WIGOS Metadata Representation (WMDR) Version 2

World Meteorological Organization

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Task Team on WIGOS Metadata (TT-WIGOSMD)[1]

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Standing Committee on Information Management and Technology (SC-IMT)[3]

Commission for Observation, Infrastructure and Information Systems (INFCOM)[4]

Table of Contents

i. Abstract

TODO opening overview.

This document defines the content, structure, and encoding for the WIGOS Metadata Representation (WMDR). This standard is a profile and extension of the OGC API - Records standard [5].

TODO high level scope, 1 sentence.

WMDR documents shall be encoded in GeoJSON (RFC 7946 [6]) as defined in this specification and shall be made available as HTTP crawlable files or via API provisioning as defined by OGC API - Records.

Weather/climate/water data is by nature geospatial and temporal. The W3C Data on the Web Best Practices [7] and Spatial Data on the Web Best Practices [8] publications provide guidelines on how to best enable spatiotemporal data to lower the barrier for users, search engine optimization, and linked data. This also aligns with the FAIR data principles (Findable, Accessible, Interoperable, Reusable) [9].

ii. Keywords

The following are keywords to be used by search engines and document catalogues.

wmo, wigos, station, instrument, weather, climate, water, metadata, discovery, search

iii. Security Considerations

Based on the WMO Unified Data Policy for the International Exchange of Earth System Data (Resolution 1 (Cg-Ext(2021) [10], exchanged data are classified as `core` or `recommended`. Core data is considered fully open and unrestricted with no security considerations. Recommended data may have access control defined.

No additional security considerations have been made for this standard.

Chapter 1. Scope

This document defines the content, structure, and encoding of discovery metadata published as part of the WIGOS Global Station Catalogue (GSC).

The WIGOS Metadata Representation (WMDR) standard defined herein is an extension of the International Standard *OGC API - Records - Part 1: Core*.

WMDR station metadata records shall be encoded as GeoJSON as defined in *OGC API - Records - Part 1: Core*.

The primary purpose of WMDR is to describe **stations**, or observing facilities. Services and APIs operating on resources may be represented as part of their own metadata or associated through WCMP links.

WMDR station metadata record provides descriptions at the granularity level of a station, or observing facilty. Dataset discovery metadata are supported by the *Manual on the WMO Information System, Volume II - WMO Information System 2.0* [11].

This specification defines the conformance requirements for the WIGOS Metadata Representation. Annex A defines the abstract test suite. Annex B provides normative information on schemas. Annex C provides informative examples. Annex D provides informative codelists.

[1] https://community.wmo.int/en/governance/commission-membership/commission-observation-infrastructure-and-information-systems-infcom/standing-committee-information-management-and-technology-sc-imt/expert-team-metadata-standards-et-metadata/task-team-wigos-metadata-tt-wigosmd

[2] https://community.wmo.int/governance/commission-membership/commission-observation-infrastructures-and-information-systems-infcom/commission-infrastructure-national-representatives/infcom-management-group/standing-committee-information-management-and-technology-sc-imt/et-metadata

[3] https://community.wmo.int/governance/commission-membership/commission-observation-infrastructures-and-information-systems-infcom/commission-infrastructure-officers/infcom-management-group/standing-committee-information-management-and-technology-sc-imt

[4] https://community.wmo.int/governance/commission-membership/infcom

[5] https://ogcapi.ogc.org/records

[6] https://datatracker.ietf.org/doc/html/rfc7946

[7] https://www.w3.org/TR/dwbp

[8] https://www.w3.org/TR/sdw-bp

[9] https://en.wikipedia.org/wiki/FAIR_data

[10] https://library.wmo.int/doc_num.php?explnum_id=11113#page=9

[11] https://library.wmo.int/idurl/4/68731

Chapter 2. Conformance

Conformance with this standard shall be checked using the tests specified in Annex A (normative) of this document.

OGC API - Records (OARec) provides a record metadata model in support of resource discovery. This standard is an extension of *OGC API - Records - Part 1: Core*. Conformance to this standard requires demonstrated conformance to the applicable Conformance Classes of *OGC API - Records - Part 1: Core*.

Authors of station metadata records published within the WIGOS Global Station Catalogue (GSC) are required to comply with the WIGOS Metadata Representation (WMDR). WMDR station metadata shall therefore be compliant with OGC API - Records - Part 1: Core: Requirements Class: Record Core.

WMO shall publish guidance material to assist authors of WMDR station metadata for maintaining consistency across multiple metadata records and perform quality assessment and reporting.

This standard identifies one Requirements Class which defines the functional requirements.

The mandatory Requirements Class for WMDR is:

- "WIGOS Metadata Representation Core": This Requirements Class inherits from *OGC API — Records — Part 1: Core: Requirements Class: Record Core* which defines the requirements for a catalogue record. The requirements specified in the Requirements Class “Record Core" are mandatory for all implementations of WMDR. The requirements are specified in Chapter 7 and in Annex A in more detail.

Chapter 3. References

- OGC: OGC 20-004, OGC API - Records - Part 1: Core 1.0 (2023) [1]
- OGC: OGC 17-069r, OGC API - Features - Part 1: Core 1.0 (2022) [2]
- IETF: RFC-7946 The GeoJSON Format (2016) [3]
- IETF: RFC-8259 The JavaScript Object Notation (JSON) Data Interchange Format (2017) [4]
- W3C/OGC: Spatial Data on the Web Best Practices, W3C Working Group Note (2017) [5]
- W3C: Data on the Web Best Practices, W3C Recommendation (2017) [6]
- W3C: Data Catalog Vocabulary, W3C Recommendation (2014) [7]
- IANA: Link Relation Types (2020) [8]
- IANA: Media Types (2023) [9]
- Linux Foundation: SPDX License List (2021) [10]
- IETF: JSON Schema (2022) [11]
- Manual on the WMO Information System, Volume II - WMO Information System 2.0 (2025) [12]

[1] https://docs.ogc.org/is/20-004r1/20-004r1.html

[2] https://docs.opengeospatial.org/is/17-069r4/17-069r4.html

[3] https://datatracker.ietf.org/doc/html/rfc7946

[4] https://datatracker.ietf.org/doc/html/rfc8259

[5] https://www.w3.org/TR/sdw-bp

[6] https://www.w3.org/TR/dwbp

[7] https://www.w3.org/TR/vocab-dcat

[8] https://www.iana.org/assignments/link-relations/link-relations.xml

[9] https://www.iana.org/assignments/media-types/media-types.xhtml

[10] https://spdx.org/licenses

[11] https://json-schema.org

[12] https://library.wmo.int/records/item/68731-manual-on-the-wmo-information-system-volume-ii-wmo-information-system-2-0

Chapter 4. Terms and definitions

This document uses the terms defined in OGC Policy Directive 49, which is based on the ISO/IEC Directives, Part 2, Rules for the structure and drafting of International Standards. In particular, the word “SHALL” (not “must”) is the verb form used to indicate a requirement to be strictly followed to conform to this Standard and OGC documents do not use the equivalent phrases in the ISO/IEC Directives, Part 2.

This document also uses terms defined in the OGC Standard for Modular specifications (OGC 08-131r3), also known as the 'ModSpec'. The definitions of terms such as standard, specification, requirement, and conformance test are provided in the ModSpec.

The following additional terms and definitions also apply.

4.1. Abbreviated terms

Table 1. Symbols and abbreviated terms

Abbreviation	Term
API	Application Programming Interface
ARK	Archival Resource Key
DCAT	Data Catalog Vocabulary
DCPC	Data Collection and Production Centres
DOI	Digital Object Identifier
GDC	Global Discovery Catalogue
GIS	Geographic Information System
GISC	Global Information System Centre
GSC	Global Station Catalogue
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
IANA	Internet Assigned Numbers Authority
IETF	Internet Engineering Task Force
ISO	International Organization for Standardization
JSON	JavaScript Object Notation
MIME	Multipurpose Internet Mail Extensions
MQTT	Message Queuing Telemetry Transport
NC	National Centre
NWP	Numerical Weather Prediction
OARec	OGC API - Records

Abbreviation	Term
OGC	Open Geospatial Consortium
OSCAR	Observing Systems Capability Analysis and Review Tool
REST	Representational State Transfer
ROA	Resource-oriented architecture
S3	Simple Storage Service
SEO	Search engine optimization
SOA	Service-oriented architecture
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
W3C	World Wide Web Consortium
WCMP	WMO Core Metadata Profile
WIGOS	WMO Integrated Global Observing System
WIS	WMO Information System
WMDR	WIGOS Metadata Representation
WMO	World Meteorological Organization
WSI	WIGOS Station Identifier
XML	eXtensible Markup Language

Chapter 5. Conventions

This section provides details and examples for any conventions used in the document. Examples of conventions are symbols, abbreviations, use of JSON schema, or special notes regarding how to read the document.

5.1. Identifiers

The normative provisions in this Standard are denoted by the URI:

http://wis.wmo.int/spec/wmdr/2

All requirements and conformance tests that appear in this document are denoted by partial URIs which are relative to this base.

5.2. Examples

Examples provided in this specification are encoded as GeoJSON.

Complete examples can be found at https://schemas.wmo.int/wmdr/2.0.0/examples

5.3. Schemas

The WMDR schema can be found at https://schemas.wmo.int/wmdr/2.0.0/schemas/wmdr2-bundled.json

5.4. Schema representation

JSON Schema [1] objects are used throughout this standard to define the structure of metadata records. These schema objects are also typically represented using YAML [2]. YAML is a superset of JSON, and in this standard are regarded as equivalent.

Metadata record instances are always represented as JSON.

5.4.1. Properties

A JSON **property** represents a key-value pair, where the key is the name of the property and the value is a standard JSON data type.

```
"myPropertyName": "test123"
```

5.5. Use of HTTPS

For simplicity, this document only refers to the HTTP protocol. This is not meant to exclude the use of HTTPS and simply is a shorthand notation for "HTTP or HTTPS." In fact, most servers are

expected to use HTTPS, not HTTP.

[1] https://json-schema.org

[2] https://en.wikipedia.org/wiki/YAML

Chapter 6. Introduction

6.1. Overview

TODO

6.1.1. WIGOS

TODO

6.1.2. Station metadata design considerations

The following describes envisioned workflows of WMDR in the context of station metadata publication and search.

- Flexible metadata publishing mechanisms so providers can publish station metadata in the easiest and most efficient way possible.
- Basic, HTTP crawlable metadata files (filesystem, object storage). For example, publishing station metadata as JSON files to an S3 bucket, and then making that bucket available for harvesting and traversal to search engines and metadata harvesters.
- The browser as the catalogue. Browsers utilize mass market search engines as the gateway to low barrier discovery. This pattern may work by way of the WIGOS Global Station Catalogue, with the idea that search engines can index from the authoritative source.

6.1.3. Granularity

TODO

6.2. User stories

TODO

6.3. OGC API - Records - Part 1: Core

The OGC Records - API - Part 1: Core specification:

- lowers the discovery barrier to finding the existence of geospatial resources on the Web
- provides the ability for discovery metadata to be published via API machinery (searchable catalogue) or static records (crawlable catalogue)
- provides a core record model for information communities to extend
- provides a subset of core queryables (e.g. by resource type, by external identifier) which enables federation and cross catalogue discovery functionality

6.4. The WIGOS Global Station Catalogue (GSC)

The GSC will provide a central search endpoint, enabling users to traverse, browse and search station metadata holdings in OSCAR. Key search predicate capabilities include:

- geospatial (`bbox=`)
- temporal (time instant or time period) (`datetime=`)
- equality predicates (i.e. `property=value`) for any defined discovery metadata property
- full-text (`q=`)

Given the WIS2 principles, use cases, OGC API - Records - Part 1: Core, and the WIGOS Global Station Catalogue, WMDR provides a standards-based, clear and well-defined information model to facilitate the management and discovery of data within WIGOS.

6.5. Mass market considerations

Given WIS2 principle 10 (publishing metadata in a way that commercial search engines can index), WMDR station metadata enables annotations that can facilitate Search Engine Optimization (SEO) and structured data discovery, search, and relevant results.

Chapter 7. WIGOS Metadata Representation (Version 2)

WIGOS Metadata Representation (WMDR) is an extension of the OGC API – Records standard and shall be encoded in GeoJSON. The normative provisions in WMDR (version 2) are denoted by the base URI (`http://wis.wmo.int/spec/wmdr/2`) and requirements are denoted by partial URIs relative to this base. Property names, values and examples are represented with `shaded text` in this document.

7.1. Requirements Class "Core"

URI	http://wis.wmo.int/spec/wmdr/2/req/core
Target type	Station metadata
Dependency	The JavaScript Object Notation (JSON) Data Interchange Format (IETF RFC8259 (2017))
Dependency	JSON Schema (2022)
Dependency	The GeoJSON Format (IETF: RFC-7946 (2016))
Dependency	OGC API - Features - Part 1: Core corrigendum (OGC: OGC 17-069r)
Preconditions	The record conforms to the Requirements Class “Record Core” of OGC API - Records - Part 1: Core

7.1.1. Overview

The table below provides an overview of the set of properties that may be included in a WMDR.

Table 2. Table. WMDR core properties

Property	Requirement	Description
`id`	**Required**	A unique identifier of the station/platform (see TODO)
`type`	**Required**	A fixed value denoting the WMDR as a GeoJSON `Feature` (see TODO)
`conformsTo`	**Required**	The version of WMDR associated to which the record conforms (see TODO)
`geometry`	**Required**	Geospatial location associated with the dataset, in a geographic coordinate reference system (see TODO)
`properties.externalIds`	Optional	Persistent identifiers or handles for the dataset (see TODO)

Property	Requirement	Description
`properties.created`	**Required**	The date that the WMDR was created (see TODO)
`properties.updated`	Optional	The date that the WMDR was updated (see TODO)
`properties.contacts`	**Required**	Contact information for the dataset (see TODO)

7.1.2. WIGOS Metadata Representation representation

A WMDR can be represented in various ways internally, in WIGOS systems and software tools, but its external representation is GeoJSON.

Recommendation 1	/rec/core/media_type
A	The media type assigned to a WMDR, when transported through a protocol that supports it, SHOULD be `application/geo+json`.

7.1.3. Validation

The WMDR schema is based on the Requirements Class "Record Core" of OGC API – Records – Part 1: Core schema and the associated information model. WMDRs compliant with the WMDR schema are therefore compliant with the OGC API – Records record schema.

Requirement 1	/req/core/validation
A	Each WMDR SHALL validate without error against the WMDR schema.
B	Each WMDR SHALL provide id (see TODO), type (see TODO), geometry (see TODO) and properties (see, for example, TODO) for GeoJSON compliance.
C	The `type` property SHALL be set to a fixed value of `Feature` for GeoJSON compliance.

7.1.4. Identifier

The `id` property is a unique identifier of the dataset. A record identifier is essential for querying and identifying records within the Global Discovery Catalogue (GDC).

Example

```
"id": "urn:wmo:md:ca-eccc-msc:observations.swob"
```

Requirement 2	/req/core/identifier
A	A WMDR SHALL provide an identifier via the `id` property.

B	The `id` property SHALL be a WIGOS Station Identifier (WSI).

7.1.5. Conformance

The `conformsTo` property identifies the version of the WMDR standard to which the metadata record conforms. Conformance identification is valuable for version detection and handling of content.

Example

```
"conformsTo": [
  "http://wis.wmo.int/spec/wmdr/2/conf/core"
]
```

Requirement 3	**/req/core/conformance**
A	A WMDR SHALL provide information on conformance via the OGC API – Records (OARec) record `conformsTo` property.
B	The `conformsTo` property SHALL advertise conformance to WMDR.

7.1.6. Geospatial extent

The `geometry` property is the location of the station/platform in the geographic coordinate system. , and provides a useful indicator of the location of the station/platform to facilitate search and map displays in the GSC.

Examples:

```
"geometry": {
  "type": "Polygon",
  "coordinates": [[
    [-142.23, 28.03],
    [-142.23, 82.56],
    [-52.16, 82.56],
    [-52.16, 28.03],
    [-142.23, 28.03]
  ]]
}
```

```
"geometry": {
  "type": "Point",
  "coordinates": [-79.38, 43.65]
}
```

```
"geometry": null
```

Requirement 4	**/req/core/extent_geospatial**

A	A WMDR SHALL provide one `geometry` property to convey the geospatial properties of a dataset using a geographic coordinate reference system (World Geodetic System 1984 [WGS 84]) and longitude and latitude decimal degree units.
B	The `geometry` coordinates SHALL be integer or float data types.
C	The `geometry` property SHALL provide the value of `null` when geometry cannot be derived.

Recommendation 2	**/rec/core/extent_geospatial_point**
A	For datasets based on a geometry without a calculated area (for example, a single station point), a WMDR SHOULD provide the GeoJSON geometry as a `Point` type.

Recommendation 3	**/rec/core/extent_geospatial_precision**
A	Geometry coordinates SHOULD have a level of precision of at least two or more decimal places.

Permission 1	**/per/core/extent_geospatial**
A	The `geometry` property MAY provide a third element (height) as per clause 4 of the GeoJSON specification.

7.1.7. Properties / Contacts

The `contacts` property is the information associated with one or more parties responsible for the resource.

Example: Contacts object with all contact details

```
"properties": {
  ...
  "contacts": [{
    "identifier": "ECCC",
    "organization": "Government of Canada; Environment and Climate Change Canada;
Meteorological Service of Canada",
    "name": "National Inquiry Response Team",
    "phones": [{
      "value": "+18199972800"
    }],
    "emails": [{
      "value":"enviroinfo@ec.gc.ca"
    }],
    "addresses": [{
      "deliveryPoint": [ "77 Westmorland Street, suite 260" ],
      "city": "Fredericton",
      "administrativeArea": "NB",
      "postalCode": "E3B 6Z4",
      "country": "Canada"
```

```
    }],
    "links": [{
      "href": "https://example.org/about",
      "rel": "about",
      "type": "text/html"
    }],
    "contactInstructions": "email",
    "roles": ["producer", "host"]
  }]
  ...
}
```

Example: Contacts object with URL to the relevant homepage

```
"properties": {
  ...
  "contacts": [{
    "organization": "Government of Canada; Environment and Climate Change Canada;
Meteorological Service of Canada",
    "links": [{
      "href": "https://example.org/about",
      "rel": "about",
      "type": "text/html"
    }],
    "roles": ["producer"]
  }]
}
```

Requirement 5	**/req/core/contacts**
A	A WMDR SHALL provide at least one contact via the `properties.contacts` property.
B	The `properties.contacts` SHALL provide an `organization` property.
C	The `roles` property, when specified, SHALL provide a role type from the WCMP role type code list.

Permission 2	**/per/core/contacts**
A	The `properties.contacts` property MAY provide more than one contact via multiple objects, or a single contact object with multiple roles.

7.1.8. Properties / Persistent identifiers

The `externalIds` property is a persistent (or handle) identifier used to provide a long lasting reference to a digital resource. Persistent identifiers are commonly used for scientific publications and datasets.

Examples of persistent identifiers include, but are not limited to:

- Digital Object Identifier (DOI)
- Archival Resource Key (ARK)
- Handle

Example: Persistent identifiers

```
"properties": {
  ...
  "externalIds": [{
    "scheme": "https://doi.org",
    "value": "10.14287/10000001"
  }, {
    "scheme": "https://handle.net",
    "value": "2381/12775"
  }, {
    "scheme": "https://arks.org",
    "value": "ark:/13030/tf5p30086k"
  }]
  ...
}
```

Example: Online citation

```
"links": [
  {
    "rel": "cite-as",
    "title": "Cite as: WMO/GAW Ozone Monitoring Community, World Meteorological
Organization-Global Atmosphere Watch Programme (WMO-GAW)/World Ozone and Ultraviolet
Radiation Data Centre (WOUDC) [Data]. Retrieved [YYYY-MM-DD], from https://woudc.org.
A list of all contributors is available on the website. doi:10.14287/10000004",
    "type": "text/html",
    "href": "https://dx.doi.org/10.14287/10000004"
  }
]
```

Recommendation 4	**/rec/core/pids**
A	A WMDR SHOULD provide persistent identifier references via items in the `properties.externalIds` array property, where the value of `scheme` is based on an established persistent identifier scheme (such as `https://doi.org`, `https://arks.org` or `https://handle.net`), and the `value` property is the persistent identifier (for example, `https://dx.doi.org/10.14287/10000001`).

Permission 3	**/per/core/pids**
A	A WMDR MAY provide a persistent identifier to cite research or for resource identification, using a persistent identifier scheme/framework.

B	A WMDR MAY provide a persistent identifier as a link object with `rel=cite-as` if there is an online citation or reference.

7.1.9. Properties / Record creation date

The `created` property is a single date, being the date that the WMDR was created. Note that this date is not related to any aspect of the station/platform.

Example:

```
"properties": {
  ...
  "created": "2021-06-12T23:45:24Z"
  ...
}
```

Requirement 6	**/req/core/record_creation_date**
A	A WMDR SHALL provide a single `properties.created` property.
B	The `properties.created` property SHALL NOT be repeated or used to document change history.

7.1.10. Properties / Record update date

The `created` property is a single date, being the date that the WMDR was created. Note that this date not related to any aspect of the station/platform.

Example:

```
"properties": {
  ...
  "updated": "2022-06-12T18:52:39Z"
  ...
}
```

Recommendation 5	**/rec/core/record_update_date**
A	A WMDR SHOULD provide a `properties.updated` property when a record has been updated since its initial creation.

7.1.11. Properties / WMO data policy

The `wmo:dataPolicy` property is a codelist that identifies the classification of the dataset exchange as described by the WMO Unified Data Policy (Resolution 1 (Cg-Ext(2021)))[1] for the international exchange of Earth system data. The code list values are `core` or `recommended`. The `wmo:dataPolicy` property is required if the metadata record describes a dataset.

Licensing and copyright are expressed via the `links` property (see TODO), providing access, license

and attribution details as required. Conditions on use of the data should be indicated for transparency and clarification.

Example: Core data

```
"properties": {
  ...
  "wmo:dataPolicy": "core"
  ...
}
```

Example: Recommended data

```
"properties": {
  ...
  "wmo:dataPolicy": "recommended"
  ...
}
```

It is useful to add provider-specific details to have the most detailed information about data policy and additional conditions.

Example: Recommended data with additional conditions and provider-specific details

```
"properties": {
  ...
  "wmo:dataPolicy": "recommended"
  ...
},
"links": [{
  "rel": "license",
  "href": "https://example.org/license",
  "type": "text/html",
  "title": "EUMETSAT DATA LICENSING"
}]
```

Example: License for recommended data in the public domain

```
"properties": {
  ...
  "wmo:dataPolicy": "recommended"
  ...
},
"links": [{
  "rel": "license",
  "href": "https://creativecommons.org/publicdomain/zero/1.0/",
  "type": "text/html",
  "title": "CC0 1.0 Deed | CC0 1.0 Universal | Creative Commons"
}]
```

To express rights not addressed by a license, the `rights` property can be used as follows:

Example: Rights

```
"properties": {
 ...
 "rights": "Users are granted free and unrestricted access to this data, without
charge and with no conditions on use. Users are requested to attribute the producer of
this data. WMO Unified Data Policy (Resolution 1 (Cg-Ext 2021))."
 ...
}
```

Requirement 7	**/req/core/data_policy**
A	The `properties.wmo:dataPolicy` property SHALL be `core` or `recommended`.
B	When the `properties.wmo:dataPolicy` property is `recommended`, data licensing SHALL be provided by at least one `links` item with link relations (`rel`) of `license`.

Recommendation 6	**/rec/core/data_policy_conditions**
A	Additional conditions represented by a `links` item SHOULD also provide a `title` property to include human-readable information about the link.
B	To express any conditions on use of a given dataset, the `properties.rights` property SHOULD be used.
C	For core data or recommended data compatible with free and unrestricted principles, `properties.rights` SHOULD be declared with exactly the following statement: `Users are granted free and unrestricted access to this data, without charge and with no conditions on use. Users are requested to attribute the producer of this data. WMO Unified Data Policy (Resolution 1 (Cg-Ext 2021)).`
D	For core or recommended data not in the public domain, a copyright statement SHOULD be expressed as either a `properties.rights` statement or a link object with `rel=copyright`.

Permission 4	**/per/core/data_policy**
A	For core data (when `properties.wmo:dataPolicy` property is `core`), attribution licensing MAY be provided as needed.

B	For core data (when `properties.wmo:dataPolicy` is `core`) or recommended data (when `properties.wmo:dataPolicy` is `recommended`, and the data is compatible with free and unrestricted principles), a license or public domain statement that is compatible with free and unrestricted principles (such as Creative Commons CC0) MAY be expressed as a link object with the `license` link relation.
C	For core data (when `properties.wmo:dataPolicy` is `core`) or recommended data (when `properties.wmo:dataPolicy` is `recommended`), a copyright statement MAY be expressed in `properties.rights`.
D	For core data (when `properties.wmo:dataPolicy` is `core`) or recommended data (when `properties.wmo:dataPolicy` is `recommended`), a link object MAY be expressed with `rel=copyright`.

7.1.12. Links and distribution information

TODO

7.1.12.1. Overview

TODO

7.1.13. Additional properties

A WMDR can be extended as required for organizational purposes by adding properties (of any type) in the record. Additional properties do not render a record non-compliant with WMDR.

Example:

```
"properties": {
  ...
  "approvalStatus": "approved"
  "_comment": {
    "validationErrors": [
      "error 1",
      "error 2"
    ]
  }
  ...
}
```

Permission 5	**/per/core/additional_properties**
A	A WMDR MAY provide additional properties of any type in any part of the document as needed.

7.2. WMO Core Metadata Profile resources

7.2.1. WMO Codes Registry

- http://codes.wmo.int/wmdr

7.2.2. WMO schemas server

Validation schemas, examples and other resources are published at https://schemas.wmo.int/wmdr.

[1] Resolution 1 (Cg-Ext(2021)) – WMO Unified Policy for the International Exchange of Earth System Data (World Meteorological Congress: Abridged Final Report of the Extraordinary Session (WMO-No. 1281))

Chapter 8. Cataloguing considerations

In addition to documenting and describing WIGOS metadata holdings, WMDR station metadata will be searchable via the WIGOS Global Station Catalogue (GSC). As part of discovery and search workflow, a GSC may choose to apply filters to help narrow search results. This is realized by the API of the GSC, as well as applying facets in the catalogue.

8.1. Faceting

The API of the GSC, in addition to allowing for spatial/temporal/attribute queries and filters, may choose to apply facets to WMDRs. Facets are effective when applied against controlled vocabularies and classifications.

Annex A: Conformance Class Abstract Test Suite (Normative)

A.1. Conformance Class: Core

label

http://wis.wmo.int/spec/wmdr/2/conf/core

subject

Requirements Class "core"

classification

Target Type:Station Metadata

A.1.1. Validation

label

/conf/core/validation

subject

/req/core/validation

test-purpose

Validate that a WMDR is valid to the authoritative WMDR schema.

Run JSON Schema validation on the WMDR against the WMDR authoritative schema.

A.1.2. Identifier

label

/conf/core/identifier

subject

/req/core/identifier

test-purpose

Validate that a WMDR has a valid identifier.

Check for the existence of an `id` property in the WMDR.

In the WMDR's `id` property, check that there are at least **five** tokens, delimited by `:`.

In the WMDR's `id` property, delimiting the value on `:`, check that the first three tokens are equal to `['urn', 'wmo', 'md']`.

In the WMDR's `id` property, delimiting the value on `:`, check that the fourth token is a centre id based on the WIS2 Topic Hierarchy and controlled vocabulary.

In the WMDR's `id` property, delimiting the value on `:`, check that the fifth token (the local identifier) has no spaces or accented characters.

A.1.3. Conformance

label

/conf/core/conformance

subject

/req/core/conformance

test-purpose

Validate that a WMDR provides valid conformance information.

Check for the existence of a `conformsTo` property in the WMDR.

In the WMDR's `conformsTo` array property, check that ONE of the values is equal to `http://wis.wmo.int/spec/wmdr/2/conf/core`.

A.1.4. Geospatial Extent

label

/conf/core/extent_geospatial

subject

/req/core/extent_geospatial

test-purpose

Validate that a WMDR provides a valid geometry property.

Check for the existence of one `geometry` property in the WMDR.

Check that all `geometry` coordinate value data types are integers or floats.

Check that `geometry` coordinate longitudinal values are between -180 and 180.

Check that `geometry` coordinate latitudinal values are between -90 and 90.

Check that `geometry` property is a valid GeoJSON geometry.

A.1.5. Contacts

label

/conf/core/contacts

subject

/req/core/contacts

test-purpose

Validate that a WMDR provides contact information for the metadata point of contact and originator of the data.

Check for the existence of a `properties.contacts` property in the WMDR.

Check that the `contact` property provides a minimum of one contact object.

Check for the existence of a `roles` property in the contact object.

Check for the existence of an `organization` property in the contact object.

If `roles` exists, check that the value is part of the WMDR contact role codelist.

A.1.6. Record Creation Date

label

/conf/core/record_creation_date

subject

/req/core/record_creation_date

test-purpose

Validate that a WMDR provides a record creation date.

Check for the existence of one and only one `properties.created` property in the WMDR.

A.1.7. WMO Data Policy

label

/conf/core/data_policy

subject

/req/core/data_policy

test-purpose

Validate that a WMDR provides information about data policy and, if applicable additional information about licensing and/or copyright.

Check for the type of WMDR (`properties.type`).

If `properties.type` is found, and `properties.type` is equal to `dataset` check that `properties.wmo:dataPolicy` exists.

Check for the existence of a `properties.wmo:dataPolicy` property in the WMDR.

If `properties.wmo:dataPolicy` is found, check that `properties.wmo:dataPolicy` has a value equal to `core` or `recommended`.

If `properties.wmo:dataPolicy` is equal to `recommended`, check for the existence of at least one `links` item containing a `license` link relation (`rel`).

Annex B: Schemas (Normative)

NOTE The schema document will be published on https://schemas.wmo.int/wmdr/2.0.0 once the standard has been approved.

B.1. WIGOS Metadata Representation Schema


```
{
  "$schema": "https://json-schema.org/draft/2020-12/schema",
  "$id": "https://raw.githubusercontent.com/wmo-
im/wmdr2/main/schemas/wmdrRecordGeoJSON.yaml",
  "title": "WMDR station metadata record definition",
  "description": "WMDR station metadata record definition",
  "required": [
    "id",
    "conformsTo",
    "type",
    "geometry",
    "properties",
    "links"
  ],
  "properties": {
    "id": {
      "oneOf": [
        {
          "type": "string"
        },
        {
          "type": "integer"
        }
      ],
      "description": "A unique identifier of the catalog record."
    },
    "conformsTo": {
      "type": "array",
      "contains": {
        "const": "http://wis.wmo.int/spec/wmdr/2/conf/core"
      }
    },
    "type": {
      "type": "string",
      "enum": [
        "Feature"
      ]
    },
    "geometry": {
      "oneOf": [
        {
```

```
          "enum": [
            null
          ]
        },
        {
          "oneOf": [
            {
              "type": "object",
              "required": [
                "type",
                "coordinates"
              ],
              "properties": {
                "type": {
                  "type": "string",
                  "enum": [
                    "Point"
                  ]
                },
                "coordinates": {
                  "type": "array",
                  "minItems": 2,
                  "items": {
                    "type": "number"
                  }
                }
              }
            },
            {
              "type": "object",
              "required": [
                "type",
                "coordinates"
              ],
              "properties": {
                "type": {
                  "type": "string",
                  "enum": [
                    "MultiPoint"
                  ]
                },
                "coordinates": {
                  "type": "array",
                  "items": {
                    "type": "array",
                    "minItems": 2,
                    "items": {
                      "type": "number"
                    }
                  }
                }
```

```
        }
      },
      {
        "type": "object",
        "required": [
          "type",
          "coordinates"
        ],
        "properties": {
          "type": {
            "type": "string",
            "enum": [
              "LineString"
            ]
          },
          "coordinates": {
            "type": "array",
            "minItems": 2,
            "items": {
              "type": "array",
              "minItems": 2,
              "items": {
                "type": "number"
              }
            }
          }
        }
      },
      {
        "type": "object",
        "required": [
          "type",
          "coordinates"
        ],
        "properties": {
          "type": {
            "type": "string",
            "enum": [
              "MultiLineString"
            ]
          },
          "coordinates": {
            "type": "array",
            "items": {
              "type": "array",
              "minItems": 2,
              "items": {
                "type": "array",
                "minItems": 2,
                "items": {
                  "type": "number"
```

```
                }
              }
            }
          }
        }
      },
      {
        "type": "object",
        "required": [
          "type",
          "coordinates"
        ],
        "properties": {
          "type": {
            "type": "string",
            "enum": [
              "Polygon"
            ]
          },
          "coordinates": {
            "type": "array",
            "items": {
              "type": "array",
              "minItems": 4,
              "items": {
                "type": "array",
                "minItems": 2,
                "items": {
                  "type": "number"
                }
              }
            }
          }
        }
      },
      {
        "type": "object",
        "required": [
          "type",
          "coordinates"
        ],
        "properties": {
          "type": {
            "type": "string",
            "enum": [
              "MultiPolygon"
            ]
          },
          "coordinates": {
            "type": "array",
            "items": {
```

```
                "type": "array",
                "items": {
                  "type": "array",
                  "minItems": 4,
                  "items": {
                    "type": "array",
                    "minItems": 2,
                    "items": {
                      "type": "number"
                    }
                  }
                }
              }
            }
          }
        },
        {
          "type": "object",
          "required": [
            "type",
            "geometries"
          ],
          "properties": {
            "type": {
              "type": "string",
              "enum": [
                "GeometryCollection"
              ]
            },
            "geometries": {
              "type": "array",
              "items": {
                "$ref": "#/properties/geometry/oneOf/1"
              }
            }
          }
        }
      ]
    }
  ]
},
"properties": {
  "type": "object",
  "required": [
    "contacts",
    "created"
  ],
  "properties": {
    "contacts": {
      "type": "array",
      "minItems": 1,
```

```
          "items": {
            "allOf": [
              {
                "required": [
                  "organization"
                ],
                "additionalProperties": false,
                "type": "object",
                "description": "Identification of, and means of communication with,
person responsible\nfor the resource.",
                "anyOf": [
                  {
                    "required": [
                      "name"
                    ]
                  },
                  {
                    "required": [
                      "organization"
                    ]
                  }
                ],
                "properties": {
                  "identifier": {
                    "type": "string",
                    "description": "A value uniquely identifying a contact."
                  },
                  "name": {
                    "type": "string",
                    "description": "The name of the responsible person."
                  },
                  "position": {
                    "type": "string",
                    "description": "The name of the role or position of the
responsible person taken\nfrom the organization's formal organizational hierarchy or
chart."
                  },
                  "organization": {
                    "type": "string",
                    "description": "Organization/affiliation of the contact."
                  },
                  "logo": {
                    "description": "Graphic identifying a contact. The link relation
should be `icon`\nand the media type should be an image media type.",
                    "allOf": [
                      {
                        "type": "object",
                        "allOf": [
                          {
                            "$ref": "#/properties/linkTemplates/items/allOf/0"
                          },
```

```
                        {
                          "type": "object",
                          "required": [
                            "href"
                          ],
                          "properties": {
                            "href": {
                              "type": "string",
                              "format": "uri"
                            }
                          }
                        }
                      ]
                    },
                    {
                      "type": "object",
                      "required": [
                        "rel",
                        "type"
                      ],
                      "properties": {
                        "rel": {
                          "enum": [
                            "icon"
                          ]
                        }
                      }
                    }
                  ]
                },
                "phones": {
                  "type": "array",
                  "description": "Telephone numbers at which contact can be made.",
                  "items": {
                    "type": "object",
                    "required": [
                      "value"
                    ],
                    "properties": {
                      "value": {
                        "type": "string",
                        "description": "The value is the phone number itself.",
                        "pattern": "^\\+[1-9]{1}[0-9]{3,14}$"
                      },
                      "roles": {
                        "description": "The type of phone number (e.g. home, work,
fax, etc.).",
                        "$ref":
"#/properties/properties/properties/contacts/items/allOf/0/properties/roles"
                      }
                    }
```

```
                    }
                  },
                  "emails": {
                    "type": "array",
                    "description": "Email addresses at which contact can be made.",
                    "items": {
                      "type": "object",
                      "required": [
                        "value"
                      ],
                      "properties": {
                        "value": {
                          "type": "string",
                          "description": "The value is the email number itself.",
                          "format": "email"
                        },
                        "roles": {
                          "description": "The type of email (e.g. home, work, etc.).",
                          "$ref":
"#/properties/properties/properties/contacts/items/allOf/0/properties/roles"
                        }
                      }
                    }
                  },
                  "addresses": {
                    "type": "array",
                    "description": "Physical location at which contact can be made.",
                    "items": {
                      "type": "object",
                      "properties": {
                        "deliveryPoint": {
                          "type": "array",
                          "description": "Address lines for the location.",
                          "items": {
                            "type": "string"
                          }
                        },
                        "city": {
                          "type": "string",
                          "description": "City for the location."
                        },
                        "administrativeArea": {
                          "type": "string",
                          "description": "State or province of the location."
                        },
                        "postalCode": {
                          "type": "string",
                          "description": "ZIP or other postal code."
                        },
                        "country": {
                          "type": "string",
```

```
                        "description": "Country of the physical address.  ISO 3166-1
is recommended."
                      },
                      "roles": {
                        "description": "The type of address (e.g. office, home,
etc.).",
                        "$ref":
"#/properties/properties/properties/contacts/items/allOf/0/properties/roles"
                      }
                    }
                  }
                },
                "links": {
                  "type": "array",
                  "description": "On-line information about the contact.",
                  "items": {
                    "allOf": [
                      {
                        "$ref":
"#/properties/properties/properties/contacts/items/allOf/0/properties/logo/allOf/0"
                      },
                      {
                        "type": "object",
                        "required": [
                          "type"
                        ]
                      }
                    ]
                  }
                },
                "hoursOfService": {
                  "type": "string",
                  "description": "Time period when the contact can be contacted."
                },
                "contactInstructions": {
                  "type": "string",
                  "description": "Supplemental instructions on how or when to
contact the\nresponsible party."
                },
                "roles": {
                  "description": "The set of named duties, job functions and/or
permissions\nassociated with this contact.\n(e.g. developer, administrator, etc.).",
                  "type": "array",
                  "minItems": 1,
                  "items": {
                    "type": "string"
                  }
                }
              }
            }
          ]
```

```
          }
        },
        "externalIds": {
          "type": "array",
          "description": "An identifier for the resource assigned by an\nexternal (to
the catalog) entity.",
          "items": {
            "type": "object",
            "properties": {
              "scheme": {
                "type": "string",
                "description": "A reference to an authority or identifier\nfor a
knowledge organization system from\nwhich the external identifier was obtained.\nIt is
recommended that the identifier be a\nresolvable URI."
              },
              "value": {
                "type": "string",
                "description": "The value of the identifier."
              }
            },
            "required": [
              "value"
            ]
          }
        },
        "created": {
          "type": "string",
          "description": "The date this record was created in the server.",
          "format": "date-time"
        },
        "updated": {
          "type": "string",
          "description": "The most recent date on which the record was changed.",
          "format": "date-time"
        },
        "wmo:dataPolicy": {
          "type": "string",
          "description": "The data policy definition as per the WMO Unified Data
Policy Resolution (Res.1) [23].",
          "enum": [
            "core",
            "recommended"
          ]
        }
      }
    },
    "links": {
      "type": "array",
      "minItems": 1,
      "items": {
        "$schema": "https://json-schema.org/draft/2020-12/schema",
```

```
        "$id": "https://raw.githubusercontent.com/wmo-im/wcmp2/main/schema/link.yaml",
        "title": "WCMP link object definition",
        "description": "WCMP link object definition",
        "type": "object",
        "required": [
          "href"
        ],
        "properties": {
          "rel": {
            "type": "string",
            "description": "The type or semantics of the relation.",
            "example": "alternate"
          },
          "type": {
            "type": "string",
            "description": "A hint indicating what the media type of the result of
dereferencing the link should be.",
            "example": "application/geo+json"
          },
          "hreflang": {
            "type": "string",
            "description": "A hint indicating what the language of the result of
dereferencing the link should be.",
            "example": "en"
          },
          "title": {
            "type": "string",
            "description": "Used to label the destination of a link such that it can
be used as a human-readable identifier.",
            "example": "Trierer Strasse 70, 53115 Bonn"
          },
          "length": {
            "type": "integer"
          },
          "channel": {
            "type": "string",
            "description": "topic to subscribe to for broker workflow"
          },
          "security": {
            "type": "object",
            "patternProperties": {
              "^[a-zA-Z0-9\\.\\-_]+$": {
                "oneOf": [
                  {
                    "$ref": "#/definitions/Schema_Reference"
                  },
                  {
                    "$ref": "#/definitions/Schema_SecurityScheme"
                  }
                ]
              }
```

```
            }
          },
          "distribution": {
            "type": "object",
            "description": "the additional information qualifying the service and
allowing to build and display the \"access\" information in a portal",
            "properties": {
              "availableFormats": {
                "type": "array",
                "items": {
                  "type": "object",
                  "properties": {
                    "name": {
                      "type": "string",
                      "description": "available format short name."
                    },
                    "description": {
                      "type": "string",
                      "description": "the individual format description to allow
building the portal information"
                    },
                    "numberOFiles": {
                      "type": "string",
                      "description": "typical number of files disseminated by the
distribution mechanism over a period of time"
                    },
                    "typicalFilesize": {
                      "type": "string",
                      "description": "size of a typical individual file (e.g. KB, MB,
GB)"
                    },
                    "typicalFilename": {
                      "type": "string",
                      "description": "example filename"
                    },
                    "samples": {
                      "description": "links of samples that can be openly accessed by
users to provide a better understanding of the data",
                      "items": {
                        "type": "object",
                        "$ref":
"#/properties/links/items/properties/distribution/properties/availableFormats/items/pr
operties/documentation/items"
                      }
                    },
                    "documentation": {
                      "type": "array",
                      "description": "links to the associated documentation available
for this format when applicable",
                      "items": {
                        "allOf": [
```

```
                        {
                          "type": "object",
                          "required": [
                            "rel"
                          ],
                          "properties": {
                            "rel": {
                              "type": "string",
                              "description": "The type or semantics of the
relation.",
                              "example": "alternate"
                            },
                            "type": {
                              "type": "string",
                              "description": "A hint indicating what the media type
of the result of dereferencing the link should be.",
                              "example": "application/geo+json"
                            },
                            "hreflang": {
                              "type": "string",
                              "description": "A hint indicating what the language of
the result of dereferencing the link should be.",
                              "example": "en"
                            },
                            "title": {
                              "type": "string",
                              "description": "Used to label the destination of a
link such that it can be used as a human-readable identifier.",
                              "example": "Trierer Strasse 70, 53115 Bonn"
                            },
                            "length": {
                              "type": "integer"
                            }
                          }
                        },
                        {
                          "type": "object",
                          "required": [
                            "href"
                          ],
                          "properties": {
                            "href": {
                              "type": "string",
                              "description": "The URI of the link target.",
                              "example": "https://data.example.com/buildings/123"
                            }
                          }
                        }
                      ]
                    }
                  }
```

```
                }
              }
            }
          }
        }
      }
    },
    "linkTemplates": {
      "type": "array",
      "items": {
        "allOf": [
          {
            "type": "object",
            "properties": {
              "rel": {
                "type": "string",
                "description": "The type or semantics of the relation."
              },
              "type": {
                "type": "string",
                "description": "A hint indicating what the media type of the\nresult
of dereferencing the link should be."
              },
              "hreflang": {
                "type": "string",
                "description": "A hint indicating what the language of the\nresult of
dereferencing the link should be."
              },
              "title": {
                "type": "string",
                "description": "Used to label the destination of a link\nsuch that it
can be used as a human-readable\nidentifier."
              },
              "length": {
                "type": "integer"
              },
              "profile": {
                "type": "array",
                "description": "One or more identifiers that provide information about
additional\nsemantics (constraints, conventions, extensions), in addition to \nthose
defined by the media type, that are associated with the\ntarget resource.",
                "items": {
                  "type": "string"
                }
              },
              "created": {
                "type": "string",
                "description": "Date of creation of the resource pointed to\nby the
link.",
                "format": "date-time"
```

```
              },
              "updated": {
                "type": "string",
                "description": "Most recent date on which the resource pointed\nto by
the link was changed.",
                "format": "date-time"
              }
            }
          },
          {
            "type": "object",
            "required": [
              "uriTemplate"
            ],
            "properties": {
              "uriTemplate": {
                "type": "string",
                "description": "Supplies a resolvable URI to a remote resource\n(or
resource fragment)."
              },
              "varBase": {
                "type": "string",
                "description": "The base URI to which the variable name can
be\nappended to retrieve the definition of the\nvariable as a JSON Schema fragment.",
                "format": "uri-reference"
              },
              "variables": {
                "type": "object",
                "description": "This object contains one key per
substitution\nvariable in the templated URL.  Each key defines\nthe schema of one
substitution variable using a\nJSON Schema fragment and can thus include things\nlike
the data type of the variable, enumerations,\nminimum values, maximum values, etc."
              }
            }
          }
        ]
      }
    }
  },
  "definitions": {
    "Schema_APIKeySecurityScheme": {
      "type": "object",
      "required": [
        "type",
        "name",
        "in"
      ],
      "properties": {
        "type": {
          "type": "string",
          "enum": [
```

```
            "apiKey"
          ]
        },
        "name": {
          "type": "string"
        },
        "in": {
          "type": "string",
          "enum": [
            "header",
            "query",
            "cookie"
          ]
        },
        "description": {
          "type": "string"
        }
      },
      "patternProperties": {
        "^x-": {}
      },
      "additionalProperties": false
    },
    "Schema_AuthorizationCodeOAuthFlow": {
      "type": "object",
      "required": [
        "authorizationUrl",
        "tokenUrl"
      ],
      "properties": {
        "authorizationUrl": {
          "type": "string",
          "format": "uri-reference"
        },
        "tokenUrl": {
          "type": "string",
          "format": "uri-reference"
        },
        "refreshUrl": {
          "type": "string",
          "format": "uri-reference"
        },
        "scopes": {
          "type": "object",
          "additionalProperties": {
            "type": "string"
          }
        }
      },
      "patternProperties": {
        "^x-": {}
```

```
    },
    "additionalProperties": false
  },
  "Schema_ClientCredentialsFlow": {
    "type": "object",
    "required": [
      "tokenUrl"
    ],
    "properties": {
      "tokenUrl": {
        "type": "string",
        "format": "uri-reference"
      },
      "refreshUrl": {
        "type": "string",
        "format": "uri-reference"
      },
      "scopes": {
        "type": "object",
        "additionalProperties": {
          "type": "string"
        }
      }
    },
    "patternProperties": {
      "^x-": {}
    },
    "additionalProperties": false
  },
  "Schema_HTTPSecurityScheme": {
    "type": "object",
    "required": [
      "scheme",
      "type"
    ],
    "properties": {
      "scheme": {
        "type": "string"
      },
      "bearerFormat": {
        "type": "string"
      },
      "description": {
        "type": "string"
      },
      "type": {
        "type": "string",
        "enum": [
          "http"
        ]
      }
```

```
    },
    "patternProperties": {
      "^x-": {}
    },
    "additionalProperties": false,
    "oneOf": [
      {
        "description": "Bearer",
        "properties": {
          "scheme": {
            "enum": [
              "bearer"
            ]
          }
        }
      },
      {
        "description": "Non Bearer",
        "not": {
          "required": [
            "bearerFormat"
          ]
        },
        "properties": {
          "scheme": {
            "not": {
              "enum": [
                "bearer"
              ]
            }
          }
        }
      }
    ]
  },
  "Schema_ImplicitOAuthFlow": {
    "type": "object",
    "required": [
      "authorizationUrl",
      "scopes"
    ],
    "properties": {
      "authorizationUrl": {
        "type": "string",
        "format": "uri-reference"
      },
      "refreshUrl": {
        "type": "string",
        "format": "uri-reference"
      },
      "scopes": {
```

```
        "type": "object",
        "additionalProperties": {
          "type": "string"
        }
      }
    },
    "patternProperties": {
      "^x-": {}
    },
    "additionalProperties": false
  },
  "Schema_OAuth2SecurityScheme": {
    "type": "object",
    "required": [
      "type",
      "flows"
    ],
    "properties": {
      "type": {
        "type": "string",
        "enum": [
          "oauth2"
        ]
      },
      "flows": {
        "$ref": "#/definitions/Schema_OAuthFlows"
      },
      "description": {
        "type": "string"
      }
    },
    "patternProperties": {
      "^x-": {}
    },
    "additionalProperties": false
  },
  "Schema_OAuthFlows": {
    "type": "object",
    "properties": {
      "implicit": {
        "$ref": "#/definitions/Schema_ImplicitOAuthFlow"
      },
      "password": {
        "$ref": "#/definitions/Schema_PasswordOAuthFlow"
      },
      "clientCredentials": {
        "$ref": "#/definitions/Schema_ClientCredentialsFlow"
      },
      "authorizationCode": {
        "$ref": "#/definitions/Schema_AuthorizationCodeOAuthFlow"
      }
```

```
      },
      "patternProperties": {
        "^x-": {}
      },
      "additionalProperties": false
    },
    "Schema_OpenIdConnectSecurityScheme": {
      "type": "object",
      "required": [
        "type",
        "openIdConnectUrl"
      ],
      "properties": {
        "type": {
          "type": "string",
          "enum": [
            "openIdConnect"
          ]
        },
        "openIdConnectUrl": {
          "type": "string",
          "format": "uri-reference"
        },
        "description": {
          "type": "string"
        }
      },
      "patternProperties": {
        "^x-": {}
      },
      "additionalProperties": false
    },
    "Schema_PasswordOAuthFlow": {
      "type": "object",
      "required": [
        "tokenUrl"
      ],
      "properties": {
        "tokenUrl": {
          "type": "string",
          "format": "uri-reference"
        },
        "refreshUrl": {
          "type": "string",
          "format": "uri-reference"
        },
        "scopes": {
          "type": "object",
          "additionalProperties": {
            "type": "string"
          }
```

```
        }
      },
      "patternProperties": {
        "^x-": {}
      },
      "additionalProperties": false
    },
    "Schema_Reference": {
      "type": "object",
      "required": [
        "$ref"
      ],
      "patternProperties": {
        "^\\$ref$": {
          "type": "string",
          "format": "uri-reference"
        }
      }
    },
    "Schema_SecurityScheme": {
      "oneOf": [
        {
          "$ref": "#/definitions/Schema_APIKeySecurityScheme"
        },
        {
          "$ref": "#/definitions/Schema_HTTPSecurityScheme"
        },
        {
          "$ref": "#/definitions/Schema_OAuth2SecurityScheme"
        },
        {
          "$ref": "#/definitions/Schema_OpenIdConnectSecurityScheme"
        }
      ]
    }
  }
}
```

Annex C: Examples (Informative)

C.1. WIGOS Metadata Representation Examples

Example: Canadian Hourly Surface Weather Observations (dataset)


```
{
    "id": "urn:wmo:md:ke-meteo:0-20008-0-NRB",
    "type": "Feature",
    "conformsTo": [
        "http://wis.wmo.int/spec/wmdr/2/conf/core"
    ],
    "geometry": {
        "type": "Point",
        "coordinates": [
            36.75919,
            -1.30169,
            1795.0
        ]
    },
    "properties": {
        "created": "1996-01-01T00:00:00Z",
        "wmo:dataPolicy": "core",
        "contacts": [
            {
                "name": "World Meteorological Organization WMO and Federal Office for
Meteorology and Climatology MeteoSwiss",
                "organization": "World Meteorological Organization WMO and Federal
Office for Meteorology and Climatology MeteoSwiss",
                "emails": [
                    {
                        "value": "oscar@wmo.int"
                    }
                ],
                "addresses": [
                    {
                        "deliveryPoint": [
                            "7bis, avenue de la Paix"
                        ],
                        "city": "Geneva",
                        "postalCode": "CH-1211",
                        "country": "Switzerland"
                    }
                ],
                "contactInstructions": "email",
                "links": [
                    {
                        "rel": "canonical",
                        "type": "text/html",
```

```
                    "href": "https://oscar.wmo.int/surface"
                }
            ],
            "roles": [
                "host"
            ]
        },
        {
            "name": "Waweru,Amos,Mr",
            "organization": "Kenyan Meteorological Department",
            "phones": [
                {
                    "value": "+254723521586"
                }
            ],
            "emails": [
                {
                    "value": "waweru_k@yahoo.com"
                },
                {
                    "value": "amoskamau1969@gmail.com"
                }
            ],
            "addresses": [
                {
                    "deliveryPoint": [
                        "Kenya Meteorological Department 30259\nNairobi \nKenya"
                    ],
                    "city": "Nairobi",
                    "administrativeArea": "NB",
                    "postalCode": "00100",
                    "country": "Kenya"
                }
            ],
            "contactInstructions": "africa",
            "roles": [
                "processor",
                "producer"
            ]
        }
    ]
},
"links": [
    {
        "rel": "license",
        "href": "https://creativecommons.org/licenses/by/4.0/"
    },
    {
        "rel": "stations",
        "href": "http://www.meteo.go.ke/obsv/ozone.html"
    }
```

```
    ]
}
```

Annex D: Codelists (Informative)

D.1. Dataset status

The links below provide some controlled vocabularies in support of dataset status, and may be of use when encoding the `properties.status` property..

- https://www.w3.org/TR/vocab-dcat-3/#life-cycle
- https://vocab.met.no/mmd/en/page/?uri=https%3A%2F%2Fvocab.met.no%2Fmmd%2FOperational_Status
- https://wiki.esipfed.org/ISO_19115_and_19115-2_CodeList_Dictionaries#MD_ProgressCode

Annex E: Bibliography

- W3C/OGC: Spatial Data on the Web Best Practices, W3C Working Group Note 28 September 2017, https://www.w3.org/TR/sdw-bp
- W3C: Data on the Web Best Practices, W3C Recommendation 31 January 2017, https://www.w3.org/TR/dwbp
- W3C: Data Catalog Vocabulary, W3C Recommendation 16 January 2014, https://www.w3.org/TR/vocab-dcat
- IANA: Link Relation Types, https://www.iana.org/assignments/link-relations/link-relations.xml
- Linux Foundation: SPDX License List, https://spdx.org/licenses

Annex F: Revision History

Date	Release	Editor	Primary clauses modified	Description
2025-11-12	Template	Tom Kralidis	all	initial template