Region VI Capacity Building 29 January 2024 (online) WHOS – WIS interoperability

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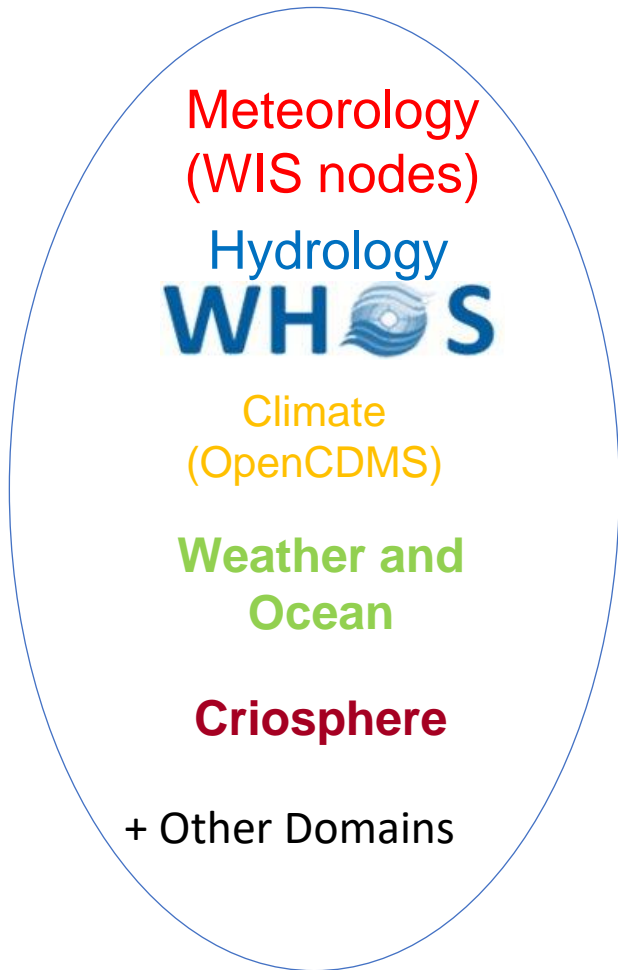
Washington Otieno – WMO Secretariat

WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

WMO OMM
World Meteorological Organization
Organisation météorologique mondiale

WHOS connection to WMO Information System (WIS)

Meteorology (WIS nodes)

Hydrology

Climate (OpenCDMS)

Weather and Ocean

Criosphere

+ Other Domains

WIS 2.0

Framework enabling unified data sharing from meteo and different domains

Key features
- Internet and Web technologies
- Open Standards based (OGC, W3C, IETF, …)
- Data sharing through Web and pub/sub protocols (i.e., new data notifications)
- Successor of GTS, will replace it by 2030

WIS2 nodes and Global Services

WIS2 node is the component to provide data and associated metadata

WIS2 node replaces the GTS Message Switching System

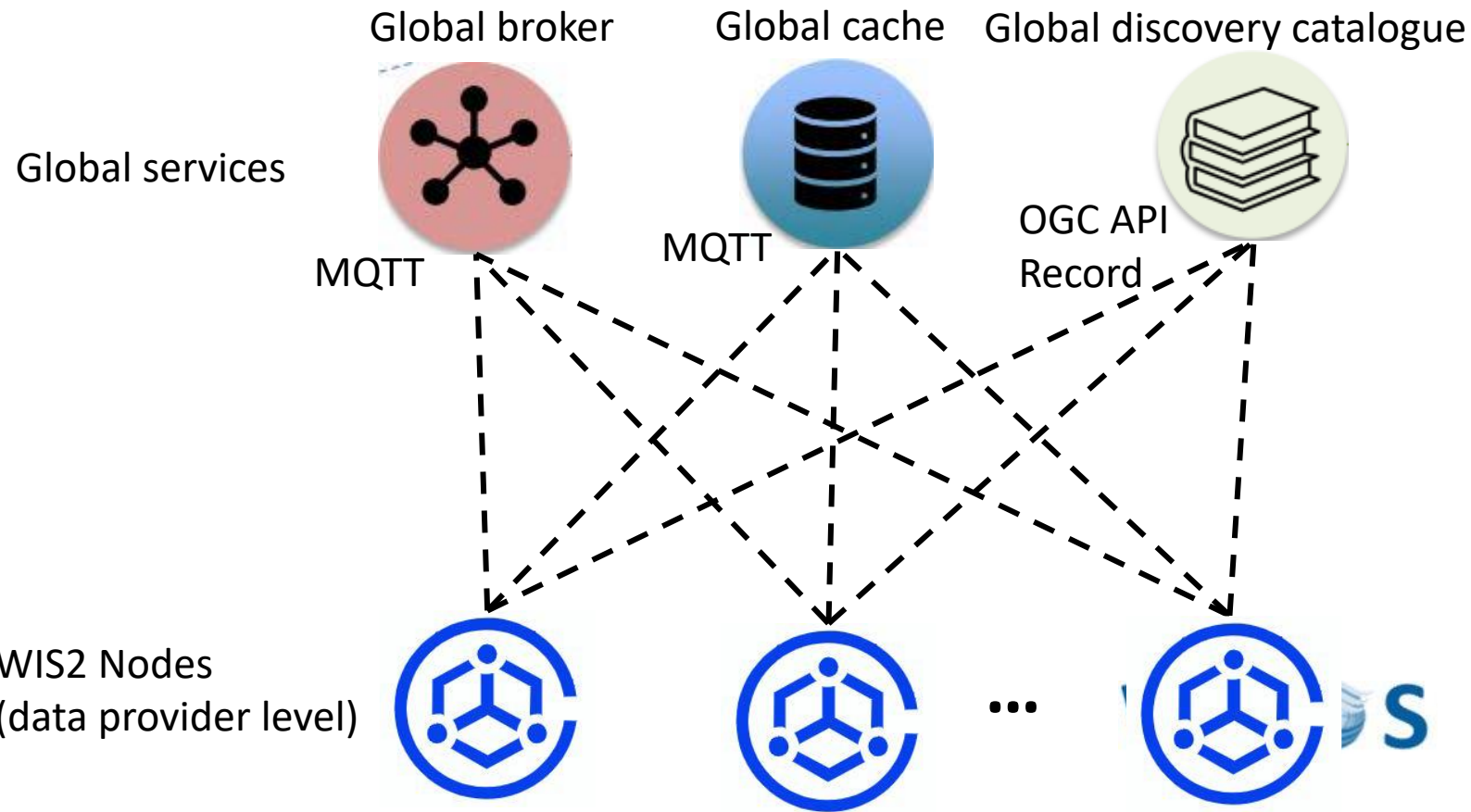NCs / DCPCs are going to implement a WIS2 Node to exchange data in WIS2

The WIS2 Node shares data from an HTTPS service and sends notifications to MQTT subscribers

No need to provide access to all the users in the world, only to some WIS2 Global Services

Global Services

Subscribes to

Downloads data

Receives notifications of new data

WIS2 node

WMO OMM

WMO Information System (WIS) 2.0

Global broker

Global cache

Global discovery catalogue

Global services

MQTT

MQTT

OGC API
Record

Federated top-down distributed system of systems using Web-architecture and open standards to provide simple, timely and seamless sharing of trusted data and information

WIS2 Nodes
(data provider level)

...

Federated architecture:
Each node implements the same interface

References for this introduction:

https://community.wmo.int/en/meetings/1st-coordination-meeting-of-wis2-pilot-phase

WIS2 in a box demo

WIS2 in a box is a reference implementation of a WMO WIS2 Node. The following wis2box deployments are currently available and sharing data on the WIS2 network as part of the WIS2 pilot phase:

Algeria
Australia
Argentina
Africa (Regional)
Belize
Caribbean Meteorological Organization (Regional)
China
Cuba
Eswatini
India
Indonesia
Japan
Kazakhstan
Kenya
Libya
Malawi
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

Tiles © Esri — Source: Esri

A WIS2 in a box for hydrology is under design …

https://demo.wis2box.wis.wmo.int/

WIS 2 as a WHOS data consumer

WIS 2 Client

A new **profiler component** is added to the WHOS DAB, in order to enable data flow from the WHOS WIS 2 node to WIS.

WHOS appears in this case as if it was a WIS 2 node, publishing its OGC API
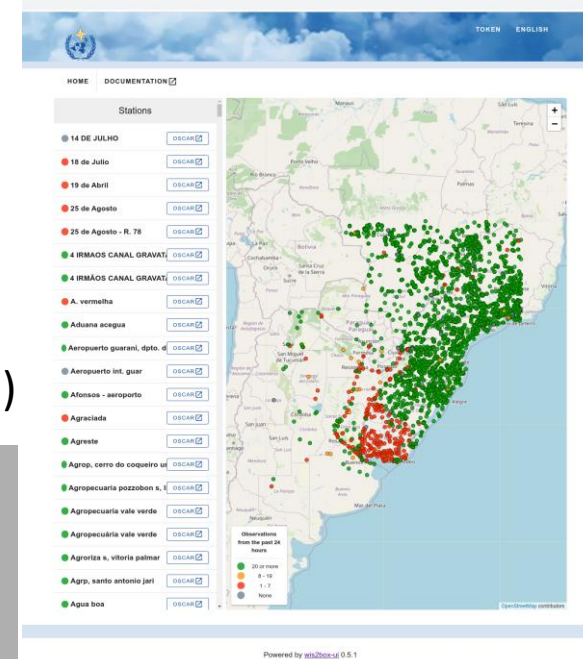
WHOS data providers

https://whos.geodab.eu/gs-service/wis2box-ui/
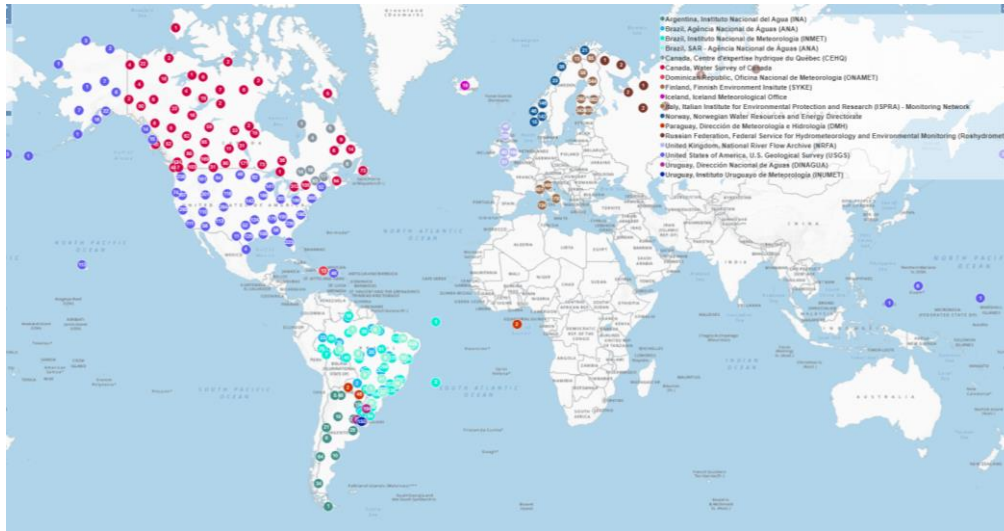
wis2box-ui

OGC API

MQTT
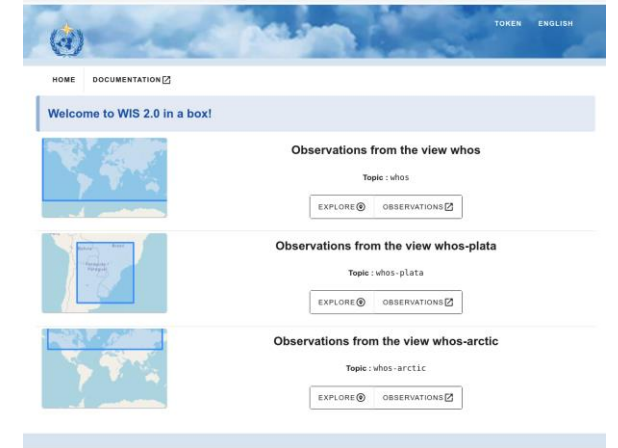
WIS Global messaging broker

Other WIS tools (to be tested soon...)

OGC API / MQTT / ...

WIS 2 as a WHOS data provider

OGC API

WIS 2 Node

A new **accessor component** is added to the WHOS DAB, in order to enable data flow from WIS 2 nodes to WHOS

WHOS in this case makes use of the OGC API published by WIS 2 nodes

WIS2-in-a-box is a reference implementation of a WMO WIS 2.0 node. The following WIS2boxes are currently available for demonstration purposes:

Tiles © Esri — Source: Esri

WIS 2 nodes demo instances

https://testwde.hydro.geodab.eu/apps/water-data-explorer-whos/

Water Data Explorer
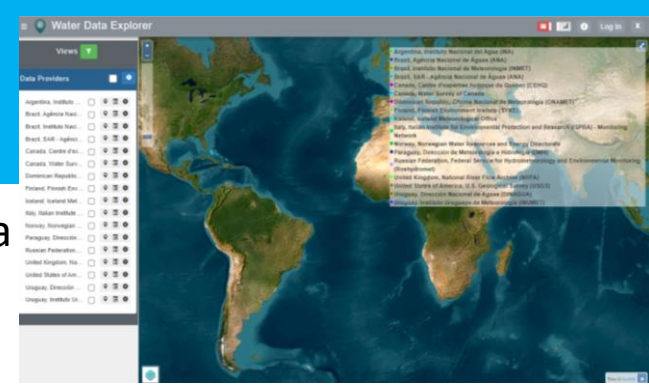
WOF

OpenSearch / OGC CSW

…

GI-portal

WIS 2 Node

WIS 2 Client

USGS GWIS
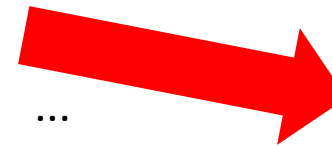
HydroDesktop
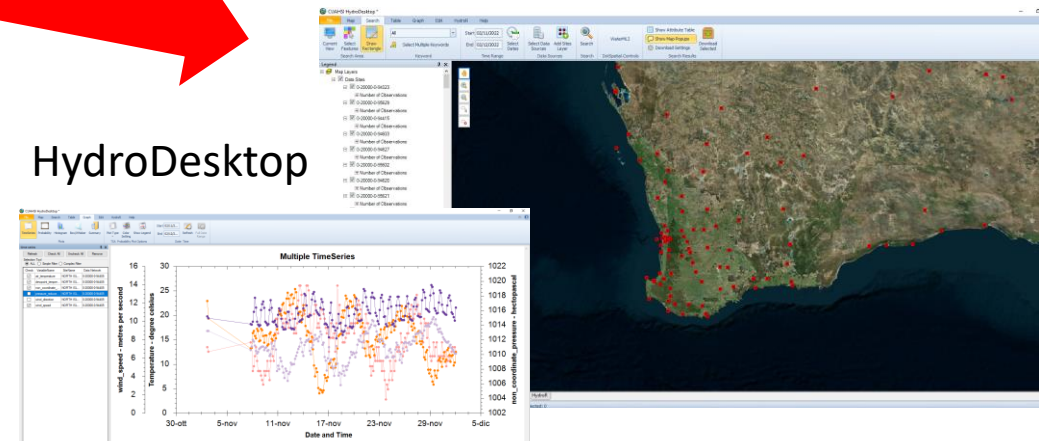
OAPI record profiler & accessor

DAB configuration of OAPI Record profiler for WIS2.0 for the test countries

WHOS OAPI service enables compliant clients such as WIS 2 box **ui** to discover and access WHOS data
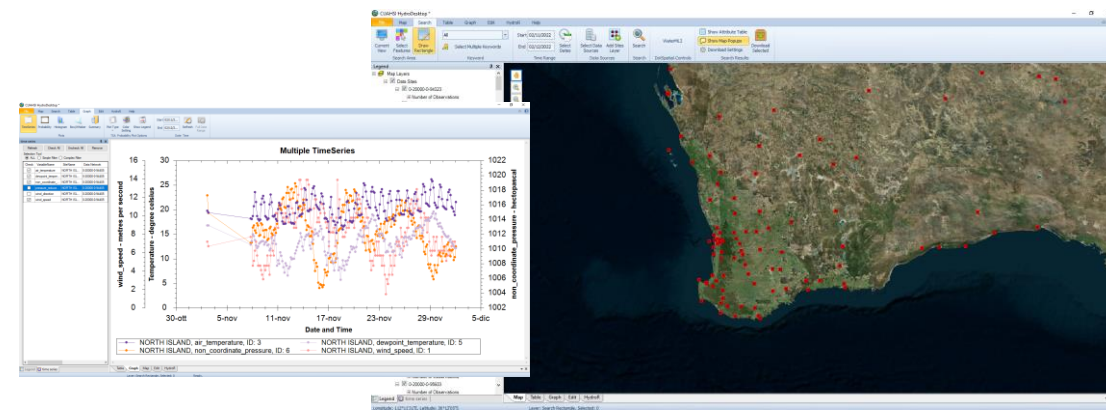
https://whos.geodab.eu/gs-service/wis2box-ui/

OAPI record profiler & accessor

DAB configuration of OAPI Record accessor for WIS2.0 for the test countries
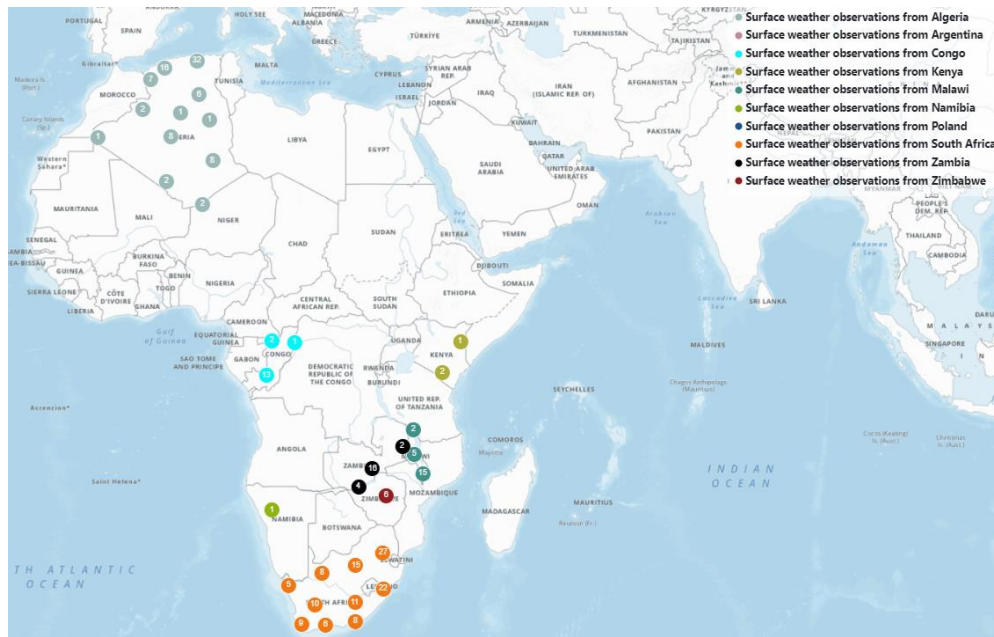
WHOS OAPI accessor enables WHOS clients such as WDE, GI-portal, HydroDesktop to discover and access WIS2 data

https://testwde.hydro.geodab.eu/apps/water-data-explorer-whos/

Discovery metadata (WCMP2)

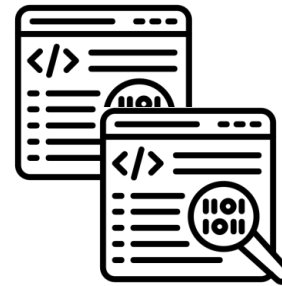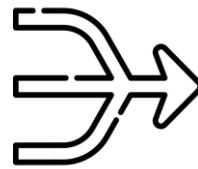WHOS broker produces WCMP 2.0 records from data provider records through **mapping** and **aggregation**

TT-W2FH document describing the target metadata model:
WCMP for Hydrology

Mapping

Data provider metadata records (different standards)

WCMP core elements
- Id
- Title
- Description
- ...

WCMP 2.0 discovery metadata records

Validation ongoing using pywcmp

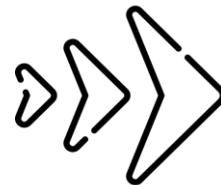**Possible additional elements**:
- Interpolation type (from WaterML)
- Aggregation period in ISO8601 (e.g. P1D, PT1H)
- Intended observing spacing in ISO8601
- Reporting frequency
- Quality control
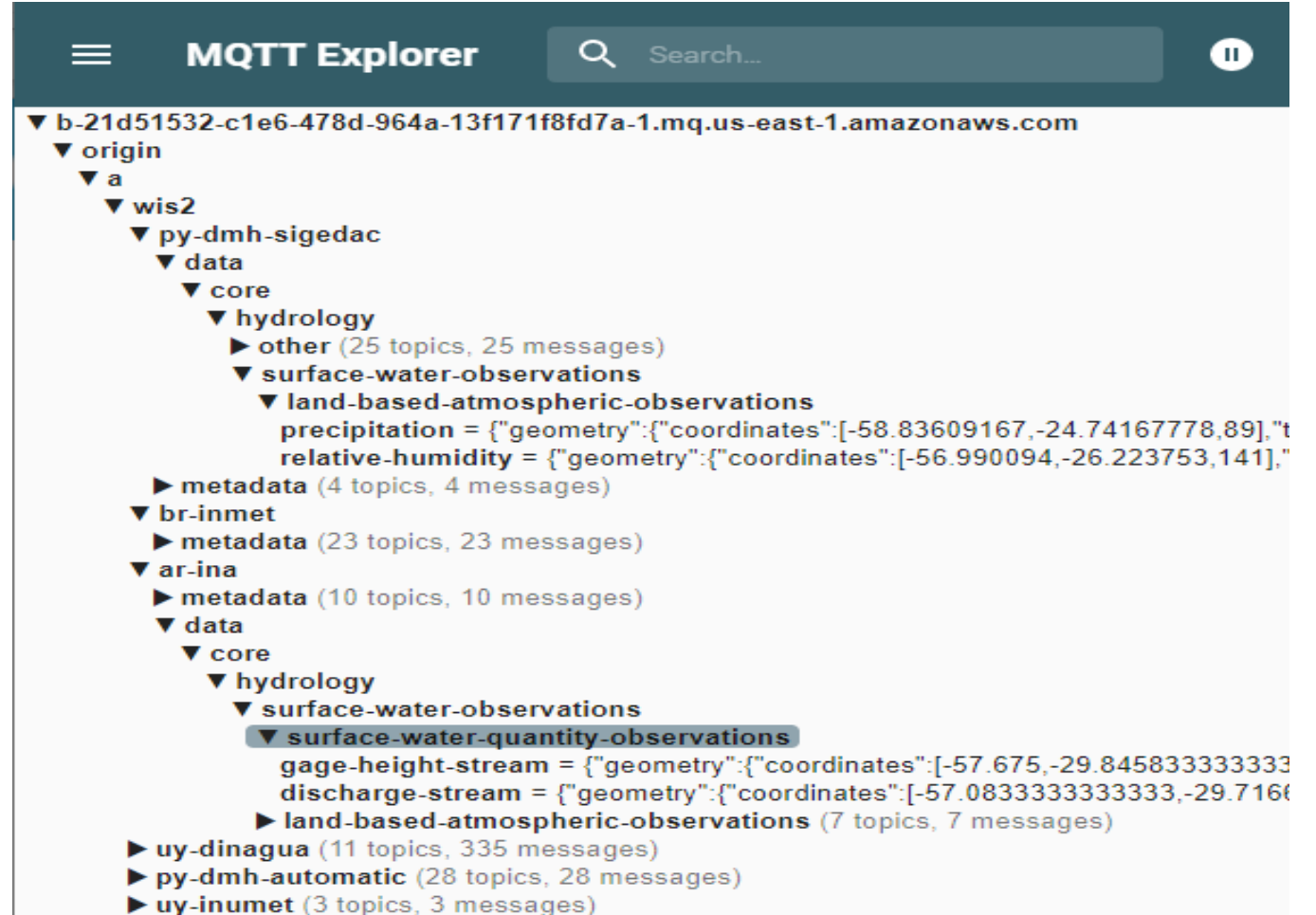- Coordinate system
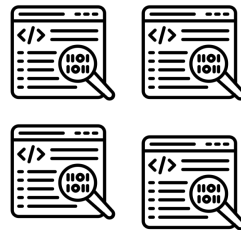
Aggregation

Time series level records

Data provider level records

Different aggregation levels:
- Level 7 (Data provider level)
- Level 8
- Level 9
- Level 10
- Level 11

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WHOS MQTT broker

- MQTT message broker ready (AWS cloud, Apache ActiveMQ technology);
- end point available for testing

Endpoint: b-21d51532-c1e6-478d-964a-13f171f8fd7a-1.mq.us-east-1.amazonaws.com
User: whos-wis-test
Pwd: skrhci83629#

Test MQTT client connecting to WHOS MQTT broker

Topic hierarchy for hydrology

- **Definition combining:**
  - **Bottom up** approach (starting from hydro ontology and WMDR regsitry) and
  - **Top down** approach (starting from a general hierarchy that is useful for data discovery)

Level #	Level name	Example
7	Earth-system-discipline	Hydrology
8	Earth-system-discipline-subcategory	Surface water observations
9	Sub-sub-category	Surface water quantity observations
10	Water Body	Stream
11	Parameter	level-stream http://hydro.geodab.eu/hydro-ontology/concept/11 (concept 11 from Hydro ontology) https://codes.wmo.int/wmdr/ObservedVariableTerrestrial/172 (concept 172 from WMO WMDR registry)

Example: "origin/a/wis2/ke-wra/data /core/hydrology/surface-observations/surface-water-quantity-observations/stream/level

TT-W2FH document describing the topic hierarchy for hydrology
Topic hierarchy for Hydrology

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Thank You
Merci

VISIT WHOS Site: **Link to WHOS Site**

Contact Us: **whos@wmo.int**