Discover *Aquarius* Data

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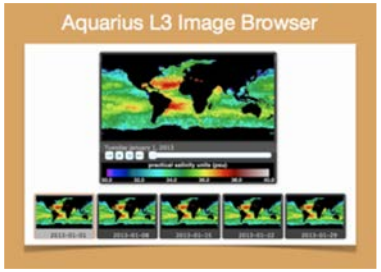
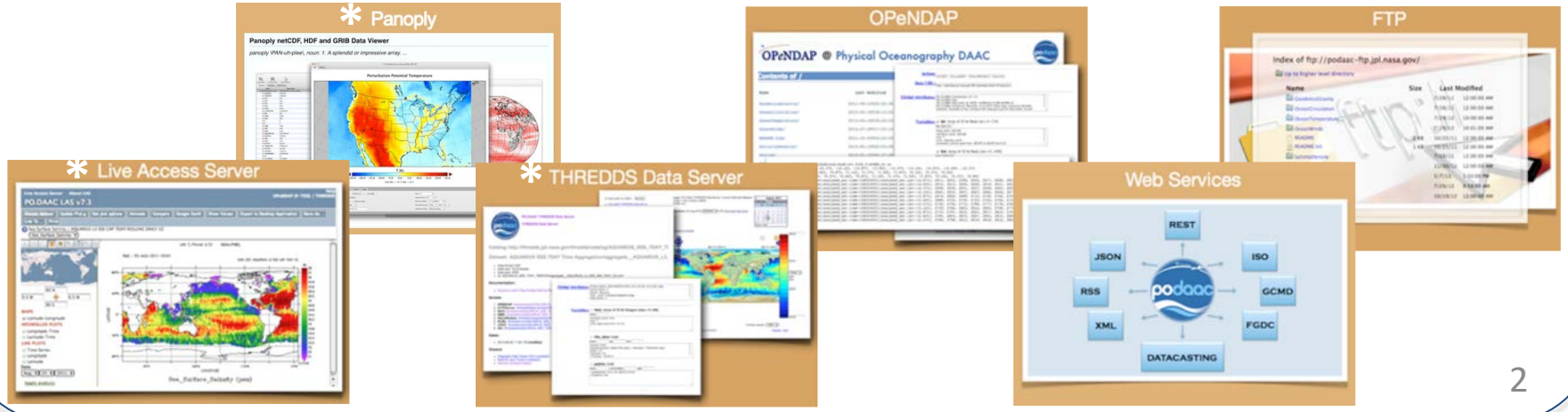


Visualization

Web Portal

Services & Tools for Accessing & Subsetting Data

**Also have visualization capabilities*



Keyword-based Discovery

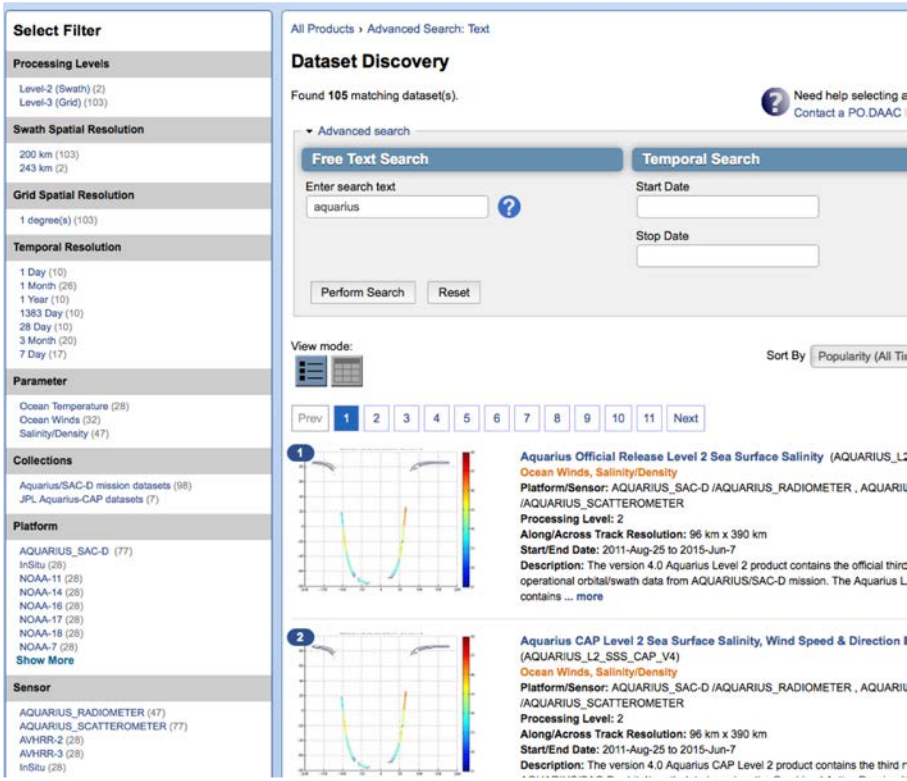
- PO.DAAC portal supports drill-down searches and exposure of data product catalogues by keyword

  - Entering “aquarius” in the search bar...

Keyword-based Discovery

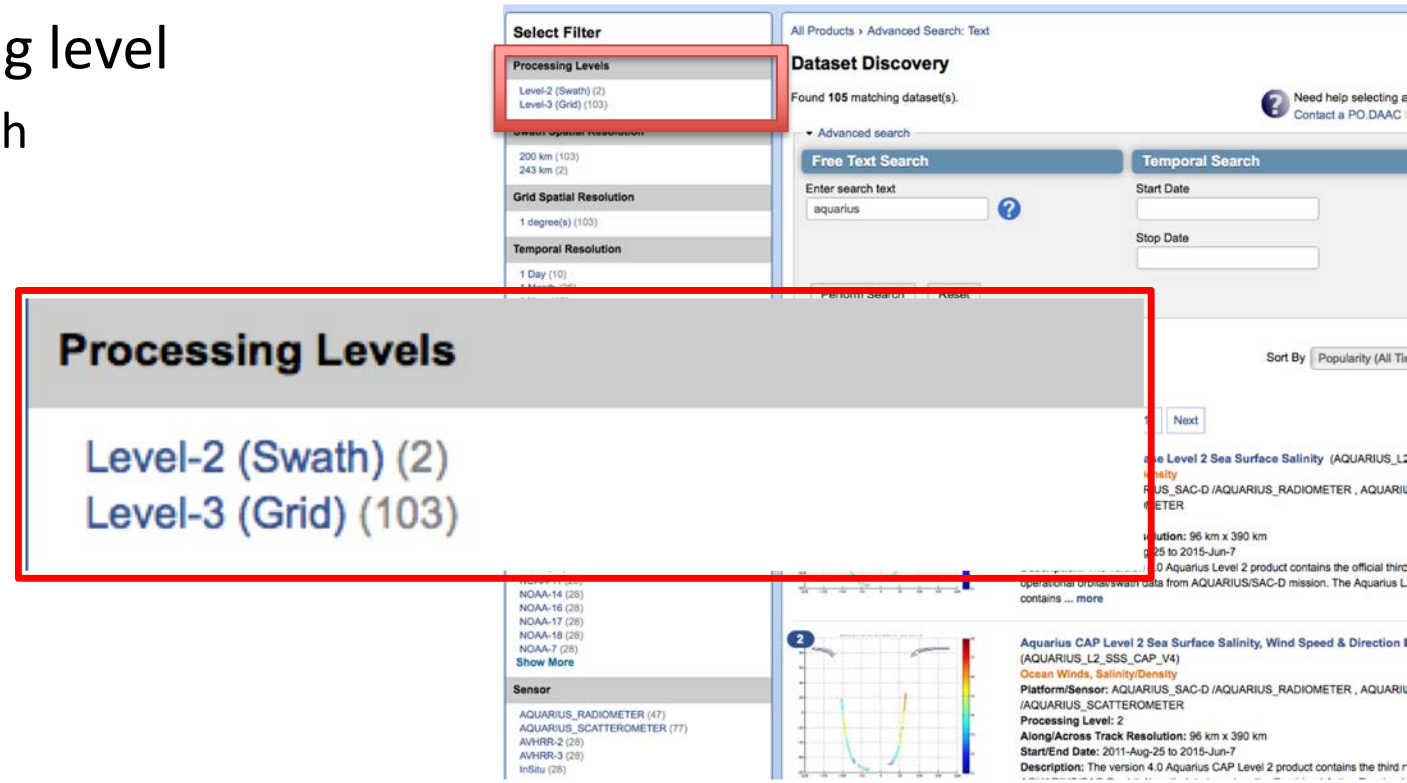
- PO.DAAC portal supports drill-down searches and exposure of data product catalogues by keyword

  - Entering “aquarius” in the search bar... returns a list of all *Aquarius* datasets maintained within the PO.DAAC archive with associated metadata descriptions



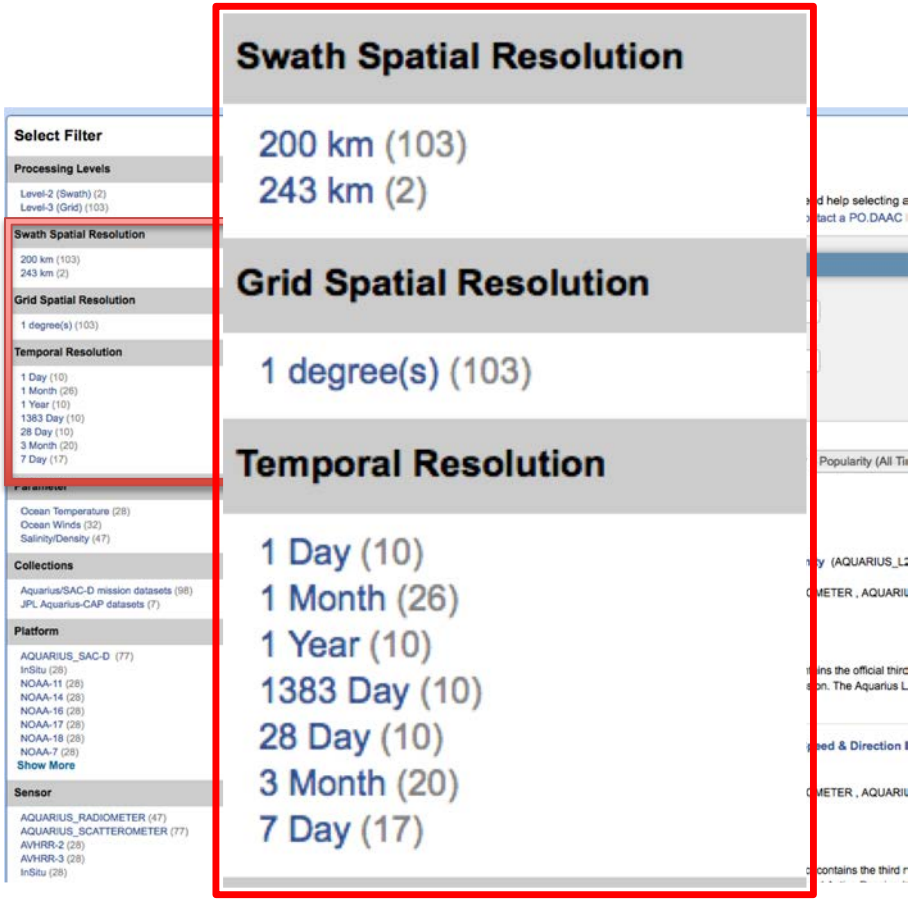
Faceted Search

- Categorical filters can be used to narrow down selections, including:
  - Processing level
    - 2: Swath
    - 3: Grid



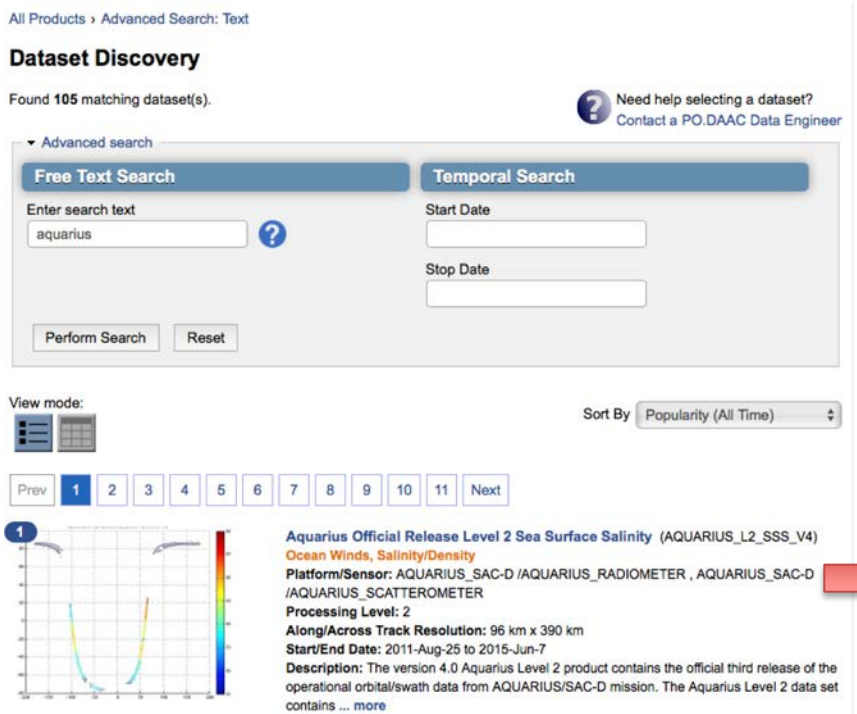
Faceted Search

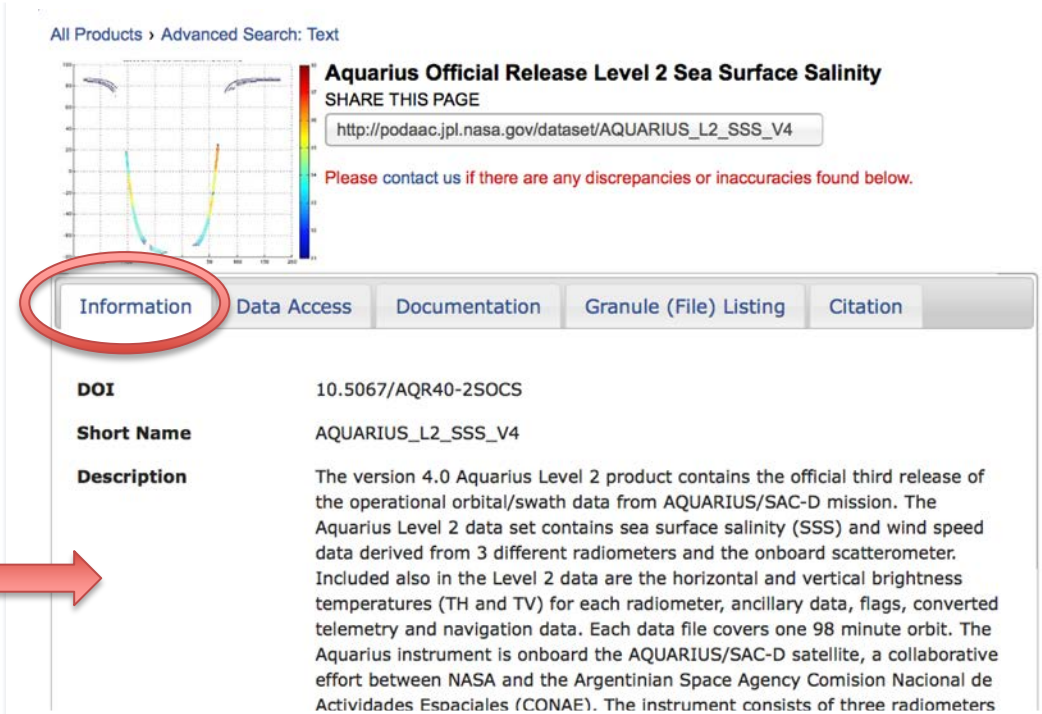
- Categorical filters can be used to narrow down selections, including:
  - Spatial resolution
    - Swath
    - Grid
  - Temporal resolution



Catalog Entries & Metadata

- Clicking on individual dataset items returns complete dataset-level metadata descriptions for the selected product





Catalog Entries & Metadata

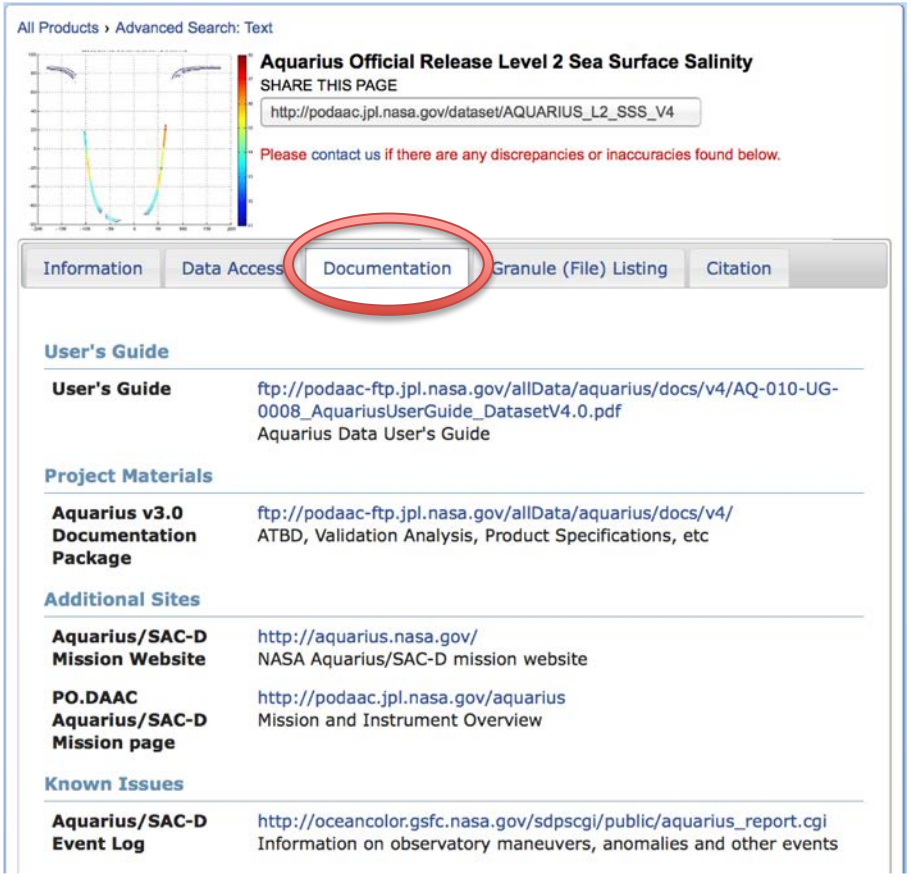
- Tabs for catalog entries provide information on:
  - "Data Access"

    - List of particular data access services (FTP, OPeNDAP, THREDDS, Web-services) available for the particular dataset, together with an indication of file format and compression information

Catalog Entries & Metadata

- Tabs for catalog entries provide information on:
  - "Documentation"

    - List of information resources and other documentation available for a given dataset



Catalog Entries & Metadata

- Tabs for catalog entries provide information on:
  - "Granules"

    - Complete listing of available data files for that product, organized by Year/Month/Day levels that can be expanded and drilled down into

Key Terms & Data Concepts

Product "*Level*" (L0 -> L4): reflects stage in data processing sequence

- L0: raw instrument telemetry data
- L1a: orbital/swath files containing instrument count & navigational telemetry data
- L2: orbital/swath files containing georeferenced geophysical measurement data
- L3: gridded/mapped parameter data at 1 degree Lat/Lon spatial resolution for various time intervals(*see table below*)
- L4: "*value added*" gridded data files – integrates data from multiple sensors and/or applies more advanced statistical/interpolation procedure
  eg. IPRC/SOEST U. Hawaii L4-OISSS product – coming to PO.DAAC soon

File ("*Granule*") Names/conventions

20110814_164328.AQ_L0

Q2011139152300.L1A_SCI.hdf

Q2011237000100.L2_SCI_V4.0.hdf

Q20112392011245.L3m_7D_SCI_V4.0_SSS_1deg.hdf

Aquarius L3 data

Parameter	Time Interval	Orbital Aggregate
Salinity	28day_running	Combined (SCI)
Density	3month	Ascending (SCIA)
Wind Speed	7day	Descending (SCID)
Ancillary SST	7day_running	
	annual	
	climatology_monthly	
	climatology_seasonal	
	cumulative	
	daily	
	monthly	

ftp://podaac-ftp.jpl.nasa.gov/SalinityDensity/aquarius/docs/v4/**AQ-010-UG-0008_AquariusUserGuide_DatasetV4.0.pdf**

Table 2. Aquarius V4.0 Datasets by Product Level/Type with Associated Descriptions and Metadata.

Level	Product Short Name (PO.DAAC DMAS System)	Product Long Name & Description	Temporal Resolution	Ellipsoid Type	Mapping Type
0	AQUARIUS_L0_SSS	Aquarius Level-0 Sea Surface Salinity	1 observation every 1.44 seconds. Repeats orbit track every 7 days.	N/A	Swath
1A	AQUARIUS_L1A_SSS	Aquarius Level-1A Sea Surface Salinity Aquarius L1A data contains raw Aquarius, navigation and telemetry data. Each granule covers 118 minutes, a 98 minute orbit plus 10 minutes of overlap with the following and previous orbits.	1 observation every 1.44 seconds. Repeats orbit track every 7 days.	N/A	Swath
2	AQUARIUS_L2_SSS_V4	Aquarius Level-2 Sea Surface Salinity Aquarius L2 data contains sea surface salinity, radiometer, scatterometer, ancillary, flags, converted telemetry and navigation data. Each granule covers a single 98 minute orbit.	1 observation every 1.44 seconds. Repeats orbit track every 7 days.	N/A	Swath
3	AQUARIUS_L3_SSS_SMI_DAILY_V4	Aquarius Level-3 Sea Surface Salinity Standard Mapped Image Daily Aquarius L3 sea surface salinity (SSS) standard mapped image data contains gridded SSS averaged daily.	Daily	WGS 84	Gridded
		Aquarius L3 sea surface salinity (SSS) standard mapped image data contains gridded SSS averaged by week.			
3	AQUARIUS_L3_SSS_SMI_MONTHLY_V4	Aquarius Level 3 Sea Surface Salinity Standard Mapped Image Monthly Aquarius Level 3 sea surface salinity (SSS) standard mapped image data contains gridded SSS averaged monthly.	Monthly	WGS 84	Gridded
3	AQUARIUS_L3_SSS_SMI_MONTHLY_SM_V4	Aquarius Level 3 Sea Surface Salinity Standard Mapped Image Monthly Smoothed Aquarius Level 3 sea surface salinity (SSS) standard mapped image contains data gridded and smoothed SSS averaged monthly (see Lillie & Lagerloef, 2008)	Monthly	WGS 84	Gridded Smoothed
3	AQUARIUS_L3_SSS_SMI_3MONTH_V4	Aquarius Level-3 Sea Surface Salinity Standard Mapped Image 3 Month Aquarius L3 sea surface salinity (SSS) standard mapped image data contains gridded SSS averaged by season.	3 Months	WGS 84	Gridded
3	AQUARIUS_L3_SSS_SMI_ANNUAL_V4	Aquarius Level-3 Sea Surface Salinity Standard Mapped Image Annual Aquarius L3 sea surface salinity (SSS) standard mapped image data contains gridded SSS averaged by year.	Annual	WGS 84	Gridded

Key Terms & Data Concepts 2/4

"Metadata" - contextual information that describes & facilitates correct interpretation of data values and their quality (eg. Units, sensor type, model/manufacturer)

- comprised of an *Attribute* and associated *Value* (eg. Units : PSU)

- <u>Dataset Level Metadata</u>

  - information fields describing a data product

eg. Level

Resolution (spatial/temporal)

Coverage (spatial/temporal)

Time interval/Frequency

Latency

Source/Provider

Reference Citation

DOI

[AQ-010-UG-0008_AquariusUserGuide_DatasetV4.0.pdf]

Product Short Name (PO.DAAC DMAS System)	Product Long Name & Description	Temporal Resolution	Ellipsoid Type	Mapping Type
AQUARIUS_L3_SSS_SMI_DAILY_V4	Aquarius Level-3 Sea Surface Salinity Standard Mapped Image Daily Aquarius L3 sea surface salinity (SSS) standard mapped image data contains gridded SSS averaged daily.	Daily	WGS 84	Gridded
AQUARIUS_L3_SSS_SMI_7DAY_V4	Aquarius Level-3 Sea Surface Salinity Standard Mapped Image 7Day Aquarius L3 sea surface salinity (SSS) standard mapped image data contains gridded SSS averaged by week.	7 Day	WGS 84	Gridded
AQUARIUS_L3_SSS_SMI_MONTHLY_V4	Aquarius Level 3 Sea Surface Salinity Standard Mapped Image Monthly Aquarius Level 3 sea surface salinity (SSS) standard mapped image data contains gridded SSS averaged monthly.	Monthly	WGS 84	Gridded
AQUARIUS_L3_SSS_SMI_MONTHLY_SM_V4	Aquarius Level 3 Sea Surface Salinity Standard Mapped Image Monthly Smoothed Aquarius Level 3 sea surface salinity (SSS) standard mapped image contains data gridded and smoothed SSS averaged monthly (see Lillie & Lagerloef, 2008)	Monthly	WGS 84	Gridded Smoothed
AQUARIUS_L3_SSS_SMI_3MONTH_V4	Aquarius Level-3 Sea Surface Salinity Standard Mapped Image 3 Month Aquarius L3 sea surface salinity (SSS) standard mapped image data contains gridded SSS averaged by season.	3 Months	WGS 84	Gridded
AQUARIUS_L3_SSS_SMI_ANNUAL_V4	Aquarius Level-3 Sea Surface Salinity Standard Mapped Image Annual Aquarius L3 sea surface salinity (SSS) standard mapped image data contains gridded SSS averaged by year.	Annual	WGS 84	Gridded
AQUARIUS_L3_SSS_SMI_7DAY-RUNNINGMEAN_V4	Aquarius Level-3 Sea Surface Salinity Standard Mapped Image 7-Day running Mean Aquarius L3 sea surface salinity (SSS) standard mapped image data contains gridded SSS averaged by 7-day moving window.	Daily (with 7-Day window)	WGS 84	Gridded

[Web Portal Aquarius Dataset Metadata Entry]

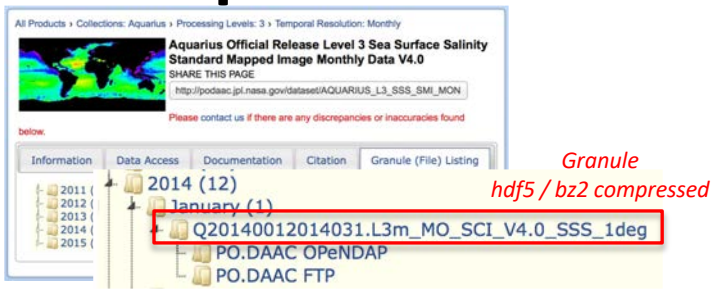
DOI	10.5067/AQR40-2SOCS
Short Name	AQUARIUS_L2_SSS_V4
Description	The version 4.0 Aquarius Level 2 product contains the official third release of the operational orbital/swath data from AQUARIUS/SAC-D mission. The Aquarius Level 2 data set contains sea surface salinity (SSS) and wind speed data derived from 3 different radiometers and the onboard scatterometer. Included also in the Level 2 data are the horizontal and vertical brightness temperatures (TH and TV) for each radiometer, ancillary data, flags, converted telemetry and navigation data. Each data file covers one 98 minute orbit. The Aquarius instrument is onboard the AQUARIUS/SAC-D satellite, a collaborative effort between NASA and the Argentinian Space Agency Comision Nacional de Actividades Espaciales (CONAE). The instrument consists of three radiometers in push broom alignment at incidence angles of 29, 38, and 46 degrees incidence angles relative to the shadow side of the orbit. Footprints for the beams are: 76 km (along-track) x 94 km (cross-track), 84 km x 120 km and 96km x 156 km, yielding a total cross-track swath of 370 km. The radiometers measure brightness temperature at 1.413 GHz in their respective horizontal and vertical polarizations (TH and TV). A scatterometer operating at 1.26 GHz measures ocean backscatter in each footprint that is used for surface roughness corrections in the estimation of salinity. The scatterometer has an approximate 390km swath. Enhancements to the version 4.0 Level 2 data relative to v3.0 include: improvement of the salinity retrieval geophysical model for SST bias, estimates of SSS uncertainties (systematic and random components), and inclusion of a new density variable.
Version	4.0
Dataset Type	OPEN
Measurement	Oceans > Salinity/Density > Salinity Oceans > Ocean Winds > Surface Winds > Surface Wind Speed
Processing Level	2
Coverage	***Region:*** Global ***Northernmost Latitude:*** 90 degrees ***Southernmost Latitude:*** -90 degrees ***Westernmost Longitude:*** -180 degrees ***Easternmost Longitude:*** 180 degrees ***Time Span:*** 2011-Aug-25 to 2015-Jun-07
Resolution	***Spatial Resolution:*** 96 km (Along) x 390 km (Across)
Projection	***Type:*** Swath ***Detail:*** - ***Ellipsoid:*** -
Latency	720 hours
Swath Width	390 km

- Aquarius Metadata developed, catalogued & archived at PO.DAAC and accessible via http://podaac.jpl.nasa.gov/ and NASA centralized metadata repository (CMR) https://earthdata.nasa.gov/about/science-system-description/eosdis-components/common-metadata-repository

Key Terms & Data Concepts

- <u>Granule (File) Level Metadata</u>

  HDF/netCDF – "*self describing*" science data formats



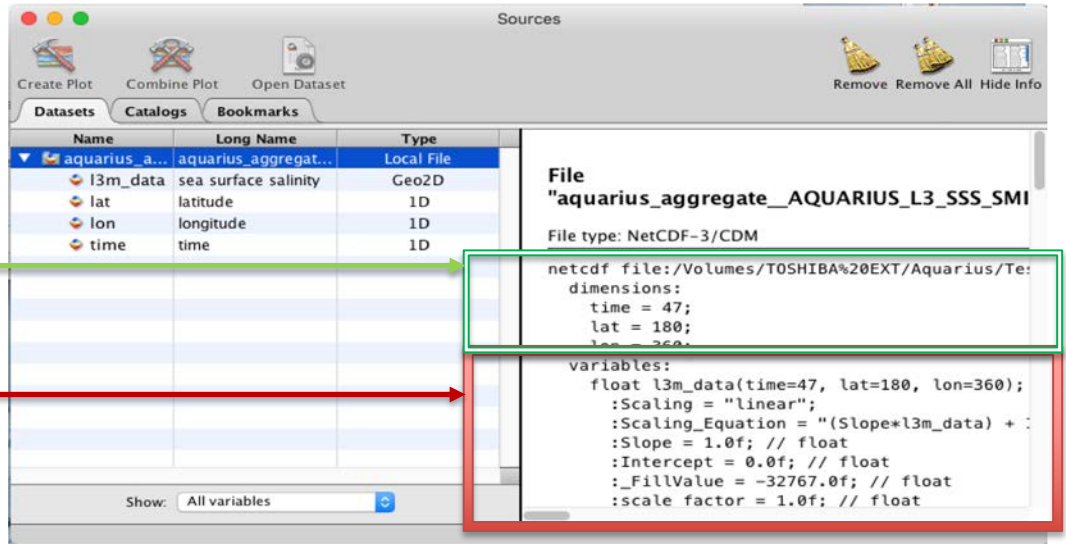
Granule
hdf5 / bz2 compressed

- *Global Level* (header) File Metadata

  Attributes describing the granule data overall

  eg. file data start/stop DateTimes, spatial extents

NASA/GISS **Panoply**
data file browser



- *Variable Level* Metadata

  Attributes describing properties of individual file variables contained in data arrays

  "Structural Metadata" – eg float l3m_data (time, lat, lon)

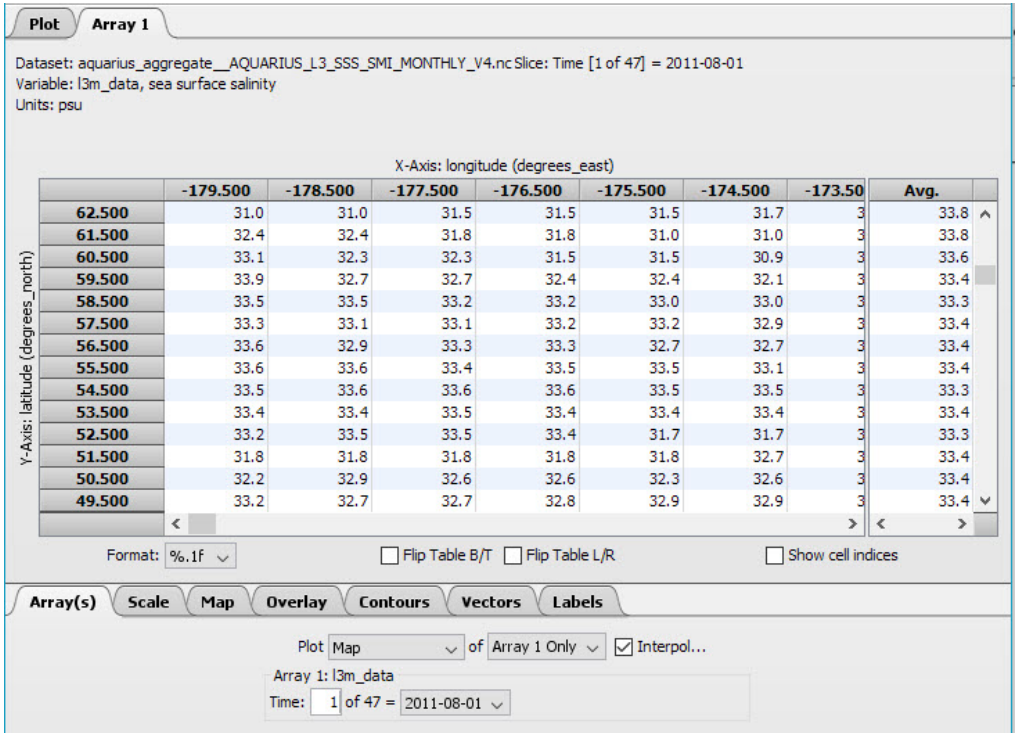
  "Descriptive Metadata" – eg _FillValue , Standard Name, Units, Scaling factor etc

- *Metadata <u>Standards</u>* for Earth Science Data: eg. http://cfconventions.org/ , ACDD

  -> Ensures "interoperability" ie. automated machine interpretation of meta/data

Key Terms & Data Concepts

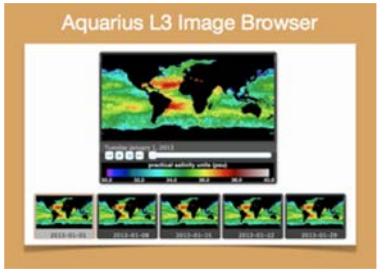
NASA/GISS **Panoply** *data file browser*



	-179.500	-178.500	-177.500	-176.500	-175.500	-174.500	-173.50	Avg.
62.500	31.0	31.0	31.5	31.5	31.5	31.7	3	33.8
61.500	32.4	32.4	31.8	31.8	31.0	31.0	3	33.8
60.500	33.1	32.3	32.3	31.5	31.5	30.9	3	33.6
59.500	33.9	32.7	32.7	32.4	32.4	32.1	3	33.4
58.500	33.5	33.5	33.2	33.2	33.0	33.0	3	33.3
57.500	33.3	33.1	33.1	33.2	33.2	32.9	3	33.4
56.500	33.6	32.9	33.3	33.3	32.7	32.7	3	33.4
55.500	33.6	33.6	33.4	33.5	33.5	33.1	3	33.4
54.500	33.5	33.6	33.6	33.6	33.5	33.5	3	33.3
53.500	33.4	33.4	33.5	33.4	33.4	33.4	3	33.4
52.500	33.2	33.5	33.5	33.4	31.7	31.7	3	33.3
51.500	31.8	31.8	31.8	31.8	31.8	32.7	3	33.4
50.500	32.2	32.9	32.6	32.6	32.3	32.6	3	33.4
49.500	33.2	32.7	32.7	32.8	32.9	32.9	3	33.4

- Contents of the "l3m_data" array here with monthly average salinity values
  - *Rows = Latitude*
  - *Columns = Longitude*

PO.DAAC Services & Tools



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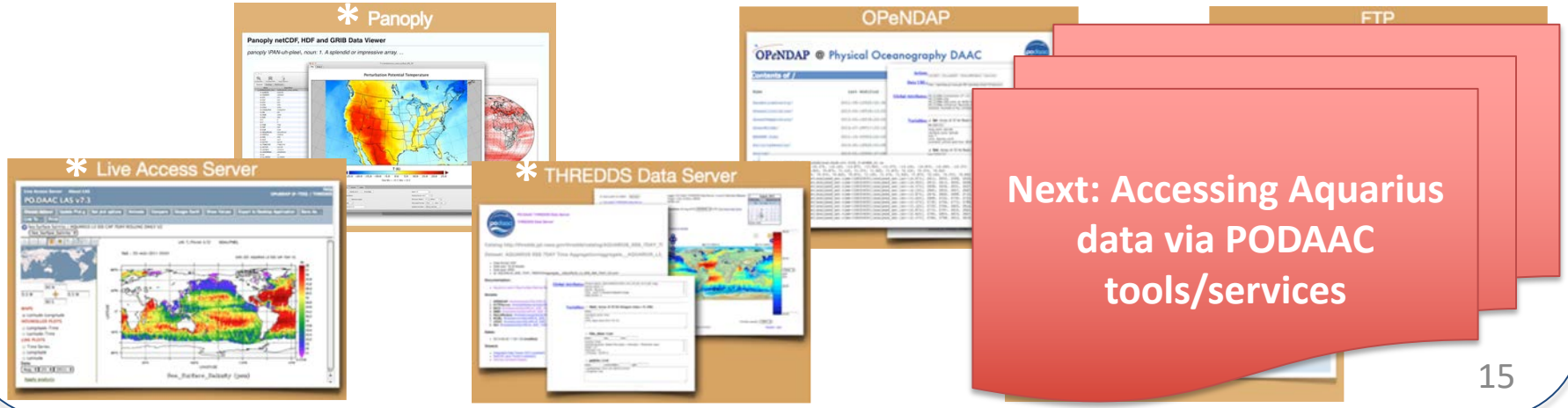

Next: Accessing Aquarius data via PODAAC tools/services