PO.DAAC Services & Tools

Services & Tools for Accessing & Subsetting Data
*Also have visualization capabilities
FTP-based Access

- PO.DAAC anonymous FTP site via web browser (Firefox, Chrome, IE, etc.)
  - Interactive/Graphical User Interface (GUI)
FTP-based Access

Directory organization: Aquarius data, documents & reader software

Data by Level (raw, orbital/swath, mapped/gridded)

Documents, Reader software
FTP-based Access

**Directory organization:** Aquarius data by Version ...

### Official Aquarius data releases (Versions 2, 3, 4)

<table>
<thead>
<tr>
<th>Name</th>
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<td>7/15/14</td>
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<td>CAPv4</td>
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<td>10:53:00 AM</td>
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<td>V2</td>
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<td>12:15:00 PM</td>
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<tr>
<td>V3</td>
<td>6/9/14</td>
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<tr>
<td>V4</td>
<td>7/22/15</td>
<td>12:00:00 AM</td>
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</table>
FTP-based Access

Directory organization: ... then by Product Time Interval ...


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<td>7/22/15 12:00:00 AM</td>
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<td>7day</td>
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<td>7/22/15 12:00:00 AM</td>
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<tr>
<td>7day_running</td>
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</tr>
<tr>
<td>annual</td>
<td></td>
<td>7/22/15 12:00:00 AM</td>
</tr>
<tr>
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<td>climatology_seasonal</td>
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<tr>
<td>cumulative</td>
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<td>7/22/15 12:00:00 AM</td>
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</tr>
<tr>
<td>monthly</td>
<td></td>
<td>7/22/15 12:00:00 AM</td>
</tr>
</tbody>
</table>

7 day

Various Aquarius dataset types
FTP-based Access

Directory organization: ... then by Product Type ...


SCI = Maps based on all/combined data
SCIA = Maps based on data from ascending passes only
SCID = Maps based on data from descending passes only

<< Designations are described in the "Aquarius User Guide"

>> Differences between ascending and descending passes are described in the "Aquarius Salinity Validation Analysis"
FTP-based Access

Directory organization: ... then by Year ...
FTP-based Access

Directory organization: ... then by Day of Year ...

Starting Julian Day (JD) of available datasets
FTP-based Access

- Listings of complete global Level-3 (mapped) or Level-2 (orbital) files for download
FTP-based Access

Specialized FTP-client tool: eg. FileZilla

- Interactive “Drag-n-Drop” GUI-based downloads
- Supports: bulk file downloads, filtering, site/login management

Login specification
User: anonymous
Password: your email address

Local destination directory
Remote FTP source data folder(s)

Mapped, Version 4, 7 day, All passes, 2015, JD 001 - 050
FTP-based Access

- FTP access via OS command line
  - Facilitates routine/automated script-based access via cronjob (e.g., scheduled downloading)
  - Bulk downloads using mget command

Syntax:  ftp://anonymous@podaac-ftp.jpl.nasa.gov  (password prompt: enter your email)
FTP-based Access

ftp> cd /allData/aquarius/L3/mapped/V4/7day/SCI2015/001

cd = change directory

ftp> ls

ls = list directory items

ftp> prompt n

by default prompt is on; mget transfers all files if prompt is off

ftp> mget *.bz2

copies remote files to the local computer (e.g. all * files ending with .bz2 extension)
Web services for Accessing Aquarius Data from PO.DAAC

- **WS**: Application programming interface (API) that can be accessed through standard web protocols (HTTP) with well-defined parameter extensions

- **General Form**: Extended URL with parameters

- **Utility**: Programmatic calls over the web to the service via standard HTTP request
  - Automated machine-to-machine data access/queries
  - Request: Metadata, subset data, process data, extract/download
  - Returns: a data object: eg. XML/JSON (*JavaScript Object Notation*) structure, data file, image file

Example of PO.DAAC visualization client tools leveraging Web services on the Back-end

**LAS (Live Access Server)** uses **THREDDS** for L3 data subsetting/extraction
THREDDS

http://podaac.jpl.nasa.gov/podaac_thredds

- HTTP-based Web service widely used to aggregate, serve and subset earth science data
- THREDDS catalogs: logical dataset/granule aggregations (eg. time series of Aquarius L3m data)
  

- Subsetting of gridded data “by-value” (Lat/Lon/Time)
- Supports output file conversion to netCDF
Interactive subsetting via THREDDS NCSS Form


Subsetting via structured THREDDS URL with parameters

HTTP service request

Catalog reference

var=l3m_data&north=60&south=20&east=-5&west=-75&time_start=2013-12-20T00:00:00Z&time_end=2014-09-24T00:00:00Z

Variable list
Spatial bounding box

Time range filters

THREDDS
OPeNDAP

- Web service architecture/HTTP-based protocol widely used to serve, subset, deliver earth science data
- Data array *Index-based* subsetting at the granule level
- PO.DAAC Aquarius OPeNDAP collection

http://podaac-opendap.jpl.nasa.gov/opendap/allData/aquarius/
OPeNDAP

Interactive subsetting and file metadata exposure via OPeNDAP Form

http://podaac-opendap.jpl.nasa.gov/opendap/allData/aquarius/L3/mapped/V4/7day/SCI/2011/239/Q20112392011245.L3m_7D_SCI_V4.0_SSS_1deg.bz2.html

Granule subsetting via extended OPeNDAP URL with parameters

PO.DAAC Web services (ws)

- Integrated set of PO.DAAC Web-services for dataset/granule metadata search & subsetting
- Returns: HTML, XML structure or in JSON format
- Utility: programmatic sequential drill down information hierarchy via “chained” ws calls

Interactive Querying via WS-Forms

http://podaac.jpl.nasa.gov/ws/
### Example WS Metadata Query Workflow for Aquarius

<table>
<thead>
<tr>
<th>Step</th>
<th>CWS Request</th>
<th>Response / Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Get metadata for a specific granule</td>
<td><a href="http://podaac.jpl.nasa.gov/ws/metadata/granule/?format=iso&amp;shortName=AQUARIUS_L3_SSS_SMI_MONTHLY_V4&amp;granuleName=Q201303222013059.L3m_MO_SCI_V4.0_SSS_1deg">http://podaac.jpl.nasa.gov/ws/metadata/granule/?format=iso&amp;shortName=AQUARIUS_L3_SSS_SMI_MONTHLY_V4&amp;granuleName=Q201303222013059.L3m_MO_SCI_V4.0_SSS_1deg</a></td>
<td>![Image 4]</td>
</tr>
<tr>
<td>5. Get spatial subset of granule data (CWS L2 SSS)</td>
<td></td>
<td>![Image 5]</td>
</tr>
</tbody>
</table>
## Summary of Web Services @ PO.DAAC

<table>
<thead>
<tr>
<th>Feature</th>
<th>THREDDS</th>
<th>OPeNDAP</th>
<th>PODAAC-ws</th>
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</thead>
<tbody>
<tr>
<td><strong>Mode of Access</strong></td>
<td>Interactive Form Extended URL</td>
<td>Interactive Form Extended URL</td>
<td>Interactive Form Extended URL</td>
</tr>
<tr>
<td><strong>Dataset Applicability</strong></td>
<td>L3 - 4 (gridded)</td>
<td>L1 – 4 (swath &amp; gridded)</td>
<td>L1 – 4 (swath &amp; gridded)</td>
</tr>
<tr>
<td><strong>Operation Level</strong></td>
<td>Granule Collection</td>
<td>Individual Granule</td>
<td>Dataset/Granule</td>
</tr>
<tr>
<td><strong>Subset Query</strong></td>
<td>By-value</td>
<td>By-index</td>
<td>By-value</td>
</tr>
<tr>
<td><strong>Exposes/Returns</strong></td>
<td>Metadata/Data</td>
<td>Metadata/Data</td>
<td>Metadata/Data</td>
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<tr>
<td><strong>Query Limitations</strong></td>
<td>lg. aggregate queries</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Subservices</strong></td>
<td>NCCS, WMS, WCS</td>
<td>-</td>
<td>Metadata: Dataset, Granule Image, extract: Granule</td>
</tr>
<tr>
<td><strong>Ease of Use</strong></td>
<td>High</td>
<td>Lower (but v. flexible)</td>
<td>Mid</td>
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</table>
PO.DAAC Services & Tools

Next week's topic!

Web Portal

Services & Tools for Accessing & Subsetting Data
*Also have visualization capabilities

Aquarius L3 Image Browser

Visualization

Panopy

THREDDS Data Server

Live Access Server

OPeNDAP

FTP

Web Services