WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

Open Access to GTS (Open-GTS)

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Project objectives

- Improve the manner in which data producers can provide their data to the GTS
- Improve the manner in which data users can access data from the GTS
- Support community data standards (FAIR) and federated services

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Project team

- Kevin O'Brien (UW/CICOES, NOAA/NDBC)
- Kevin Kern (NOAA/NDBC)
- Bill Smith (NOAA/NDBC)

- Micah Wengren (NOAA/IOOS)
- Open-GTS project supported by GOOS Observations Coordination Group (Formerly JCOMM OCG)

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Project plan

- Successful Pilot Implementation
- Develop Open-GTS Implementation plan
- Implement Open-GTS workflow for US IOOS Regional Association Data
- Implement Open-GTS for NOAA Saildrone Mission data
- Investigate, through pilot projects, use of Open-GTS for non-standard data producers (AIS met/ocean data from ships)
- Investigate ERDDAP services for NetCDF data exchange
- Provide access to GTS data through web services
- Develop additional Open-GTS nodes

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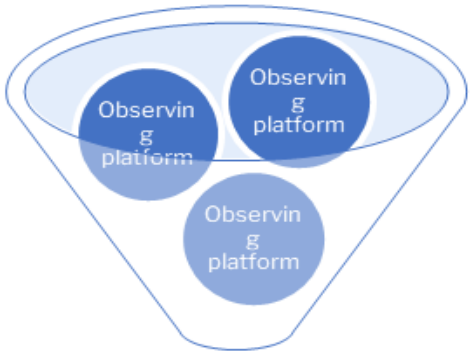
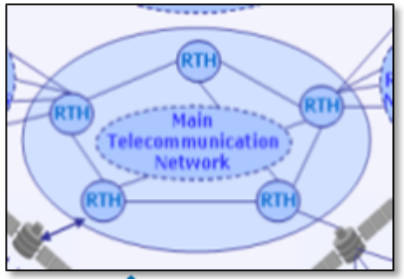
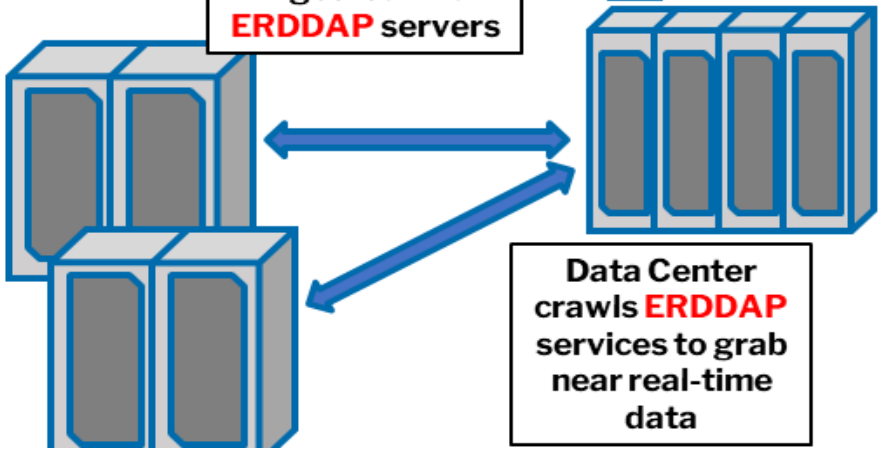
OCG Open Access to GTS workflow



Data harvested from observing platforms and ingested into ERDDAP servers



Data is encoded into BUFR and sent to GTS



Data Center crawls ERDDAP services to grab near real-time data

Data is harvested from GTS, decoded and ingested into ERDDAP services

Data is available through ERDDAP services to end users and their favorite applications

ERDDAP provides data services for accessing data with many popular clients, without the need for reformatting, including:

MATLAB®

Google Earth

Project Jupyter Notebooks

R statistical package

As well as many other open-source analysis and visualization packages and user-scripted machine-to-machine (M2M) services.

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WIS 2 Principles in the project

	WIS 2.0 Principle		
1	WIS 2.0: adopts Web technologies and leverages industry best practices and open standards		Apache, Tomcat, OpenDAP
2	WIS 2.0: uses Uniform Resource Locators (URL) to identify resources (i.e. Web pages, data, metadata, APIs).		RESTful API for: Data Access, Metadata harvesting, Image Creation, status checks, etc
3	WIS 2.0: prioritizes use of public telecommunications networks (i.e. the Internet) when publishing digital resources.		Uses internet to access digital resources

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WIS 2 Principles in the project

	WIS 2.0 Principle		
4	WIS 2.0: requires provision of Web service(s) to access or interact with digital resources (e.g. data, information, products) published using WIS.		ERDDAP RESTful API web services used for data and metadata harvesting
5	WIS 2.0: encourages NCs and DCPCs to provide 'data reduction' services via WIS that process 'big data' to create results or products that are small enough to be conveniently downloaded and used by those with minimal technical infrastructure.		ERDDAP access services support data decimation (average, binning, etc)
6	WIS 2.0: will add open standard messaging protocols that use the publish-subscribe message pattern to the list of data exchange mechanisms approved for use within WIS and GTS.		

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WIS 2 Principles in the project

	WIS 2.0 Principle		
7	WIS 2.0: will require all services that provide real-time distribution of messages (containing data or notifications about data availability) to cache/store the messages for a minimum of 24-hours, and allow users to request cached messages for download.		ERDDAP services will maintain access to the metadata/data requested through the unique RESTful URL. Provides subscription mechanisms (RSS, email) for notification of new data
8	WIS 2.0: will adopt direct data-exchange between provider and consumer.		Data URLs accessed for harvesting data are directly available to all users
9	WIS 2.0: will phase out use of routing tables and bulletin headers.		

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WIS 2 Principles in the project

	WIS 2.0 Principle		
10	WIS 2.0: will provide a catalogue containing metadata that describes both data and the service(s) provided to access that data.		ERDDAP metadata available in a variety of ways: ISO-19115 xml, schema.org markup, json-ld
11	WIS 2.0: encourages data providers to publish metadata describing their data and Web services in a way that can be indexed by commercial search engines.		ERDDAP metadata available in a variety of ways: ISO19115 xml, schema.org markup, json-ld and can already be harvested by commercial search engines.

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Project data/metadata standards

Standard/Convention	Used for
NetCDF*	Preferred Data format (can use many other types, however)
Climate and Forecast conventions	Metadata for NetCDF files
ISO 19115	Available through ERDDAP services
Schema.org	Available through ERDDAP services for discovery systems using JSON-LD content
*Note:	ERDDAP capabilities allow for great flexibility in terms of data input formats

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Data discovery

- ERDDAP supports JSON-LD for inclusion in the semantic web
- ERDDAP JSON-LD content uses schema.org terms and definitions
- Search engines (Google in particular) use the structured markup for discovery and indexing
- This happens by default for every ERDDAP dataset

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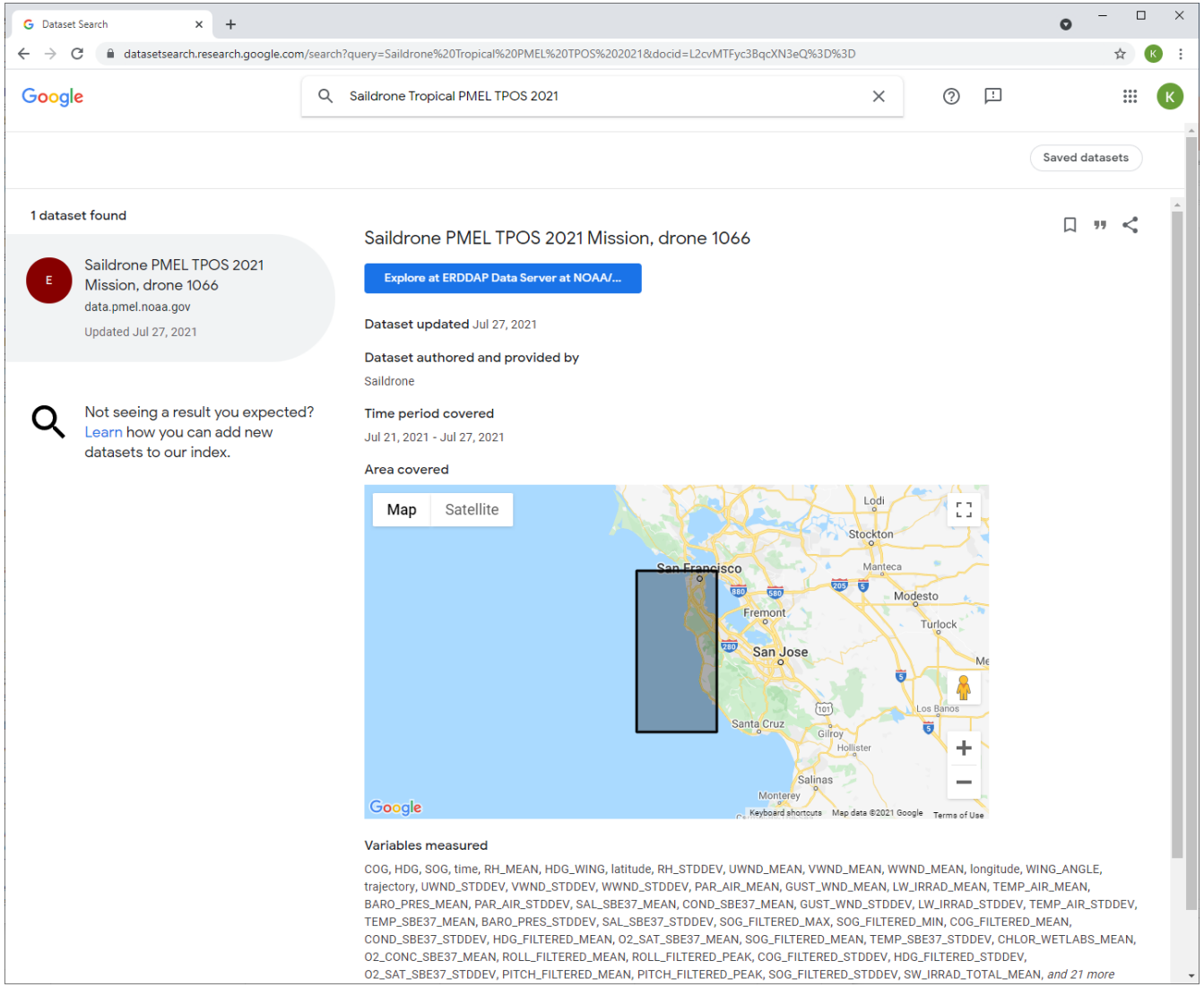
Data discovery

Google Dataset results for TPOS Saildrone 2021 search



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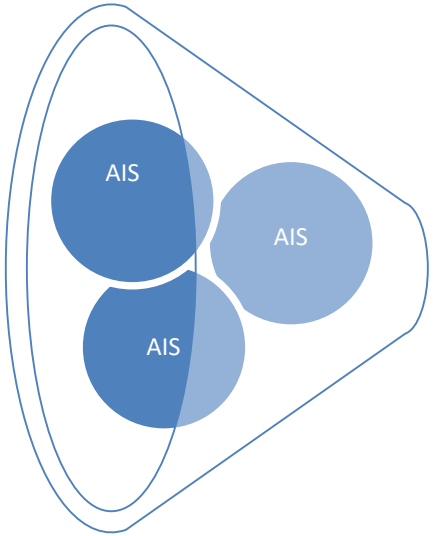
Data exchange

- 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.



SFTP

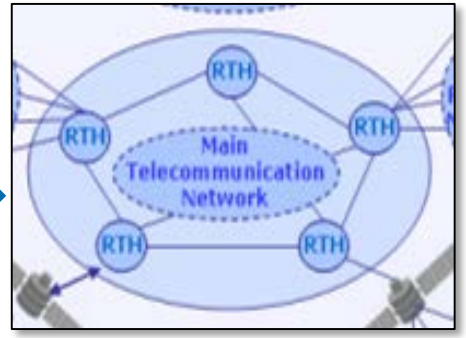
python

PMEL
ERDDAP

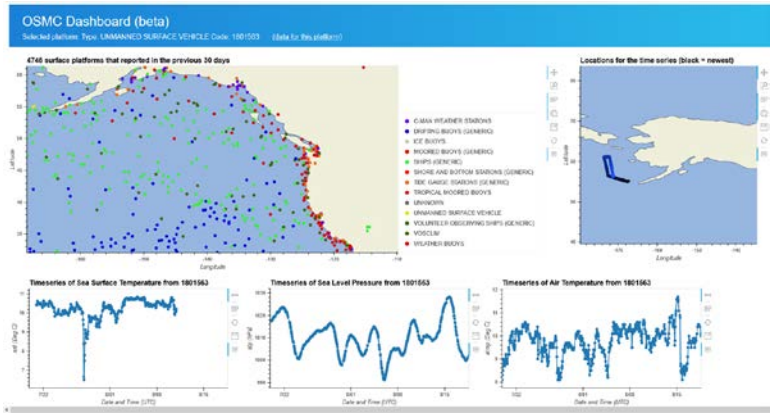
NDBC

Harvest and
encode

GTS



Data sent on GTS also
available through
ERDDAP services



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Input to WIS2

Contributions, suggestions, technical specifications, standards used in the project that should be adopted as standard or recommended practises in WIS2

- CF-NetCDF as meteorological and oceanographic near real-time data exchange format
- ERDDAP as a recommended federated web service for the exchange/harvesting of data and metadata in near real-time
- Relevant to the WIS 2.0 Data exchange of CF-NetCDF profiles

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Thank you
Merci

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