

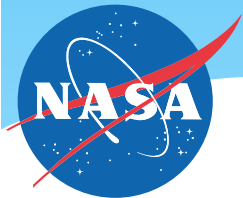
# Global Data Assembly Center (GDAC) Report to the GHRSSST Science Team

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Thomas Huang, Cynthia Chen, Chris Finch, Charles Thompson

15<sup>th</sup> GHRSSST Science Team Meeting

Cape Town, South Africa

2 June 2014



National Aeronautics and  
Space Administration

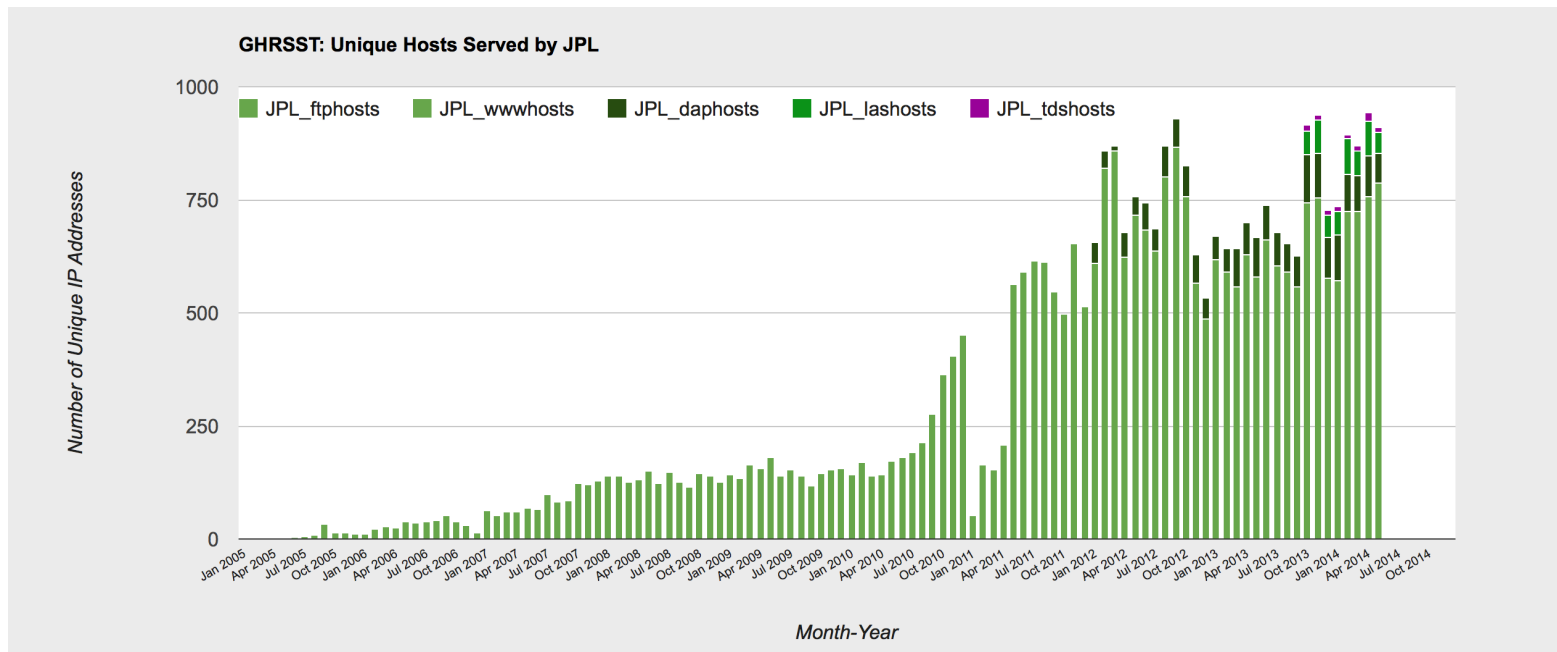
**Jet Propulsion Laboratory**  
California Institute of Technology  
Pasadena, California

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Government sponsorship acknowledged.

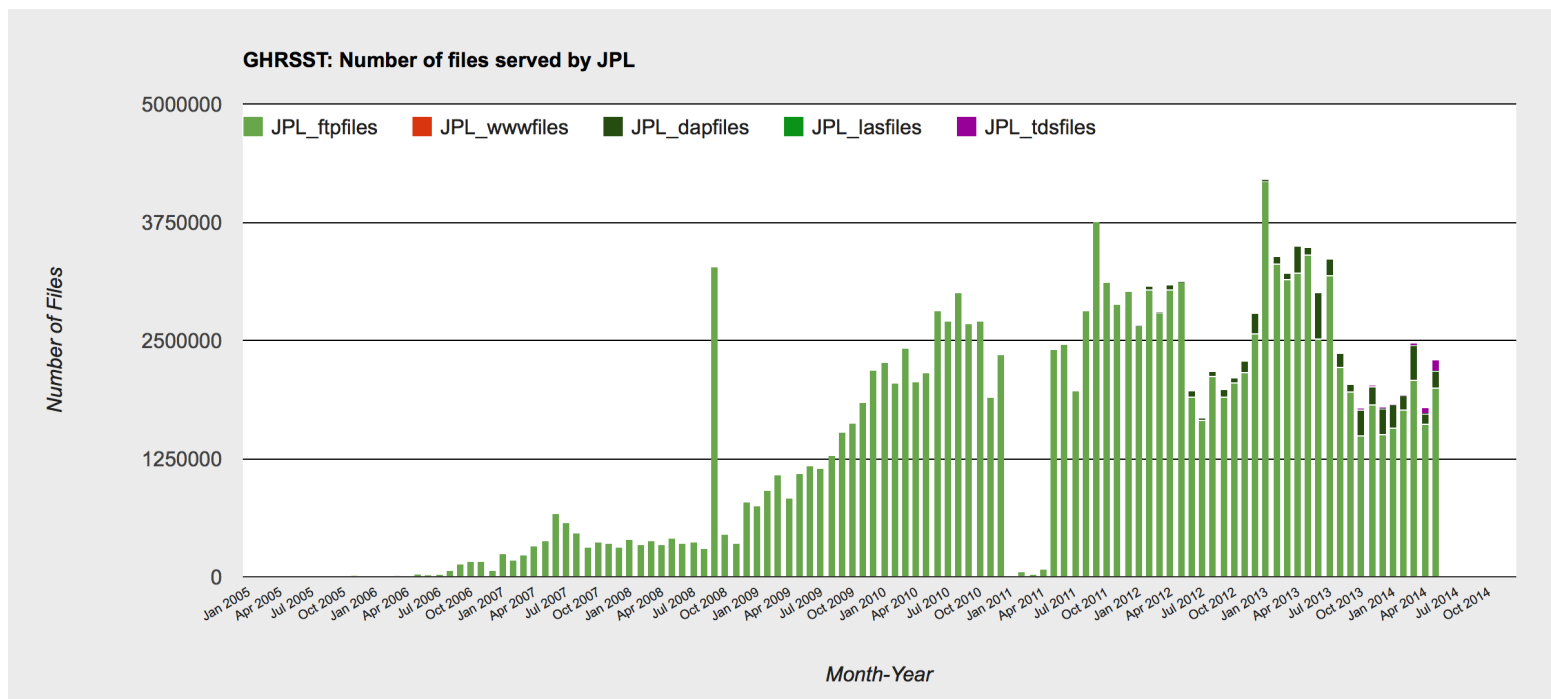
# GDAC Highlights

- \* 2013-2014 focused on ingesting and distributing GDS2 datasets
  - \* Maintaining existing GDS1 datastreams
  - \* Support operational datastreams for L2P/L3/L4 data from 14 RDACs
    - \* 40-50 Gs/day; 10K granules/day
- \* Maintain linkages to data providers and LTSRF archive
- \* Develop/improve tools and services for data usage
  - \* Web services, Subsetting, Visualization, Data Aggregation
- \* User community engagement
  - \* GHRSSST webinar and GHRSSST Ocean Sciences booth.
  - \* Reports in the AUS-TAG
- \* Data management and lifecycle implementation
  - \* Implementation of lifecycle and its challenges
  - \* Reports in DAS-TAG on data management use cases

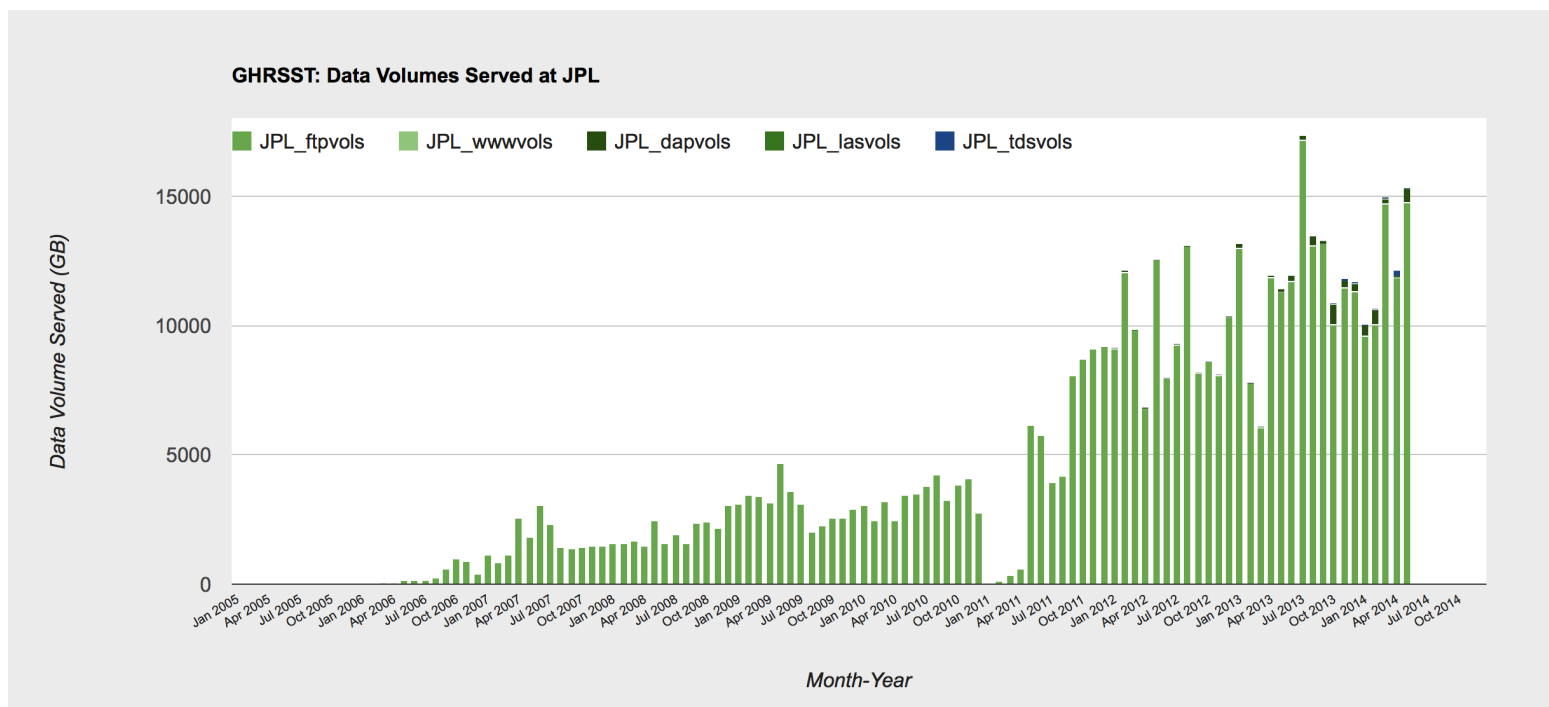
# PO.DAAC Distribution metrics: Monthly Unique Users



# Number of Monthly Files



# Volume of Monthly Files



# Top Datasets in 2013

## **FTP**

- \* GHRSSST Level 4 MUR Global Foundation Sea Surface Temperature Analysis
- \* GHRSSST Level 4 OSTIA Global Foundation Sea Surface Temperature Analysis
- \* MetOp-A ASCAT Level 2 12.5km Ocean Surface Wind Vectors

## **OPeNDAP**

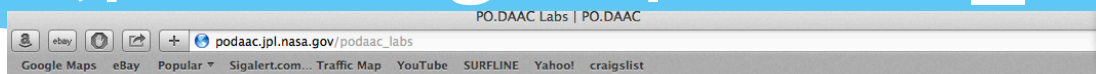
- \* GHRSSST Level 4 MUR Global Foundation Sea Surface Temperature Analysis
- \* OSCAR third degree resolution ocean surface currents
- \* Cross-Calibrated Multi-Platform Ocean Surface Wind Vector L3.0 First-Look Analyses

# Redesigned Web portal

The screenshot displays the redesigned Podaac web portal. At the top left is the Podaac logo with the tagline "Physical Oceanography Distributed Active Archive Center". To the right of the logo are "Follow Us" and "Data Search" buttons. A navigation menu below the logo includes links for Home, Dataset Discovery, Data Access, Measurements, Missions, Multimedia, Community, and About. The main content area features a large banner image of a surfer riding a wave. To the left of the banner is a vertical sidebar with buttons for Search, Access, Visualize, and Help. Below the banner is a text block titled "Waves and Satellites: Chasing the Big Ones (January, 2014)" with a sub-headline and a paragraph of text. To the right of the banner is an "Announcements" section with two entries: "NAVO Data Friday, March 28, 2014" and "UPDATE: ASCAT wind products unavailable due to EPS ground segment anomaly Thursday, March 27, 2014". Below the announcements are sections for "Events" and "System Alerts". At the bottom of the page are three columns of content: "Ocean Stories" with sub-sections for "Waves and Satellites: Chasing the Big Ones (Januar..." and "AQUARIUS detects effects of an extreme Mississippi..."; "Image of the Day" featuring a "Sea Surface Height Anomaly: SARAL and Jason-2 Measurements from 22-Mar-2014 to 01-Apr-2014"; and "Spotlight" featuring a "Creator of P.O.DAAC's OSCAR dataset on NBC News" and "How ocean currents play into the efforts to find the Malaysia Airlines Flight 370".

# New Tools – PO.DAAC Labs

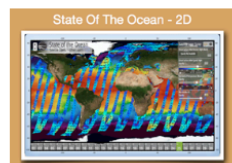
## [podaac.jpl.nasa.gov/podaac\\_labs](http://podaac.jpl.nasa.gov/podaac_labs)



### PO.DAAC Labs

**Explore New Ideas, Prototypes and Tools.**  
**Offer feedback directly to the engineers who developed them.**

You can reach us by email at: [podaac@podaac.jpl.nasa.gov](mailto:podaac@podaac.jpl.nasa.gov)



#### State of the Ocean 2D (SOTO 2D)

State of the Ocean 2D provides near real-time data layers (vector and image) that are visualized in an HTML5 interface utilizing open-source tools such as Leaflet.js. SOTO 2D data layers are annotated to give contextual descriptions of the ocean's features and events, and kml overlays (ice extent, hurricane tracks, clouds). Some layer implementations include Sea Surface Temperature (SST), wind vectors, and ocean current vectors.



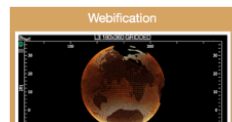
#### PO.DAAC Web Services

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/#whatis>). 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.



#### PO.DAAC HITIDE (Subsetter) v3.1.x

The High-level Tool for Interactive Data Extraction (HITIDE) is a web-based interface facilitating the search, imaging, and extraction of select Level 2 "swath" datasets from PO.DAAC's archive. HITIDE's v3.1.x user interface is powered by a set of Web Services which facilitate machine to machine interoperability.



#### Webification

Webification (W10n) is ReSTful Webservice technology providing simplified access to PODAAC data and metadata via HTTP/HTTPS protocols with URLs comprised of well-defined parameters. W10n supports major Earth science data formats like NetCDF and HDF 4/5, and abstracts an arbitrary data store as a hierarchical tree of nodes for each associated attributes which can be interrogated. Direct access to inner components of the tree is via HTTP requests from either a web browser, script or similar client. Results of W10n calls



# Tool summary

- \* **SOTO2D**: visualization including GHRSSST MODIS L2P, Windsat L3, G1SST L4
- \* **PO.DAAC Web Services**: search, discovery, metadata, extract as “chained” services
- \* **HiTIDE**: GUI based L2 subsetting
- \* **Webification**: Arbitrary data store exposed as URLs
- \* **Coastal Marine Discovery Service**: GIS interface for satellite data
- \* **Datacasting**: RSS Informed earth science data availability
- \* **Live Access Server (LAS)** for L3/L4 subsetting

# HiTIDE Level 2 Subsetter

**PO.DAAC Subsetter**  
PHYSICAL OCEANOGRAPHY  
DISTRIBUTED ACTIVE ARCHIVE CENTER  
Version 1.2.0

**Filters**

- DataSets +
  - JPL-L2P-MODIS\_A
- Region +
  - (113.0, -43.0) to (153.0, -10.0)
- DateRange +
  - 2014-04-21 to 2014-04-29

**Data Preview**

\* Displaying the first 10 items

<input type="checkbox"/>	Granule Name	Start Time	End Time	Lower Bou...	Upper
<input type="checkbox"/>	20140428-MODIS_A-JPL-L2P-A2014118172000.L2_LAC_GHRSSST_N-v...	2014-04-28T17:20:0...	2014-04-28T17:21:2...	109.85 -47.51	116.3
<input checked="" type="checkbox"/>	20140428-MODIS_A-JPL-L2P-A2014118171500.L2_LAC_GHRSSST_N-v...	2014-04-28T17:15:0...	2014-04-28T17:20:0...	102.58 -44.25	132.4
<input checked="" type="checkbox"/>	20140428-MODIS_A-JPL-L2P-A2014118171000.L2_LAC_GHRSSST_N-v...	2014-04-28T17:10:0...	2014-04-28T17:15:0...	110.07 -25.11	135.9
<input type="checkbox"/>	20140428-MODIS_A-JPL-L2P-A2014118154500.L2_LAC_GHRSSST_N-v...	2014-04-28T15:48:5...	2014-04-28T15:48:5...	0.0 -71.6	115

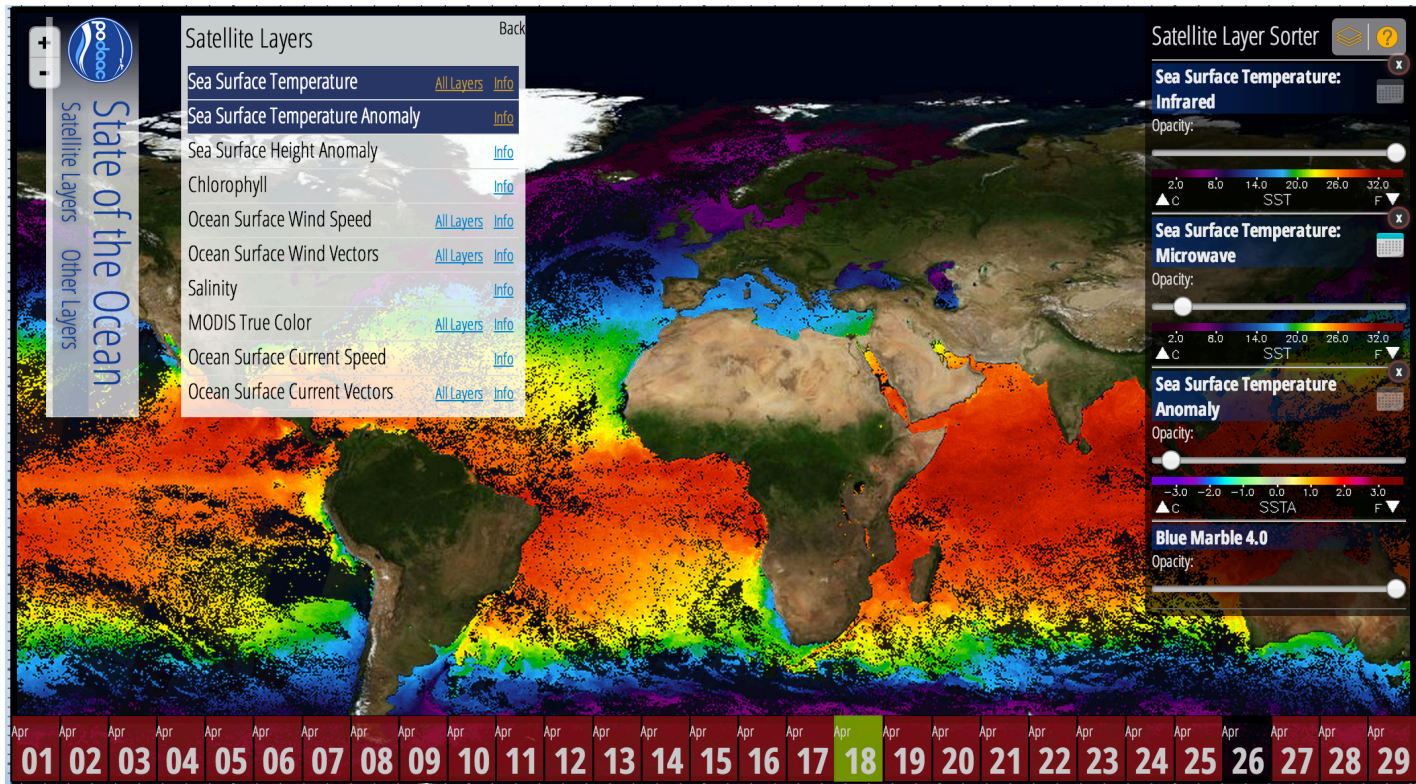
▶ Get Next 10   ⬇ Download Selected   ⬇ Download All

**Coverage Preview**

Generate Image Preview   Legend

(lon,lat) : 29.54° W , 9.45° S

# SOTO 2D -- Visualization



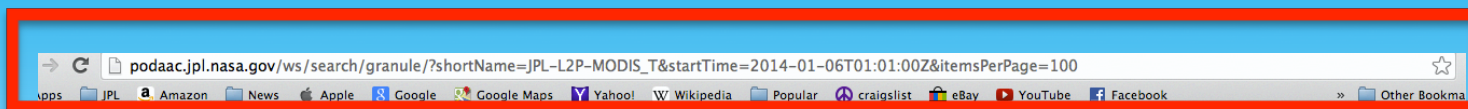
# Web services



- PO.DAAC Web Services are for software interaction
  - Discover dataset info
  - Discover granules
  - Subset and extract granules
  - Visualize
- Through Application Programming Interface
- “Chained” ...so output of one service can input to the next

Name	Description
<a href="#"><u>Dataset Metadata</u></a>	Dataset metadata service retrieves the metadata of a dataset on PO.DAAC's dataset catalog using the following parameters: datasetId, shortName, and format.
<a href="#"><u>Granule Metadata</u></a>	Granule metadata service retrieves the metadata of a granule on PO.DAAC's catalog using the following parameters: format and other optional parameters.
<a href="#"><u>Search Dataset</u></a>	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.
<a href="#"><u>Search Granule</u></a>	Search Granule does granule searching on PO.DAAC level 2 swath datasets (individual orbits of a satellite), and level 3 & 4 gridded datasets (time averaged to span the globe). The following parameters are supported: datasetId, shortName, startTime, endTime, bbox, and others.
<a href="#"><u>Image Granule</u></a>	The PODAAC Image service renders granules in the PO.DAAC's catalog to images such as jpeg and/or png. This image service also utilizes OGC WMS protocol.
<a href="#"><u>Extract Granule</u></a>	Extract service subsets a granule in PO.DAAC catalog and produces either netcdf3 or hdf4 files.

# Example of a search return to find MODIS SST granules



```
<link href="http://podaac-opendap.jpl.nasa.gov/opendap/allData/ghrsst/data/L2P/MODIS_T/JPL/2014/006/20140106-MODIS_T-JPL-L2P-T2014006074500.L2_LAC_GHRSSST_N-v01.nc.bz2.html" rel="enclosure" title="OPeNDAP URL" type="text/html"/>
<link href="ftp://podaac-ftp.jpl.nasa.gov/allData/ghrsst/data/L2P/MODIS_T/JPL/2014/006/20140106-MODIS_T-JPL-L2P-T2014006074500.L2_LAC_GHRSSST_N-v01.nc.bz2" rel="enclosure" title="FTP URL" type="application/x-netcdf"/>
<podaac:datasetId>          PODAAC-GHMDT-2PJ01          </podaac:datasetId>
<podaac:shortName>         JPL-L2P-MODIS_T          </podaac:shortName>
<georss:where>
  <gml:Envelope>
    <gml:lowerCorner>      -165.58700561523438  30.945999145507812    </gml:lowerCorner>
    <gml:upperCorner>     -131.61000061035156  52.43199920654297    </gml:upperCorner>
  </gml:Envelope>
</georss:where>
<time:start>              2014-01-06T07:45:08Z      </time:start>
<time:end>                2014-01-06T07:50:07Z      </time:end>
</entry>
<entry>
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<updated>                 2014-01-06T07:40:09Z      </updated>
<id>                      PODAAC-GHMDT-2PJ01:20140106-MODIS_T-JPL-L2P-T2014006074000.L2_LAC_GHRSSST_N-v01.nc  </id>
<link href="http://podaac.jpl.nasa.gov/ws/search/granule?full=true&granuleName=20140106-MODIS_T-JPL-L2P-T2014006074000.L2_LAC_GHRSSST_N-v01.nc&datasetId=PODAAC-GHMDT-2PJ01" rel="enclosure" title="PO.DAAC Metadata" type="application/atom+xml"/>
<link href="http://podaac.jpl.nasa.gov/ws/metadata/granule?granuleName=20140106-MODIS_T-JPL-L2P-T2014006074000.L2_LAC_GHRSSST_N-v01.nc&datasetId=PODAAC-GHMDT-2PJ01&format=iso" rel="enclosure" title="ISO-19115 Metadata" type="text/xml"/>
<link href="http://podaac.jpl.nasa.gov/ws/metadata/granule?granuleName=20140106-MODIS_T-JPL-L2P-T2014006074000.L2_LAC_GHRSSST_N-v01.nc&datasetId=PODAAC-GHMDT-2PJ01&format=fgdc" rel="enclosure" title="FGDC Metadata" type="text/xml"/>
<link href="http://podaac-opendap.jpl.nasa.gov/opendap/allData/ghrsst/data/L2P/MODIS_T/JPL/2014/006/20140106-MODIS_T-JPL-L2P-T2014006074000.L2_LAC_GHRSSST_N-v01.nc.bz2.html" rel="enclosure" title="OPeNDAP URL" type="text/html"/>
<link href="ftp://podaac-ftp.jpl.nasa.gov/allData/ghrsst/data/L2P/MODIS_T/JPL/2014/006/20140106-MODIS_T-JPL-L2P-T2014006074000.L2_LAC_GHRSSST_N-v01.nc.bz2" rel="enclosure" title="FTP URL" type="application/x-netcdf"/>
<podaac:datasetId>          PODAAC-GHMDT-2PJ01          </podaac:datasetId>
<podaac:shortName>         JPL-L2P-MODIS_T          </podaac:shortName>
<georss:where>
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    <gml:upperCorner>    -128.96200561523438  34.51300048828125    </gml:upperCorner>
  </gml:Envelope>
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```

[http://podaac.jpl.nasa.gov/ws/search/granule/?shortName=JPL-L2P-MODIS\\_T&startTime=2014-01-08T01:01:00Z&itemsPerPage=100](http://podaac.jpl.nasa.gov/ws/search/granule/?shortName=JPL-L2P-MODIS_T&startTime=2014-01-08T01:01:00Z&itemsPerPage=100)

# Webification

## Open specification:

<http://w10n.org>

## Summary:

- Resource is viewed as a tree of nodes and leaves.
- They have semantic URLs, accessible through HTTP.
- Meta info exchange format is JSON, by default.
- Full ReSTful style request/response. Read/Write.

## Disciplines:

Earth science (NetCDF, HDF 4/5, GRIB)

Planetary Science (VICAR/PDS)

Astronomy (FITS) and more

# Use Case – Quality filtering the SST observations

- \* Subset a L2P granule (by value!)
  - \* [http://host:port/path/2013/123/20130503-MODIS\\_T-JPL-L2P-T2013123065500.L2\\_LAC\\_GHRSSST\\_N-v01.nc.bz2/sea\\_surface\\_temperature\[-130<lon<-120,35<lat<45\]?output=format](http://host:port/path/2013/123/20130503-MODIS_T-JPL-L2P-T2013123065500.L2_LAC_GHRSSST_N-v01.nc.bz2/sea_surface_temperature[-130<lon<-120,35<lat<45]?output=format)
- \* Apply quality filter
  - \* [http://host:port/path/2013/123/20130503-MODIS\\_T-JPL-L2P-T2013123065500.L2\\_LAC\\_GHRSSST\\_N-v01.nc.bz2/sea\\_surface\\_temperature\[quality\\_flag>=4\]?output=format](http://host:port/path/2013/123/20130503-MODIS_T-JPL-L2P-T2013123065500.L2_LAC_GHRSSST_N-v01.nc.bz2/sea_surface_temperature[quality_flag>=4]?output=format)
- \* Quality filter, wind screen, subset all in one step !
  - \* [http://host:port/path/2013/123/20130503-MODIS\\_T-JPL-L2P-T2013123065500.L2\\_LAC\\_GHRSSST\\_N-v01.nc.bz2/sea\\_surface\\_temperature\[quality\\_flag>=4,wind\\_speed>6,-130<lon<-120,35<lat<45\]?output=format](http://host:port/path/2013/123/20130503-MODIS_T-JPL-L2P-T2013123065500.L2_LAC_GHRSSST_N-v01.nc.bz2/sea_surface_temperature[quality_flag>=4,wind_speed>6,-130<lon<-120,35<lat<45]?output=format)
- \* Virtual Quality Screening Service
  - \* NASA funded technology project to implement quality screening web service for GHRSSST and SMAP data



# GHRSSST GDS2 datasets

- \* Public release of four GDS2 datasets with dataset lifecycle adherence
  - \* Consistency with treatment of data insured. Distribution, tools, services
  - \* Still need to improve quality documentation with assistance of provider
- \* Ingest of 13 others for L2P, L3C and L4
- \* Working with providers to insure data and metadata compliance

# Status of GDS2 datasets

Dataset(s)	RDAC	Status
L4 OSTIA	UKMO	Released
L4 DMI_OI	DMI	Released
L4 CMCo.2deg	CMC	Released
L2p VIIRS	NAVO	Released
L2P VIIRS	OSPO	Ingested and Accessible
L2P AVHRR18, 19, MTA, MTB	NAVO	Ingested and Accessible
L2P GOES 13, 15	OSPO	Ingested and Accessible
L2P MSG	OSPO	Ingested and Accessible
L2P MTSAT2	OSPO	Ingested and Accessible
LC3 AVHRR19, MTA	OSISAF	Ingested and Accessible
L2P AVHRR MTA	OSISAF	Ingested

# Summary

- \* Stable and growing user community
  - \* User engagement at Ocean Sciences and NASA webinar
- \* GDS2 datasets online, discoverable, available via tools and services !
  - \* Remaining ingested available via FTP
  - \* Continue to support migration of existing GDS1
- \* New PO.DAAC tools and services implemented for subsetting, discovery, dataset and granule web services. Try them !
- \* Issues for consideration:
  - \* Dataset lifecycle quality descriptions. Has not been stringently enforced.
  - \* Dataset relevance. Dataset selection. What can be done to improve this?
  - \* Streamline the R/G TS. GDS2 data policy. Discuss in DAS-TAG
- \* PO.DAAC under new management: Rob Toaz is Manager since Dec 2013
  - \* GHRSSST is a recognized “mission” under NASA ESDIS portfolio

# Backup

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<a href="#"><u>Extract Granule</u></a>	Extract service subsets a granule in PO.DAAC catalog and produces either netcdf3 or hdf4 files.

# Status of GDS2

<b>Dataset</b>	<b>RDAC</b>	<b>Status</b>
L4 OSTIA	UKMO	Released
L4 DMI_OI	DMI	Released
L2P NAVO VIIRS_NPP	NAVO	Released
L2P NOAA VIIRS_NPP	OSPO	Ingested and Accessible
Five L2P NAVO AVHRR-18, -19, MTA, MTB	NAVO	Ingested and Accessible
Two L2P GOES-13, -15	OSPO	Ingested and Accessible
L2P MSG03	OSPO	Ingested and Accessible
L2P <u>MTSAT2</u>	OSPO	Ingested and Accessible