CEOS CWIC Project

CWIC Client Partner Guide

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Editor: Archie Warnock, Eugene G. Yu, Li Lin

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CWIC Client Partner Guide

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Table of Contents

List of Tables

List of Figures

1. Introduction

This document contains the comprehensive client partner's guide adopted in the CEOS WGISS Integrated Catalog (CWIC) project, which introduces CWIC background, concept and design, required skills to be a client, related query interface and metadata model. Several detailed use cases about how to interact IDN for collection metadata and how to interact with CWIC for granule metadata are also included in this document.

2. Scope

This client partner guide applies to the CEOS WGISS Integrated Catalog (CWIC) version 1.0. CWIC has three instances: Operational (PROD), public testing (TEST) and development (DEV). This client partner guide is applicable to both CWIC PROD instance and CWIC TEST instance.

The target audience for this document is the community of software developers who are:

a) Developer of CWIC client

b) Developer of IDN-CWIC two step search client

3. Document Name and Version Control

Every CWIC technical document may have multiple versions, in which modification or update has been made. If necessary, some documents will be approved to be publicly released. Every released document has a unique reference number, which follows the naming rule below:

CWIC-DOC-Last two digit of Year-Document Series No-Release No

For example: CWIC-DOC-12-001r1 means this is the first released document (i.e., r1), which is the first CWIC technical document (i.e., 001) in 2012 (i.e., 12).

4. References

The following documents provide more background and supportive information.

Document Reference & Version	Document Title / Description
CWIC-DOC-12-001r1	CWIC Software Test Plan
CWIC-DOC-12-002r1	CWIC Dataset Inventory Synchronization
CWIC-DOC-12-004r1	CWIC Connector API Report

5. Before You Begin

This chapter introduces the background, concept and architecture of CWIC, which ensure you get the overall information about CWIC. The related skills you will need as a client partner are also listed.

5.1. CWIC Background

For scientists who conduct multi-disciplinary research, there may be a need to search multiple catalogs in order to find the data they need. Such work is very time-consuming and tedious, especially when the catalogs may use different metadata models and catalog interface protocols. It would be desirable, therefore, for those catalogs to be integrated into a catalog federation, which will present a well-known and documented metadata model and interface protocol to users and hide the complexity and diversity of the affiliated catalogs behind the interface. With such a federation, users only need to work with the federated catalog through the public interface or API to find the data they need instead of working with various catalogs individually.

Committee on Earth Observation Satellite (CEOS) addresses coordination of the satellite Earth Observation (EO) programs of the world's government agencies, along with agencies that receive and process data acquired remotely from space. Working Group on Information Systems and Services (WGISS) is a subgroup of CEOS, which aims to promote collaboration in the development of systems and services that manage and supply EO data to users world-wide. To realize a federated catalogue for data discovery from multiple EO data centers, CEOS WGISS Integrated catalog (CWIC) was implemented. CWIC was expected to provide inventory search to WGISS agency catalog systems for EO data.

5.2. CWIC Concept and Design

The mediator-wrapper architecture has been widely adopted to realize the integrated access to heterogeneous, autonomous data sources. As depicted in Fig. 1, the data source archives data and disseminate it through the Internet. The wrapper on top of the data source provides a universal query interface by encapsulating heterogeneous data models, query protocols, and access methods. The mediator interacts with the wrapper and provides the user with an integrated access through the global information schema.

Wrappers offer query interfaces hiding the heterogenous data model, access path, and interface technology of the partner catalog systems. Wrappers are accessed by a mediator, which offers users a front-end integrated access through its global schema. The user poses queries against the global schema of the mediator; the mediator then distributes the query to the individual systems using the appropriate wrappers. The wrappers transform the queries so they are understandable and executable by the partner catalog systems they wrap, collect

the results, and return them to the mediator. Finally, the mediator integrates the results as a user response.
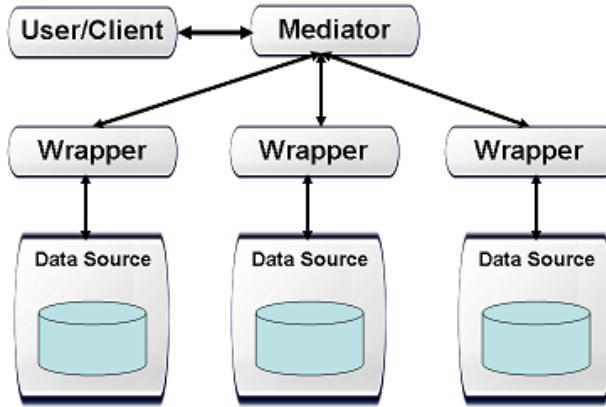
Fig. 1 The Mediator-Wrapper Architecture

The data providers connected by CWIC include NASA, USGS, NOAA GHRSST, Brazil INPE, Canada CCMEO, EUMETSAT and India ISRO (MOSDAC and NRSC). Additionally, the CWIC connector connecting Australia NCI, and China AOE are under development in CWIC development server. Fig. 2 illustrates the system architecture of CWIC. Different wrappers were implemented for different data providers. The wrapper is responsible for translating and dispatching the request to different data inventories.
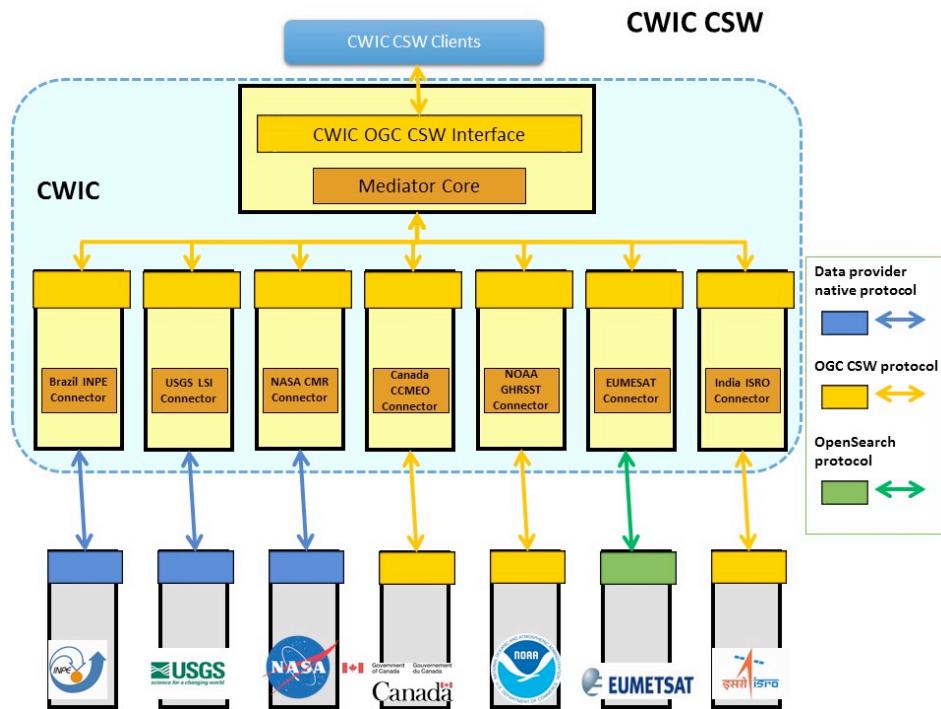
Fig. 2 The System Architecture of CWIC

5.3.   Skills You Will Need as a Client Partner

As a CWIC Client Data Partner, you need to be familiar with web API development and Service Oriented Architecture (SOA) concepts such as:

- XML and XML Schema (XSD)

- Service-based Application Programmer's Interface (API)

- Web development programming language

5.4.   CWIC Terms and Definitions

For the purposes of this document, the following terms and definitions apply:

1) **client**

   A software component that can invoke an operation from a server

2) **data clearinghouse**

   The collection of institutions providing digital data, which can be searched through a single interface using a common metadata standard

3) **identifier**

   A character string that may be composed of numbers and characters that is exchanged between the client and the server with respect to a specific identity of a resource

4) **IDN dataset ID**

   Unique dataset identifier in IDN, returned from the IDN in response to the OSDD request. This identifier is assigned by the IDN CMR database.

5) **native ID**

   Dataset identifier used by CWIC to retrieve granule metadata through data provider API. This identifier is assigned by the data provider.

6) **catalog ID**

   Identifiers of data provider catalogs or connections serving granule metadata

7) **operation**

   The specification of a transformation or query that an object may be called to execute

8) **profile**

   A set of one or more base standards and - where applicable - the identification of chosen clauses, classes, subsets, options and parameters of those base standards that are necessary for accomplishing a particular function

9) **request**

   The invocation of an operation by a CWIC client

10) response

The result of an operation, returned from CWIC server to CWIC client

11) collection

A grouping of granules that all come from the same source, such as a modeling group or institution. Collections have information that is common across all the granules they "own" and a template for describing additional attributes not already part of the metadata model.

12) dataset

Has the same meaning as collection, see (11)

13) granule

The smallest aggregation of data that can be independently managed (described, inventoried, and retrieved). Granules have their own metadata model and support values associated with the additional attributes defined by the owning collection.

14) IDN

The CEOS International Directory Network, a Gateway to the world of Earth Science data and services

5.5.   CWIC Systems

There are two CWIC instances that you, as a Client Partner, have access to:

- CWIC Operations. This is the current operational system for CWC and is available to all users.
  Endpoint: http://cwic.wgiss.ceos.org/

- CWIC Partner Test. This is a test system area used by partners and CWIC developers to test before changes to the CWIC system go operational.
  Endpoint: http://cwictest.wgiss.ceos.org/

5.6.   Contact Information

All the documents and information about CWIC are available at WGISS CWIC page at

> http://ceos.org/ourwork/workinggroups/wgiss/access/cwic/

Any questions regarding to CWIC, please send the email to

> cwic-help@wgiss.ceos.org

6. Metadata Model in CWIC

The metadata model defines the concepts of query parameters. Different data inventories design and maintain different metadata models. CWIC adopts universal metadata models to integrate heterogeneous metadata models, which provides CWIC client with universal catalog discovery. Two metadata models are adopted in CWIC: Dublin Core Metadata and ISO 19115-2 Metadata. The Dublin Core Metadata is referred to describe the parameters in catalog request and response. The ISO 19115-2 Metadata is referred to describe the parameters in catalog response. Not all elements in Core Metadata or ISO 19115-2 Metadata are implemented in CWIC. A synopsis of implemented elements is present in following sections.

6.1.   Dublin Core Metadata

Dublin Core Metadata elements referred in CWIC's catalog REQUEST are list in Table 1.

Element	Definition [d]	Expression
dc[a]: subject	Dataset identifier	Dataset ID
dct[b]: coverage	Start/end of temporal searching criterion	yyyy-MM-ddTHH:mm:ssZ/yyyy-MM-ddTHH:mm:ssZ[e] or yyyy-MM-dd HH:mm:ss/ yyyy-MM-dd HH:mm:ss or yyyy-MM-dd/yyyy-MM-dd
ows[c]: BoundingBox	Rectangle of spatial searching criterion	See Fig. 3
a: xmlns:dc="http://purl.org/dc/elements/1.1/"		
b: xmlns:dct="http://purl.org/dc/terms/"		
c: xmlns:ows="http://www.opengis.net/ows"		
d: "Definition" represents the semantic meaning of element in CWIC. It is slightly different from the genetic meaning in Dublin Core Metadata.		
e: ISO 8601 – see http://www.w3.org/TR/NOTE-datetime		

Table 1 The Dublin Core Metadata Element in CWIC Request

```
<ogc:BBOX>
    <ogc:PropertyName>ows:BoundingBox</ogc:PropertyName>
    <gml:Envelope srsName="EPSG:4326" a>
        <gml:lowerCorner>SouthBoundingLatitude    WestBoundingLongitude</gml:lowerCorner>b
        <gml:upperCorner>NorthBoundingLatitude    EastBoundingLongitude</gml:upperCorner>b
    </gml:Envelope>
</ogc:BBOX>
```

Fig. 3 Example of ows: BouondingBox

Dublin Core Metadata elements referred in CWIC's catalog RESPONSE (Table 2). Owing to different response types (i.e., "brief", "summary", "full") defined in OGC CSW[1], The metadata model elements do not necessarily present in the responses of all types.

Element	Definition [d]	Present in "brief" response	Present in "summary" response	Present in "full" response
dc [a]: identifier	Granule identifier	Yes	Yes	Yes
dc: title	Description of granule	Yes	Yes	Yes
dc: type	Indicator of granule retrieval (i.e., downloadable)	Yes	Yes	Yes
dc: subject	Subject of granule	No	Yes	Yes
dct [b]: modified	Date on which the record was created or updated within the catalogue	No	Yes	Yes
dct: abstract	Abstract of granule	No	Yes	Yes
dct: temporal	Temporal coverage of granule	No	No	Yes
dct: references	See Fig. 4	No	No	Yes
ows [c]: WGS84BouondingBox	See Fig. 5	Yes	Yes	Yes
ows: BoundingBox	See Fig. 6	Yes	Yes	Yes

a: xmlns:dc="http://purl.org/dc/elements/1.1/"

b: xmlns:dct="http://purl.org/dc/terms/"

c: xmlns:ows="http://www.opengis.net/ows"

d: "Definition" represents the semantic meaning of element in CWIC. It is slightly different from the genetic meaning in Dublin Core Metadata.

Table 2 The Dublin Core Metadata Elements in CWIC Response

<dct:references scheme=retrieval schema [a]>Granule retrieval URL</dct:references>

a: There are three kinds of retrieval schema:

"urn:x-cwic: Onlink" : Granule retrieval URL with this schema is a metadata retrieval URL.

"urn:x-cwic: Browse": Granule retrieval URL with this schema is data browsing URL.

"urn:x-cwic: Order": Granule retrieval URL with this schema is a data ordering URL.

Fig. 4 Element of dct:references

```
<ows:WGS84BoundingBox>
    <gml:lowerCorner>SouthBoundingLatitude    WestBoundingLongitude</gml:lowerCorner>
    <gml:upperCorner>NorthBoundingLatitude    EastBoundingLongitude</gml:upperCorner>
</ows:WGS84BoundingBox>
```

Fig. 5 Element of ows:WGS84BoundingBox

```
<ows:BoundingBox>
    <gml:lowerCorner>SouthBoundingLatitude    WestBoundingLongitude</gml:lowerCorner>
    <gml:upperCorner>NorthBoundingLatitude    EastBoundingLongitude</gml:upperCorner>
</ows:BoundingBox>
```

Fig. 6 Element of ows:BoundingBox

6.2.   ISO 19115-2 Metadata

ISO 19115-2 Metadata elements referred in CWIC's catalog REPONSE are list in Fig. 7 (UML) and Table 3.
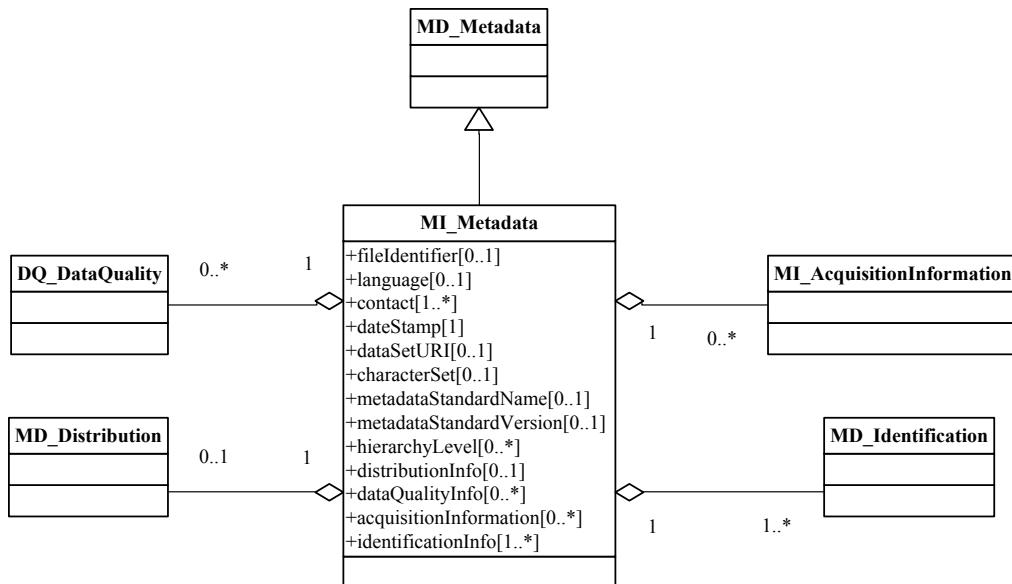
Fig. 7 The UML of CWIC implemented 19115-2 Elements

Element	Definition [c]	Present in "brief" response	Present in "summary" response	Present in "full" response
gmi [a]: MI_Metadata	Root entity representing granule level imagery or gridded data. It is extended from gmd: MD_Metadata	Yes	Yes	Yes
gmd [b]: fileIdentifier	Identifier of granule	Yes	Yes	Yes
gmd: language	Language used for documenting metadata	Yes	Yes	Yes
gmd: contact	Contact information of party responsible for metadata maintenance	Yes	Yes	Yes

gmd: dateStamp	Date that the metadata was created	Yes	Yes	Yes
gmd: dataSetURI	Uniformed Resource Identifier (URI) of the dataset to which the metadata applies	Yes	Yes	Yes
gmd: identificationInfo	Include data and service identification. (i.e., keyword, category, geo-spatial extent)	Yes	Yes	Yes
gmd: characterSet	Character coding standard used for the metadata set	No	Yes	Yes
gmd: metadataStandardName	Name of metadata standard (including profile name) used	No	Yes	Yes
gmd: metadataStandardVersion	Version (profile) of the metadata standard used	No	Yes	Yes
gmd: hierarchyLevel	Name of the hierarchy levels for which the metadata is provided	No	No	Yes
gmd: distributionInfo	Information about the distributor of and options for obtaining the resource(s)	No	No	Yes
gmd: dataQualityInfo	Overall assessment of quality of a resource(s)	No	No	Yes
gmi [a]: acquisitionInformation	Information about the conceptual schema of a dataset	No	No	Yes

a: xmlns:gmi="http://www.isotc211.org/2005/gmi"

b: xmlns:gmd= "http://www.isotc211.org/2005/gmd"

c: "Definition" represents the semantic meaning of element in CWIC. It is slightly different from the genetic meaning in ISO 19115-2.

Table 3 The ISO 19115-2 Elements in CWIC Response.

7. CWIC Query Interface

Query interface stipulates the protocol between client and catalog server. CWIC adopts OGC CSW specification[1] as a query interface.

7.1. Introduction

The OGC CSW specification stipulates interface for catalog service. The interfaces are divided into three categories, which are OGC service interface, CSW discovery interface and CSW manager interface. Specifically, the GetCapabilities operation is OGC service interface, which provides summary information of CWIC catalog. The operations under CSW discovery interface include GetRecords, GetRecordById, DescribeRecord and GetDomain. The operations under CSW manager interface include Transaction, Harvest. Detailed operation information is list in Table 4. Specifically, "CWIC Support" field indicates whether this operation is implemented in CWIC. "Supported HTTP Protocol" field indicates which HTTP protocol is implemented for that operation.

Operation	Operation Description	CWIC Support	Supported HTTP Protocol
GetCapabilities	Retrieve catalog summary information	Yes	GET
GetRecords [a]	Retrieval dataset information. A list of granule data within the dataset will be returned.	Yes	POST
GetRecordById [a]	Retrieval granule information.	Yes	GET/POST
DescribeRecord	Retrieve the information models supported in CWIC	Yes	GET
GetDomain	Retrieve the runtime information about information models.	No	N/A
Transaction	Interface for creating, modifying and deleting catalog records.	No	N/A
Harvest	Interface for pulling data reference from inventories to catalog.	No	N/A
a: Operations of GetRecords and GetRecordById differ in data inventory support. See **Error! Reference source not found.**			

Table 4 OGC CSW Operations implemented in CWIC

7.2. GetCapabilities Operation

The mandatory GetCapabilities operation allows CWIC clients to retrieve service metadata. The response to this request shall be an XML document containing service metadata about

the server. To initialize a GetCapabilities request, CWIC client will construct a GetCapabilities GET request as follows:

http://cwic.wgiss.ceos.org/discovery?service=CSW&request=GetCapabilities&version=2.0.2

CWIC extends GetCapabilities response with <cwic:FederationMetadata> (Fig. 8) element. The registered datasets and corresponding spatial and temporal extents are available in the extended element.

```
<cwic ^a:FederationMetadata>
    <cwic:catalog id=""> ^b
        <cwic:dataSet entryId=""></cwic:dataSet> ^c
        ….
        <cwic:dataSet entryId=""></cwic:dataSet>
    </cwic:catalog>
</cwic:FederationMetadata>


a: xmlns:cwic="http://csiss.gmu.edu/cwic"
b: This element is a container for inventory. Attribute "id" is inventory identifier (i.e., NASA).
c: This element is a container for dataset. Attribute "entryId" is the IDN dataset Id. The value of this element is the IDN title of dataset.
```

Fig. 8 Extended FederationMetadata Element in CWIC capabilities

CWIC supports the "sections" parameter for GetCapabilities operation. Besides "ServiceIdentification", "ServiceProvider", "OperationsMetadata" and "Filter_Capabilities", CWIC clients can specify "FederationMetadata" as a sections parameter.

7.3. DescribeRecord Operation

The mandatory DescribeRecord operation allows CWIC clients to discover elements of the information model supported by CWIC. The operation allows some or the entire information model to be described.

To initialize a DescribeRecord Operation to CWIC, client is supposed to construct a DescribeRecord GET request, as follows:

http://cwic.wgiss.ceos.org/discovery?request=DescribeRecord&Service=CSW&Version=2.0.2

7.4. GetRecords Operation

The mandatory GetRecords operation works as the primary mean of resource discovery in the HTTP protocol binding. It executes an inventory search and returns the granule results. Only OGC Filter XML encoding is supported at this moment. CQL encoding is not.

To initialize a GetRecords request to CWIC, clients are supposed to fill request attributes include the identifier of dataset, spatial and temporal searching clause. The template of

GetRecords POST Request in CWIC is showed in Fig. 9. To achieve simplicity, namespace is ignored in this template.

```
<?xml version="1.0" encoding="UTF-8"?>
<GetRecords List of Request Attribute >
  <Query>
    <ElementSetName></ElementSetName>
    <Constraint>
      <ogc:Filter>
        <ogc:And>
            Identifier of Dataset
            Spatial Searching Clause
            Temporal Searching Clause
        </ogc:And>
      </ogc:Filter>
    </Constraint>
  </Query>
</GetRecords>
```

Fig. 9 GetRecords POST Request Template in CWIC

7.4.1. Request Attributes

Request Parameter [a]	Description [b]	Value & Optionality (M) = mandatory (O) = optional	XPath [c]
service	Tell CWIC this is a CSW service.	(M) Fixed value: CSW	/GetRecords@service
version	Tell CWIC which version of CSW service you are requesting.	(M) Fixed value; 2.0.2	/GetRecords@version
resultType	Specify the type of result	(O) Allowed values in CWIC: "hits", "results". Default value is "hits"	/GetRecords@resultType
outputFormat	Specify the output format of GetRecords returned document	(O) Allowed values in CWIC: "application/xml"	/GetRecords@outputFormat
outputSchema	Specify the schema of GetRecords returned document	(O) Allowed namespace in CWIC: "http://www.opengis.net/cat/csw/2.0.2" And "http://www.isotc211.org/	/GetRecords@outputSchema

		2005/gmd" Default value is: "http://www.opengis.net/cat/csw/2.0.2"	
startPosition	Specify the sequence number of first returned record	(O) Allowed value is: positive integer between zero and returned number Default value is 1	/GetRecords@startPosition
maxRecords	Specify number of returned records	(O) Allowed value is: positive integer Default value is: 10	/GetRecords@maxRecords
typeNames	Specify	(M) Allowed values in CWIC: "csw:Record" and "gmd:MD_Metadata"	/GetRecords/Query@typeName And /GetRecords/Query/ElementSetName@typeName
ElementSetName	Specify the type of GetRecords returned document	(M) Allowed values: "brief" "summary" or "full".	/GetRecords/Query/ElementSetName
a: All request parameters are case insensitive in CWIC			
b: "Definition" represents the semantic meaning of element in CWIC. It is slightly different from the genetic meaning in OGC CSW.			
c: Element's XML Path in GetRecords Request.			

Table 5 Table of GetRecords Request Attributes

7.4.2. Identifier of Datasets

```
<ogc:PropertyIsEqualTo>
      <ogc:PropertyName>dc:subject</ogc:PropertyName>
      <ogc:Literal>Identifier of Dataset a as URI</ogc:Literal>
</ogc:PropertyIsEqualTo>


a: The identifier of dataset is expressed as:    Dataset ID
```

Fig. 10 Dataset Identifier Clause

7.4.3. Spatial Search Clause

```
<ogc:BBOX>
      <ogc:PropertyName>ows:BoundingBox</ogc:PropertyName>
      <gml:Envelope srsName="EPSG:4326" >
          <gml:lowerCorner>SouthBoundingLatitude WestBoundingLongitude</gml:lowerCorner>b
          <gml:upperCorner>NorthBoundingLatitude EastBoundingLongitude</gml:upperCorner>b
      </gml:Envelope>
</ogc:BBOX>
```

a: Searching area has to be defined with coordinates under EPSG:4326.

b: Coordinate under EPSG:4326 conforms to the form: latitude + blank + longitude.

Fig. 11 Spatial Searching Clause

7.4.4. Temporal Search Clause

```
<ogc:PropertyIsGreaterThanOrEqualTo>
    <ogc:PropertyName>TempExtent_begin</ogc:PropertyName>
    <ogc:Literal>Start date of Temporal Coverage ᵃ</ogc:Literal>
</ogc:PropertyIsGreaterThanOrEqualTo>
<ogc:PropertyIsLessThanOrEqualTo>
    <ogc:PropertyName>TempExtent_end</ogc:PropertyName>
    <ogc:Literal> End date of Temporal Coverage ᵃ</ogc:Literal>
</ogc:PropertyIsLessThanOrEqualTo>
```

a: Both "Start date of Temporal Coverage" and "End date of Temporal Coverage" are expressed as: "yyyy-MM-dd HH:mm:ss" or "yyyy-MM-ddTHH:mm:ssZ".

Fig. 12 Temporal Searching Clause

7.5. GetRecordById Operation

The mandatory GetRecords operation works as the primary mean of resource discovery in the HTTP protocol binding. It executes an inventory search and returns the granule results. Only OGC Filter XML encoding is supported at this moment. The GetRecordById shall return the detailed metadata information for some specific objects of interest.

To initialize a GetRecordById request to CWIC, clients will set the identifier of the granule. The template of GetRecordById request in HTTP POST (Fig. 13) is showed below. To achieve simplicity, namespaces are ignored in this template.

```
<?xml version="1.0" encoding="UTF-8"?>
<GetRecordById List of Request Attribute>
    <ElementSetName></ElementSetName>
    Identifier of Granule
</GetRecordById>
```

Fig. 13 GetRecordById POST Request Template in CWIC

7.5.1. Request Attributes

Request Parameter [a]	Description [b]	Value & Optionality (M) = mandatory	XPath [c]

(O) = optional			
service	Tell CWIC this is a CSW service.	(M) Fixed value: CSW	/GetRecordById@service
version	Tell CWIC which version of CSW service you are requesting.	(M) Fixed value; 2.0.2	/ GetRecordById@version
outputFormat	Specify the output format of GetRecordById returned document	(O) Allowed values in CWIC: "application/xml"	/ GetRecordById @outputFormat
outputSchema	Specify the schema of GetRecordById returned document	(O) Allowed namespace in CWIC: "http://www.opengis.net/cat/csw/2.0.2" And "http://www.isotc211.org/2005/gmd" Default value is: "http://www.opengis.net/cat/csw/2.0.2"	/ GetRecordById@outputSchema
a: All request parameters are case insensitive in CWIC. b: "Definition" represents the semantic meaning of element in CWIC. It is slightly different from the genetic meaning in OGC CSW. c: Element's XML Path in GetRecordById Request.			

Table 6 Table of GetRecordById Request Attribute

7.5.2. Identifier of Granule

```
<Id>CWIC Granule Identifier 1</Id>
….
<Id>CWIC Granule Identifier n</Id>
```

Fig. 14 Granule Identifier Clause

The granule identifier should be identical to the one returned in the GetRecords response.

7.6. CWIC Queryables

As of April 2017, CWIC has supported the following Queryables:

Queryables	description
dc: subject	specify dataset ID

dc: identifier	specify dataset ID (same as dc:subject)
dct:coverage	specify start/end date and time
apiso:TempExtent_begin	specify start date and time
apiso:TempExtent_end	specify end date and time
ows:BoundingBox	specify spatial bounding box with gml:Envelope element

Table 7 CWIC Queryables and description

8. CWIC Client Partner Implementation Outline

The dataset identifier is mandatory in CWIC request. This chapter provides a comprehensive overview about how to implement a CWIC client. This includes how to retrieve dataset identifier from IDN/CWIC GetCapabilities and how to build a GetRecords query for granule search on CWIC.

8.1. Retrieve dataset identifier from IDN CSW

CWIC client can retrieve datasets from IDN CSW with proper search constrains. The identifier of returned dataset will be used as search parameter during the granule-level search on CWIC. The following request is an example of retrieving datasets (available from CWIC) through IDN CSW GetRecords. The returned results can be further filtered with more constrains (e.g., spatial, temporal, keyword). For detail info about IDN CSW, please refer the GetCapabilities document of IDN CSW:

https://cmr.earthdata.nasa.gov/csw/collections?request=GetCapabilities&service=CSW&version=2.0.2

Endpoint:
https://cmr.earthdata.nasa.gov/csw/collections

Request example:
```xml
<?xml version="1.0" encoding="UTF-8"?>
<csw:GetRecords maxRecords="10" outputFormat="application/xml"
    outputSchema="http://www.isotc211.org/2005/gmd" resultType="results" service="CSW"
    startPosition="1" version="2.0.2" xmlns="http://www.opengis.net/cat/csw/2.0.2"
    xmlns:csw="http://www.opengis.net/cat/csw/2.0.2"
xmlns:gmd="http://www.isotc211.org/2005/gmd"
    xmlns:gml="http://www.opengis.net/gml" xmlns:ogc="http://www.opengis.net/ogc"
    xmlns:rim="urn:oasis:names:tc:ebxml-regrep:xsd:rim:3.0">
    <csw:Query typeNames="csw:Record">
        <csw:ElementSetName>full</csw:ElementSetName>
        <csw:Constraint version="1.1.0">
            <ogc:Filter xmlns:ogc="http://www.opengis.net/ogc">
                <ogc:PropertyIsLike>
                    <ogc:PropertyName>IsCwic</ogc:PropertyName>
                    <ogc:Literal>true</ogc:Literal>
                </ogc:PropertyIsLike>
            </ogc:Filter>
        </csw:Constraint>
    </csw:Query>
</csw:GetRecords>
```

The identifier of each returned dataset is available under the gmd:fileIdentifier element.

Response example:
```
<?xml version="1.0"?>
<csw:GetRecordsResponse xmlns:csw="http://www.opengis.net/cat/csw/2.0.2">
    <csw:SearchStatus timestamp="2017-04-18T16:46:21-04:00"/>
    <csw:SearchResults numberOfRecordsMatched="4584" numberOfRecordsReturned="10"
nextRecord="11" elementSet="full" recordSchema="http://www.isotc211.org/2005/gmd">
        <gmd:MD_Metadata xmlns:gco="http://www.isotc211.org/2005/gco"
xmlns:gmd="http://www.isotc211.org/2005/gmd" xmlns:gmi="http://www.isotc211.org/2005/gmi"
xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:gmx="http://www.isotc211.org/2005/gmx"
xmlns:gss="http://www.isotc211.org/2005/gss"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:gml="http://www.opengis.net/gml/3.2" xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:eos="http://earthdata.nasa.gov/schema/eos" xmlns:srv="http://www.isotc211.org/2005/srv"
xmlns:gts="http://www.isotc211.org/2005/gts"
xmlns:swe="http://schemas.opengis.net/sweCommon/2.0/"
xmlns:gsr="http://www.isotc211.org/2005/gsr">
            <gmd:fileIdentifier>
                <gco:CharacterString>
                    http://cwic.wgiss.ceos.org/opensearch/granules.atom/?datasetId=C179003030-ORNL_DAAC
                </gco:CharacterString>
            </gmd:fileIdentifier>
        …
</gmd:MD_Metadata>
…
<gmd:MD_Metadata>
</gmd:MD_Metadata>
    </csw:SearchResults>
</csw:GetRecordsResponse>
```

8.2. Retrieve Dataset Identifier from CWIC Capabilities

The CWIC client can also retrieve the dataset identifier from CWIC GetCapabilities document (http://cwic.wgiss.ceos.org/discovery?service=CSW&request=GetCapabilities&version=2.0.2). As shown in the follow figure, the identifier of dataset is available in the id attribute of <cwic:dataSet> element.

Example of extended section of CWIC Capabilities document
```
<cwic:FederationMetadata>
    <cwic:catalog id="USGSLSI">
        <cwic:dataSet id="C1220567235-USGS_LTA">
```

```
        …
    </cwic:dataSet>

    …
  </cwic:catalog>
  <cwic:catalog id="INPE">

    ... ...
  </cwic:catalog>
  <cwic:catalog id="NASA">

    ... ...
  </cwic:catalog>
</cwic:FederationMetadata>
```

Fig. 15 Example of FederationMetadata Element

8.3. Request granule metadata from CWIC

With the dataset identifier retrieved from either IDN CSW or CWIC GetCapabilities document, the CWIC client will construct CSW request by following the request template in Fig. 9. Particularly, search constraints such as spatial footprint or temporal extent can be used by the CWIC client to further filter search results.

Abbreviations and Glossary

Term	Meaning
AOE	Academy of Optic-Electronic (AOE) of Chinese Academy of Science
CCMEO	Canada Centre for Mapping and Earth Observation
CEOS	Committee on Earth Observation Satellites
CSW	OpenGIS Catalog Service for Web
CWIC	CEOS WGISS Integrated Catalog
CWIC DEV	CWIC development instance
CWIC PROD	CWIC operational instance
CWIC TEST	CWIC public testing instance
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
GHRSST	Group for High Resolution Sea Surface Temperature
IDN	International Directory Network
INPE	Instituto Nacional de Pesquisas Espaciais (National Institute For Space Research, Brazil)
ISRO	Indian Space Research Organisation
NASA	National Aeronautics and Space Administration
NCEI	National Centers for Environmental Information
NOAA	National Oceanic and Atmospheric Administration
OGC	Open Geospatial Consortium
USGS	U.S. Geological Survey
WGISS	Working Group on Information Systems and Services