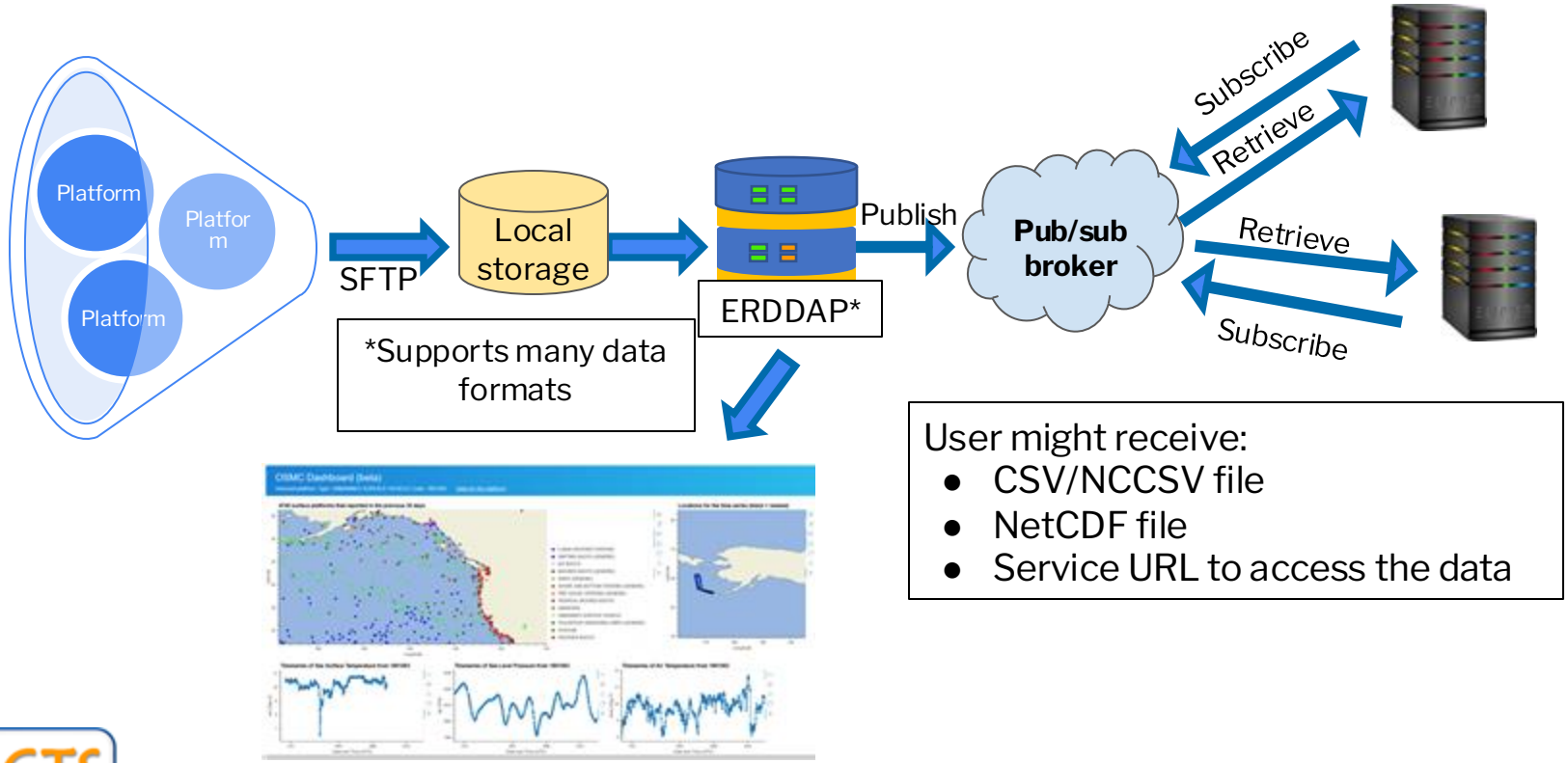
The Open-GTS currently uses the GTS for exchanging data in near real-time



However, the ERDDAP data/metadata endpoints are available to the public.

Open-GTS
Open Access to the GTS

Open-GTS, WMO and WIS 2.0



Open-GTS
Open Access to the GTS

Current Open-GTS contributions

USV data exchange

- Data from 80+ missions to the GTS
- Most recently 12 USVs involved in 2024 hurricane season

Science RoCS data exchange

- Science Research on Commercial Ships
- Data from Xaymaca going to GTS

Non-traditional ship data exchange

- Working with OceanSync to pilot exchange of weather data from commercial chips
- 1 vessel at this time
- Non-VOS ships only

Fishing Vessel Observing Network (FVON)

- New GOOS OCG emerging network
- Place data from 45 fishing vessels onto the GTS
- Temperature profile data from fishing tows and traps

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Thank You

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