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Goddard Earth Sciences  
Data and Information Services Center  
(GES DISC)

**What's NEW at the GES DISC:  
Evolution of data management and services for  
Aura mission and beyond**

Jennifer Wei<sup>1,2</sup>

<sup>1</sup> NASA GES DISC

**Acknowledgment: Aura ST, SIPs, ESDIS EMS, GES DISC team**

<sup>2</sup> Adnet Systems Inc.

2016 Aura Science Team Meeting

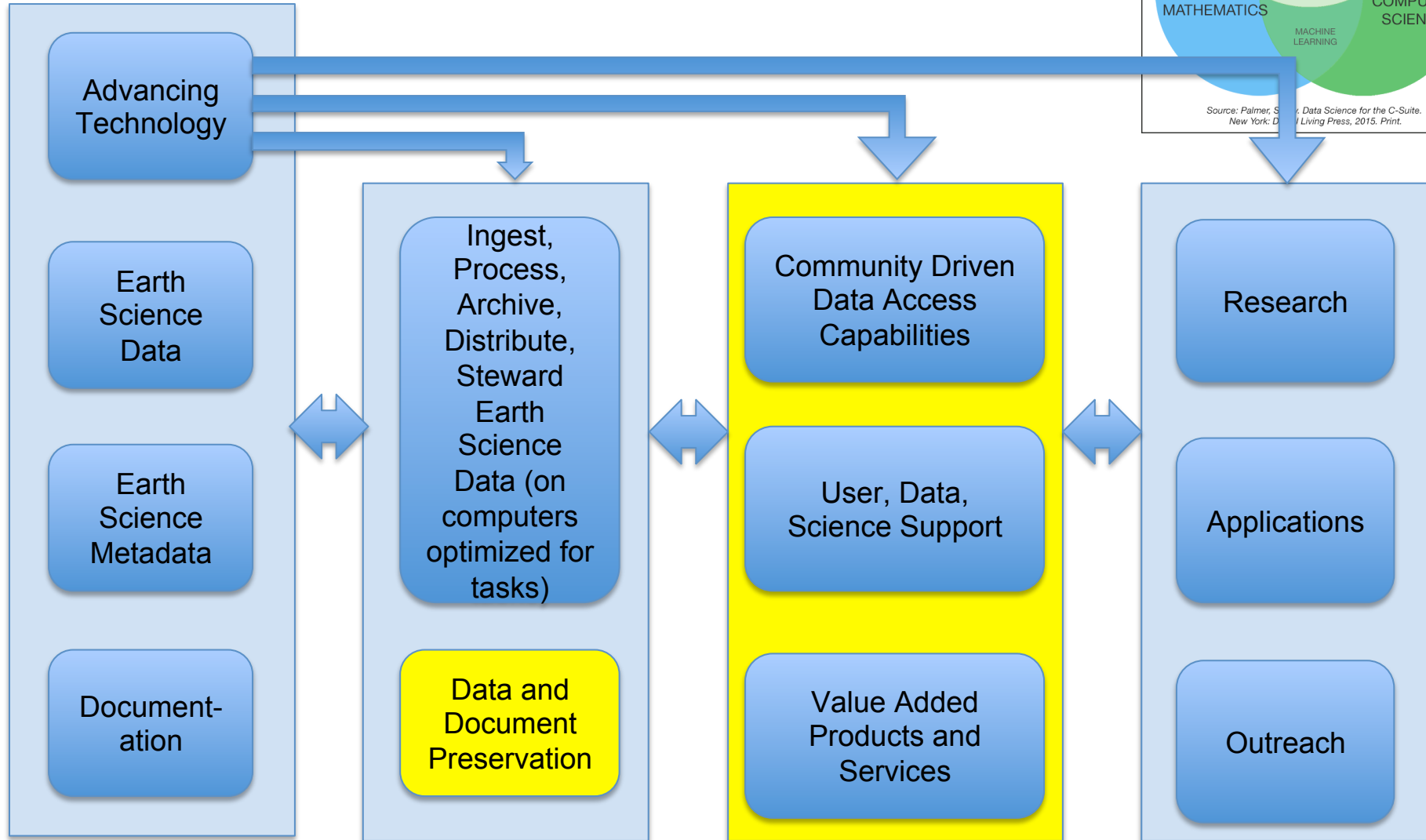
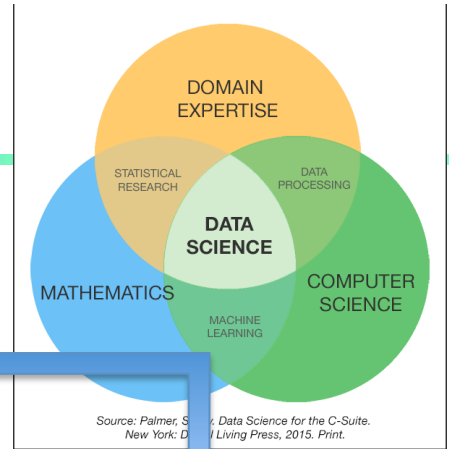


# Outline

- GES DISC world
- Aura data usage and trend
- Aura data users requests
- GES DISC update (before/after)
  - New Access method (ftp → http) with Earthdata Login System
  - New Website (DISC/Mirador → New Interface)
  - New Giovanni (Giovanni → Now Federated)
- GES DISC support beyond Aura Mission
  - Multi-sensor coincident data subsets
  - Level 2 support (Subsetter, Visualization)
  - Data List



# The GES DISC 'World'





# Outline

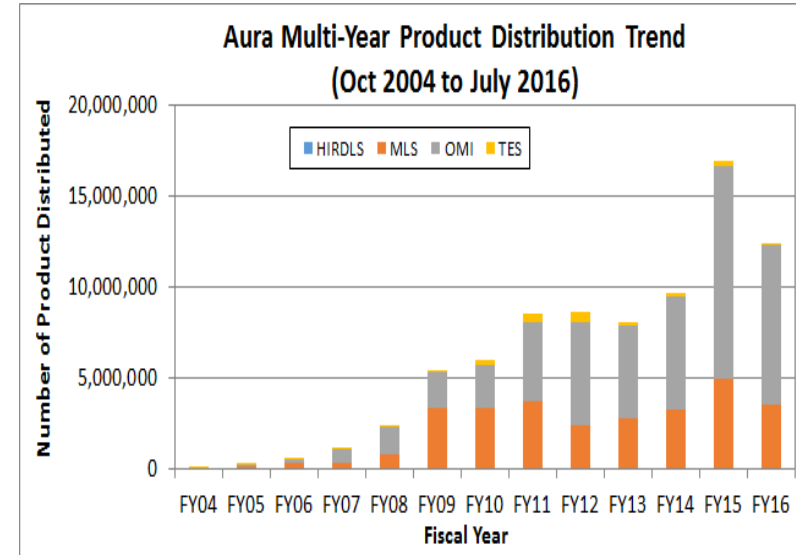
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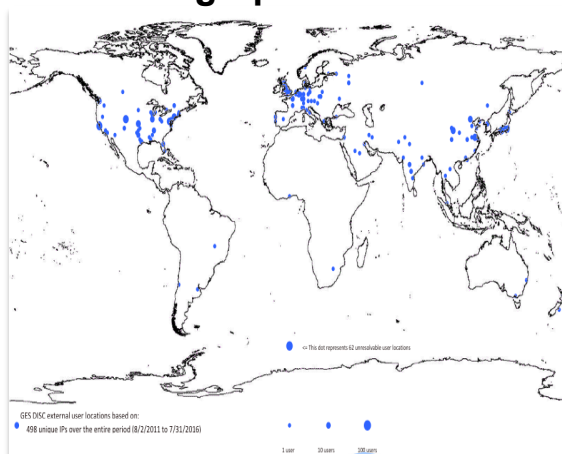
# Aura Distribution by Instrument

Distribution presents the amount of data successfully distributed to user community.

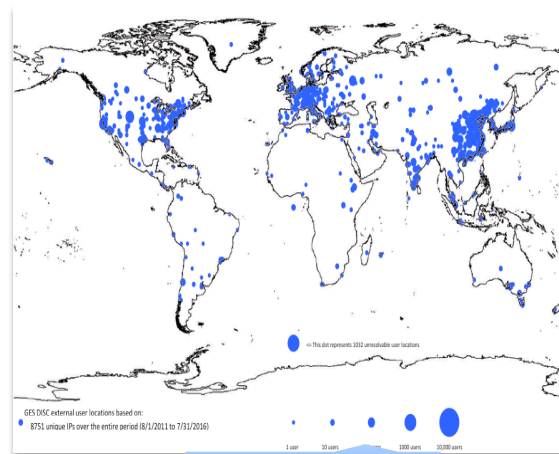
Mission	Instrument	# Files	Volume (TB)
Aura	HIRDLS	18,922	0.92
	MLS	3,420,094	25.34
	OMI	11,634,182	164.48
	TES	244,550	6.80



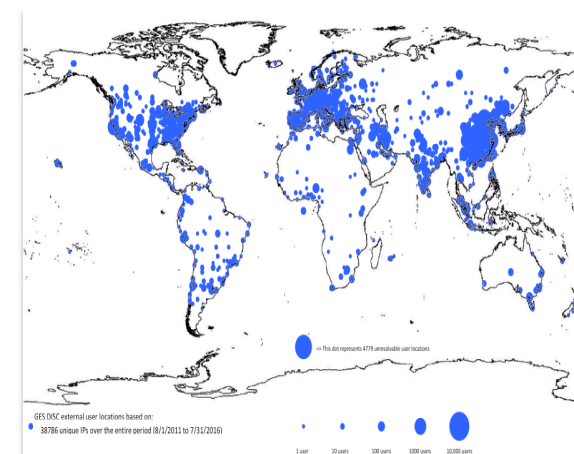
## User Geographical Distribution



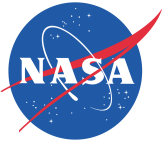
**HIRDLS**



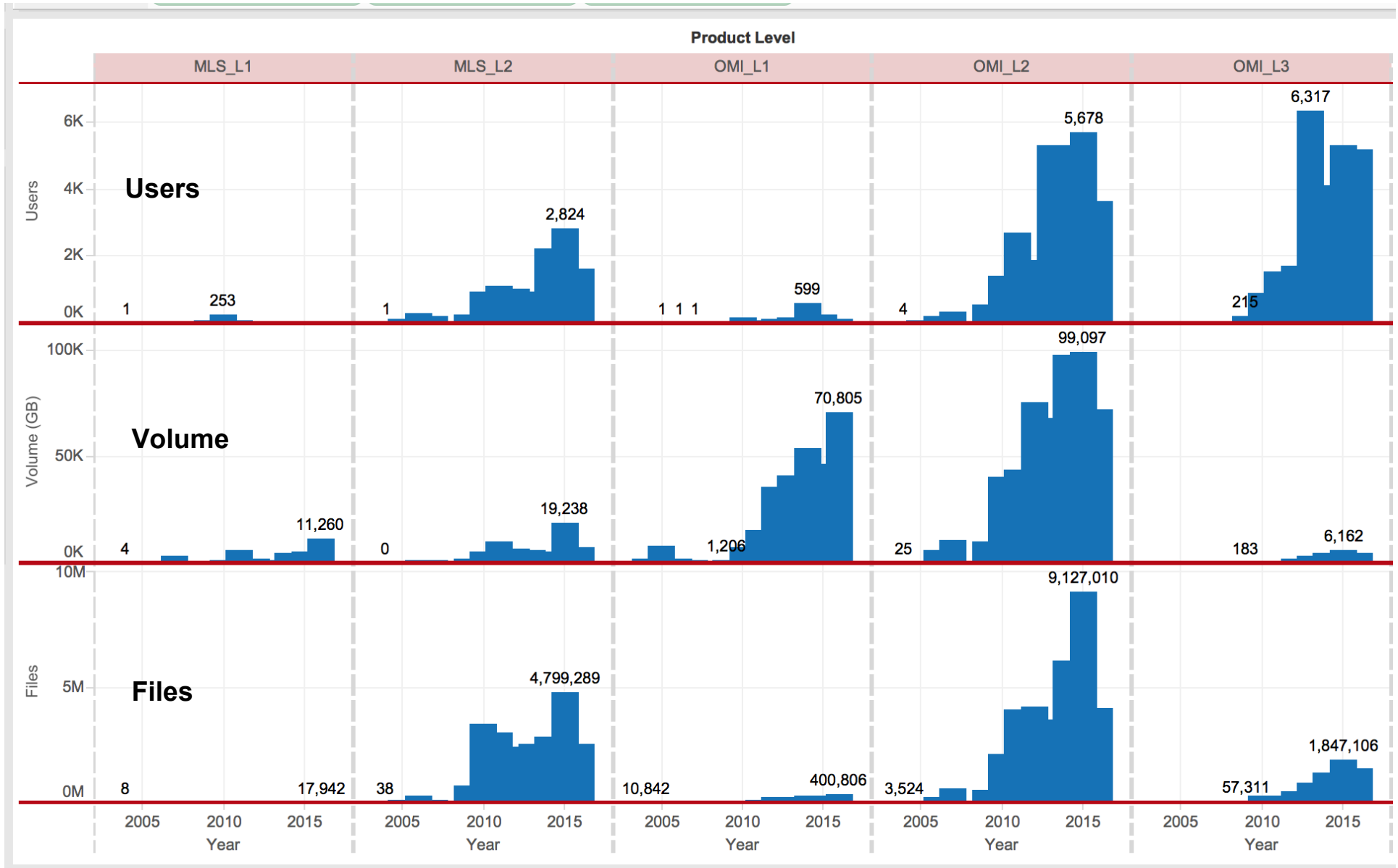
**MLS**

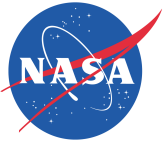


**OMI**



# Aura MLS/OMI Data Processing Level Distribution





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# Help Desk Request from Users

2007 May to 2016 Aug

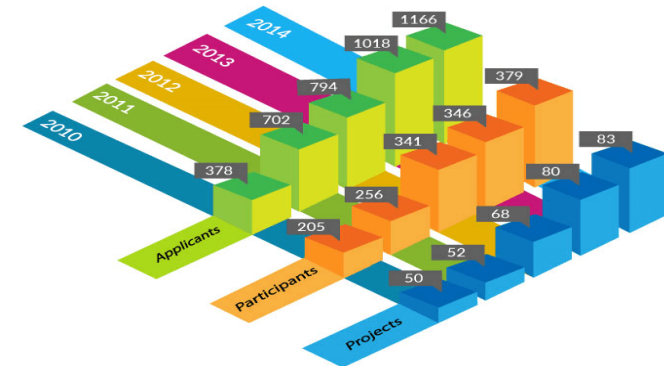
- ❑ **Find/Access/Download Data**
  - I do not know how to download...
  - Enhance tools/services/data recipe for better data search, data access, data download

Instrument	# User Request
Aura	9
HIRDLS	7
MLS	53
OMI	283
Total	352

- ❑ **Data Subsetting**
  - Improve ability and performance of data subsetting tool

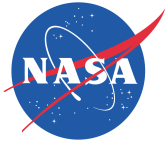
- ❑ **Data Reading**
  - Keep data reader code updated, more data reading recipes

- ❑ **Documentation and Science Question**
  - Parameter unit, vertical layers ...
  - Can we use OMI data for ...? Are OMI data better than ...?
  - Enhance metadata and online resources



- ❑ **Users help us**
  - Users find error in our website and code not working -> we make correction.





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# Transition to Earthdata Login



**IMPORTANT MESSAGE Jun 28, 2016** Access to GES DISC data will require all users to be registered with the Earthdata Login system

Starting August 1st, 2016, access to GES DISC data will require all users to be registered with the Earthdata Login system. Data will continue to be free of charge and accessible via HTTP. Access to data via FTP will no longer be available after October 3rd, 2016. Detailed instructions on how to register and receive authorization to access GES DISC data are provided [here](#).

GES DISC Users who deploy scripting methods to list and download data in bulk via anonymous FTP are advised to review the [How to Download Data Files from HTTP Service with wget](#) recipe that provides examples of GNU wget commands for listing and downloading data via HTTP.

- GES DISC will replace anonymous FTP with HTTP download on October 3rd, 2016
- We have provided detail in alert message, banner, emails...
- Problems/Questions to GES DISC Help Desk ([gsfc-help-disc@lists.nasa.gov](mailto:gsfc-help-disc@lists.nasa.gov))



# GES DISC New Web Interface

**EARTHDATA**
Data Discovery ▾
DAACs ▾
Community ▾
Science Disciplines ▾
🔍

**GES DISC**

📅
📄
🔍
⚠ Alerts
Feedback
Help ▾
Login

Atmospheric Composition , Water and Energy Cycle , and Climate Variability Data
 🌱 Back to Classic
🐦
📺
💬
📄

## Data Collections

## Related Documentation

### Refine By

#### SubjectSort ▾

- Aerosols (16)
- Air Quality (1)
- Altitude (5)
- Atmospheric Chemistry (80)
- Atmospheric Radiation (14)

[More...](#)

#### MeasurementSort ▾

- Aerosol Extinction (12)
- Aerosol Optical Depth/Thickness (11)
- Attitude Characteristics (2)
- Bromine Monoxide (6)
- Carbon Monoxide (5)

[More...](#)

#### SourceSort ▾

Showing all (143) datasets associated with **Aura** for date range **1920-01-01** to **2016-08-24** within **-180, -90, 180, 90...**

Image	Dataset	Source	Temporal Resolution	Spatial Resolution	Process Level	Begin Date	End Date
No Sample Image	<a href="#">OMI/Aura Ozone (O3) Total Column Daily L2 Global Gridded 0.25 degree x 0.25 degree V3 (OMTO3G.003) - Atmospheric Chemistry, Atmospheric Radiation, Aerosols</a>	Aura OMI	1 day	0.25 ° x 0.25 °	2	2004-10-01	present
No Sample Image	<a href="#">GOZCARDS Merged Water Vapor 1 month L3 10 degree Zonal Means on a Vertical Pressure Grid V1 (GozMmlpH2O.1) - Atmospheric Water Vapor</a>	UARS HALOE, UARS MLS, Aura MLS	1 month		3	1991-09-01	2013-01-01

0:0 History

Frozen Ground

Platform Characteristics

Visible Wavelengths

Precipitation

Radar



# Giovanni: More Data, More Plots, Faster Results

2015

Old Giovanni:  
40 individual Portals

Personalize & Configure

New Giovanni:  
Omnibus Portal (future)  
• Point data (future)

Variable Name	Source	Temp. Res.	Spat. Res.	Begin Date	End Date	Units
<input type="checkbox"/> Ozone Total Column (Daytime/Ascending) (AIRX3STD_v006)	AIRS	Daily	1°	2002-08-31	2015-10-05	DU
<input type="checkbox"/> Ozone Total Column (Nighttime/Descending) (AIRX3STD_v006)	AIRS	Daily	1°	2002-08-31	2015-10-05	DU
<input type="checkbox"/> Methane Total Column (Daytime/Ascending) (AIRX3STD_v006)	AIRS	Daily	1°	2002-08-31	2015-10-05	mol/cm2
<input type="checkbox"/> Methane Total Column (Nighttime/Descending) (AIRX3STD_v006)	AIRS	Daily	1°	2002-08-31	2015-10-05	mol/cm2
<input type="checkbox"/> Carbon Monoxide Total Column (Daytime/Ascending) (AIRX3STD_v006)	AIRS	Daily	1°	2002-08-31	2015-10-05	mol/cm2
<input type="checkbox"/> Carbon Monoxide Total Column (Nighttime/Descending) (AIRX3STD_v006)	AIRS	Daily	1°	2002-08-31	2015-10-05	mol/cm2
<input type="checkbox"/> Methane Total Column (Daytime/Ascending) (AIRX3STM_v006)	AIRS	Monthly	1°	2002-09-01	2015-08-31	mol/cm2
<input type="checkbox"/> Methane Total Column (Nighttime/Descending) (AIRX3STM_v006)	AIRS	Monthly	1°	2002-09-01	2015-08-31	mol/cm2



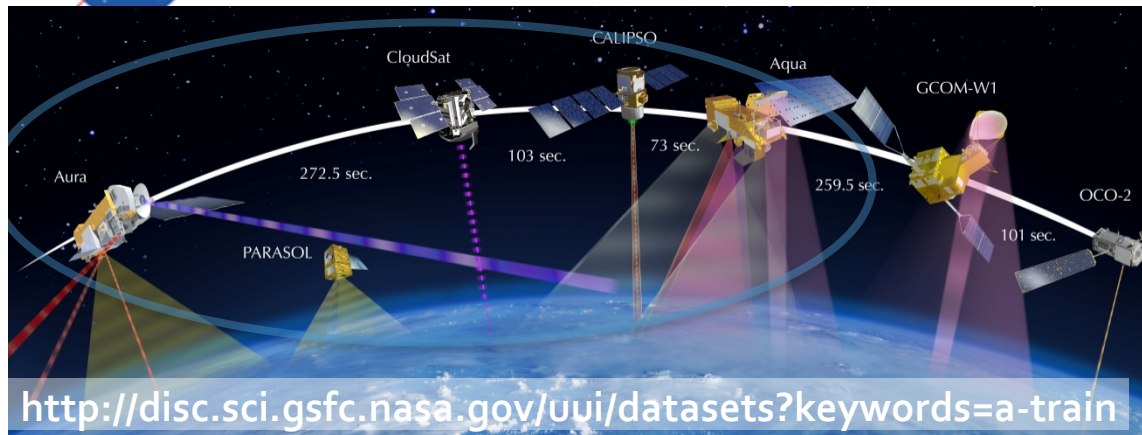
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  - New Access method (ftp → http) with User Registration System
  - New Website (Mirador → Unified User Interface)
  - Giovanni (G3 → Giovanni, open source)
- **GES DISC support beyond Aura Mission**
  - **A Train Data Depot (Multi-sensor coincident data subsets)**
  - Level 2 support (Subsetter, Visualization)
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# Multi-Sensor Collocated Subsets

## Example: A-Train Data Depot (ATDD)



- A-Train Data Depot (ATDD) was supported by NASA ACCESS (Advancing Collaborative Connections in Earth System Science) program and now is on sustaining mode.
- Started with CloudSat mission support with MODIS-CloudSat collocated subsets. Building upon the expertise, OMI, POLDER, and AIRS subsets were subsequently added in production, and distributed by ATDD.
- The collocated subsets include MODIS/Aqua L1B and L2 atmospheric products, OMI/Aura L2 products, and Polder/Parasol L2 products (Table shows detail)

### Archived On-line A-Train Subsets

- **New Web** <http://disc.sci.gsfc.nasa.gov/ui/datasets?keywords=a-train>
- **http:** <http://atrain.gesdisc.eosdis.nasa.gov/data/>

### MODIS/Aqua, Level 1B, radiances

- **MAC021S\***: 1-km radiances
- **MAC02QS\***: 250-m radiances

### MODIS/Aqua, Level 2, atmospheric products

- **MAC04S\***: Aerosol Optical Depth Land and Ocean, Aerosol Type over Land, Angstrom Exponent, Mass Concentration, Fine Mode Fraction
- **MAC05S\***: Water Vapor IR and near IR retrievals
- **MAC06S\***: Cloud Top Parameters: Pressure, Temperature, Effective Emissivity, Spectral Forcing, Cloud Phase; Cloud Optical Parameters: Cloud Optical Thickness, Effective Particle Radius; Cirrus Detection: Cirrus Reflectance.
- **MAC07S\***: Temperature and Moisture (dew point temperature) profiles.
- **MAC35S\***: Cloud Mask: IR, NIR, and CO2 tests; Visible test at 250-m.

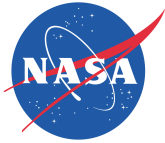
### OMI/Aura, Level 2, Cloud Pressure, Ozone, and UV index

- **OMCLDO2\_CPR**: Cloud effective pressure based on O2-O2 absorption
- **OMCLDRR\_CPR**: Cloud effective pressure based on Raman scattering
- **OMTO3\_CPR**: Column amount O3, UV Aerosol Index, UV reflectivity.
- **OMAERUV\_CPR**: UV Aerosol Index, Aerosol Absorption Optical Depth, Surface Albedo, UV Reflectivity.

### POLDER/Parasol, Level 2, Radiation Budget processing

- **PARASOLRB\_CPR**: Column Water Vapor, Cloud Pressure from O2 lines, Cloud Optical Thickness, Cloud Phase, Cloud Albedo, Clear Albedo.

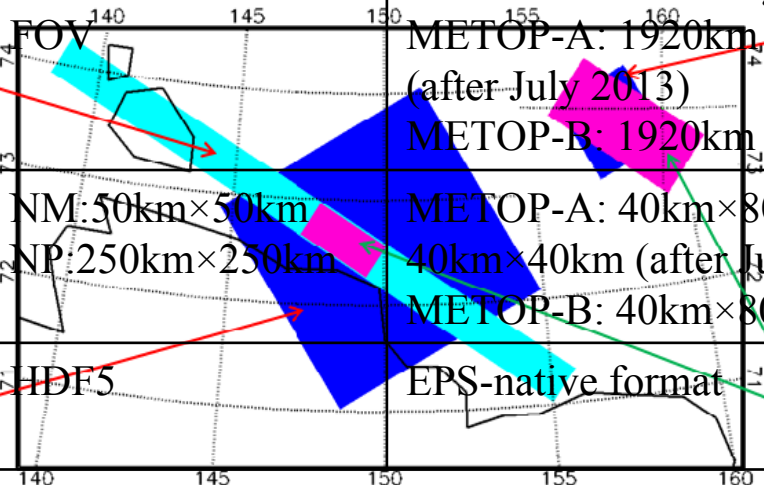
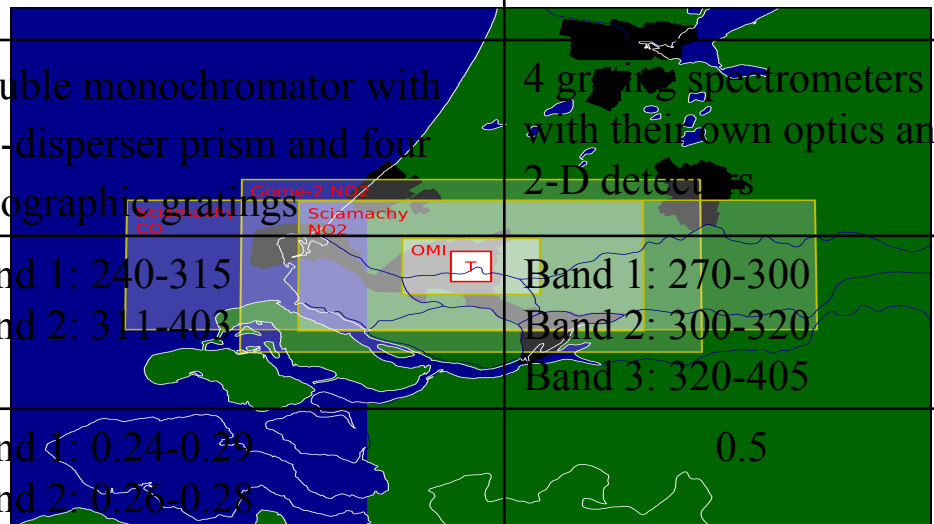
\*Available in 200- and 10-km swath widths; The Goddard Earth Sciences Data Information Services Center



# Multi-Sensor Intercomparison

	OMPS	GOME-2	TROPOMI
Footprints of S5P TROPOMI, S-2 grating spectrometers with CCD detectors		Double monochromator with pre-disperser prism and four holographic gratings	4 grating spectrometers with their own optics and 2-D detectors
Wavelength (nm)	NP: 250-310 NM: 300-380	Band 1: 240-315 Band 2: 311-403	Band 1: 270-300 Band 2: 300-320 Band 3: 320-405
Spectral resolution (nm)	1.0	Band 1: 0.24-0.29 Band 2: 0.26-0.28	0.5
Sample interval (nm)	0.41	Band 1: 0.12 Band 2: 0.12	Band 1 & 2: 0.065 Band 3: 0.20
Swath	Push broom 110° FOV: 140, 145, 150	Across track scanning METOP-A: 1920km & 900km (after July 2013) METOP-B: 1920km	Push broom 2600km nadir macropixel
Spatial Resolution	NM: 50km x 50km NP: 250km x 250km	METOP-A: 40km x 80km & 40km x 40km (after July 2013) METOP-B: 40km x 80km	Band 1: 28x7km Band 2 & 3: 7km x 7km
L1B Data Format OMPS NP Cell	HDF5	EPS-native format	netCDF-4 GOME-2 near-nadir pixel (band 1B and 2B)

Footprints of S5P TROPOMI, S-2 grating spectrometers with CCD detectors  
 NPP OMPS, METOP-A  
 GOME-2, Aura OMI, and  
 EarthSat Schiavachy



GOME-2 band 1A pixel

L1B Data Format  
OMPS NP Cell

GOME-2 near-nadir pixel (band 1B and 2B)





# Data Quality Level 2 Visualizer

**NASA L2 Data Quality Visualization**

Feedback

**MAP LAYERS**

- MODIS
  - Terra Corrected Reflectance (True Color)
  - Aqua Corrected Reflectance (True Color)
- OMI
  - OMAERUV
    - Absorption AOD 388nm (no QA)
    - Absorption AOD 388nm (QA)
    - Absorption AOD 500nm (no QA)
    - Absorption AOD 500nm (QA)
    - AOD 388nm (no QA)
    - AOD 388nm (QA)
    - AOD 500nm (no QA)
    - AOD 500nm (QA)
- OMAERO
- OMSO2
- OMT03
- OMDOAO3
- World Background

August 2016

S	M	T	W	T	F	S
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3
4	5	6	7	8	9	10

2016-08-24

50°00'W 120°00'W 90°00'W

150° 180°

60° 90°

Welcome

ATTENTION

global s

interes

Use

icon

diffe

imag





# Summary

## → GES DISC is user driven data service center

- ❑ Maintain **active archive** of datasets and enhance information services by developing tools and services for users
  - **Applications Support: Earthdata Login, New Website, Subsetting, Giovanni, Data Recipe/Cookbook, OPeNDAP, ...**
  - Dataset documentation support (User Guides, Readme, FileSpec, DIF, ...)
- ❑ Engage the **user community** in their data access, data usability and information/services needs.
  - Conference & Science Team participation, outreach.
  - Help Desk/User Support.
  - Develop and test recipes, and support tools for working with GES DISC data.
- ❑ **Web content support, Social Media, User Forum**, news articles, version release information, and data services updates, FAQ.
- ❑ Support for **legacy missions & document preservation**



# Operational Services/Tools

- **Giovanni** – Data Discovery, Visualization and Exploration
- **Mirador** – Data Search and access
- **Simple Subset Wizard** – GES DISC led, cross DAAC effort to provide subsetting capabilities
- **Data Recipes**
- **OpenDAP**
- **GrADS Data Server**
- **Open Geospatial Consortium (OGC) Web Map Service (WMS)**
- **Data provided in various formats** (HDF, netCDF, ASCII, kmz, others)
- **MAPSS** – Provides multi-sensor aerosol analysis centered around AERONET sites
- **Data Quality Screening** – Allows users to filter data on Quality
- **NEESPI (Northern Eurasia), MAIRS (Monsoon Asia), and A-Train Data Depot (along the A-Train track)** – Provides multi-instrument heterogeneous data access for a given region
- **Data Stewardship**