WIS2 Data Download Hands-on

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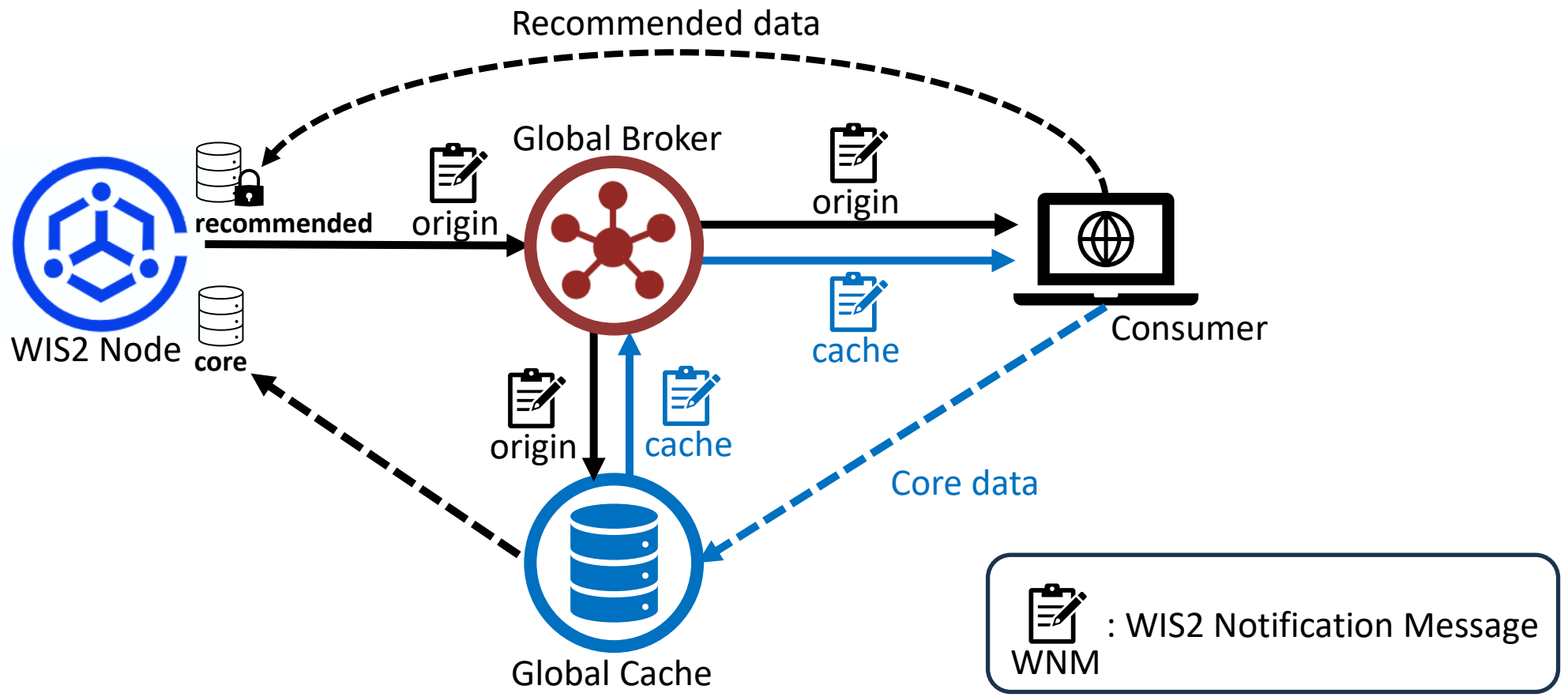
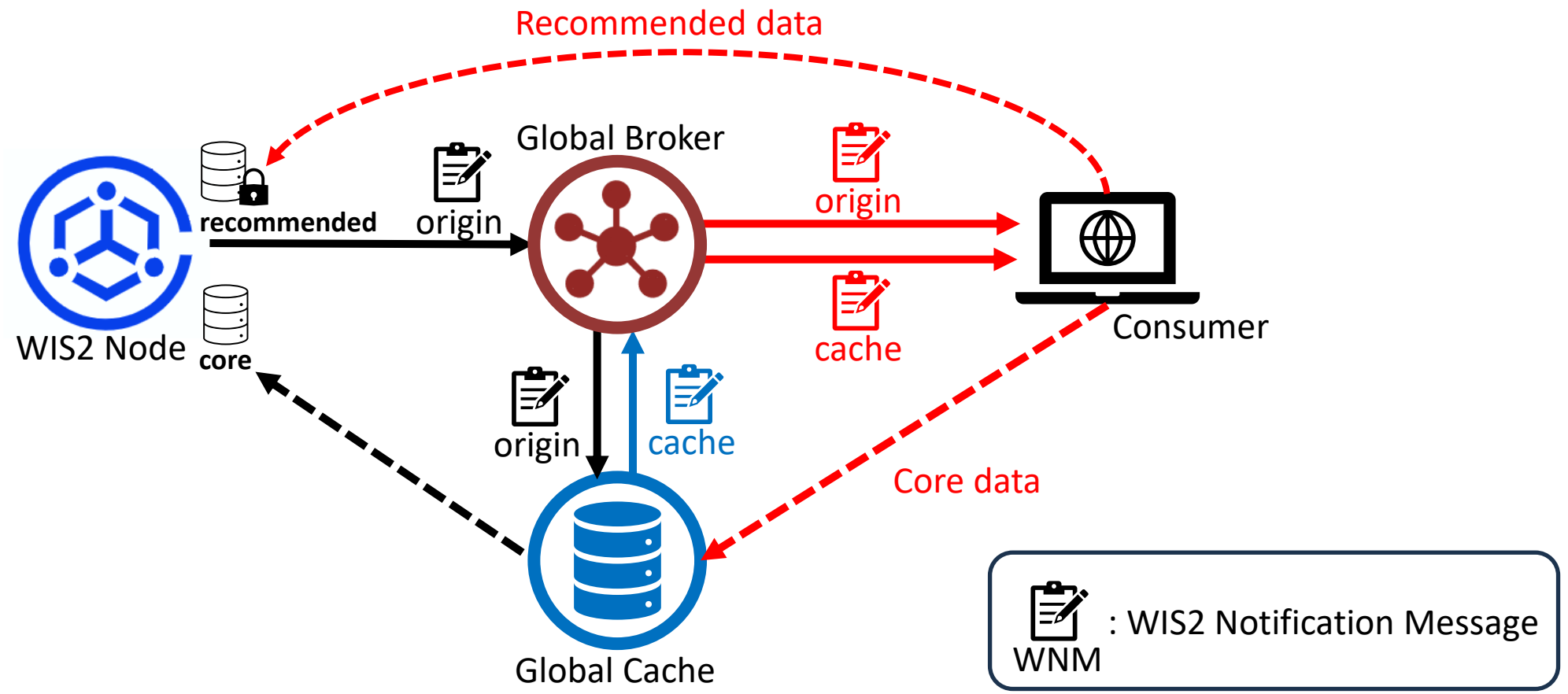
WIS2 Data Flow

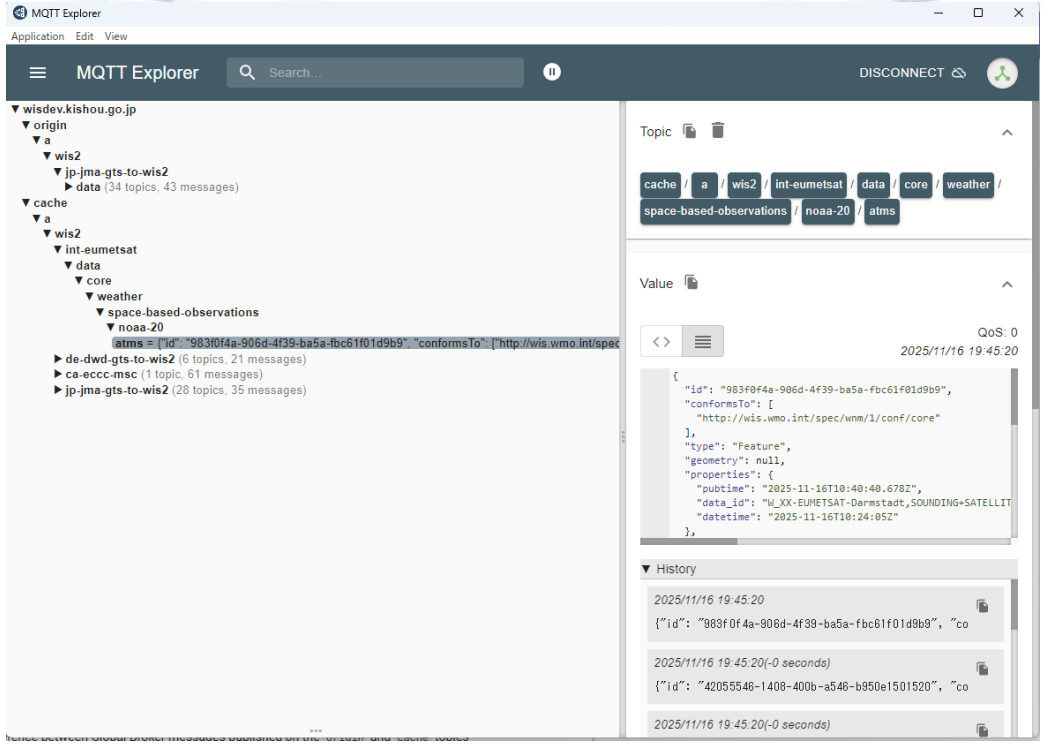


WIS2 Data Flow

This exercise will focus on the parts highlighted in red.



Hands-on: WIS2 Data Download



MQTT Explorer is a user-friendly desktop application that lets you connect to an MQTT broker and monitor all the messages being sent and received.

Step1. Configure MQTT Explorer
Step2. Check **WNM**s (origin/cache)
Step3. Download the **core** data
Step4. Check the **recommended** data

MQTT Explorer is already installed on your laptop.

Revisit: WIS2 Topic Hierarchy (WTH)

- The WTH is composed of primary topics (levels 1-7) and sub-discipline specific topics (levels 8 and beyond).
- The representation is encoded as a simple text string of values in each topic level, separated by a slash (/).

Table 2. WTH primary topic levels

Level	Name	Description
1	channel	Location at which the data originates (data providers are `origin` and Global Services are `cache`)
2	version	Alphabetical version of the topic hierarchy, currently: `a`
3	system	Fixed value of `wis2` for WIS2
4	centre-id	Acronym proposed by Member and endorsed by WMO Secretariat
5	notification-type	WIS2 notification types (`data` or `metadata`)
6	data-policy	Data policy as defined by the WMO Unified Data Policy (Resolution 1 (Cg-Ext(2021)))[13] (`core` or `recommended`)
7	earth-system-discipline	Seven high-level categories as defined by the WMO Unified Data Policy (Resolution 1 (Cg-Ext(2021))) - Annex 1 (`atmospheric-composition`, `climate`, `cryosphere`, `hydrology`, `ocean`, `space-weather` or `weather`)

Notation	Name	Description
advisories-warnings	advisories-warnings	Advisories and warnings
aviation	aviation	Aviation
experimental	experimental	Experimental topics
prediction	prediction	Data sets produced by quantitative algorithms, such as numeri...
space-based-observations	space-based-observations	Space based observations
surface-based-observations	surface-based-observations	Surface based observations

Notation	Name	Description
fixed-marine-platforms	fixed-marine-platforms	Weather observations from fixed marine platforms, e.g. rigs a...
ship	ship	Ship based weather observations
synop	synop	Surface observations
temp	temp	Upper air observations
temp-ship	temp-ship	Radiosonde measurements from ships
temperature-profile-radar	temperature-profile-radar	Radar based temperature profile measurements, e.g. RASS
wind-profile	wind-profile	Wind profile measurements using PILOT balloons
wind-profile-radar	wind-profile-radar	Radar based wind profile measurements
wind-profile-ship	wind-profile-ship	Wind profile measurements using PILOT balloons from ships

Example:
origin/a/wis2/jp-jma/data/core/weather/surface-based-observations/synop

https://wmo-im.github.io/wis2-topic-hierarchy/standard/wis2-topic-hierarchy-STABLE.html
https://codes.wmo.int/wis/topic-hierarchy

Revisit: WIS2 Notification Message (WNM)

A **WNM** provides notification metadata about data or metadata published to WIS2, including when the data was published, its spatial and temporal characteristics, and **where to access and download**.

Table 2. WNM core properties

Property	Requirement	Description
`id`	**Required**	A universally unique identifier (UUID) of the message (see 1.4 Identifier)
`type`	**Required**	A fixed value denoting the record as a GeoJSON `Feature` (see 1.3 GeoJSON compliance)
`conformsTo`	**Required** (one of `conformsTo` or `version`)	The version of WNM associated that the record conforms to (see 1.5 Conformance).
`version`	**Required** (one of `conformsTo` or `version`)	**DEPRECATED** Please use `conformsTo` (see 1.5 Conformance)
`geometry`	**Required**	Geospatial location associated with the data or metadata (see 1.7 Geometry)
`properties.pubtime`	**Required**	The date and time when the notification was published, in RFC3339 format, Coordinated Universal Time (UTC) (see 1.8 Properties / Publication time)
`properties.data_id`	**Required**	Unique identifier of the data as defined by the data producer (see 1.9 Properties / Data identification)

`links`	**Required**	Online linkages for data retrieval or additional resources associated with the dataset (see 1.16 Links)

Example: Canonical link

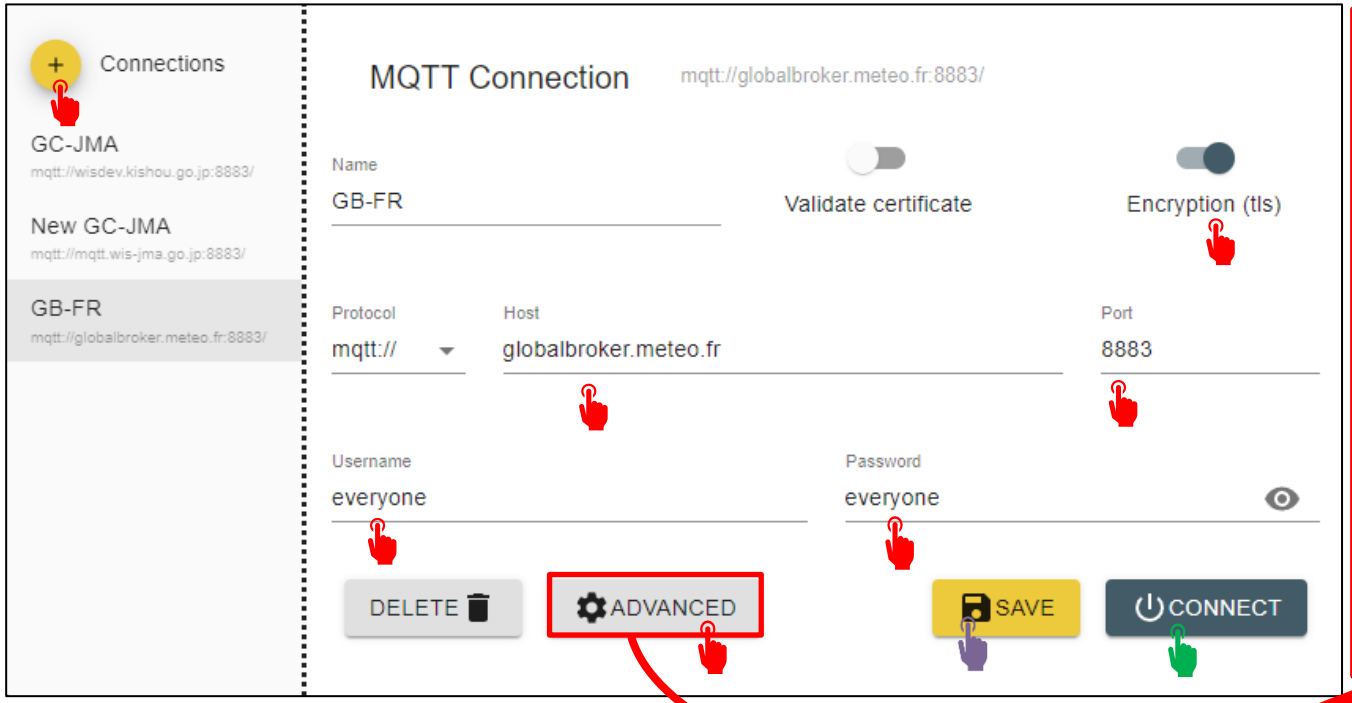
```
"links": [{
  "href": "https://example.org/data/4Pubsub/92c557ef-d28e-4713-91af-2e2e7be6f8ab.bufr4",
  "rel": "canonical",
  "type": "application/bufr"
}]
```

WMO WIS2 Notification Message Encoding

https://wmo-im.github.io/wis2-notification-message/standard/wis2-notification-message-DRAFT.html

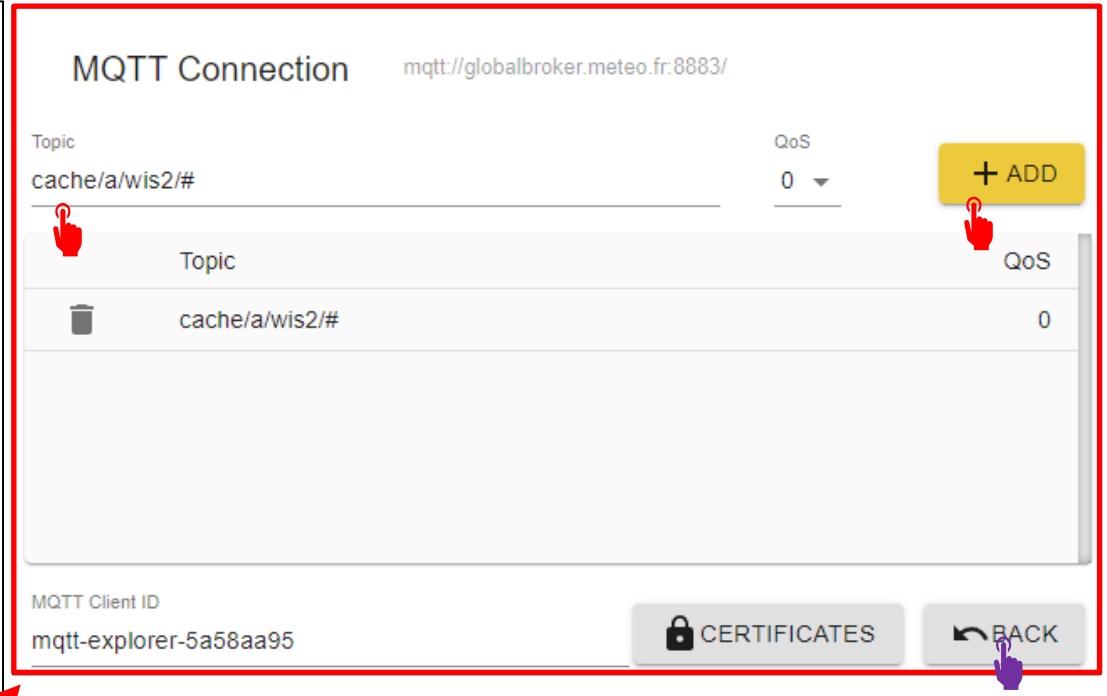
Step1. Configure MQTT Explorer

1. Configure the Global Broker



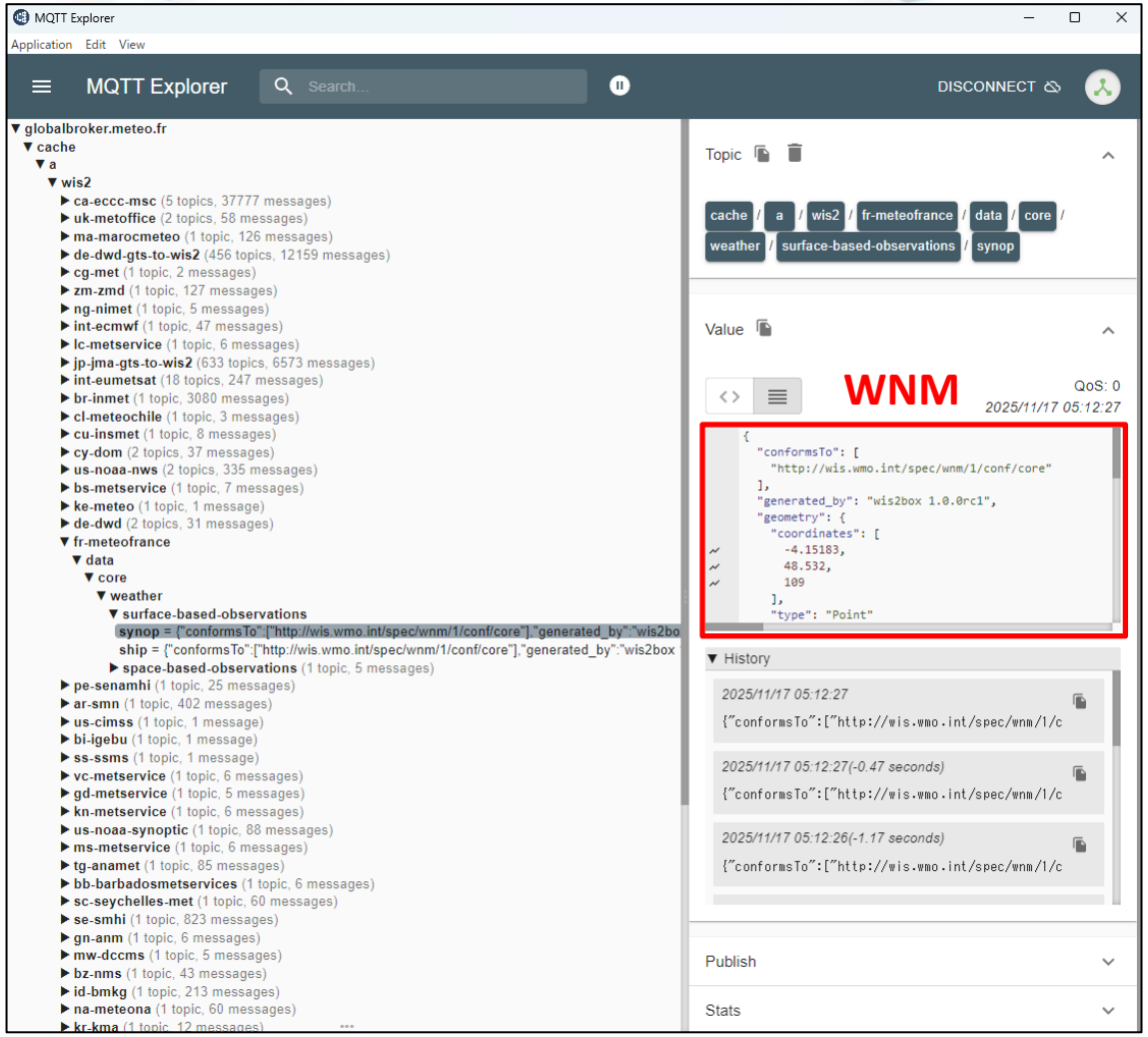
Connect to the Global Broker of France
mqtts://everyone:everyone@globalbroker.meteo.fr:8883

2. Set the desired MQTT topic for subscription



Example:
cache/a/wis2/#
origin/a/wis2/#
cache/a/wis2/+/data/core/weather/surface-based-observations/synop

Step2. Check WNMs (origin/cache)

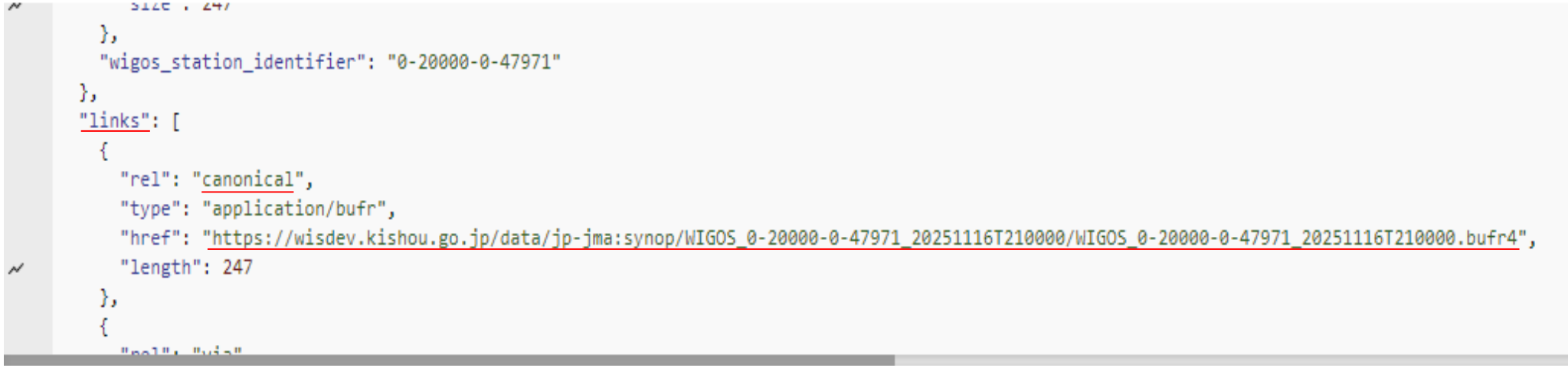


1. Check **WNM**s on the MQTT Explorer
   e.g.
   “id”, “geometry”, “data-id”, “datetime”
   “pubtime”, “links”, etc.

2. Subscribe to an additional topic
   e.g.
   origin/a/wis2/#
   cache/a/wis2/+/…

Step3. Download the core data

1. Find “rel”: “canonical” in “links” in the **WNM**
2. HTTPS access to the link
3. Check the downloaded data

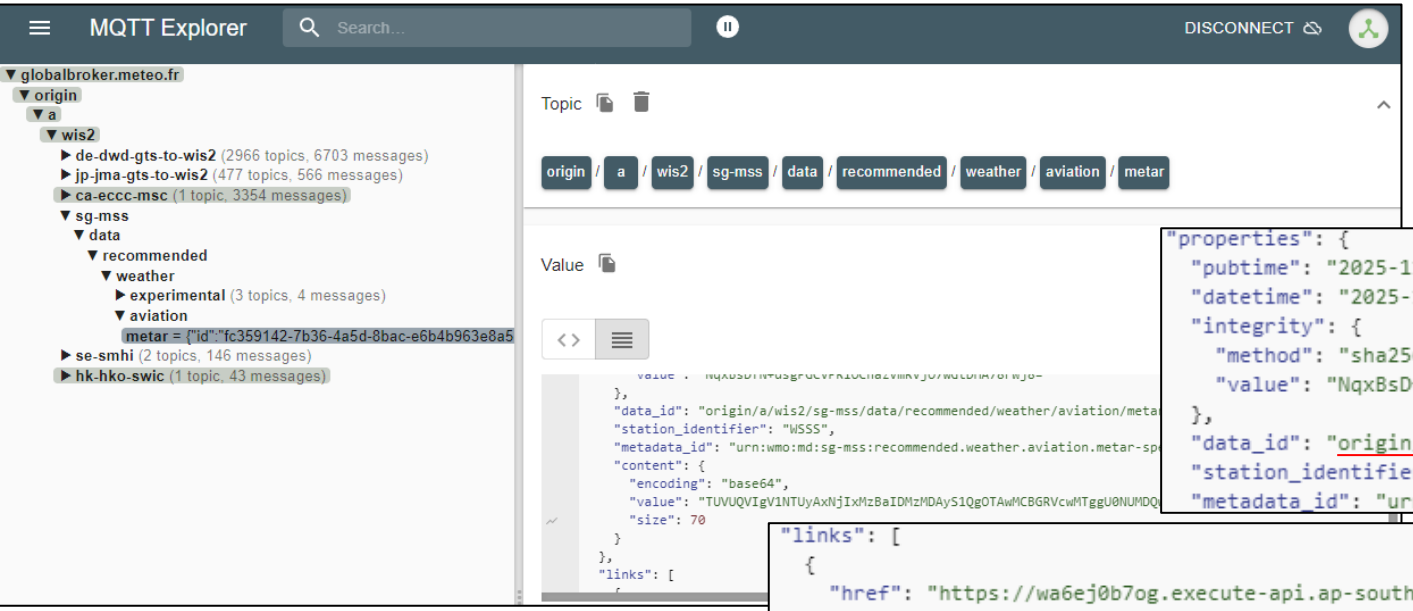


e.g.
Decode BUFR data using BUFR Validator by ECMWF
https://codes.ecmwf.int/bufr/validator

Step4. Check the **recommended** data

Since recommended data is not stored in Global Cache, it must be subscribed from the origin and retrieved directly from each WIS2 node.

e.g. Subscribe to “origin/a/wis2/+/data/recommended/#”




```
"properties": {
  "pubtime": "2025-11-16T21:40:12Z",
  "datetime": "2025-11-16T21:30:00Z",
  "integrity": {
    "method": "sha256",
    "value": "NqxBsDfN+dsgPGCVPR1OChazVmRVjO7wGtDHA78FWj8="
  },
  "data_id": "origin/a/wis2/sg-mss/data/recommended/weather/aviation/metar/LASR31WSSS162130.xml",
  "station_identifier": "WSSS",
  "metadata_id": "urn:wmo:md:sg-mss:recommended.weather.aviation.metar-speci",
```

```
"links": [
  {
    "href": "https://wa6ej0b7og.execute-api.ap-southeast-1.amazonaws.com/v1/api/collections/metar_iwxxm_wsss/items/METAR_WSSS",
    "rel": "canonical",
    "type": "application/xml",
    "security": {
      "default": {
        "type": "http",
        "scheme": "basic",
        "description": "Please complete the IP address whitelisting form at https://go.gov.sg/wis2-recommended-data-ip-whitelist."
      }
    }
```

wis2downloader

You can automatically download data to your local system using the “wis2downloader” included in the wis2box

Wis2downloader command line interface
e.g.
Subscribe to data
wis2downloader add-subscription -- topic cache/a/wis2/jp-jma/#
Remove the subscription
wis2downloader remove-subscription -- topic cache/a/wis2/jp-jma/#

For more details, please refer to “WIS2 in a box training” on the WMO website.
https://training.wis2box.wis.wmo.int/
https://training.wis2box.wis.wmo.int/practical-sessions/downloading-data-from-wis2/#wis2downloader-basics