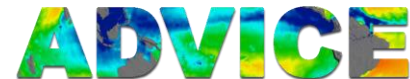


Access Aquarius Data

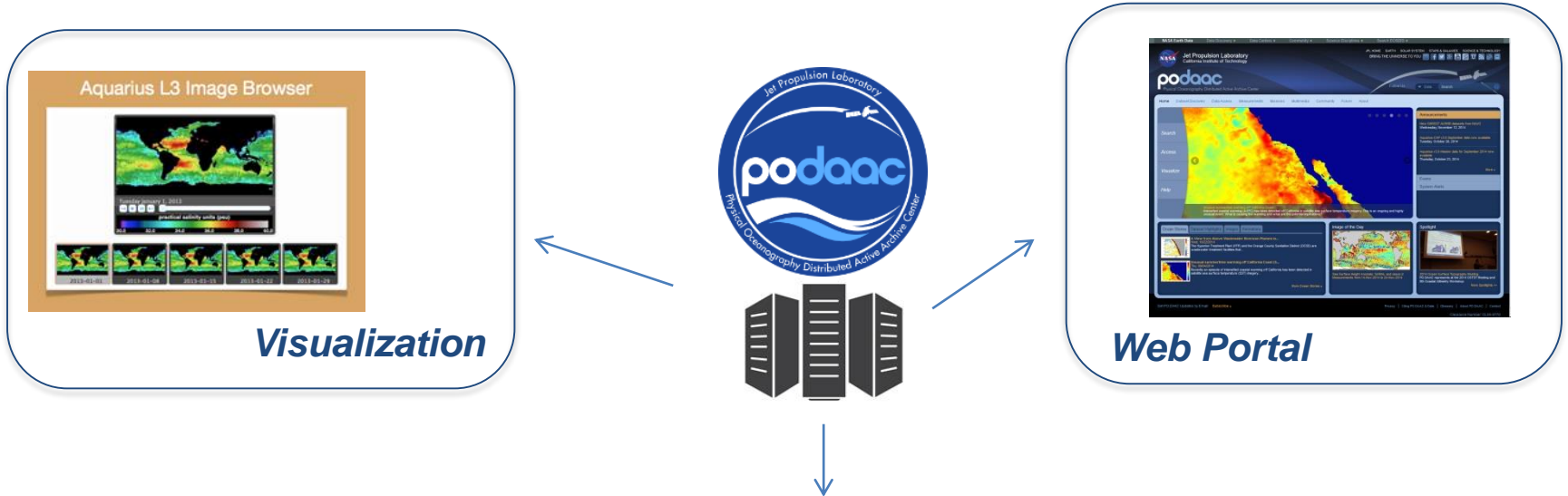
Vardis Tsontos

NASA Jet Propulsion Laboratory

PO.DAAC Data Engineer



PO.DAAC Services & Tools



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

This section displays a collage of various services and tools used for accessing and subsetting data. The items are arranged in a cluster:












- Panoply**: A tool for viewing netCDF, HDF, and GRIB data, showing a map of the United States with temperature data.
- OPeNDAP**: A web interface for accessing remote data, showing a table of data files and their metadata.
- FTP**: A screenshot of an FTP directory listing for the PO.DAAC FTP site, showing file names, sizes, and last modified dates.
- Live Access Server**: A web interface for live data access, showing a map of the Pacific Ocean with data overlays.
- THREDDS Data Server**: A web interface for accessing data through the THREDDS protocol, showing a search interface and data details.
- Web Services**: A diagram showing the PO.DAAC logo at the center, surrounded by various service protocols: REST, JSON, XML, RSS, ISO, GCMD, FGDC, and DATACASTING.

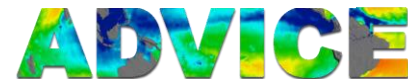
FTP-based Access

- PO.DAAC anonymous FTP site via web browser (Firefox, Chrome, IE, etc.)
 - **ftp://podaac-ftp.jpl.nasa.gov**
 - Interactive/Graphical User Interface (GUI)

Index of ftp://podaac-ftp.jpl.nasa.gov/

 [Up to higher level directory](#)

Name	Size	Last Modified
 GeodeticsGravity		12/2/14 12:00:00 AM
 OceanCirculation		7/28/11 12:00:00 AM
 OceanTemperature		6/9/14 12:00:00 AM
 OceanWinds		7/28/11 12:00:00 AM
 README	2 KB	10/25/11 12:00:00 AM
 README.txt	1 KB	10/25/11 12:00:00 AM
 SalinityDensity		7/28/11 12:00:00 AM
 Seace		11/30/12 12:00:00 AM
 SeaSurfaceTopography		11/20/13 12:00:00 AM
 allData		5/5/15 12:00:00 AM
common		9/29/14 12:00:00 AM
 misc		4/6/15 12:00:00 AM



FTP-based Access

Directory organization: Aquarius data, documents & reader software





Index of ftp://podaac-ftp.jpl.nasa.gov/SalinityDensity/

 Up to higher level directory

Name	Size	Last Modified
 aquarius		2/25/13 12:00:00 AM

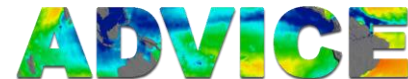
Index of ftp://podaac-ftp.jpl.nasa.gov/SalinityDensity/aquarius/

 Up to higher level directory

Name	Size	Last Modified
 L0		2/25/13 12:00:00 AM
 L1		2/25/13 12:00:00 AM
 L2		10/8/15 10:14:00 AM
 L3		2/25/13 12:00:00 AM
docs		7/17/14 12:00:00 AM
sw		7/17/14 12:00:00 AM

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

Documents, Reader software



FTP-based Access

Directory organization: Aquarius data by Version ...

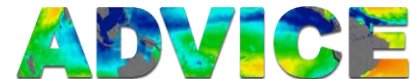
Index of ftp://podaac-ftp.jpl.nasa.gov/SalinityDensity/aquarius/L3/mapped/

 Up to higher level directory

Name	Size	Last Modified
 CAPv2		5/7/13 12:00:00 AM
 CAPv3		7/15/14 12:00:00 AM
 CAPv4		10/8/15 10:53:00 AM
 V2		12/16/15 12:15:00 PM
 V3		6/9/14 12:00:00 AM
 V4		7/22/15 12:00:00 AM

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

V4













FTP-based Access

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

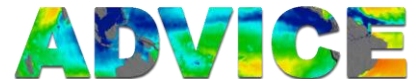
Index of ftp://podaac-ftp.jpl.nasa.gov/SalinityDensity/aquarius/L3/mapped/V4/

 Up to higher level directory

Name	Size	Last Modified
 28day_running		7/22/15 12:00:00 AM
 3month		7/22/15 12:00:00 AM
 7day		7/22/15 12:00:00 AM
 7day_running		7/22/15 12:00:00 AM
 annual		7/22/15 12:00:00 AM
 climatology_monthly		7/22/15 12:00:00 AM
 climatology_seasonal		7/22/15 12:00:00 AM
 cumulative		7/22/15 12:00:00 AM
 daily		1/26/16 2:25:00 PM
 monthly		7/22/15 12:00:00 AM

Various Aquarius dataset types

7 day




FTP-based Access

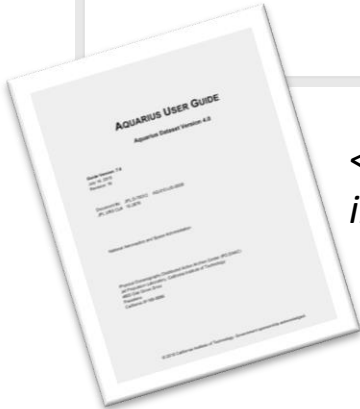
Directory organization: ... then by Product Type ...

Index of <ftp://podaac-ftp.jpl.nasa.gov/SalinityDensity/aquarius/L3/mapped/V4/7day/>

 Up to higher level directory

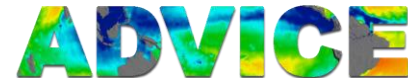
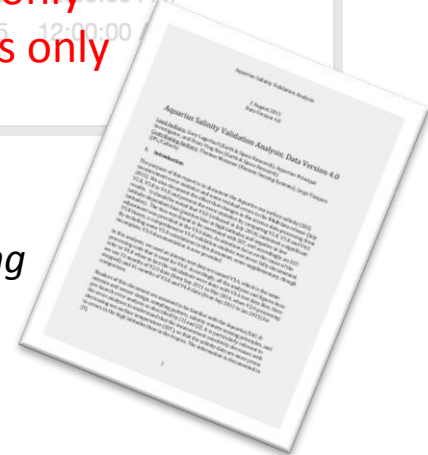
Name	Size	Last Modified
 SCI		7/22/15 12:00:00 AM
SCI		7/22/15 12:00:00 AM
SCIA		7/22/15 12:00:00 AM
SCID		7/22/15 12:00:00 AM

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 ...

Index of <ftp://podaac-ftp.jpl.nasa.gov/SalinityDensity/aquarius/L3/mapped/V4/7day/SCI/>

 [Up to higher level directory](#)

Name

 2011
 2012
 2013
 2014
 2015

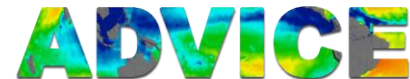
Years of Aquarius data availability

Size

Last Modified

6/19/15 12:00:00 AM
6/19/15 12:00:00 AM
6/19/15 12:00:00 AM
6/19/15 12:00:00 AM
7/11/15 12:00:00 AM

2015



FTP-based Access

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

Index of ftp://podaac-ftp.jpl.nasa.gov/SalinityDensity/aquarius/L3/mapped/V4/7day/SCI/2015/

[Up to higher level directory](#)

Name	Size	Last Modified
001		6/19/15 12:00:00 AM
008		6/20/15 12:00:00 AM
015		6/19/15 12:00:00 AM
022		6/19/15 12:00:00 AM
029		6/19/15 12:00:00 AM
036		6/19/15 12:00:00 AM
043		6/20/15 12:00:00 AM
050		6/20/15 12:00:00 AM
057		6/20/15 12:00:00 AM
064		6/19/15 12:00:00 AM
071		6/20/15 12:00:00 AM
078		6/19/15 12:00:00 AM
085		6/20/15 12:00:00 AM
092		6/20/15 12:00:00 AM
099		6/20/15 12:00:00 AM
106		6/20/15 12:00:00 AM
113		6/20/15 12:00:00 AM
120		7/11/15 12:00:00 AM
127		7/11/15 12:00:00 AM
134		7/11/15 12:00:00 AM
141		7/11/15 12:00:00 AM
148		7/11/15 12:00:00 AM
155		7/11/15 12:00:00 AM

001

Starting Julian Day (JD) of available datasets



FTP-based Access

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

The screenshot shows a web browser window with the address bar displaying the URL: `ftp://podaac-ftp.jpl.nasa.gov/allData/aquarius/L3/mapped/V4/7day/SCI/2015/001/`. The browser's address bar also shows the text "Index of ftp://podaac-ftp.jpl...".

A red arrow points from the text "Mapped, Version 4, 7 day, All passes, 2015, JD = 001" to the first file in the directory listing: `Q20150012015007.L3m_7D_SCI_V4.0_SSS_1deg.bz2`.

The directory listing is titled "Index of ftp://podaac-ftp.jpl.nasa.gov/allData/aquarius/L3/mapped/V4/7day/SCI/2015/001/" and includes a link "Up to higher level directory". The listing contains the following files:

Name	Size	Last Modified
Q20150012015007.L3m_7D_SCI_V4.0_SSS_1deg.bz2	86 KB	6/18/2015 12:00:00 AM
Q20150012015007.L3m_7D_SCI_V4.0_SSS_1deg.md5	1 KB	6/18/2015 12:00:00 AM
Q20150012015007.L3m_7D_SCI_V4.0_anc_sst_1deg.bz2	83 KB	6/19/2015 12:00:00 AM
Q20150012015007.L3m_7D_SCI_V4.0_anc_sst_1deg.md5	1 KB	6/19/2015 12:00:00 AM
Q20150012015007.L3m_7D_SCI_V4.0_density_1deg.bz2	69 KB	6/18/2015 12:00:00 AM
Q20150012015007.L3m_7D_SCI_V4.0_density_1deg.md5	1 KB	6/18/2015 12:00:00 AM
Q20150012015007.L3m_7D_SCI_V4.0_scat_wind_speed_1deg.bz2	102 KB	6/18/2015 12:00:00 AM
Q20150012015007.L3m_7D_SCI_V4.0_scat_wind_speed_1deg.md5	1 KB	6/18/2015 12:00:00 AM

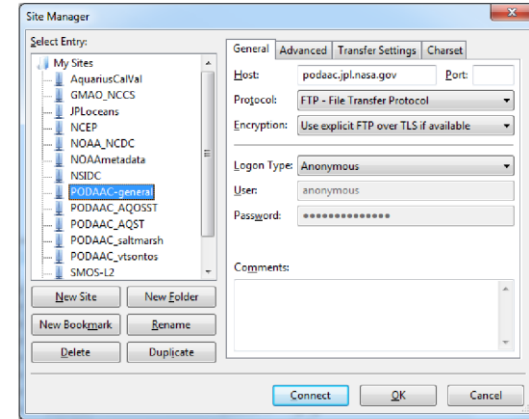
A dialog box titled "Opening Q20150012015007.L3m_7D_SCI_V4.0_SSS_1deg.bz2" is open, showing the file name and its size (85.4 KB). The dialog asks "What should Firefox do with this file?" and has three options: "Open with WinRAR archiver (default)", "Save File" (selected), and "Do this automatically for files like this from now on." (unchecked). The "OK" and "Cancel" buttons are visible at the bottom.



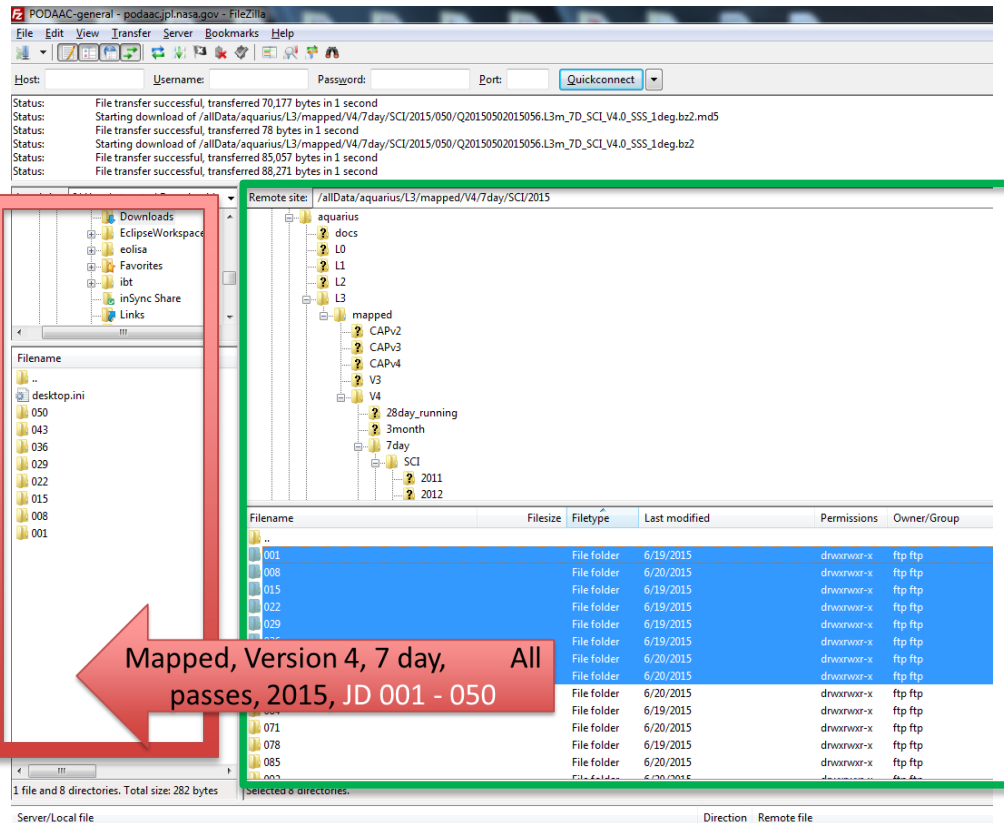
FTP-based Access

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



Remote FTP
source data
folder(s)

Local
destination
directory

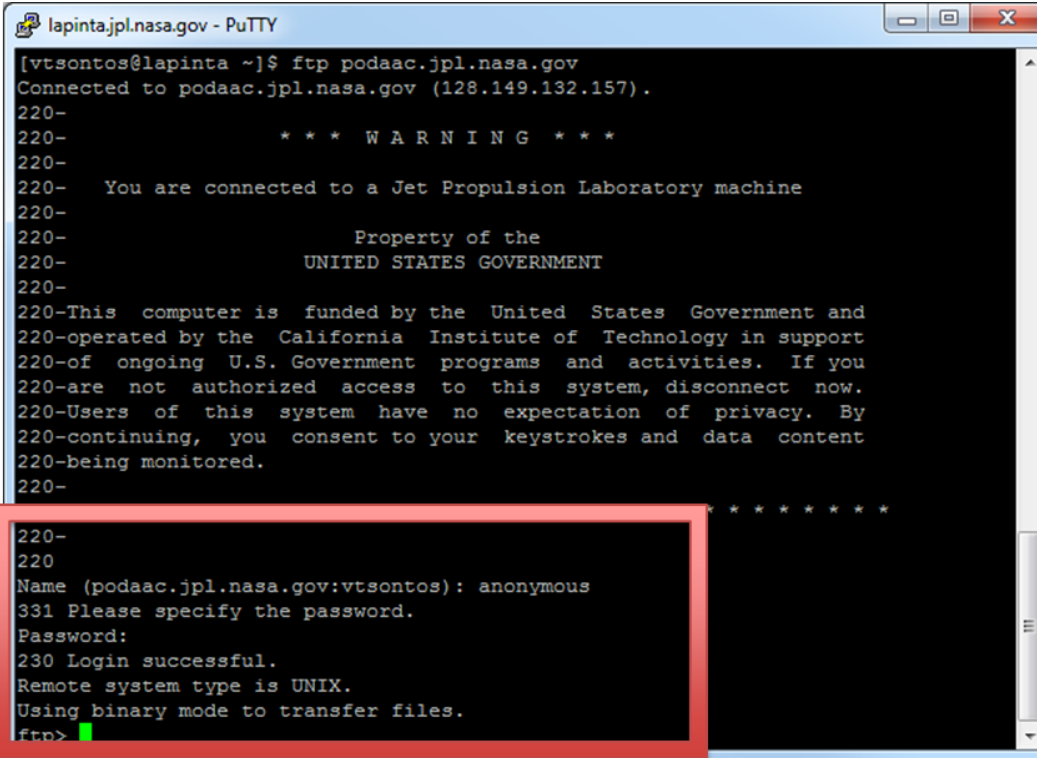
Mapped, Version 4, 7 day, All
passes, 2015, JD 001 - 050



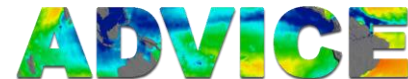
FTP-based Access

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

Syntax: <ftp://anonymous@podaac-ftp.jpl.nasa.gov> (password prompt: enter your email)



```
lapinta.jpl.nasa.gov - PuTTY
[vtsonotos@lapinta ~]$ ftp podaac.jpl.nasa.gov
Connected to podaac.jpl.nasa.gov (128.149.132.157).
220-
220-          * * *  W A R N I N G  * * *
220-
220-  You are connected to a Jet Propulsion Laboratory machine
220-
220-          Property of the
220-          UNITED STATES GOVERNMENT
220-
220-This computer is funded by the United States Government and
220-operated by the California Institute of Technology in support
220-of ongoing U.S. Government programs and activities. If you
220-are not authorized access to this system, disconnect now.
220-Users of this system have no expectation of privacy. By
220-continuing, you consent to your keystrokes and data content
220-being monitored.
220-
220-          * * * * *
220-
220
Name (podaac.jpl.nasa.gov:vtsonotos): anonymous
331 Please specify the password.
Password:
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp>
```



FTP-based Access

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

cd = change directory

```
ftp> ls
```

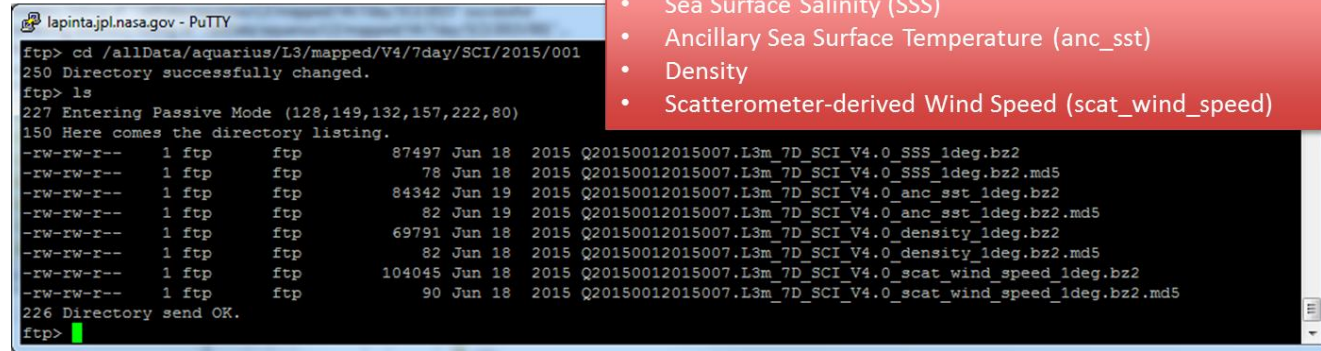
ls = list directory items

```
ftp > prompt n
```

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

```
ftp> mget *.bz2
```

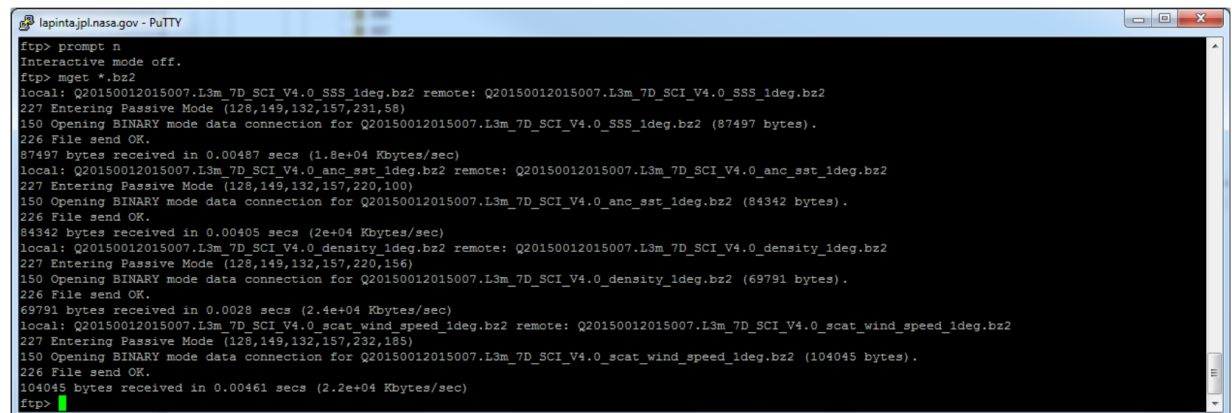
*copies remote files to the local computer (e.g. all * files ending with .bz2 extension)*



```
lapinta.jpl.nasa.gov - PuTTY
ftp> cd /allData/aquarius/L3/mapped/V4/7day/SCI/2015/001
250 Directory successfully changed.
ftp> ls
227 Entering Passive Mode (128,149,132,157,222,80)
150 Here comes the directory listing.
-rw-rw-r-- 1 ftp ftp 87497 Jun 18 2015 Q20150012015007.L3m_7D_SCI_V4.0_SSS_1deg.bz2
-rw-rw-r-- 1 ftp ftp 78 Jun 18 2015 Q20150012015007.L3m_7D_SCI_V4.0_SSS_1deg.bz2.md5
-rw-rw-r-- 1 ftp ftp 84342 Jun 19 2015 Q20150012015007.L3m_7D_SCI_V4.0_anc_sst_1deg.bz2
-rw-rw-r-- 1 ftp ftp 82 Jun 19 2015 Q20150012015007.L3m_7D_SCI_V4.0_anc_sst_1deg.bz2.md5
-rw-rw-r-- 1 ftp ftp 69791 Jun 18 2015 Q20150012015007.L3m_7D_SCI_V4.0_density_1deg.bz2
-rw-rw-r-- 1 ftp ftp 82 Jun 18 2015 Q20150012015007.L3m_7D_SCI_V4.0_density_1deg.bz2.md5
-rw-rw-r-- 1 ftp ftp 104045 Jun 18 2015 Q20150012015007.L3m_7D_SCI_V4.0_scat_wind_speed_1deg.bz2
-rw-rw-r-- 1 ftp ftp 90 Jun 18 2015 Q20150012015007.L3m_7D_SCI_V4.0_scat_wind_speed_1deg.bz2.md5
226 Directory send OK.
ftp>
```

This directory file list includes:

- Sea Surface Salinity (SSS)
- Ancillary Sea Surface Temperature (anc_sst)
- Density
- Scatterometer-derived Wind Speed (scat_wind_speed)

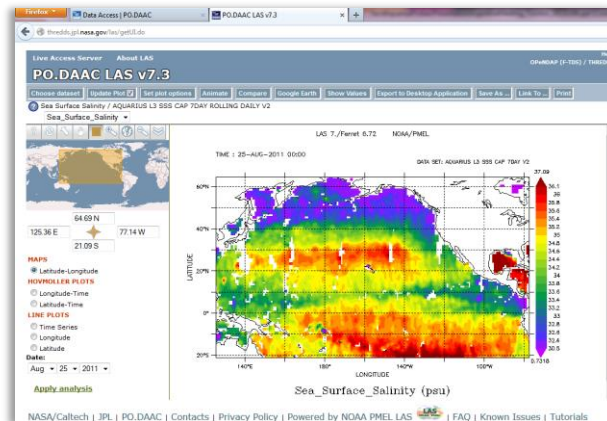


```
lapinta.jpl.nasa.gov - PuTTY
ftp> prompt n
Interactive mode off.
ftp> mget *.bz2
local: Q20150012015007.L3m_7D_SCI_V4.0_SSS_1deg.bz2 remote: Q20150012015007.L3m_7D_SCI_V4.0_SSS_1deg.bz2
227 Entering Passive Mode (128,149,132,157,231,58)
150 Opening BINARY mode data connection for Q20150012015007.L3m_7D_SCI_V4.0_SSS_1deg.bz2 (87497 bytes).
226 File send OK.
87497 bytes received in 0.00487 secs (1.8e+04 Kbytes/sec)
local: Q20150012015007.L3m_7D_SCI_V4.0_anc_sst_1deg.bz2 remote: Q20150012015007.L3m_7D_SCI_V4.0_anc_sst_1deg.bz2
227 Entering Passive Mode (128,149,132,157,220,100)
150 Opening BINARY mode data connection for Q20150012015007.L3m_7D_SCI_V4.0_anc_sst_1deg.bz2 (84342 bytes).
226 File send OK.
84342 bytes received in 0.00405 secs (2e+04 Kbytes/sec)
local: Q20150012015007.L3m_7D_SCI_V4.0_density_1deg.bz2 remote: Q20150012015007.L3m_7D_SCI_V4.0_density_1deg.bz2
227 Entering Passive Mode (128,149,132,157,220,156)
150 Opening BINARY mode data connection for Q20150012015007.L3m_7D_SCI_V4.0_density_1deg.bz2 (69791 bytes).
226 File send OK.
69791 bytes received in 0.0028 secs (2.4e+04 Kbytes/sec)
local: Q20150012015007.L3m_7D_SCI_V4.0_scat_wind_speed_1deg.bz2 remote: Q20150012015007.L3m_7D_SCI_V4.0_scat_wind_speed_1deg.bz2
227 Entering Passive Mode (128,149,132,157,232,155)
150 Opening BINARY mode data connection for Q20150012015007.L3m_7D_SCI_V4.0_scat_wind_speed_1deg.bz2 (104045 bytes).
226 File send OK.
104045 bytes received in 0.00461 secs (2.2e+04 Kbytes/sec)
ftp>
```



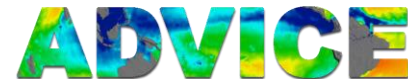
Web services for Accessing Aquarius Data from PO.DAAC

- 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
eg. <http://ServerAddress/ws-path/service-request?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

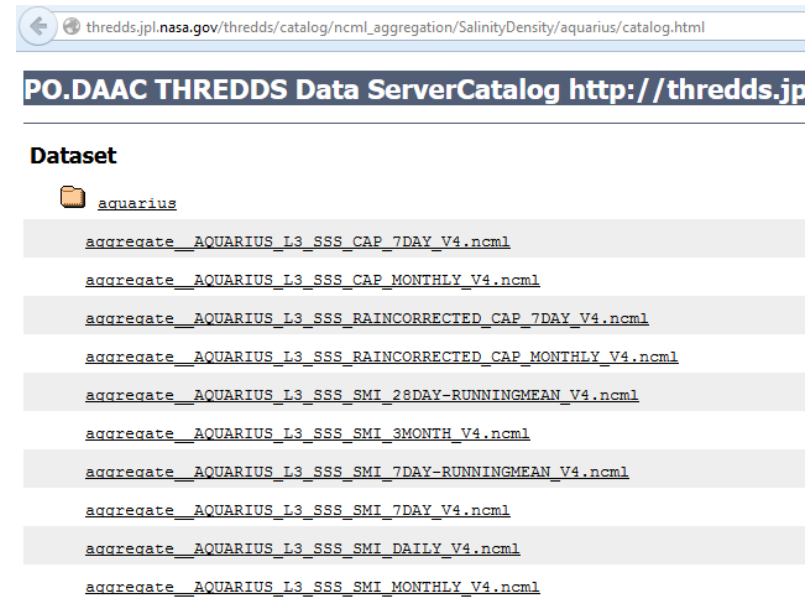
http://podaac.jpl.nasa.gov/podaac_thredds

- 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)

http://thredds.jpl.nasa.gov/thredds/catalog/ncml_aggregation/SalinityDensity/aquarius/catalog.html

http://thredds.jpl.nasa.gov/thredds/catalog/ncml_aggregation/OceanWinds/aquarius/catalog.html


- Subsetting of gridded data “by-value” (*Lat/Lon/Time*)
- Supports output file conversion to netCDF



thredds.jpl.nasa.gov/thredds/catalog/ncml_aggregation/SalinityDensity/aquarius/catalog.html

PO.DAAC THREDDS Data Server <http://thredds.jp>

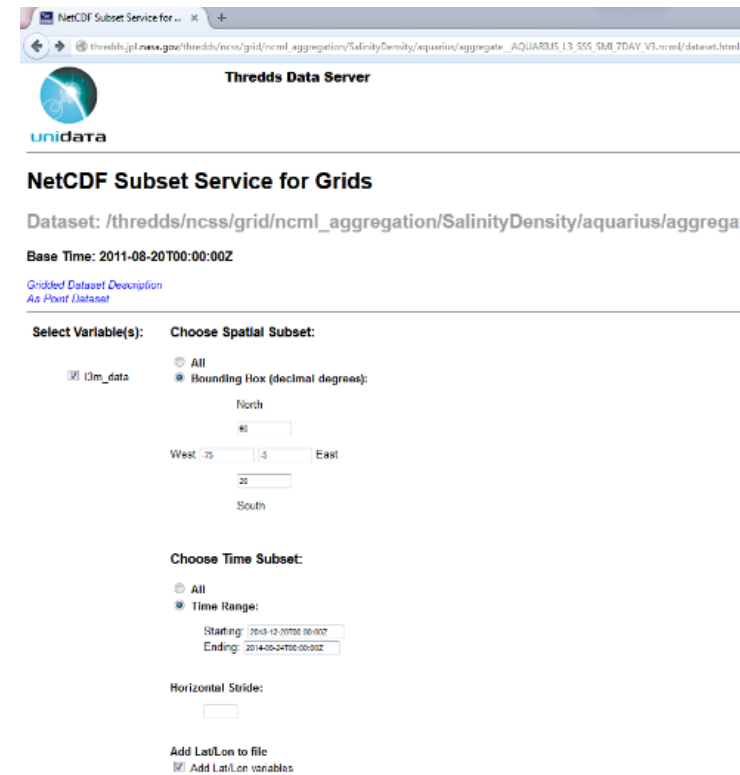
Dataset

-  [aquarius](#)
- [aggregate_AQUARIUS_L3_SSS_CAP_7DAY_V4.ncml](#)
- [aggregate_AQUARIUS_L3_SSS_CAP_MONTHLY_V4.ncml](#)
- [aggregate_AQUARIUS_L3_SSS_RAINCORRECTED_CAP_7DAY_V4.ncml](#)
- [aggregate_AQUARIUS_L3_SSS_RAINCORRECTED_CAP_MONTHLY_V4.ncml](#)
- [aggregate_AQUARIUS_L3_SSS_SMI_28DAY-RUNNINGMEAN_V4.ncml](#)
- [aggregate_AQUARIUS_L3_SSS_SMI_3MONTH_V4.ncml](#)
- [aggregate_AQUARIUS_L3_SSS_SMI_7DAY-RUNNINGMEAN_V4.ncml](#)
- [aggregate_AQUARIUS_L3_SSS_SMI_7DAY_V4.ncml](#)
- [aggregate_AQUARIUS_L3_SSS_SMI_DAILY_V4.ncml](#)
- [aggregate_AQUARIUS_L3_SSS_SMI_MONTHLY_V4.ncml](#)

THREDDS

Interactive subsetting via THREDDS NCSS Form

http://thredds.jpl.nasa.gov/thredds/ncss/grid/ncml_aggregation/SalinityDensity/aquarius/aggregate_AQUARIUS_L3_SSS_CAP_7DAY_V4.ncml/dataset.html



NetCDF Subset Service for Grids

Dataset: /thredds/ncss/grid/ncml_aggregation/SalinityDensity/aquarius/aggregate_AQUARIUS_L3_SSS_CAP_7DAY_V4.ncml/dataset.html

Base Time: 2011-08-20T00:00:00Z

Select Variable(s): l3m_data

Choose Spatial Subset:

All

Bounding Box (decimal degrees):

North:

West: | East

South:

Choose Time Subset:

All

Time Range:

Starting:

Ending:

Horizontal Stride:

Add Lat/Lon to file Add Lat/Lon variables

Subsetting via structured THREDDS URL with parameters

HTTP service request

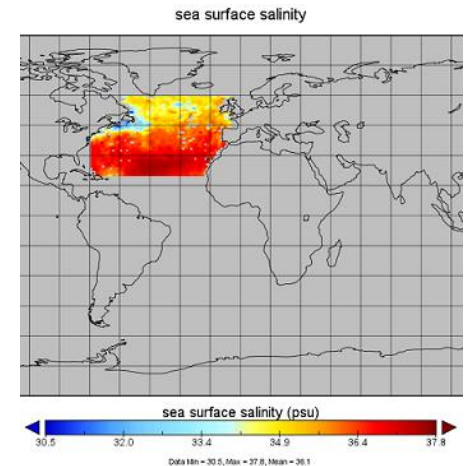
Catalog reference

http://thredds.jpl.nasa.gov/thredds/ncss/grid/ncml_aggregation/SalinityDensity/aquarius/aggregate_AQUARIUS_L3_SSS_SMI_7DAY_V4.ncml?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



OPeNDAP

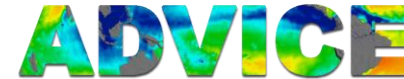
- Web service architecture/HTTP-based protocol widely used to serve, subset, deliver earth science data
- Data array *Index-based* subsetting at the granule level
- PO.DAAC Aquarius OPeNDAP collection

<http://podaac-opensdap.jpl.nasa.gov/opensdap/allData/aquarius/>

The screenshot shows the OPeNDAP @ Physical Oceanography DAAC website. At the top, there is a NASA Jet Propulsion Laboratory header with navigation links for JPL HOME, EARTH, SOLAR SYSTEM, and STARS & GALAXY. Below this is the OPeNDAP logo and the text "OPeNDAP @ Physical Oceanography DAAC". A breadcrumb trail indicates the current directory: "Contents of /allData/aquarius" and "Contents of /allData/aquarius/L3/mapped/V3/7day/SCI/2014/001".

Name	Last Modified	Size	Name	Last Modified	Size	DAP Response Links
Parent Directory/			Parent Directory/			
L1/	2013-03-13T21:05:03	-	Q20140012014007.L3m_7D_SCI_V3.0_SSS_1deg.bz2	2014-05-30T01:06:25	87140	ddx dds das info html rdf file
L2/	2014-07-15T08:35:26	-	Q20140012014007.L3m_7D_SCI_V3.0_SSS_1deg.bz2.md5	2014-05-30T01:06:25	78	ddx dds das info html rdf file
L3/	2013-02-25T16:19:59	-	Q20140012014007.L3m_7D_SCI_V3.0_SSS_bias_adj_1deg.bz2	2014-05-29T09:02:50	87143	ddx dds das info html rdf file
			Q20140012014007.L3m_7D_SCI_V3.0_SSS_bias_adj_1deg.bz2.md5	2014-05-29T09:02:49	87	ddx dds das info html rdf file
			Q20140012014007.L3m_7D_SCI_V3.0_anc_sst_1deg.bz2	2014-05-29T14:11:22	83961	ddx dds das info html rdf file
			Q20140012014007.L3m_7D_SCI_V3.0_anc_sst_1deg.bz2.md5	2014-05-29T14:11:22	82	ddx dds das info html rdf file
			Q20140012014007.L3m_7D_SCI_V3.0_scat_wind_speed_1deg.bz2	2014-05-29T09:38:29	103689	ddx dds das info html rdf file
			Q20140012014007.L3m_7D_SCI_V3.0_scat_wind_speed_1deg.bz2.md5	2014-05-29T09:38:30	90	ddx dds das info html rdf file

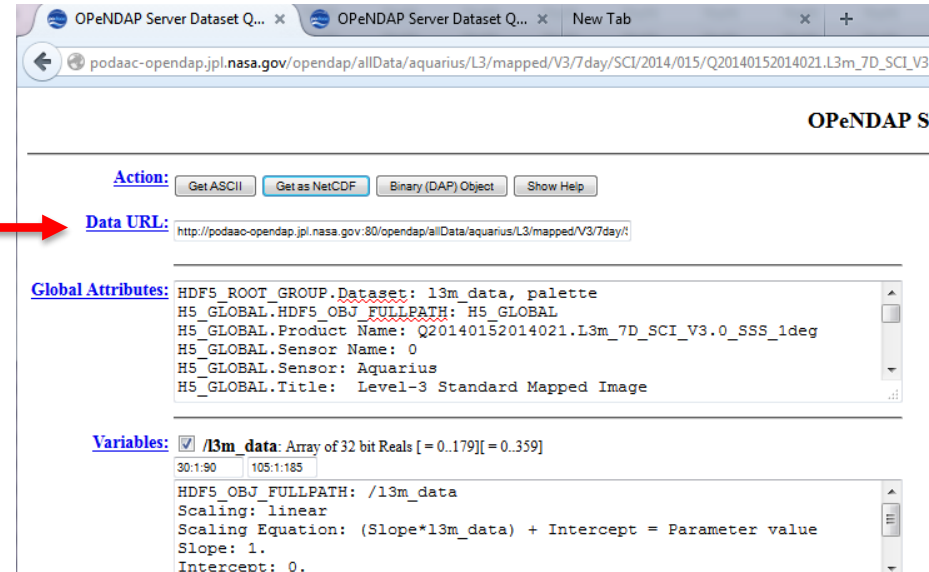
Output
Format



OPeNDAP

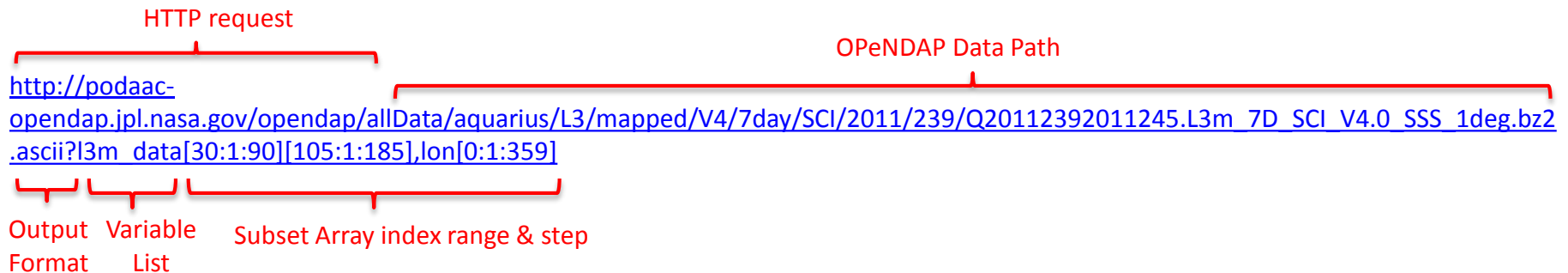
Interactive subsetting and file metadata exposure via OPeNDAP Form

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



The screenshot shows the OPeNDAP web interface. The browser address bar displays the URL: `podaac-opendap.jpl.nasa.gov/opendap/allData/aquarius/L3/mapped/V3/7day/SCI/2014/015/Q20140152014021.L3m_7D_SCI_V3...`. The page title is "OPeNDAP S...". The "Action:" section contains buttons for "Get ASCII", "Get as NetCDF", "Binary (DAP) Object", and "Show Help". The "Data URL:" section shows the URL: `http://podaac-opendap.jpl.nasa.gov:80/opendap/allData/aquarius/L3/mapped/V3/7day/!`. The "Global Attributes:" section displays metadata for the dataset, including "HDF5_ROOT_GROUP.Dataset: l3m_data, palette", "H5_GLOBAL.HDF5_OBJ_FULLPATH: H5_GLOBAL", "H5_GLOBAL.Product Name: Q20140152014021.L3m_7D_SCI_V3.0_SSS_1deg", "H5_GLOBAL.Sensor Name: 0", "H5_GLOBAL.Sensor: Aquarius", and "H5_GLOBAL.Title: Level-3 Standard Mapped Image". The "Variables:" section shows a checked checkbox for "/l3m_data: Array of 32 bit Reals [= 0.179][= 0.359]", with sub-range selectors for "30:1:90" and "105:1:185". Below this, it shows "HDF5_OBJ_FULLPATH: /l3m_data", "Scaling: linear", "Scaling Equation: (Slope*l3m_data) + Intercept = Parameter value", "Slope: 1.", and "Intercept: 0."

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

<http://podaac.jpl.nasa.gov/ws/>

PO.DAAC Web Services Overview

Please note that the next release of PO.DAAC Web Services, planned for the summer of 2015, will contain changes to the ISO reference schema used by PO.DAAC Web Services. Therefore, the keywords that reference certain metadata in the Web Service results will change at that time. Go to <https://cdm.earthdata.nasa.gov/iso> to see the new reference schema. In addition, it is known that certain metadata in the PO.DAAC catalog is inaccurate. In particular, the resource links returned for granule metadata of certain datasets may not be valid. Metadata cleanup is an ongoing process at PO.DAAC. If you observe any bad or inaccurate metadata, please notify podaac@podaac.jpl.nasa.gov.

Introduction

PO.DAAC provides several ways to discover and access physical oceanography data, from the PO.DAAC Web Portal to FTP access to front-end user interfaces (see <http://podaac.jpl.nasa.gov>). That same data can also be discovered and accessed through PO.DAAC Web Services, enabling efficient machine-to-machine communication and data transfers.

What is PO.DAAC Web Services?

PO.DAAC Web Services are application programming interfaces (APIs) that can be accessed through standard web protocols. The W3C defines a Web Service in part as, “A software system designed to support interoperable machine-to-machine interaction over a network.” (for the full definition, see <http://www.w3.org/TR/ws-arch/#what-is>). The PO.DAAC Web Services use a Representational State Transfer (REST) model with calls issued over a Hypertext Transfer Protocol (HTTP) connection. On receipt of a request message, our services return the response in either an Extensible Markup Language (XML) structure or, optionally, a JavaScript Object Notation (JSON) format.

A typical PODAAC Web Service request is generally of the following form:

<http://podaac.jpl.nasa.gov/ws/service?parameters>

Where service indicates the particular service requested (such as “search”) and format indicates the output response format (usually atom or rss for a call to the “search” service). The parameters, options, and details of each of our Web Services are described in the corresponding API documentation.

Web Services

The following is the list of available PO.DAAC Web Services

Name	Description
Dataset Metadata	Dataset metadata service retrieves the metadata of a dataset on PO.DAAC's dataset catalog using the following parameters: datasetId, shortName, and format.
Granule Metadata	Granule metadata service retrieves the metadata of a granule on PO.DAAC's catalog using the following parameters: format and other optional parameters.
Search Dataset	Dataset Search service searches PO.DAAC's dataset catalog, over Level 2, Level 3, and Level 4 datasets, using the following parameters: datasetId, shortName, startTime, endTime, bbox, and others.



Interactive Querying via WS-Forms

PO.DAAC Web Services

Dataset Metadata

URL <http://podaac.jpl.nasa.gov/ws/metadata/dataset>
 Related Resources [Granule Metadata](#)

Description

Dataset metadata service retrieves the metadata of a dataset on PO.DAAC's dataset catalog using the following parameters: datasetId, shortName, and format. It returns metadata in ISO-19115 or GCMD format.
 Please [contact](#) us if there are any discrepancies or inaccuracies found.

Parameters

* BOLD = required parameters

Parameter	Details
datasetId	Description: dataset persistent ID. datasetId or shortName is required for this metadata service. Example: PODAAC-GHMG2-2P001
shortName	Description: dataset shortname. datasetId or shortName is required for this metadata service. Example: OSDPD-L2P-MSG02
format	Description: metadata format. Default format is iso. Possible values: iso, gcmd

Example Usage

Example 1: gcmd Metadata for dataset with shortName = OSDPD-L2P-MSG02
<http://podaac.jpl.nasa.gov/ws/metadata/dataset?format=gcmd&shortName=OSDPD-L2P-MSG02>

Response Example (gcmd format)

```
<?xml version="1.0" ?>
<dif xmlns="http://gcmd.gsfc.nasa.gov/Aboutus/xml/dif/" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://gcmd.gsfc.nasa.gov/Aboutus/xml/dif/ http://gcmd.nasa.gov/Aboutus/xml/dif/dif_v9.8.2.xsd">
  <Entry ID>
```

Sample Run


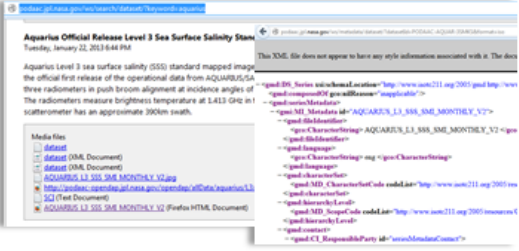






* BOLD = required parameters

Parameter	Value
datasetId	example: PODAAC-GHMG2-2P001
shortName	example: OSDPD-L2P-MSG02
format	iso



PO.DAAC Web services (ws)

Example WS Metadata Query Workflow for Aquarius

Step	CWS Request	Response / Result
<p>1. List Aquarius datasets</p> 	<p>http://podaac.jpl.nasa.gov/ws/search/dataset/?keyword=aquarius</p>	
<p>2. Get dataset metadata for monthly SSS product</p> 	<p>http://podaac.jpl.nasa.gov/ws/metadata/dataset/?format=gcmd&shortName=AQUARIUS_L3_SSS_SMI_MONTHLY_V4</p>	
<p>3. List all related granules within a date range</p> 	<p>http://podaac.jpl.nasa.gov/ws/search/granule/?shortName=AQUARIUS_L3_SSS_SMI_MONTHLY_V4&startTime=2013-01-01T08%3A10%3A07Z&endTime=2013-06-30T23%3A10%3A07Z&format=html&pretty=true</p>	
<p>4. Get metadata for a specific granule</p> 	<p>http://podaac.jpl.nasa.gov/ws/metadata/granule/?format=iso&shortName=AQUARIUS_L3_SSS_SMI_MONTHLY_V4&granuleName=Q20130322013059.L3m_MO_SCI_V4.0_SSS_1deg</p>	
<p>5. Get spatial subset of granule data (CWS L2-SSS)</p>		



Summary of Web Services @ PO.DAAC

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



PO.DAAC Services & Tools



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