



WIS2 Metadata

Agenda

- Introduction: What is metadata and why do we need it?
- Example: WIS2 Metadata
- Working with metadata: Creation & Validation
- Benefits and Challenges
- Best Practices



Introduction

What is in this can?



What do the numbers in this table mean?

001	20	01	65
002	36	02	70
003	72	01	94
004	42	01	80
005	18	02	65

Metadata tells us!


Respondent ID	Age	Sex	Weight
001	20	01	65
002	36	02	70
003	72	01	94
004	42	01	80
005	18	02	65


Age is in years as of last birthday
Sex: 01 = Male, 02 = Female
Weight is in kg

} Metadata



Why Metadata Matters

 **Discover & Navigate:** Metadata helps people find, assess, and explore collections of data

 **Understand Data:** Provides context, meaning, and provenance so data can be interpreted correctly

 **Enable Automation:** Machines use metadata to process, manage, and integrate data efficiently

 **Harmonize & Reuse:** Facilitates integration of datasets and promotes reuse across applications

 **Metadata Quality = Data Quality:** Your data is only as good as the metadata that describes it

Time matters!

- Create metadata at the time of data creation
- Information will be forgotten and there won't be time or effort left to capture it later
- Metadata benefits from quality control at an early stage too



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WIS2 network will not allow data publishing without metadata starting 2026/01/01



WIS2 Metadata

Comparison: WIS1 vs WIS2 Metadata

Feature	WIS-1 (WCMP 1.3)	WIS-2 (WCMP 2)
Metadata Standard	ISO 19115 / 19139-based XML	GeoJSON format
Orientation	Service-oriented	Resource-oriented
Readability	Hard to read for humans	Easy to read for humans
Web Compatibility	Not Web-friendly	Web-friendly
Updates	Manual on GTS ends 31 Dec 2024; Volume C1 frozen since 1 Jan 2025	Actively maintained



WIS1

➔ WMO Core Metadata Profile (WCMP) Version 1.3

```
<gmd:MD_Metadata>
  <gmd:fileIdentifier>
    <gco:CharacterString>urn:x-wmo:md:int.wmo.wis::DATASET123</gco:CharacterString>
  </gmd:fileIdentifier>
  <gmd:metadataStandardName>
    <gco:CharacterString>WMO Core Metadata Profile of ISO 19115</gco:CharacterString>
  </gmd:metadataStandardName>
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      <gmd:citation>
        <gmd:CI_Citation>
          <gmd:title>
            <gco:CharacterString>Surface Weather Observations</gco:CharacterString>
          </gmd:title>
        </gmd:CI_Citation>
      </gmd:citation>
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
</gmd:MD_Metadata>
```

WIS2

➔ WMO Core Metadata Profile (WCMP) Version 2

```
{
  "id": "urn:wmo:md:ca-eccc-msc:weather.observations.swob-realtime",
  "conformsTo": ["http://wis.wmo.int/spec/wcmp/2/conf/core"],
  "type": "Feature",
  "properties": {
    "title": "Surface Weather Observations",
    "description": "Surface observations measured at automatic and manual stations"
  }
}
```

WMO Core Metadata Profile (WCMP) Version 2

What is WCMP?

- Extension of the OGC API – Records – Part 1: Core standard
- Designed by the WMO for better metadata discovery

Why it matters


- WCMP documents describe WMO resources — including data, services/APIs, and processes
- Helps users discover weather, climate and water assets more easily

Key characteristics

- Published in GeoJSON format and accessible via HTTP or APIs
- Fully supports the **geospatial + temporal** nature of weather/climate/water data
- Aligns with FAIR principles: Findable, Accessible, Interoperable, Reusable



Descriptive Metadata → Discovery Properties

 Information that helps find and understand data

- **title** - Human-readable name
- **description** - Free-text summary
- **keywords** - Searchable tags
- **themes** - Controlled vocabulary classifications

```
    "title": "Surface Weather Observations",
    "description": "Surface Observations measured at the automatic
                  and manual stations of Deutscher Wetterdienst, the
                  German Weather Service",
    "keywords": [
      "temperture",
      "humidity",
      "wind"
    ],
    "themes": [
      {
        "concepts": [
          {
            "id": "meteorology"
          }
        ]
      },
      {
        "scheme": "http://wis.wmo.int/2012/codelists/WMOCodeLists#WMO_Category"
      }
    ]
  }
]
```

Descriptive Metadata → Discovery Properties



🔍 Information that helps find and understand data

- title
- description
- keywords
- themes
- classifications

This is what users search for and read.

```
"title": "Surface Weather Observations",  
"description": "Surface Observations measured at the automatic  
; the  
}  
],  
"scheme": "http://wis.wmo.int/2012/codelists/WMOCodeLists#WMO_Category  
}  
]
```

Structural Metadata → Extents & Organization

 /  How data is organized spatially, temporally, and hierarchically

- **geometry** - Spatial bounding box (GeoJSON format)
- **time** - Temporal extent (intervals, timestamps)
- **type** - Features

```
"geometry": {  
  "type": "Polygon",  
  "coordinates": [  
    [  
      [  
        5.87,  
        47.27  
      ],  
      [  
        5.87,  
        55.06  
      ],  
      [  
        15.04,  
        55.06  
      ],  
      [  
        15.04,  
        47.27  
      ],  
      [  
        5.87,  
        47.27  
      ]  
    ]  
  ]  
},  
"time": {  
  "interval": [  
    "2024-01-01T00:00:00Z",  
    ".."  
  ]  
},  
"type": "Feature",
```

Structural Metadata → Extents & Organization

▲ / 🕒 How data is organized spatially,
temporally




- **geometry** (GeoJSON)
- **time** (interval)
- **type** – Resource type (dataset, service, process)

This defines **WHERE** and **WHEN** the data exists

```
"geometry": {  
  "type": "Polygon",  
  "coordinates": [  
    [  
      [ 5.87,  
        47.27  
      ]  
    ]  
  ]  
},  
"time": {  
  "interval": [  
    "2024-01-01T00:00:00Z",  
    ".."  
  ]  
},  
"type": "Feature",
```



Administrative Metadata → Management Properties




 /  /  Who manages it, how to access it, usage rights

- **contacts** – Responsible parties and roles
- **created/updated** – Dates
- **wmo:dataPolicy** – Usage policy
- **links** – Access endpoints
- **id** – Unique identifier

```
"links": [  
  {  
    "rel": "stations",  
    "href": "https://oscar.wmo.int/surface/rest/api/search/station",  
    "type": "application/json",  
    "title": "Stations associated with this dataset"  
  },  
  {  
    "rel": "about",  
    "href": "https://www.dwd.de/EN/ourservices/surface_weather_obs",  
    "type": "text/html",  
    "title": "Surface Weather Information"  
  },  
  {  
    "rel": "data",  
    "href": "https://wis2.dwd.de/de-dwd/observations/",  
    "type": "application/octet-stream",  
    "title": "Raw data download (BUFR)"  
  },  
  {  
    "rel": "items",  
    "channel": "origin/a/wis2/de-dwd/data/core/weather/surface-bas",  
    "href": "mqtt://everyone:everyone@wis2.dwd.de:8883",  
    "type": "application/geo+json",  
    "title": "Data notifications"  
  }  
]
```



Administrative Metadata → Management Properties

 /  /  Who manages it, how to access it,




- contact and role
- create
- wmo:da
- links – Access endpoints
- id – Unique identifier

This tells you how to **GET** the data and who to contact

```
"links": [  
  {  
    "rel": "stations",  
    "href": "https://oscar.wmo.int/surface/rest/api/search/station  
er_obs  
  },  
  {  
    "rel": "items",  
    "channel": "origin/a/wis2/de-dwd/data/core/weather/surface-bas  
    "href": "mqtt://everyone:everyone@wis2.dwd.de:8883",  
    "type": "application/geojson",  
    "title": "Data notifications"  
  }  
]
```

Working with metadata

How to create metadata?

-  **Edit directly in JSON:** Advanced users can modify metadata in the JSON
- **WIS2BOX includes a metadata editor**
 - Publish metadata in the network
 -  **Daily automated publishing:** Metadata is re-published across the WIS2 network every day (recommendation)
- **Alternative editor:**
 - qjisc.dwd.de provides an online metadata editor with **JSON download** .



Metadata validation

1.  [pywcmp](#)
2.  Use GDC (Canada, Germany)
→ <https://wis2.dwd.de/gdc/openapi?f=html#/pywcmp-wis2-wcmp2-ets/executePywcmp-wis2-wcmp2-etsJob>
3.  Check monitor topic

Metadata validation

1.  [pywcmp](#)
2.  Use GDC (Canada, Germany)
→ <https://wis2.dwd.de/gdc/openapi?f=html#/pywcmp-wis2-wcmp2-ets/executePywcmp-wis2-wcmp2-etsJob>
3.  Check monitor topic

After coffee
break

Metadata validation → pywcmp

→ <https://github.com/World-Meteorological-Organization/pywcmp>

→  Small Python tool for metadata validation

→  Installation:

```
pip install pywcmp
```

→   Usage:

```
pywcmp bundle sync  
pywcmp ets validate /path/to/file.json  
pywcmp ets validate https://example.org/path/to/file.json --verbosity DEBUG
```

How good is my metadata?

- <https://wmo-im.github.io/wcmp2/kpi/wcmp2-kpi-DRAFT.html>
- KPI's for metadata
- pywcmp is able to calculate KPI

```
pywcmp kpi validate https://example.org/path/to/file.json --verbosity DEBUG
```



Benefits and Challenges

Benefits

- Searchability & Discovery
- Organization & Management
- Compliance & Governance
- Interoperability
- Transparency

Challenges

- Maintenance burden
- Complexity
- Quality Control
- Resource overhead

The best time to start was yesterday, the second
best time is now

Key Takeaways

- **Consistency over completeness:**
 - It's better to have consistent metadata across all datasets than to have a few records that are "perfect."
- **Automate where possible:**
 - Use available tools (e.g. metadata templates, CLI utilities, or scripts) to reduce manual editing.
- **Validate early and often:**
 - Don't wait until publication — use WCMP2 validators during development to catch issues.
- **Reuse existing information:**
 - Extract metadata from data sources, configuration files, or other systems rather than rewriting everything.
- **Think of future users:**
 - Include clear descriptions, contact info, and keywords — small details that make discovery easier later.



Good metadata isn't just extra work — it's what makes our data visible, usable, and valuable across the WIS2 network.

Thank you for your attention!