WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

WIS2 Publication Tools

Tom Kralidis

Senior Geospatial Architect
Meteorological Service of Canada
tom.kralidis@ec.gc.ca
@tomkralidis

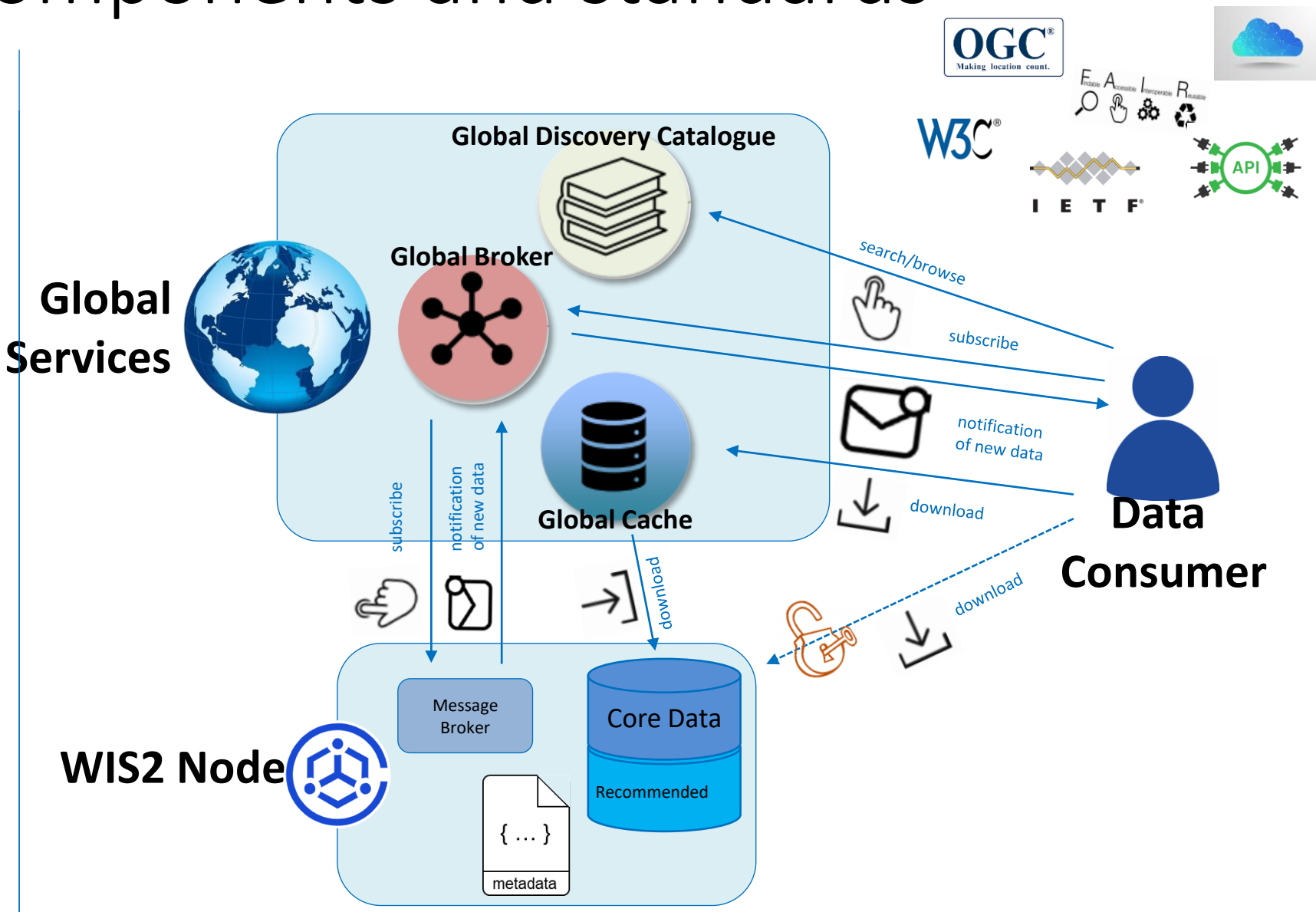
Chair, WMO Expert Team on Metadata Standards
WIS2 Architecture and Implementation
Lead, WIS2 in a box

WMO OMM
World Meteorological Organization
Organisation météorologique mondiale

2024-05-13

Recap: WIS2 components and standards

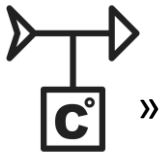
- **Global Discovery Catalogue**: provides a cataloguing and discovery capability of WMO dataset collections
- **Global Broker**: provides notifications of all data available in WIS2
- **Global Cache**: stores and provides a copy of *real-time* and *near-real-time* Core data from WIS2 nodes
- **Global Monitor**: captures information on data availability and whether that data can effectively be accessed by Data consumers
- **WIS2 Node**: provides data and metadata publication facility



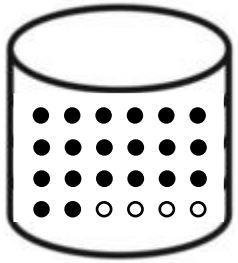
Publishing data

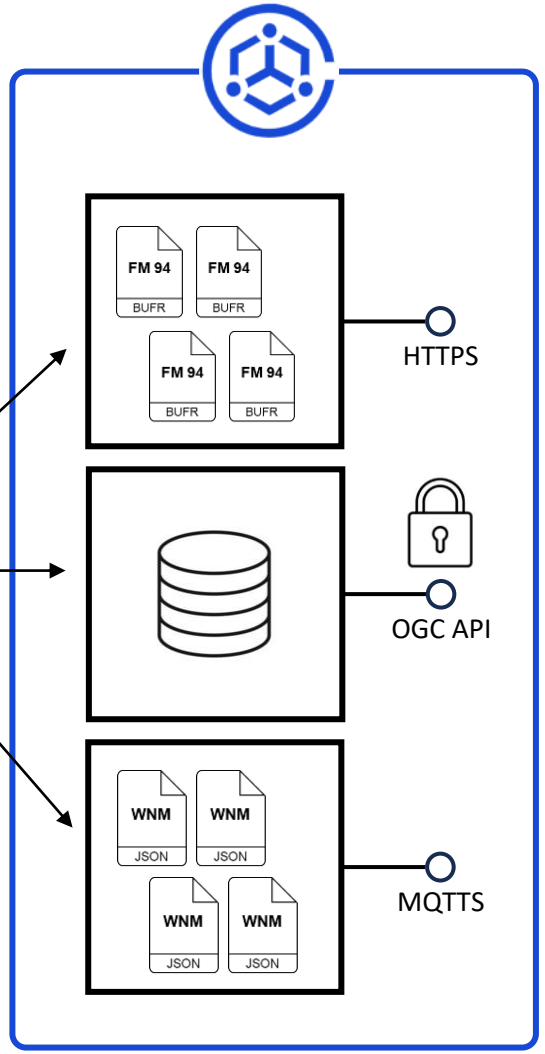
For WIS2 I see that my collection of real-time observation data is called a '**Dataset**'[1]

Following instructions in the WIS2 Guide[2], I establish a WIS2 Node to share my **Dataset**



» 00110001
00110000 »





nl-knmi-nmc

files in (BUFR, NetCDF, GeoJSON, XML, …)

interactive API

WIS2 Notification Messages

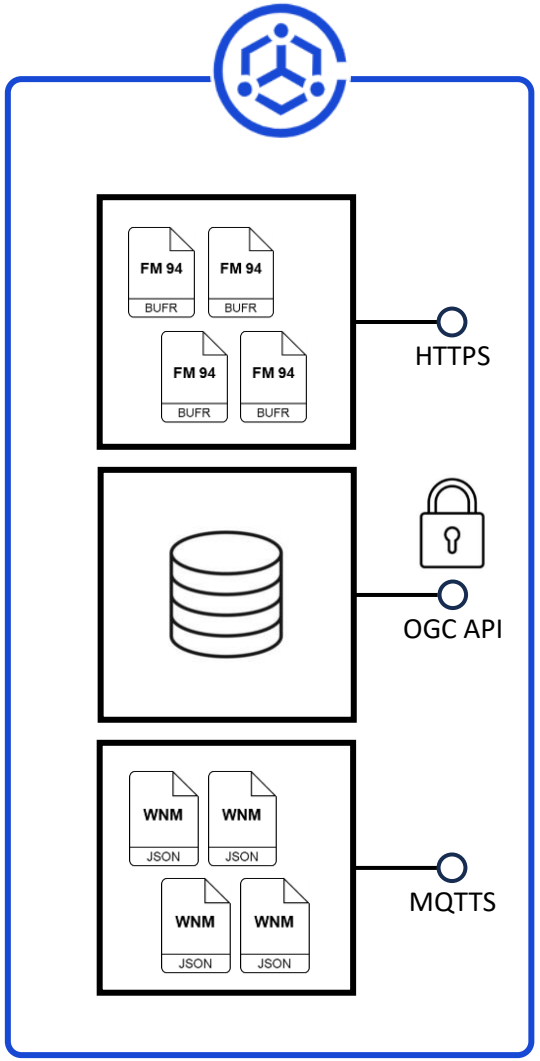
But I still don't know anything about your Dataset!

[1] Guide to WIS (WMO No. 1061), Vol II, §1.1.4 Why are datasets so important [draft]
[2] Guide to WIS (WMO No. 1061), Vol II, §1.3.1 How to get started [draft]

Publishing metadata

> Ahh, good point! The next section in the WIS2 Guide[3] says that I need to provide '**discovery metadata**'[4] about my Dataset

Description of the Dataset
Identifier
Title
Description
Keywords
Geometry (extent)
Time (extent)
Who to contact
Publisher contact
How to access
Data access (files)
Data access (API)
Data access (notifications)
Conditions of use
Data policy
Rights
License
How to attribute
Citation



> That's great. I can find the description of your Dataset …

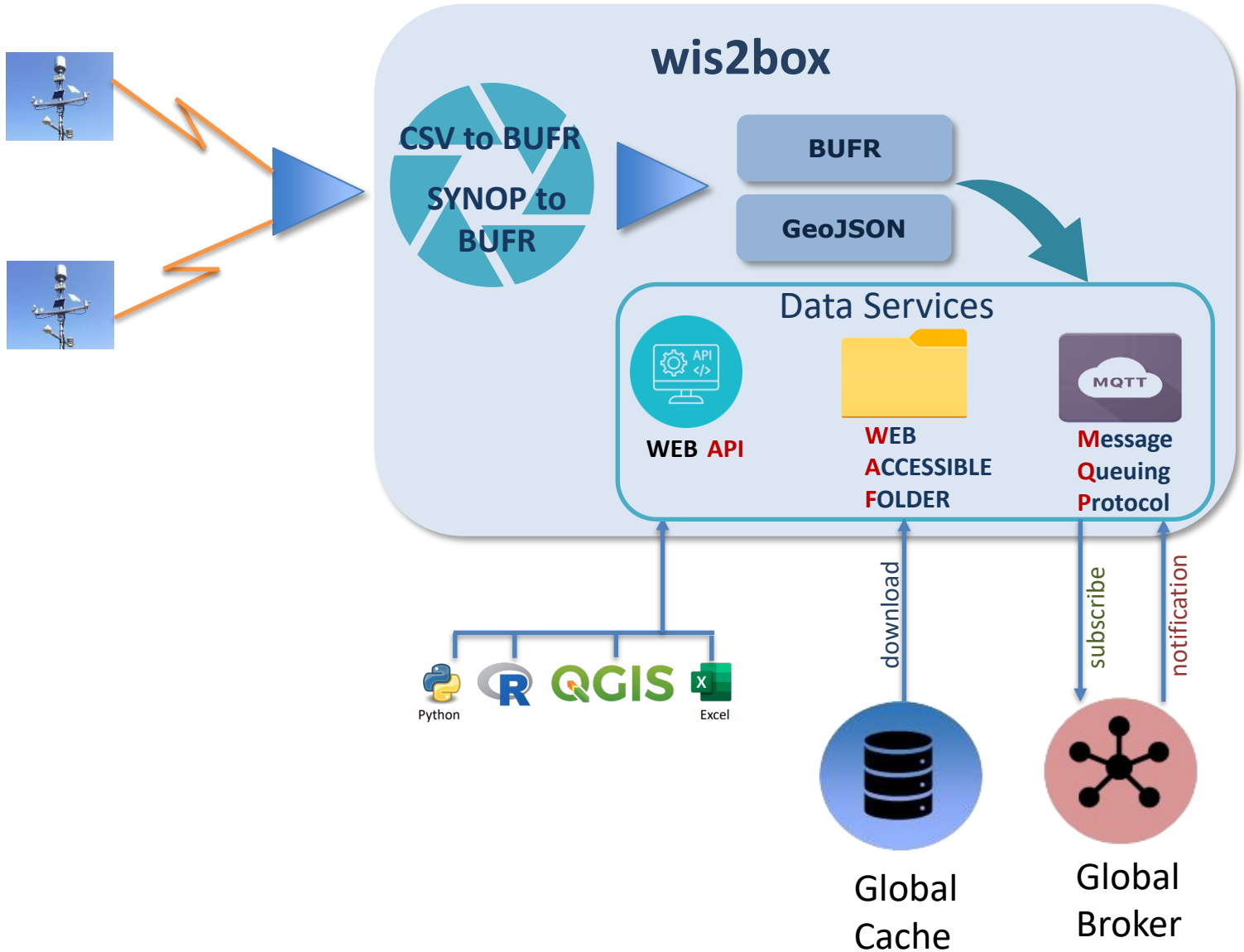
[3] Guide to WIS (WMO No. 1061), Vol II, §1.3.2 How to provide discovery metadata to WIS2 [draft]
[4] Manual on WIS (WMO No. 1060), Vol II, Appendix F: WMO Core Metadata Profile 2 [draft]

WIS2 publication tools: Options

- Publishing data to WIS 2.0 requires a **WIS2 Node**
- A **WIS2 Node** requires publication of data and metadata
  - Dataset Discovery Metadata (WCMP2)
  - Notifications (WIS2 Notification Message)
- A WIS2 Node requires the following technologies:
  - MQTT server
  - HTTP server

WIS2 in a box: enabling broad participation in WIS2

- **"WIS2 in a box" is a Reference Implementation of a WIS2 Node**
  - **MQTT**
  - **HTTP**
- **Software** (not hardware)
- **Publishing facility/capability** compliant to WIS 2.0 Architecture
  - Provides basic data transformation
  - Can **integrate** with existing data management systems
  - Adds API and user interface
  - Core and recommended data (access control)
  - Cloud or on-premises



WIS2 in a box features

Plug and play

- Free and Open Source Software (FOSS)
- Based on standards (OGC/W3C/IETF)
- Cloud technology
- Deploy
  1. Cloud service
  2. On premises

Data exchange

- Data conversion (CSV to BUFR, …)
- Simple to configure
- Publish – subscribe (Message Queuing Protocols)
- Upload / download

Use & Visualize

- National network data
- International data
- Satellite, NWP
- Based on standards (OGC/W3C/IETF)

Discover

- Find data from other Countries and areas
- Find forecast and analysis
- Find satellite data

Monitor

- Visualise the status of National stations
- Monitor the continuity of data transmission
- Provide data to central monitoring tools

WMO OMM

WIS2 in a box

GitHub repositories and documentation

- Code: github/wmo-im/wis2box
- Documentation: docs.wis2box.wis.wmo.int
- Demo: demo.wis2box.wis.wmo.int
- Training: training.wis2box.wis.wmo.int

Apache license version 2.0

Permissions

- Commercial use
- Distribution
- Modification
- Patent use
- Private use

Conditions

- License and copyright notice
- State any changes

Limitations

- Liability
- Trademark use
- Warranty

WMO OMM

WIS2 in a box is a reference implementation of a WMO WIS2 Node. The following wis2box deployments are currently sharing data on the WIS2 network:

Algeria	Australia	Argentina	Brazil	Belize	Burkino Faso
Caribbean Meteorological Organization	Cameroon	Chile	China	Cuba	Eswatini
Guinea	India	Indonesia	Iran	Japan	Kazakhstan
Kenya	Libya	Malaysia	Morocco	Namibia	New Zealand
Poland	Republic of Congo	Republic of Korea	Russian Federation	South Africa	Trinidad and Tobago
United States of America	Uruguay	Zambia	Zimbabwe		

open source

Integrating data and metadata publishing pipelines

- Data
  - Generate/transform data (to BUFR, NetCDF, etc.)
  - Publish data to a web server (HTTP)
  - Publish notification message of data (MQTT)
- Metadata
  - Create WIS2 discovery metadata (WCMP2)
  - Publish notification message of metadata (MQTT)

WMO OMM

Standalone tooling

- Components of wis2box modular architecture
- Can be used standalone
- Flexible, can work with files or streams, tighter integration
- Data
  - BUFR tools (csv2bufr, synop2bufr, ecCodes)
- Metadata
  - pygeometa (geopython.github.io/pygeometa)
- Publishing
  - pywis-pubsub (github.com/wmo-im/pywis-pubsub)

WMO OMM

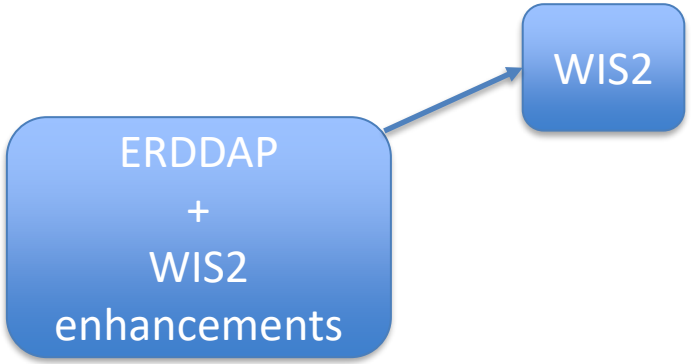
Putting it all together: examples

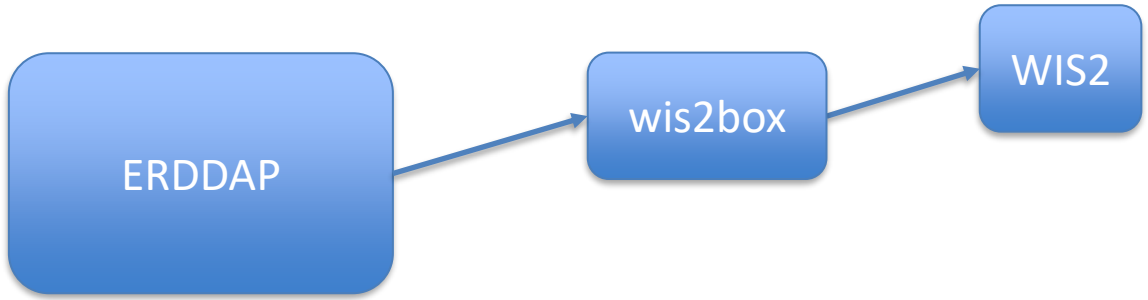
- MSC wis2node: github.com/ECCC-MSC/msc-wis2node
  - BUFR data and WIS2 metadata created externally
  - Data / metadata publisher
  - Uses pywis-pubsub and pygeometa and minimal Python to chain together publication workflows
- wis2node-metadata-mgmt: github.com/wmo-cop/wis2node-metadata-mgmt
  - Metadata management and creation/publication
  - Uses GitHub Pages to for HTTP/storage

WMO OMM

ERDDAP / WIS2 Considerations

- Extending ERDDAP with WIS2 support
  - MQTT broker/service
- Publishing ERDDAP via wis2box bridge
  - Data pipeline

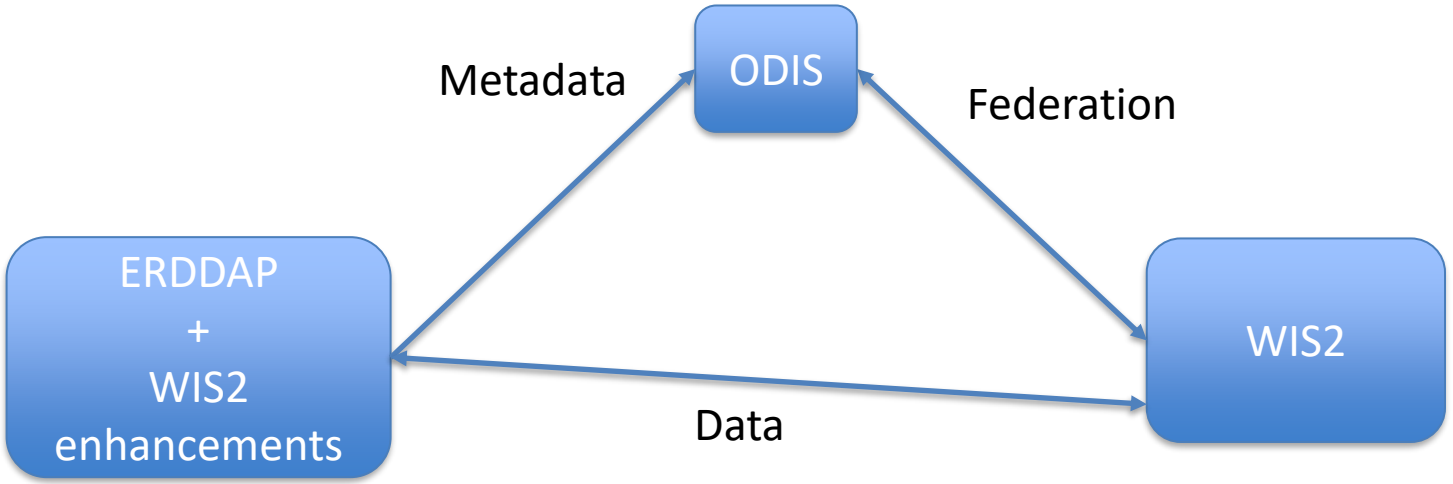




WMO OMM

ERDDAP / ODIS / WIS2 Considerations

- Extending ERDDAP with WIS2 support
  - MQTT broker/service
- wis2box Component reuse



WMO OMM

Thank you
Merci
Gracias
شكرا
谢谢

WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

WMO OMM

World Meteorological Organization
Organisation météorologique mondiale

Team:

- David Berry (WMO)
- Rory Burke (WMO)
- Enrico Fucile (WMO)
- Hassan Haddouch (WMO)
- Tom Kralidis (MSC)
- Maaike Limper (WMO)
- Antje Schremmer (DWD)
- James Sinkins (Synoptic Data PBC)