CWIC-IDN Alignment

# White Paper Archie Warnock (warnock@awcubed.com)

## Background

This paper presents suggested resolutions to some inconsistencies in how CSW capabilities are presented by the CWIC and IDN implementations. The focus is on two primary areas – consistent expressions of supported operations and operands in the respective capabilities documents, and handling of temporal quantities in Filter expressions used in GetRecords requests.

It is not possible for CWIC to support every operation that the IDN implementation support – the remote data systems for which CWIC serves as a proxy do not support the same range of operations as the IDN implementation, which is based on the open-source GeoNetwork software. But in the case where the operations align, the description and documentation of them should be in agreement.

The ideas presented here are the results of discussions within the CWIC development team and with client developers. The intent of this paper is to document the results of those discussions and establish supported practices for the CWIC implementation.

## Capabilities Alignment

In the process of trying to resolve differences between the CWIC and IDN CSW capabilities documents, we have stumbled several times across a seeming ambiguity in declaring some operators. This seems to arise from the CSW spec itself.  We should be able to come to an agreement to resolve it in a way that will be useful to the clients.

Specifically, the issue is over the names of the scalar comparison operators.  The operators are declared in the capabilities document, to be instantiated in a GetRecords request using the OGC Filter specification (which both CWIC and IDN support) or the CQL query language (which CWIC does not currently support).

The OGC filter spec is completely unambiguous about the names of operators to be used – it requires the names of the elements in question to be <PropertyIsLessThanOrEqualTo> or <PropertyIsGreaterThanOrEqualTo>. Both CWIC and the IDN use these names.

The ambiguity apparently arises in how support for those comparisons is declared in the capabilities document.  The example in the Filter specification (only in v1.1, OGC 04-095) gives an example of the <Filter\_Capabilities> element in which the functions are listed like this:

<ogc:ComparisonOperator>LessThanEqualTo</ogc:ComparisonOperator>   
<ogc:ComparisonOperator>GreaterThanEqualTo</ogc:ComparisonOperator>

It is not entirely why the comparison operators aren't called <PropertyIsLessThanOrEqualTo> and <PropertyIsGreaterThanOrEqualTo>, which would be more intuitive, nor does there appear to be any particular rule describing how to map from the comparison operator value in the capabilities document to the actual comparison function in the Filter expression.

In addition, this example from the Filter specification appears to have been copied into the CSW v2.0.2 specification document. If this is an inconsistency, at least it is consistently inconsistent. Note further than the examples have been removed from the OGC Filter v2.0.0 (OGC 09-026r1) specification document, which was issued after the CSW specification.

In any event, the capabilities document for CWIC uses these values as found in the CSW and Filter documents (pasted here):

<ogc:ComparisonOperator>GreaterThanEqualTo</ogc:ComparisonOperator>  
<ogc:ComparisonOperator>LessThanEqualTo</ogc:ComparisonOperator>

Similarly, the capabilities document for IDN notes the ambiguity while including both versions of the operators. However, only the two above are actually valid according to the OGC filter specification. The other two (noted in the comments as coming from the CSW schema) are not valid OGC comparison operators and, as a result, the IDN document does not validate.

<!--

LessThanOrEqualTo is in OGC Filter Spec, LessThanEqualTo is in OGC CSW schema

-->

<ogc:ComparisonOperator>LessThanEqualTo</ogc:ComparisonOperator>

<ogc:ComparisonOperator>LessThanOrEqualTo</ogc:ComparisonOperator>

<!--

GreaterThanOrEqualTo is in OGC Filter Spec, GreaterThanEqualTo is in OGC CSW schema

-->

<ogc:ComparisonOperator>GreaterThanEqualTo</ogc:ComparisonOperator>

<ogc:ComparisonOperator>GreaterThanOrEqualTo</ogc:ComparisonOperator>

Note that the CSW Core specification (OGC 07-006r1) does not include any of these operators in the example capabilities document, nor does the Filter specification v2.0.0.  The names of the comparison operators seem to arise from the example capabilities in the v1.1 of the Filter spec and were lifted from there for the CSW ISO profile spec.

### Conclusions

1. The CWIC capabilities document validates against the specified schema. The IDN capabilities document does not, but can be made valid by removing the two non-compliant comparison operators. The CWIC capabilities documents should remain valid and need only contain these two elements:

<ogc:ComparisonOperator>GreaterThanEqualTo</ogc:ComparisonOperator>  
<ogc:ComparisonOperator>LessThanEqualTo</ogc:ComparisonOperator>   
  
It would be advisable for the IDN to make the appropriate change to their capabilities document so that it validates.

1. Additionally, we also require (by the OGC Filter spec) that a valid <Filter> expression can only contain <ogc:PropertyIsLessThanOrEqualTo> or <ogc:PropertyIsGreaterThanOrEqualTo> (making the namespace explicit with the "ogc:" prefix) and not <ogc:PropertyIsLessThanEqualTo> or <ogc:PropertyIsGreaterThanEqualTo> (in the OGC namespace or any other).
2. Finally, comparison functions and operands not supported by CWIC implementation must not be included in the CWIC capabilities document.

## Filter Expressions in GetRecords Requests (Short Version)

A number of significant catalogs within CWIC (notably, NASA/ECHO, USGS/LSI and INPE) do not provide support for detailed temporal semantics in their inventory search interfaces. In particular, none provide for temporal relations, either numeric (e.g., GreaterThan, LessThan) or date/time specific (e.g., Before, During, After). A request to any of these systems may only specify start and/or end date and time and the results are filtered based on the default behavior of the search system.

As a result, the CWIC team has made an effort to determine what this default filtering is for each of these systems and the results are summarized in the CWIC API Report document. A consequence of this limitation on the expression of temporal searches is that, for these catalogs at least, the associated connectors largely ignore the semantics of the incoming GetRecords request and just copy the start and end dates and times into the translated remote query. Just to reiterate, this is because there are no semantics to be translated from the GetRecords request into the native query request.

Notwithstanding the point that some CWIC connectors may, based on the semantics of the native query request, simply ignore most of any temporal filter expressions in the client’s incoming GetRecords request and only extract the start and end dates and times to pass to the remote system, it is probably useful to review the filter expressions which most closely match the default behavior of the remote systems. This will manage expectations on the part of clients as to what filter expressions will actually provide meaningful and consistent responses.

Each of these connectors implements what is essentially an “Overlaps” relationship in selecting granules which match the incoming request. That is, if any part of the temporal footprint of a granule lies between the specified start and end date and time, the granule is considered to match the request and returned.

CWIC currently supports the expression of start/end dates as scalars using the simple scalar comparison operators like this:

<ogc:Filter xmlns=["http://www.opengis.net/ogc"](http://www.opengis.net/ogc)>   
  <ogc:And>   
    <ogc:PropertyIsEqualTo>   
    <ogc:PropertyName>identifier</ogc:PropertyName>   
      <ogc:Literal>USGS\_FCT\_Brazil</ogc:Literal>   
    </ogc:PropertyIsEqualTo>   
    <ogc:PropertyIsGreaterThanOrEqualTo>   
      <ogc:PropertyName>TempExtent\_begin</PropertyName>   
      <ogc:Literal>date1</ogc:Literal>   
    </ogc:PropertyIsGreaterThanOrEqualTo>   
    <ogc:PropertyIsLessThanOrEqualTo>   
      <ogc:PropertyName>TempExtent\_end</ogc:PropertyName>   
      <ogc:Literal>date2</ogc:Literal>   
    </ogc:PropertyIsLessThanOrEqualTo>   
  </ogc:And>   
</ogc:Filter>

Note that this specifies that the granule starting time must be after some specified date AND the granule ending time must be before some other specified date, implying that the granule should be completely contained within the specified interval (i.e., when date1 is before date2). This works in most cases as the granule duration times are frequently relatively small, but isn’t accurate when the temporal footprint of the granule is large. The remote systems may return some overlapping granules which match only one of the two conditions in the Boolean <And> expression.

A more accurate representation of the default behavior of the remote systems would utilize the OGC ‘Between’ comparison operator like this:

<ogc:Filter xmlns=["http://www.opengis.net/ogc"](http://www.opengis.net/ogc)>   
  <ogc:And>   
    <ogc:PropertyIsEqualTo>   
    <ogc:PropertyName>identifier</ogc:PropertyName>   
      <ogc:Literal>USGS\_FCT\_Brazil</ogc:Literal>   
    </ogc:PropertyIsEqualTo>   
 <ogc:Or>  
 <ogc:PropertyIsBetween>  
     <ogc:PropertyName>TempExtent\_begin</ogc:PropertyName>  
     <ogc:LowerBoundary>  
 <ogc:Literal>startDate</ogc:Literal>  
 </ogc:LowerBoundary>  
     <ogc:UpperBoundary>  
 <ogc:Literal>endDate</ogc:Literal>  
 </ogc:UpperBoundary>  
   </ogc:PropertyIsBetween>  
   <ogc:PropertyIsBetween>  
     <ogc:PropertyName>TempExtent\_end</ogc:PropertyName>  
     <ogc:LowerBoundary>  
 <ogc:Literal>startDate</ogc:Literal>  
 </ogc:LowerBoundary>  
     <ogc:UpperBoundary>  
 <ogc:Literal>endDate</ogc:Literal>  
 </ogc:UpperBoundary>  
 </ogc:PropertyIsBetween>  
 </ogc:Or>  
  </ogc:And>   
</ogc:Filter>

In this case, this will match when either the granule start date or the granule end date lies inside the specified interval (and note that the upper and lower boundary values must be the same since the remote data systems only accept one start and one end date in the remote query request). Only granules which completely contain the specified interval do not match the request but may be returned anyway. This does not happen often and no valid responses will be missed.

We need to consider how the connectors are to response to unsupported temporal requests as we are starting to see a divergence of functionality between the remote data systems. This will need to be addressed by CWIC at some point in the future.  For example, some combinations of 'Between' can be translated correctly by the ECHO connector but not others - that is, we can 'OR' two clauses together, but 'AND' won't be guaranteed to be accurate. The CWIC team believes clients will find the preferable to throwing exceptions on such requests because the temporal extent of most individual granules is usually small and the "edge" cases will be few although, strictly speaking, we could get some granules with date ranges that fall partially outside of a requested extent.

### Conclusions

Now that we have demonstrated the syntax for the 'Between' comparison operator, we can adequately express temporal searches using that.  The CWIC team will update the connectors to allow requests which use it, at least as demonstrated above.

Since v2.0.0 of the OGC Filter spec has a set of temporal operands, the ones previously proposed for the cwic: namespace will be removed from the CWIC capabilities document.  CWIC users should probably consider support for the OGC Filter v2.0.0 specification in the future, especially if we want to support more complex temporal queries.

In summary, CWIC will accept the two temporal requests specified above although there will be potential inaccuracies in the responses in the sense that the response may contain additional granules which do not fully match the filter criterion for reasons already cited.

In the ECHO, LSI and INPE connectors, so far, we just copy the requested start and end dates to the outgoing request and take what the server gives back, as we do not have the option of submitting any temporal semantics.

The remaining question is whether we should continue to do this for temporal requests that ask for a Boolean combination that isn’t supported?  Do we continue to try a "best match" approach? The alternative of throwing an exception (as in the case of the 'And' expression) seems unduly harsh for clients.

# Annex 1 – Abbreviated CWIC Capabilities Document

This is a sample of the current CWIC capabilities document. Not all datasets are represented but it includes examples to show how the extendedCapabilities element is used.

Note, in particular, the addition of the new elements <cwic:requireSpatialExtent> and <cwic:requireTemporalExtent> inside the <cwic:defaults> element. These are intended to inform the client which data catalogs (remote data systems) require temporal and spatial limits. While we can supply defaults for spatial extent from the <cwic:valids> element for each data set, there are no usable defaults which can be supplied by CWIC for temporal extent and so an exception will be thrown if the data system requires it and the request omits it. We also provide a new element, <cwic:updated>, which documents the last time the catalog information was updated from the GCMD/IDN.

In addition, clients should assume that, if either of these elements are missing or empty, the assumed value is false.

<?xml version="1.0" encoding="UTF-8"?>

<csw:Capabilities xmlns:csw="http://www.opengis.net/cat/csw/2.0.2"

xmlns:cwic="http://csiss.gmu.edu/cwic" xmlns:ows="http://www.opengis.net/ows"

xmlns:ogc="http://www.opengis.net/ogc" xmlns:xlink="http://www.w3.org/1999/xlink"

xmlns:rim="urn:oasis:names:tc:ebxml-regrep:xsd:rim:3.0"

xmlns:gml="http://www.opengis.net/gml" xmlns:gmd="http://www.isotc211.org/2005/gmd"

xmlns:gco="http://www.isotc211.org/2005/gco"

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

xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" version="2.0.2"

updateSequence="1" xsi:schemaLocation="http://www.opengis.net/cat/csw/2.0.2

http://schemas.opengis.net/csw/2.0.2/CSW-discovery.xsd">

<ows:ServiceIdentification>

<ows:Title>CEOS WGISS Integrated Catalog (CWIC) - Development instance</ows:Title>

<ows:Abstract>CWIC provides an OGC CSW 2.0.2 - compliant access point for major CEOS agency catalog systems. This is the development instance of CWIC.</ows:Abstract>

<ows:Keywords>

<ows:Keyword>Committee on Earth Observation Satellites - CEOS</ows:Keyword>

<ows:Keyword>CEOS Working Group on Information Systems and Services - CEOS WGISS</ows:Keyword>

<ows:Keyword>CEOS WGISS Integrated Catalog - CWIC</ows:Keyword>

<ows:Keyword>International Directory Network - IDN</ows:Keyword>

<ows:Keyword>OGC Catalogue Service for Web - CSW</ows:Keyword>

<ows:Keyword>Earth Observation Satellite Data Catalog</ows:Keyword>

<ows:Keyword>Center for Spatial Information Science and Systems - CSISS</ows:Keyword>

<ows:Keyword>George Mason University - GMU</ows:Keyword>

<ows:Keyword>A/WWW Enterprises</ows:Keyword>

</ows:Keywords>

<ows:ServiceType>CSW</ows:ServiceType>

<ows:ServiceTypeVersion>2.0.2</ows:ServiceTypeVersion>

<ows:Fees>NONE</ows:Fees>

<ows:AccessConstraints>NONE</ows:AccessConstraints>

</ows:ServiceIdentification>

<ows:ServiceProvider>

<ows:ProviderName>CEOSS WGISS</ows:ProviderName>

<ows:ProviderSite xlink:href="http://wgiss.ceos.org/cwic"/>

<ows:ServiceContact>

<ows:IndividualName>Yonsook Enloe, Martin Yapur</ows:IndividualName>

<ows:PositionName>CWIC Co-chair</ows:PositionName>

<ows:ContactInfo>

<ows:Address>

<ows:ElectronicMailAddress>exec@wgiss.ceos.org</ows:ElectronicMailAddress>

</ows:Address>

<ows:OnlineResource xlink:href="mailto:exec@wgiss.ceos.org"/>

</ows:ContactInfo>

</ows:ServiceContact>

</ows:ServiceProvider>

<ows:OperationsMetadata>

<ows:Operation name="GetCapabilities">

<ows:DCP>

<ows:HTTP>

<ows:Get xlink:href="http://cwicdev.csiss.gmu.edu/cwicv1/discovery?"/>

</ows:HTTP>

</ows:DCP>

</ows:Operation>

<ows:Operation name="DescribeRecord">

<ows:DCP>

<ows:HTTP>

<ows:Get xlink:href="http://cwicdev.csiss.gmu.edu/cwicv1/discovery?"/>

</ows:HTTP>

</ows:DCP>

<ows:Parameter name="typeName">

<ows:Value>csw:Record</ows:Value>

<ows:Value>gmd:MD\_Metadata</ows:Value>

</ows:Parameter>

<ows:Parameter name="outputFormat">

<ows:Value>application/xml</ows:Value>

</ows:Parameter>

<ows:Parameter name="schemaLanguage">

<ows:Value>XMLSCHEMA</ows:Value>

</ows:Parameter>

</ows:Operation>

<ows:Operation name="GetRecords">

<ows:DCP>

<ows:HTTP>

<ows:Post xlink:href="http://cwicdev.csiss.gmu.edu/cwicv1/discovery"/>

</ows:HTTP>

</ows:DCP>

<ows:Parameter name="TypeName">

<ows:Value>csw:Record</ows:Value>

<ows:Value>gmd:MD\_Metadata</ows:Value>

</ows:Parameter>

<ows:Parameter name="outputFormat">

<ows:Value>application/xml</ows:Value>

</ows:Parameter>

<ows:Parameter name="outputSchema">

<ows:Value>http://www.opengis.net/cat/csw/2.0.2</ows:Value>

<ows:Value>http://www.isotc211.org/2005/gmd</ows:Value>

</ows:Parameter>

<ows:Parameter name="resultType">

<ows:Value>hits</ows:Value>

<ows:Value>results</ows:Value>

</ows:Parameter>

<ows:Parameter name="ElementSetName">

<ows:Value>brief</ows:Value>

<ows:Value>summary</ows:Value>

<ows:Value>full</ows:Value>

</ows:Parameter>

<ows:Parameter name="CONSTRAINTLANGUAGE">

<ows:Value>Filter</ows:Value>

</ows:Parameter>

<ows:Constraint name="SupportedDublinCoreQueryables">

<ows:Value>subject</ows:Value>

<ows:Value>identifier</ows:Value>

<ows:Value>coverage.dateStart</ows:Value>

<ows:Value>coverage.dateEnd</ows:Value>

<ows:Value>BoundingBox</ows:Value>

</ows:Constraint>

<ows:Constraint name="SupportedISOQueryables">

<ows:Value>TempExtent\_begin</ows:Value>

<ows:Value>TempExtent\_end</ows:Value>

</ows:Constraint>

</ows:Operation>

<ows:Operation name="GetRecordById">

<ows:DCP>

<ows:HTTP>

<ows:Get xlink:href="http://cwicdev.csiss.gmu.edu/cwicv1/discovery"/>

</ows:HTTP>

</ows:DCP>

<ows:Parameter name="outputSchema">

<ows:Value>http://www.opengis.net/cat/csw/2.0.2</ows:Value>

<ows:Value>http://www.isotc211.org/2005/gmd</ows:Value>

</ows:Parameter>

<ows:Parameter name="ElementSetName">

<ows:Value>brief</ows:Value>

<ows:Value>summary</ows:Value>

<ows:Value>full</ows:Value>

</ows:Parameter>

</ows:Operation>

<ows:ExtendedCapabilities>

<cwic:ExtendedCapabilities>

<gmd:onLine>

<gmd:CI\_OnlineResource id="ID">

<gmd:linkage>

<gmd:URL>http://www.ceos.org/images/WGISS/CWIC/CWIC-DOC-12-007r1\_CWIC\_Software\_Exception\_Handling.doc</gmd:URL>

</gmd:linkage>

<gmd:protocol>

<gco:CharacterString>http</gco:CharacterString>

</gmd:protocol>

<gmd:name>

<gco:CharacterString>CWIC Exception Handing Guide</gco:CharacterString>

</gmd:name>

<gmd:description>

<gco:CharacterString>CWIC Guide for clients documenting exceptions thrown by the CWIC server.</gco:CharacterString>

</gmd:description>

<gmd:function>

<gmd:CI\_OnLineFunctionCode codeList="http://www.ngdc.noaa.gov/metadata/published/xsd/schema/resources/Codelist/gmxCodelists.xml#CI\_OnLineFunctionCode" codeListValue="download">download</gmd:CI\_OnLineFunctionCode>

</gmd:function>

</gmd:CI\_OnlineResource>

</gmd:onLine>

<gmd:onLine>

<gmd:CI\_OnlineResource id="ID">

<gmd:linkage>

<gmd:URL>http://www.ceos.org/images/WGISS/CWIC/CWIC-DOC-12-004r1\_CWIC\_Connector\_API\_Report.doc</gmd:URL>

</gmd:linkage>

<gmd:protocol>

<gco:CharacterString>http</gco:CharacterString>

</gmd:protocol>

<gmd:name>

<gco:CharacterString>CWIC Connector API Report</gco:CharacterString>

</gmd:name>

<gmd:description>

<gco:CharacterString>CWIC Documentation for connector/wrapper APIs.</gco:CharacterString>

</gmd:description>

<gmd:function>

<gmd:CI\_OnLineFunctionCode codeList="http://www.ngdc.noaa.gov/metadata/published/xsd/schema/resources/Codelist/gmxCodelists.xml#CI\_OnLineFunctionCode" codeListValue="download">download</gmd:CI\_OnLineFunctionCode>

</gmd:function>

</gmd:CI\_OnlineResource>

</gmd:onLine>

<cwic:FederationMetadata>

<cwic:attributes>

<!-- These apply to all datasets unless overridden -->

<cwic:updated>

<gmd:dateStamp>

<gco:DateTime>2013-03-25T15:44:20Z</gco:DateTime>

</gmd:dateStamp>

</cwic:updated>

<cwic:supportHitsRequest>true</cwic:supportHitsRequest>

<cwic:supportStartPosition>true</cwic:supportStartPosition>

<cwic:supportMaxRecords>true</cwic:supportMaxRecords>

<cwic:supportNextRecord>true</cwic:supportNextRecord>

<cwic:supportNumberOfRecordsMatched>true</cwic:supportNumberOfRecordsMatched>

<cwic:supportNumberOfRecordsReturned>true</cwic:supportNumberOfRecordsReturned>

</cwic:attributes>

<cwic:catalog id="NOAA">

<cwic:attributes>

<cwic:defaults>

<cwic:requireSpatialExtent>true</cwic:requireSpatialExtent>

<cwic:requireTemporalExtent>false</cwic:requireTemporalExtent>

</cwic:default>

</cwic:attributes>

<cwic:datasets>

<!-- These override defaults for specific NOAA datasets -->

<cwic:dataset id="gov.noaa.class.ASCAT">

<dc:title>Advanced Scatterometer Level 1B</dc:title>

<cwic:valids>

<gmd:EX\_TemporalExtent>

<gmd:extent>

<gml:TimePeriod gml:id="gov.noaa.class.ASCAT">

<gml:beginPosition>2007-05-21</gml:beginPosition>

<gml:endPosition/>

</gml:TimePeriod>

</gmd:extent>

</gmd:EX\_TemporalExtent>

</cwic:valids>

</cwic:dataset>

<cwic:dataset id="gov.noaa.class.AVHRR">

<dc:title>Advanced Very High Resolution Radiometer</dc:title>

<cwic:valids>

<gmd:EX\_TemporalExtent>

<gmd:extent>

<gml:TimePeriod gml:id="gov.noaa.class.AVHRR">

<gml:beginPosition>1978-11-05</gml:beginPosition>

<gml:endPosition/>

</gml:TimePeriod>

</gmd:extent>

</gmd:EX\_TemporalExtent>

</cwic:valids>

</cwic:dataset>

<cwic:dataset id="gov.noaa.class.CORBL">

<dc:title>Coral Bleaching Monitoring Datasets</dc:title>

<cwic:valids>

<gmd:EX\_GeographicBoundingBox>

<gmd:westBoundingLongitude>

<gco:Decimal>-180.0</gco:Decimal>

</gmd:westBoundingLongitude>

<gmd:eastBoundingLongitude>

<gco:Decimal>180.0</gco:Decimal>

</gmd:eastBoundingLongitude>

<gmd:southBoundingLatitude>

<gco:Decimal>-80.25</gco:Decimal>

</gmd:southBoundingLatitude>

<gmd:northBoundingLatitude>

<gco:Decimal>85.25</gco:Decimal>

</gmd:northBoundingLatitude>

</gmd:EX\_GeographicBoundingBox>

<gmd:EX\_TemporalExtent>

<gmd:extent>

<gml:TimePeriod gml:id="gov.noaa.class.CORBL">

<gml:beginPosition>2007-05-28</gml:beginPosition>

<gml:endPosition/>

</gml:TimePeriod>

</gmd:extent>

</gmd:EX\_TemporalExtent>

</cwic:valids>

</cwic:dataset>

<cwic:dataset id="gov.noaa.class.CORS">

<dc:title>NOAA CLASS archive: Continuously Operating Reference Stations (CORS)</dc:title>

<cwic:valids>

<gmd:EX\_TemporalExtent>

<gmd:extent>

<gml:TimePeriod gml:id="gov.noaa.class.CORS">

<gml:beginPosition>2010-10-01</gml:beginPosition>

<gml:endPosition/>

</gml:TimePeriod>

</gmd:extent>

</gmd:EX\_TemporalExtent>

</cwic:valids>

</cwic:dataset>

<cwic:dataset id="gov.noaa.class.CWALA">

<dc:title>CoastWatch, Alaska Regional Node</dc:title>

<cwic:valids>

<gmd:EX\_GeographicBoundingBox>

<gmd:westBoundingLongitude>

<gco:Decimal>-145.0</gco:Decimal>

</gmd:westBoundingLongitude>

<gmd:eastBoundingLongitude>

<gco:Decimal>-120.0</gco:Decimal>

</gmd:eastBoundingLongitude>

<gmd:southBoundingLatitude>

<gco:Decimal>49.0</gco:Decimal>

</gmd:southBoundingLatitude>

<gmd:northBoundingLatitude>

<gco:Decimal>60.0</gco:Decimal>

</gmd:northBoundingLatitude>

</gmd:EX\_GeographicBoundingBox>

<gmd:EX\_TemporalExtent>

<gmd:extent>

<gml:TimePeriod gml:id="gov.noaa.class.CWALA">

<gml:beginPosition>1991-04-14</gml:beginPosition>

<gml:endPosition>2004-03-08</gml:endPosition>

</gml:TimePeriod>

</gmd:extent>

</gmd:EX\_TemporalExtent>

</cwic:valids>

</cwic:dataset>

</cwic:datasets>

</cwic:catalog>

<cwic:catalog id="NASA">

<cwic:attributes>

<cwic:defaults>

<cwic:requireSpatialExtent>false</cwic:requireSpatialExtent>

<cwic:requireTemporalExtent>false</cwic:requireTemporalExtent>

</cwic:default>

</cwic:attributes>

<cwic:datasets>

<!-- These override defaults for specific NASA datasets -->

<cwic:dataset id="dc8capac">

<dc:title>CAMEX-3 Cloud and Aerosol Particle Characterization (CAPAC)</dc:title>

<cwic:valids>

<gmd:EX\_GeographicBoundingBox>

<gmd:westBoundingLongitude>

<gco:Decimal>-90.0</gco:Decimal>

</gmd:westBoundingLongitude>

<gmd:eastBoundingLongitude>

<gco:Decimal>-60.0</gco:Decimal>

</gmd:eastBoundingLongitude>

<gmd:southBoundingLatitude>

<gco:Decimal>7.0</gco:Decimal>

</gmd:southBoundingLatitude>

<gmd:northBoundingLatitude>

<gco:Decimal>28.0</gco:Decimal>

</gmd:northBoundingLatitude>

</gmd:EX\_GeographicBoundingBox>

<gmd:EX\_TemporalExtent>

<gmd:extent>

<gml:TimePeriod gml:id="dc8capac">

<gml:beginPosition>1998-08-13</gml:beginPosition>

<gml:endPosition>1998-09-22</gml:endPosition>

</gml:TimePeriod>

</gmd:extent>

</gmd:EX\_TemporalExtent>

</cwic:valids>

</cwic:dataset>

<cwic:dataset id="aces1cont">

<dc:title>ACES Continuous Data</dc:title>

<cwic:valids>

<gmd:EX\_GeographicBoundingBox>

<gmd:westBoundingLongitude>

<gco:Decimal>-85.0</gco:Decimal>

</gmd:westBoundingLongitude>

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<gco:Decimal>-81.0</gco:Decimal>

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