Bulk Metadata and Browse Export Capability for the ECS Project

White Paper

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Abstract

In order to support the development of value-added providers (e.g., IIIMS, ESIPs, RESACs, and InfoMarts), ECS sites will make an external representation of their metadata holdings available and provide a capability for bulk distribution of browse data through normal ECS distribution methods.

Several new ECS data collections will be created and maintained at each site to store this data. The Bulk Metadata Generation Tool (BMGT) will be run daily at each site to populate these data collections. One metadata product will be created per ESDT group per day. Each product will contain an external representation of the metadata for each new, updated, or deleted granule that is a member of the ESDT group. The format used for the external representation of the metadata is XML. The XML Collection and Granule metadata files can be verified using BMGT Metadata Validation Tools. One bulk browse product will be produced per day that contains references to all new, updated, or deleted browse granules. Value-added providers may use any of the standard ECS search, order, and subscription capabilities to find and order these bulk metadata and browse products.

This document defines the operations concept for the ECS Bulk Metadata and Browse Export Capability and specifies the XML Document Type Definitions (DTDs) for the external representation of the metadata.

**Keywords:** metadata, XML, ESD 68, ESD 120
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Abstract

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1. Introduction

1.1 Purpose

In order to support the development of value-added providers (e.g., IIMS, ESIPs, RESACs, and InfoMarts), ECS sites will make an external representation of their metadata holdings available and provide a capability for bulk distribution of browse data through normal ECS distribution methods.

Several new ECS data collections will be created and maintained at each site to store this data. Bulk Metadata Generator and Bulk Browse Generator Tools will be run daily at each site to populate these data collections. One metadata product will be created per ESDT group per day. Each product will contain an external representation of the metadata for each new, updated, or deleted granule that is a member of the ESDT group. The format used for the external representation of the metadata is XML. One bulk browse product will be produced per day that contains references to all new, updated, or deleted browse granules. Value-added providers may use any of the standard ECS search, order, and subscription capabilities to find and order these bulk metadata and browse products.

This document defines the operations concept for the ECS Bulk Metadata and Browse Export Capability and specifies the XML Document Type Definitions (DTDs) for the external representation of the metadata.

1.2 Organization

Section 1 provides an introduction to the document. Section 2 defines the process for bulk metadata generation. Section 3 defines the process for bulk browse generation. Appendix A specifies the DTDs for the external representation of the metadata and browse data. Appendix B contains a list of open issues.

1.3 Review and Approval

This White Paper is an informal document approved at the Office Manager level. It does not require formal Government review or approval; however, it is submitted with the intent that review and comments will be forthcoming.

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2. Bulk Metadata Generation Process

2.1 Operations Concept

2.1.1 Overview

Several new ESDTs will be created to store the external representation of the metadata. Section 2.1.2 describes these ESDTs and the way that the metadata will be grouped into products within the ESDTs. Then, five scenarios are used to describe the operations concept for bulk metadata generation. The first scenario describes the initial setup process. The second scenario describes how the tool is used during normal operations. The third scenario describes how the tool is used to generate bulk metadata products for all existing granules in the Science Data Server (SDSRV) inventory database. The fourth scenario describes how the tool is used in recovery situations. The fifth scenario describes how a value-added provider locates and orders bulk metadata products.

2.1.2 New ESDTs and GroupId PSA

Four new ESDTs are created at each site to store an external representation of the ECS metadata. The name and purpose of each ESDT follows:

- ECSMETC – Stores products that contain an XML representation of ECS collection level metadata and the packaging options that may be used when ordering products from each collection;
- ECSMETG – Stores products that contain an XML representation of ECS granule level metadata;
- ECSBBR - Stores products that contain an XML representation of references to browse images.
- ECSMETV – Stores products that contain an XML representation of ECS collection and granule valid values.

The ECSMETC and ECSMETG data collections store products that contain metadata for multiple collections and multiple granules. The metadata will be grouped by instrument and mission except for metadata related to the MODIS instrument, which is grouped, by mission and major discipline (ocean, atmosphere, land, and snow & ice). Each product in these collections has a group identifier Product Specific Attribute (PSA) called GroupId. The mapping of specific ESDTs to groups is provided as a configuration file with the Bulk Metadata Generator Tool. Table 2-1 defines the groups used for the various ECS missions.

The ECSBBR collection stores products that contain browse product references. The ESDT has a custom acquire service that will convert the browse product references into actual browse products during distribution.
The ECSMETV collection stores products that contain the entire set of valids contained within the SDSRV database for a particular instance in time.

<table>
<thead>
<tr>
<th>GroupId</th>
<th>Description</th>
<th>DAAC Storing Metadata</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOGT</td>
<td>MODIS Radiometric and Geolocation collections/granules from the Terra mission</td>
<td>GDAAC</td>
</tr>
<tr>
<td>MOGA</td>
<td>MODIS Radiometric and Geolocation collections/granules from the Aqua mission</td>
<td>GDAAC</td>
</tr>
<tr>
<td>MOOT</td>
<td>MODIS Oceans collections/granules from the Terra mission</td>
<td>GDAAC</td>
</tr>
<tr>
<td>MOOA</td>
<td>MODIS Oceans collections/granules from the Aqua mission</td>
<td>GDAAC</td>
</tr>
<tr>
<td>MOAT</td>
<td>MODIS Atmosphere collections/granules from the Terra mission</td>
<td>GDAAC</td>
</tr>
<tr>
<td>MOAA</td>
<td>MODIS Atmosphere collections/granules from the Aqua mission</td>
<td>GDAAC</td>
</tr>
<tr>
<td>MOLT</td>
<td>MODIS Land collections/granules from the Terra mission</td>
<td>EDAAC</td>
</tr>
<tr>
<td>MOLA</td>
<td>MODIS Land collections/granules from the Aqua mission</td>
<td>EDAAC</td>
</tr>
<tr>
<td>MOST</td>
<td>MODIS Snow and Ice collections/granules from the Terra mission</td>
<td>NDAAC</td>
</tr>
<tr>
<td>MOSA</td>
<td>MODIS Snow and Ice collections/granules from the Aqua mission</td>
<td>NDAAC</td>
</tr>
<tr>
<td>ASTT</td>
<td>ASTER collections/granules from the Terra mission</td>
<td>EDAAC</td>
</tr>
<tr>
<td>MSRT</td>
<td>MISR collections/granules from the Terra mission</td>
<td>LDAAC</td>
</tr>
<tr>
<td>MOPT</td>
<td>MOPITT collections/granules from the Terra mission</td>
<td>LDAAC</td>
</tr>
<tr>
<td>LSR7</td>
<td>All collections/granules from the Landsat 7 mission</td>
<td>EDAAC</td>
</tr>
<tr>
<td>SAG3</td>
<td>All collections/granules from the SAGE III mission</td>
<td>LDAAC</td>
</tr>
<tr>
<td>ACRM</td>
<td>All collections/granules from the ACRIM mission</td>
<td>LDAAC</td>
</tr>
<tr>
<td>AIRA</td>
<td>AIRS/AMSU/MHS collections/granules from the Aqua mission</td>
<td>GDAAC</td>
</tr>
<tr>
<td>AMSA</td>
<td>AMSR-E collections/granules from the Aqua mission</td>
<td>NDAAC</td>
</tr>
<tr>
<td>GLAS</td>
<td>GLAS collections/granules from the ICESat mission</td>
<td>NSIDC</td>
</tr>
<tr>
<td>HIRD</td>
<td>HIRDLS collections/granules from the Aura mission</td>
<td>GDAAC</td>
</tr>
<tr>
<td>MLSA</td>
<td>MLS collections/granules from the Aura mission</td>
<td>GDAAC</td>
</tr>
<tr>
<td>OMIA</td>
<td>OMI collections/granules from the Aura mission</td>
<td>GDAAC</td>
</tr>
<tr>
<td>SORC</td>
<td>All collections/granules from the SORCE mission</td>
<td>GDAAC</td>
</tr>
<tr>
<td>TESA</td>
<td>TES collections/granules from the Aura mission</td>
<td>LDAAC</td>
</tr>
<tr>
<td>DASP</td>
<td>Data Assimilation System Products</td>
<td>GDAAC</td>
</tr>
<tr>
<td>OTHR</td>
<td>Other Products. This group is used for ancillary products or other non-science products (e.g., ECSMETC, ECSMETG, ECSBBR, ECSMETV).</td>
<td>GDAAC, EDAAC, LDAAC, NDAAC</td>
</tr>
</tbody>
</table>
2.1.3 Setup Process for Bulk Metadata Generation

The following steps must be performed prior to initiating bulk metadata generation:

1. DAAC personnel install new Earth Science Data Types (ESDTs), named ECSMETC, ECSMETG, ECSBBR, and ECSMETV, that will store the external representation of the Science Data Server's (SDSRV) inventory database.

2. DAAC personnel install the ECS Bulk Metadata Generator Tool (BMGT) in OPS mode and configure the target ESDT versions to be exported by editing the BMGT's group configuration file.

3. DAAC personnel configure BMGT to run daily as a cron job. BMGT input arguments are set to generate bulk metadata products for each target ESDT version that had granules inserted, updated, or deleted during the previous day.

2.1.4 Normal Operation of the Bulk Metadata Generator Tool (BMGT)

The following events occur on a daily basis during normal operation of the BMGT:

1. The BMGT is invoked at the specified time each day via a cron job.

2. The BMGT determines the date of the previous day and then executes a series of Sybase stored procedures against the SDSRV inventory database to extract metadata for all collections, granules, browse and valids that were inserted, updated, or deleted during the target day.

3. For each target ESDT version that had collection level metadata inserted, updated, and/or deleted, perform the following steps:
   3.1. If this collection is the first collection in a group, then create a new file and append an XML representation of the packaging options to the file.
   3.2. Append an XML representation of the collection level metadata to the file.

4. Insert each file, as a product, into the ECSMETC data collection setting the value for the GroupId PSA along with the starting date and ending date of the insert, update, and/or delete activity covered by this file. In this case, the starting and ending dates are the same since the period covered is a single day.

5. For each target ESDT version that had granule level metadata inserted, updated, and/or deleted, perform the following steps:
   5.1. If this granule is the first granule in a group, then create a new file.
   5.2. Append an XML representation of the metadata for each active granule to the file.

6. Insert each file, as a product, into the ECSMETG data collection setting the value for the GroupId PSA along with the starting date and ending date of the insert, update, and/or delete activity covered by this file. In this case, the starting and ending dates are the same since the period covered is a single day.
7. For all browse images that were inserted or deleted within a specified time period, extract the browse identifiers and associated browse file names for each browse product and insert an XML file, called the Browse Reference File (BRF) file, as a product into the ECSBBR data collection. Set the value for start and end date of the insert, update, and/or delete activity covered by this file, allowing it to be an ECS product that can be ordered and distributed via normal ECS search and order mechanisms. The BRF DTD is specified in Appendix A.5.

8. If any collections were inserted, updated, and/or deleted during the period then create a new file, append an XML representation of the valid information, and insert the file, as a product, into the ECSMETV data collection setting the starting date and ending date of the insert, update, and/or delete activity covered by this file. In this case, the starting and ending dates are the same since the period covered is a single day.

### 2.1.5 Bulk Metadata Generation for Existing Data

After the BMGT has been setup for normal operation, DAAC personnel must go back and generate ECSMET products for all of the existing granules in the SDSRV inventory database. The following steps are performed:

1. DAAC personnel invoke the BMGT and set a date range to be processed. Note that because some DAACs will have over a year's worth of operational data, all existing granules should not be processed at once. Instead, it is suggested that DAAC personnel invoke BMGT to process one week of granules at a time.

2. For each day in the date range, the BGMT performs steps 3 through 8 as defined in Section 2.1.4.

3. Step 1 is repeated by DAAC personnel until all existing granules in the SDSRV inventory database have been converted.

### 2.1.6 Using BGMT in Recovery Situations

Occasionally, the cron job that automatically executes the BGMT will fail to operate on a daily basis. This may happen due to a variety of reasons including software failure, hardware failure, or changes in DAAC operational priorities. When this happens, it is necessary for DAAC operations to manually invoke the tool to generate ECSMET products for all days that were missed. This is accomplished by following the steps specified in Section 2.1.5.

### 2.1.7 Value-Added Provider Access to Metadata Products

ECSMET products can be accessed using any of the standard ECS search and order methods. These include the following:

1. Contact DAAC User Services and request an FTPPush subscription be placed on the ECSMETC, ECSMETG, ECSBBR and ECSMETV data collections. This will enable metadata products to be pushed to the value-added provider as they are generated. If a subset of the metadata is desired, the subscriptions may be qualified by one or more GroupIds. Details of the subscription interface and distribution notifications can be found in ECS
2. Use the EOS Data Gateway (EDG) web interface to search and order ECSMETC, ECSMETG, ECSBBR and ECSMETV products. Details on how to use the EDG may be found at http://edcimswww.cr.usgs.gov/pub/imswelcome/.


4. Use the ECS V0-to-ECS Gateway to search and order ECSMETC, ECSMETG, ECSBBR and ECSMETV products using the V0 Protocol. The interface specification for the V0-to-ECS Gateway can be found in ESDIS document number 505-41-30, ICD Between ECS and Version-0 System for Interoperability.

2.2 Bulk Browse Distribution Operations Concept

The ECSBBR ESDT has a custom acquire service that operates as follows:

1. For each granule specified in the ECSBBR acquire request, the custom acquire service calls STMGT to create a staging disk and retrieve the BRF associated with the granule.

2. The BRF is read and for each browse granule identifier contained in the file, the browse product is added to the distribution request as if it were another file in a multi-file granule. No browse metadata files are created.

3. After all granules have been processed, SDSRV passes the distribution request to DDIST.

4. DDIST retrieves the BRF corresponding to each granule in the acquire request, as well as, all browse products referenced in each BRF and distributes them via the method specified in the acquire request.

2.3 Relating Browse Pointers to Browse Files

5. Value-added providers can use the Browse Reference File (BRF) to relate science granules to browse granules and browse granules to browse product file names. The BRF is an XML file whose DTD is specified in Appendix A.5. The BRF contains a set of browse granule identifier, file name pairs. Each science granule contains a list of browse granule identifiers (see Appendix A.3) for the browse products that are related to the science granule. In order to relate science granules to browse granules, the value-added provider matches a browse granule identifier in the science granule with a browse granule identifier in the BRF. The file name corresponding to the BRF browse granule identifier is the name of the file that contains the actual browse product.
2.4 ESDT and Product Specification

2.4.1 ESDT Specification

Tables 2-2 through 2-9 specify the collection and granule level metadata that is populated for the ECSMETC, ECSMETG, and ECSMETV data collections.

**Table 2-2. ECSMETC Collection Level Metadata**

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Data Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LongName</td>
<td>varchar(85)</td>
<td>Long name for this ESDT. Is set to “ECS bulk collection-level metadata in XML format”.</td>
</tr>
<tr>
<td>ShortName</td>
<td>char(8)</td>
<td>Short name for this ESDT. Is set to “ECSMETC”.</td>
</tr>
<tr>
<td>VersionID</td>
<td>tinyint</td>
<td>Version identifier for this ESDT. Integer between 1 and 255.</td>
</tr>
</tbody>
</table>

**Table 2-3. ECSMETC Granule Level Metadata**

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Data Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GroupId</td>
<td>char(4)</td>
<td>Group Identifier of this product (see Table 2-1)</td>
</tr>
<tr>
<td>RangeBeginningDate</td>
<td>datetime</td>
<td>Start date for the period covered by this product.</td>
</tr>
<tr>
<td>RangeEndingTime</td>
<td>datetime</td>
<td>End date for the period covered by this product.</td>
</tr>
</tbody>
</table>

**Table 2-4. ECSMETG Collection Level Metadata**

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Data Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LongName</td>
<td>varchar(85)</td>
<td>Long name for this ESDT. Is set to “ECS bulk granule-level metadata in XML format”.</td>
</tr>
<tr>
<td>ShortName</td>
<td>char(8)</td>
<td>Short name for this ESDT. Is set to “ECSMETG”.</td>
</tr>
<tr>
<td>VersionID</td>
<td>tinyint</td>
<td>Version identifier for this ESDT. Integer between 1 and 255.</td>
</tr>
</tbody>
</table>
### Table 2-5. ECSMETG Granule Level Metadata

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Data Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GroupId</td>
<td>char(4)</td>
<td>Group Identifier of this product (see Table 2-1)</td>
</tr>
<tr>
<td>RangeBeginningDate</td>
<td>datetime</td>
<td>Start date for the period covered by this product.</td>
</tr>
<tr>
<td>RangeEndingTime</td>
<td>datetime</td>
<td>End date for the period covered by this product.</td>
</tr>
</tbody>
</table>

### Table 2-6. ECSBBR Collection Level Metadata

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Data Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LongName</td>
<td>varchar(85)</td>
<td>Long name for this ESDT. Is set to “ECS bulk browse data”.</td>
</tr>
<tr>
<td>ShortName</td>
<td>char(8)</td>
<td>Short name for this ESDT. Is set to “ECSBBR”.</td>
</tr>
<tr>
<td>VersionID</td>
<td>tinyint</td>
<td>Version identifier for this ESDT. Integer between 1 and 255.</td>
</tr>
</tbody>
</table>

### Table 2-7. ECSBBR Granule Level Metadata

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Data Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GroupId</td>
<td>char(4)</td>
<td>Group Identifier of this product (see Table 2-1)</td>
</tr>
<tr>
<td>RangeBeginningDate</td>
<td>datetime</td>
<td>Start date for the period covered by this product.</td>
</tr>
<tr>
<td>RangeEndingTime</td>
<td>datetime</td>
<td>End date for the period covered by this product.</td>
</tr>
</tbody>
</table>

### Table 2-8. ECSMETV Collection Level Metadata

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Data Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LongName</td>
<td>varchar(85)</td>
<td>Long name for this ESDT. Is set to &quot;ECS bulk valids metadata in XML format&quot;.</td>
</tr>
<tr>
<td>ShortName</td>
<td>char(8)</td>
<td>Short name for this ESDT. Is set to “ECSMETV”.</td>
</tr>
<tr>
<td>VersionID</td>
<td>tinyint</td>
<td>Version identifier for this ESDT. Integer between 1 and 255.</td>
</tr>
</tbody>
</table>
Table 2-9. ECSMETV Granule Level Metadata

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Data Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RangeBeginningDate</td>
<td>datetime</td>
<td>Start date for the period covered by this product.</td>
</tr>
<tr>
<td>RangeEndingTime</td>
<td>Datetime</td>
<td>End date for the period covered by this product.</td>
</tr>
</tbody>
</table>

2.4.2 Product Specification

The ECSMETC, ECSMETG, ECSBBR and ECSMETV products consist of XML files. The XML is generated using DTDs specified in Appendix A.

The file name for the ECSMETC, ECSMETG, and ECSMETV products consist of 30 characters including the file extension. It has the following form:

ssstggggaaaaabbbccccdddnnmm.XML

The components of the file name for the ECSMETC, ECSMETG, and ECSMETV products are specified in Table 2-10.

Table 2-10. ECSMET File Name Components

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sss</td>
<td>Three character site identifier. For ECS sites, the identifiers are EDC, GFC, LRC, and NDC.</td>
</tr>
<tr>
<td>t</td>
<td>File type indicator. Valid values are &quot;C&quot; if this file stores collection-level metadata, &quot;G&quot; if this file stores granule-level metadata, and &quot;V&quot; if this file stores valids metadata.</td>
</tr>
<tr>
<td>gggg</td>
<td>For ECSMETC and ECSMETG products, this is a four character GroupId (see Table 2-1). For ECSMETV products, this value is set to &quot;VALD&quot;.</td>
</tr>
<tr>
<td>aaaa</td>
<td>Four digit year of the beginning range of the data in the product. Valid values are 1999 to 9999.</td>
</tr>
<tr>
<td>bbb</td>
<td>Three digit day of year of the beginning range of the data in the product. Valid values are 001 to 366.</td>
</tr>
<tr>
<td>cccc</td>
<td>Four digit year of the ending range of the data in the product. Valid values are 1999 to 9999.</td>
</tr>
<tr>
<td>ddd</td>
<td>Three digit day of year of the beginning range of the data in the product. Valid values are 001 to 366.</td>
</tr>
<tr>
<td>nn</td>
<td>Two digit segment number. Valid values are 01 to 99. If the size of an individual product is larger than the maximum file size (2 GB), the BGMT will break the file into segments. The segment number is incremented by one for each additional file segment.</td>
</tr>
<tr>
<td>mm</td>
<td>Two digit maximum segment number. Valid values are 01 to 99. If the size of an individual product is larger than the maximum file size (2 GB), the BGMT will break the file into segments. The maximum segment number indicates the last segment for this product.</td>
</tr>
</tbody>
</table>
For example, EDCGMOLT200009920000990101.XML would be the file name for the granule-level metadata related to MODIS Land products stored at the EDC DAAC. The metadata contained in the file was inserted, updated, and/or deleted on the 99th day of the year 2000. This is file segment one of one.

Each ECSBBR product consist of XML files, called Browse Reference Files (BRF). The XML files contain a set of browse granule pointers, file name pairs that map a given browse granule pointer to the name of the file containing the corresponding browse product. The XML is generated using the DTD specified in Appendix A.5.

The file name of each BRF is 30 characters including the file extension. It has the following form:

```
ssstgggaabbbccccddnnmm.XML
```

The components of the file name are specified in Table 2-11.

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sss</td>
<td>Three character site identifier. For ECS sites, the identifiers are EDC, GFC, LRC, and NDC.</td>
</tr>
<tr>
<td>t</td>
<td>File type indicator. Valid value is &quot;B&quot; for browse.</td>
</tr>
<tr>
<td>gggg</td>
<td>This is a four character GroupId(see Table 2-1).</td>
</tr>
<tr>
<td>aaaa</td>
<td>Four digit year of the beginning range of the data in the product. Valid values are 1999 to 9999.</td>
</tr>
<tr>
<td>bbb</td>
<td>Three digit day of year of the beginning range of the data in the product. Valid values are 001 to 366.</td>
</tr>
<tr>
<td>cccc</td>
<td>Four digit year of the ending range of the data in the product. Valid values are 1999 to 9999.</td>
</tr>
<tr>
<td>ddd</td>
<td>Three digit day of year of the beginning range of the data in the product. Valid values are 001 to 366.</td>
</tr>
<tr>
<td>nn</td>
<td>Two digit segment number. Valid values are 01 to 99. If the number of image referred by a browse product is larger than the maximum browse number (200), the BGMT will break the file into segments. The segment number is incremented by one for each additional file segment.</td>
</tr>
<tr>
<td>mm</td>
<td>Two digit maximum segment number. Valid values are 01 to 99. If the number of image referred by a browse product is larger than the maximum browse number, the BGMT will break the file into segments. The maximum segment number indicates the last segment for this product.</td>
</tr>
</tbody>
</table>

For example, EDCBMOLT200009920000990101.XML would be the file name for the bulk browse products related to MODIS Land products stored at the EDC DAAC. The metadata contained in the file was inserted, updated, and/or deleted on the 99th day of the year 2000.
2.4.3 Sizing Estimates

ECSMETC products produced per day will depend on the frequency of ESDT inserts, updates, and deletes. This activity is expected to happen infrequently. Changes to ECS valid information is expected to happen infrequently, as well. Thus, the number of ECSMETG products that are generated per day will drive metadata volume.

The size of the granule-level metadata in an ECSMETG product varies depending on how many core attributes are populated for each granule and how many product-specific attributes (PSAs) a granule contains. The average size of the granule metadata in XML format is 5 KB (TBR). During Release 6A, it is estimated that the total number of granules inserted per day across all ECS sites will be approximately 26,500. The total number of granules deleted per day across all ECS sites will be approximately 12,300. However, only a small amount of metadata is generated for deleted granules. It is expected that the number of granules updated later than one day after they are inserted will be small.

Thus, the average volume of metadata produced per day in XML format is approximately 26,500 * .005 MB = 133 MB. The number of ECSMETG products produced per day is equal to the number of groups defined in Table 2-1.

2.5 Running BGMT

2.5.1 Product Generation Rules

The following rules apply to determining if collection-level metadata for a given ESDT version is included in an ECSMETC product:

1. The ESDT version must be defined in the list of target ESDT versions contained in the "groups" configuration file (see Section 2.4.2).

2. The collection-level metadata for the target ESDT version data collection must have either an insert date or a last update date that falls within the target date range.

3. Collection-level metadata is generated only once, even if the ESDT version was both inserted and updated within the target date range.

The following rules apply to determining if granules from a given ESDT version are included in an ECSMETG product:

1. The ESDT version must be defined in the list of target ESDT versions contained in the "groups" configuration file (see Section 2.4.2).

2. One or more granules in the target ESDT version data collection must have either an insert date or a last update date or a delete date that falls within the target date range.

3. Granule metadata is generated only once for a qualifying granule, even if the granule is both inserted and updated within the target date range.

4. If a granule is both inserted and deleted within the target date range then the granule is considered to not qualify.
5. If a granule is deleted within the target date range then only the granule identifier and delete time are included in the generated metadata.

The following rules apply to determining if a browse granule is included in an ECSBBR BRF product:

1. The ESDT version must be defined in the list of target ESDT versions contained in the "groups" configuration file (see Section 2.4.2).

2. The browse granule must have either an insert date or a last update date or a delete date that falls within the target date range.

3. A BRF entry is generated only once for a qualifying browse granule, even if the granule is both inserted and updated within the target date range.

4. If a browse granule is both inserted and deleted within the target date range then the granule is considered to not qualify.

The following rules apply to determining if an ECSMETV product is generated for the target date range:

1. If one or more ECSMETC products were generated for the target date range then the current valids information will be generated as a single ECSMETV product.

### 2.5.2 Configuration Options

BGMT is invoked from a Unix shell script. Table 2-12 specifies the configuration files available for modification at the DAACs. Table 2-13 highlights the parameters in the those files that may be set more frequently by the DAACs. These configuration options will be defined during installation, and when the DAAC is using the BMGT for generation of existing data. Additional information about how to configure the BMGT at installation can be found in the OSS subsystem's installation instructions.

<table>
<thead>
<tr>
<th>Configuration File Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EcOsBMGTCronConfigParams.xml</td>
<td>The configuration parameters from these two files are used when BMGT is run as a cron job. Based on parameters in this file the period for which the processing needs to be done is calculated.</td>
</tr>
<tr>
<td>EcOsBMGTCronUserParams.xml</td>
<td>The configuration parameters from these two files are used when BMGT is started as a non-cron job. Based on parameters in this file the period for which the processing needs to be done is calculated.</td>
</tr>
</tbody>
</table>
### Table 2-12. BGMT Configuration files (2 of 2)

<table>
<thead>
<tr>
<th>Configuration File Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EcOsBMGTGroup.xml</td>
<td>This file controls which ESDTs are exported to the ECS ClearingHouse (ECHO) system. The ESDTs that are exported should be the same set of ESDTs that are currently exported using the DMS subsystem's Data Dictionary Maintenance Tool. The only difference is that the ESDTs are grouped. The complete grouping list can be found on the ECS Info web site at <a href="http://observer.gsfc.nasa.gov/welcome.html">http://observer.gsfc.nasa.gov/welcome.html</a></td>
</tr>
<tr>
<td>EcOsBMGTContactInfo.xml</td>
<td>This file needs to be modified to specify the contact information for the user services group. This information should be the same as what is listed as the contact information in the V0-ECS Gateway's Registry information. The Registry entries are ContactName, Organization, Address, City, State, Zip, Country, Phone, Fax and Email.</td>
</tr>
<tr>
<td>EcOsBMGTGeneralPackage.xml</td>
<td>This file specifies the different mediatypes and mediaformats. This file as supplied includes all the mediatypes. The individual DAAC's have to modify this file to remove the mediatypes not applicable to them by deleting text enclosed (including) by <code>&lt;MediaTypes&gt;</code> … &lt;/MediaTypes&gt; .</td>
</tr>
<tr>
<td>EcOsBMGSTSpecialCases.xml</td>
<td>This file is used to specify the cost of L7 granules.</td>
</tr>
</tbody>
</table>

### Table 2-13. BGMT Configuration files along with Parameters Description (1 of 2)

<table>
<thead>
<tr>
<th>Configuration File Name</th>
<th>Parameter Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EcOsBMGTUserParams.xml</td>
<td>&lt;doPreviousFlag&gt;</td>
<td>Used to process a previous time period of time referenced from today as opposed to specific date ranges. Set to true for a cron job.</td>
</tr>
<tr>
<td>EcOsBMGTUserParams.xml</td>
<td>&lt;duration&gt;</td>
<td>Legal durations are minute, hour, day, week, month and year.</td>
</tr>
<tr>
<td></td>
<td>&lt;count&gt;</td>
<td>Must be greater than 0. Count means number of such durations as set in &lt;duration&gt;.</td>
</tr>
<tr>
<td>EcOsBMGTUserParams.xml</td>
<td>&lt;beginDate&gt; &lt;endDate&gt;</td>
<td>If &lt;doPreviousFlag&gt; is set to false then processing will be done for the period specified from &lt;beginDate&gt; to &lt;endDate&gt;.</td>
</tr>
<tr>
<td>EcOsBMGTGroup.xml</td>
<td>&lt;ShortName&gt; &lt;VersionID&gt;</td>
<td>The ESDTs that are to be exported from DAAC's to ECHO are specified here.</td>
</tr>
</tbody>
</table>
Table 2-13. BGMT Configuration files along with Parameters Description (2 of 2)

<table>
<thead>
<tr>
<th>Configuration File Name</th>
<th>Parameter Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EcOsBMGTCronConfigParams.xml</td>
<td>&lt;worker&gt; .. &lt;/worker&gt;</td>
<td>In the event that BGMT needs to be run only to process some combination of Collection, Granule, Valids, Browse but not all, then the ones that are not required to be processed are commented out as follows: &lt;!--worker&gt;… &lt;/worker--&gt;</td>
</tr>
<tr>
<td>EcOsBMGTConfigParams.xml</td>
<td>&lt;/worker&gt;</td>
<td></td>
</tr>
</tbody>
</table>

2.5.3 Guidelines for Running BGMT

Starting with Release 6A the Science Data Server will provide a granule deletion utility. This utility will enable the operator to delete granules from data collections. Granules are first logically deleted (i.e., marked for deletion). After a DAAC determined period of time, the granules will then be physically deleted from both the Science Data Server inventory database and the archive. In order to guarantee that granule deletions are captured by BGMT, DAAC personnel must ensure BGMT is executed after granules are logically deleted and before they are physically deleted.

2.5.4 BMGT Metadata Validation

The BMGT provides two tools for validating the content of the collection and granule XML files generated by the BMGT.

On the host that the BMGT is typically run, there are two scripts under the /usr/ecs/<mode>/CUSTOM/ProductOutput directory, EcOsBMGTValidateCollection and EcOsBMGTValidateGranule. Each script takes one ODL metadata file and one XML file as input parameters. The output of each script consists of a difference between the ODL metadata file and BMGT XML file.

The BMGT XML granule file can contain multiple granules, but only the granule associated with the single ODL metadata file gets validated. All other granules are ignored. The same applies for collection XML files.

In order to obtain the ODL metadata file, the associated granule must be ordered from ECS. When the scripts are run, multiple, intermediate PVL (Parameter Value Language) files are generated in order to compare the ODL and XML files using a common format. Operators are responsible for cleaning the intermediate PVL files.

The detailed steps required in order to perform the validation are outlined here:

1. Order the granule you would like to validate in order to obtain the ODL metadata file associated with that granule.
2. Perform collection metadata validation by executing the following command:
   > EcOsBMGTVValidateCollection GranuleODLFilename CollectionXMLFilename

3. Perform the granule metadata validation by executing the following command:
   > EcOsBMGTVValidateGranule GranuleODLFilename GranuleXMLFilename
Appendix A. Document Type Definitions (DTD's)

A.1 Introduction

Sections A.2 through A.4 specify the DTDs used for generating the external representation of collection-level metadata, granule-level metadata, and valids information. The DTDs also available on the web, the URLs are specified in XML metadata files.

Following are the reserved characters and entities used in the DTDs.

'|'  Any element name may appear.
',,'  Requires element appearance in specified sequence.
'?'  Makes element optional, but only one may appear.
'*'  Allow any number of elements to appear in sequence, even zero.
'+'  Requires at least one element to appear; more may appear in sequence.
'(' and ')'  Groups elements.
'#PCDATA'  The value of the element.

A.2 Collection-Level Metadata DTD

<!ELEMENT CollectionMetaDataFile (DTDVersion, DataCenterId, TemporalCoverage, DefaultPackage, CollectionMetaData*)>

<!-- Version identifier of the DTD used to generate the file -->
<!ELEMENT DTDVersion (#PCDATA)>

<!-- DataCenterId of the site that stores this metadata (e.g., EDC) -->
<!ELEMENT DataCenterId (#PCDATA)>

<!-- the start and end dates of this MetaDataFile (YYYY-MM-DD) -->
<!ELEMENT TemporalCoverage (StartDate, EndDate)>
<!ELEMENT StartDate (#PCDATA)>
<!ELEMENT EndDate (#PCDATA)>

<!-- Default Packaging Information will apply to every data collection unless over written in the collection-level metadata -->
<!ELEMENT DefaultPackage (MediaTypes+, ProductionOptions, EstimatedCost?)>
<!ELEMENT EstimatedCost (#PCDATA)>

<!ELEMENT MediaTypes (MediaType, MediaFormats+)>

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<!ELEMENT DistanceandBearingRepresentation (DistanceResolution, BearingResolution, BearingUnits, BearingReferenceDirection, BearingReferenceMeridian)>
<!ELEMENT DistanceResolution (#PCDATA)>
<!ELEMENT BearingResolution (#PCDATA)>
<!ELEMENT BearingUnits (#PCDATA)>
<!ELEMENT BearingReferenceDirection (#PCDATA)>
<!ELEMENT BearingReferenceMeridian (#PCDATA)>

<!ELEMENT CoordinateRepresentation (AbscissaResolution, OrdinateResolution)>
<!ELEMENT AbscissaResolution (#PCDATA)>
<!ELEMENT OrdinateResolution (#PCDATA)>

<!ELEMENT MapProjection (MapProjectionName, MapProjectionPointer?)>
<!ELEMENT MapProjectionName (#PCDATA)>
<!ELEMENT MapProjectionPointer (#PCDATA)>

<!ELEMENT LocalPlanarCoordinateSystem (LocalPlanarCoordinateSystemDescription, LocalPlanarGeoreferenceInformation)>
<!ELEMENT LocalPlanarCoordinateSystemDescription (#PCDATA)>
<!ELEMENT LocalPlanarGeoreferenceInformation (#PCDATA)>

<!ELEMENT GridCoordinateSystem (GridCoordinateSystemName)>
<!ELEMENT GridCoordinateSystemName (#PCDATA)>

<!ELEMENT LocalCoordinateSystem (LocalCoordinateSystemDescription, LocalGeoreferenceInformation)>
<!ELEMENT LocalCoordinateSystemDescription (#PCDATA)>
<!ELEMENT LocalGeoreferenceInformation (#PCDATA)>

<!ELEMENT Temporal ((RangeDateTime | SingleDateTime+), TimeType, DateType, TemporalRangeType, PrecisionofSeconds, EndsatPresentFlag)>
<!ELEMENT TimeType (#PCDATA)>
<!ELEMENT DateType (#PCDATA)>
<!ELEMENT TemporalRangeType (#PCDATA)>
<!ELEMENT PrecisionofSeconds (#PCDATA)>
<!ELEMENT EndsatPresentFlag (#PCDATA)>

<!ELEMENT RangeDateTime (RangeBeginningDate, RangeBeginningTime, RangeEndingDate, RangeEndingTime)>
<!ELEMENT RangeBeginningDate (#PCDATA)>
<!ELEMENT RangeBeginningTime (#PCDATA)>
<!ELEMENT RangeEndingDate (#PCDATA)>
<!ELEMENT RangeEndingTime (#PCDATA)>

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A.3 Granule-Level Metadata DTD

<!ELEMENT GranuleMetaDataFile (DTDVersion, DataCenterId, TemporalCoverage, GranuleURMetaData*)>

<!-- Version identifier of the DTD used to generate the file -->
<!ELEMENT DTDVersion (#PCDATA)>

<!-- DataCenterId of the site that stores this metadata (e.g., EDC) -->
<!ELEMENT DataCenterId (#PCDATA)>

<!-- the start and end dates of this MetaDataFile (YYYY-MM-DD) -->
<!ELEMENT TemporalCoverage (StartDate, EndDate)>
<!ELEMENT StartDate (#PCDATA)>
<!ELEMENT EndDate (#PCDATA)>

<!ELEMENT GranuleUR (#PCDATA)>
<!ELEMENT DbID (#PCDATA)>
<!ELEMENT InsertTime (#PCDATA)>
<!ELEMENT LastUpdate (#PCDATA)>
<!ELEMENT DeleteTime (#PCDATA)>

<!ELEMENT CollectionMetaData (ShortName, VersionID)>
<!ELEMENT ShortName (#PCDATA)>
<!ELEMENT VersionID (#PCDATA)>

<!ELEMENT ECSDataGranule
A-10
A.4 Valids DTD

Note that a listing of current ECS valids may be found at the following URL:

<?xml version="1.0" encoding="UTF-8"?>
<!ELEMENT ValidsFile (DTDVersion, DataCenterId, TemporalCoverage,
DictionaryAttribute+, KeywordValids+)>

<!-- Version identifier of the DTD used to generate the file -->
<!ELEMENT DTDVersion (#PCDATA)>

<!-- DataCenterId of the site that stores the metadata (e.g. EDC-ECS) -->
<!ELEMENT DataCenterId (#PCDATA)>

<!-- The start and end dates of this MetaDataFile (YYYYDDD) -->
<!ELEMENT TemporalCoverage (StartDate, EndDate)>
<!ELEMENT StartDate (#PCDATA)>
<!ELEMENT EndDate (#PCDATA)>

<!-- Attributes and their Data Types -->
<!ELEMENT DictionaryAttribute (QualifiedAttrName, Type, Length, RuleText*)>
<!ELEMENT QualifiedAttrName (#PCDATA)>
<!ELEMENT Type (#PCDATA)>
<!ELEMENT Length (#PCDATA)>
<!ELEMENT RuleText (#PCDATA)>

<!-- Keyword Attributes and their Domain Values -->
<!ELEMENT KeywordValids (DisciplineKeyword, TopicKeyword, TermKeyword,
VariableKeyword?, ParameterKeyword?)>
<!ELEMENT DisciplineKeyword (#PCDATA)>
<!ELEMENT TopicKeyword (#PCDATA)>
<!ELEMENT TermKeyword (#PCDATA)>
<!ELEMENT VariableKeyword (#PCDATA)>
<!ELEMENT ParameterKeyword (#PCDATA)>
A.5 Browse Reference File DTD

```xml
<?xml version="1.0" encoding="UTF-8"?>
<!ELEMENT BrowseReferenceFile (DTDVersion, DataCenterId, TemporalCoverage, BrowseCrossReference*)>

<!ELEMENT DTDVersion (#PCDATA)>

<!ELEMENT DataCenterId (#PCDATA)>

<!ELEMENT TemporalCoverage (StartDate, EndDate)>
<!ELEMENT StartDate (#PCDATA)>
<!ELEMENT EndDate (#PCDATA)>

<!ELEMENT BrowseCrossReference (GranuleUR, BrowseGranuleId, InsertTime, LastUpdate?, DeleteTime?, InternalFileName, BrowseDescription?, BrowseSize?)>
<!ELEMENT GranuleUR (#PCDATA)>
<!ELEMENT BrowseGranuleId (#PCDATA)>
<!ELEMENT InsertTime (#PCDATA)>
<!ELEMENT LastUpdate (#PCDATA)>
<!ELEMENT DeleteTime (#PCDATA)>
<!ELEMENT InternalFileName (#PCDATA)>
<!ELEMENT BrowseDescription (#PCDATA)>
<!ELEMENT BrowseSize (#PCDATA)>
```
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Appendix B. Issues

1. Need to add a Level 3 requirement for bulk metadata and browse generation since it will have operational impact at the DAACs.

2. If a DAAC submits older metadata for a granule to ECHO, after ECHO already has a more recent version of the metadata for a given granule, the older version will be placed into ECHO.

Resolution The ECHO system will check the insert or update times associated with an incoming granule against the insert or update times that already exist in the ECHO database. If the incoming insert or update times of the incoming granule is older than what is in the ECHO database, the granule will not be inserted.

3. The BMGT does not support the export of Landsat 7 subintervals because the complicated pricing algorithm is not supported outside of ECS (e.g., ECHO).

4. There is no way for the BMGT to determine when DAAC personnel version off granules since this process does not change the “lastUpdate” attribute in the granule-level metadata.

5. Although the BMGT can produce compressed XML files, the DAACs must set the output to formatted for the browse xml file otherwise the browse files will not be distributed correctly.

6. There is a delay between when DAAC personnel delete a granule and when the VAP gets the metadata export file that indicates the granule has been deleted. Thus, there is a window when a VAP user may attempt to order the granule only to find out it’s been deleted.
This page intentionally left blank.
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACRIM</td>
<td>Active Cavity Radiometer Irradiance Monitor</td>
</tr>
<tr>
<td>AIRS</td>
<td>Atmospheric Infrared Sounder</td>
</tr>
<tr>
<td>AMSR</td>
<td>Advanced Microwave Scanning Radiometer</td>
</tr>
<tr>
<td>AMSU</td>
<td>Advanced Microwave Sounding Unit</td>
</tr>
<tr>
<td>ASTER</td>
<td>Advanced Spaceborne Thermal Emission and Reflection Radiometer</td>
</tr>
<tr>
<td>BBGT</td>
<td>Bulk Browse Generator Tool</td>
</tr>
<tr>
<td>BMGT</td>
<td>Bulk Metadata Generator Tool</td>
</tr>
<tr>
<td>BRF</td>
<td>Browse Reference File</td>
</tr>
<tr>
<td>DAAC</td>
<td>Distributed Active Archive Center</td>
</tr>
<tr>
<td>DDIST</td>
<td>Data Distribution</td>
</tr>
<tr>
<td>DTD</td>
<td>Document Type Definition</td>
</tr>
<tr>
<td>ECS</td>
<td>EOSDIS Core System</td>
</tr>
<tr>
<td>EDAAC</td>
<td>EDC Distributed Active Archive Center</td>
</tr>
<tr>
<td>EDG</td>
<td>EOS Data Gateway</td>
</tr>
<tr>
<td>ESD</td>
<td>Engineering Support Directive</td>
</tr>
<tr>
<td>ESDT</td>
<td>Earth Science Data Type</td>
</tr>
<tr>
<td>ESIP</td>
<td>Earth Science Information Partner</td>
</tr>
<tr>
<td>GDAAC</td>
<td>GSFC Distributed Active Archive Center</td>
</tr>
<tr>
<td>IIMS</td>
<td>Independent Information Management System</td>
</tr>
<tr>
<td>LDAAC</td>
<td>Langley Distributed Active Archive Center</td>
</tr>
<tr>
<td>MISR</td>
<td>Mult-angle Imaging SpectroRadiometer</td>
</tr>
<tr>
<td>MODIS</td>
<td>Moderate-Resolution Imaging Spectroradiometer</td>
</tr>
<tr>
<td>MOPITT</td>
<td>Measurements of Pollution in the Troposphere</td>
</tr>
<tr>
<td>MSU</td>
<td>Microwave Humidity Sounder</td>
</tr>
<tr>
<td>NDAAC</td>
<td>NSIDC Distributed Active Archive Center</td>
</tr>
<tr>
<td>PSA</td>
<td>Product Specific Attribute</td>
</tr>
<tr>
<td>QA</td>
<td>Quality Assurance</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>RESAC</td>
<td>Regional Earth Science Application Center</td>
</tr>
<tr>
<td>SDSRV</td>
<td>Science Data Server</td>
</tr>
<tr>
<td>SIPS</td>
<td>Science Information Processing System</td>
</tr>
<tr>
<td>STMGMT</td>
<td>Storage Management</td>
</tr>
<tr>
<td>VAP</td>
<td>Value-Added Provider</td>
</tr>
<tr>
<td>XML</td>
<td>Extensible Markup Language</td>
</tr>
</tbody>
</table>