NASA Goddard Giovanni Support For YOTC

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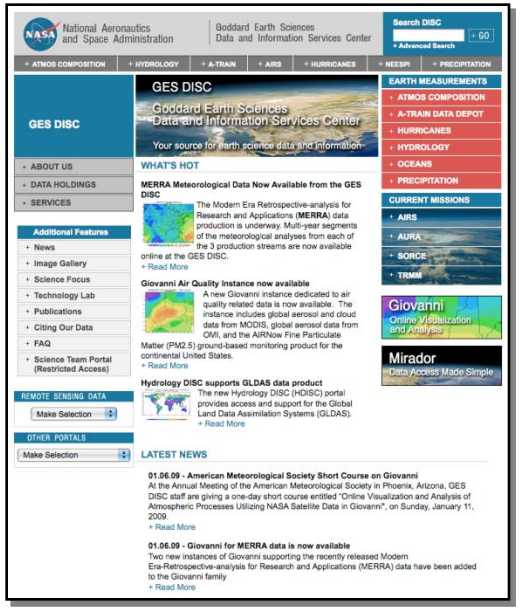
Introduction

- **What is YOTC**?

Year Of Tropical Convection (YOTC), a joint activity of the *World Climate Research Programme (WCRP)* and *World Weather Research Programme (WWRP)/THORPEX*, is a 2-year period of coordinated observing, modeling, and forecasting with a focus on organized tropical convection, its prediction, and predictability.

- **What is GES DISC**?



The Goddard Earth Sciences Data and Information Services Center (GES DISC) supports archive and distribution of hundreds of datasets for multiple satellite sensors, ground measurements, and models. These include Aqua AIRS, Aura HIRDLS/MLS/OMI, SORCE, TOMS, TOVS, TRMM, UARS, GLDAS and MERRA.

Through various available services and tools, the GES DISC provides users with multi-sensor and model visual comparisons and data access via a number of projects crossing several disciplines.

Goal – Dissemination of YOTC Satellite Products

Our goal is to facilitate data usage as much as possible by providing a way the community can easily visualize and access the data.

We provide:

- A user friendly, interactive interface to efficiently visualize and analyze the data.
- Multiple output data formats to the user can use desired post-analysis software.
- Easy to use efficient data download methods.

Visualization and access Methods:

Giovanni	On-line Data Visualization and Analysis Tool
Mirador	Search and Download Mechanism
OPeNDAP	Open-source Project for a Network Data Access Protocol
FTP	Direct anonymous FTP access

What is Giovanni?

Giovanni is a Web-based application developed by the GES DISC that provides a simple and easy way to visualize, analyze, and access vast amounts of Earth science remote sensing and model data.

Only a Web browser is needed. There is no need to learn data formats, programming, or download large amounts of data.

Visualizations and analysis services include latitude-longitude maps, **time series diagrams**, latitude-time and longitude-time Hovmöller diagrams, and animations. New visualizations will be introduced over time.

Giovanni Allows Scientists to Concentrate on the *Science*

The Old Way:

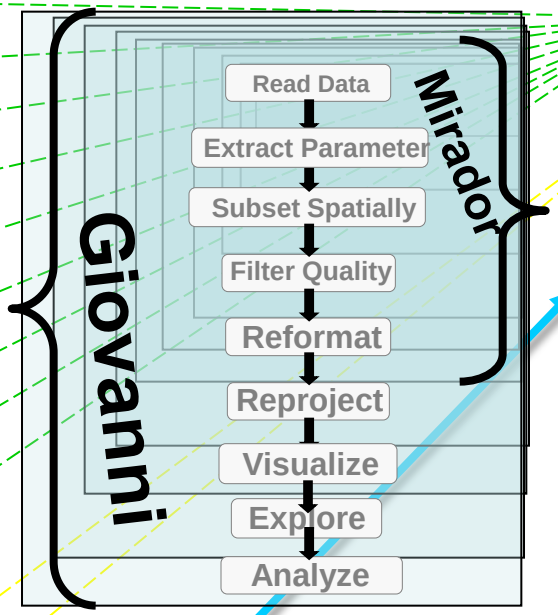
Pre-Science

- Find data
- Retrieve high volume data
- Learn formats and develop readers
- Extract parameters
- Perform spatial and other subsetting
- Identify quality and other flags and constraints
- Perform filtering/masking
- Develop analysis and visualization
- Accept/discard/get more data (sat, model, ground-based)

DO SCIENCE

- Exploration
- Initial Analysis
- Use the best data for the final analysis
- Derive conclusions
- Write the paper
- Submit the paper

Web-based Services:



The Giovanni Way:

- Minutes for technicalities
- Days for exploration

- Use the best data for the final analysis
- Derive conclusions
- Write the paper
- Submit the paper

DO SCIENCE

GES DISC tools allow scientists to ***compress*** the time needed for pre-science preliminary tasks: *data discovery, access, manipulation, visualization, and basic statistical analysis*.

Scientists have ***more time to do science!***

What is currently in Giovanni?

Almost 40 customized Giovanni portals

Thousands of geophysical parameters

Data from:

- ~ 20 space-based instruments
- ~ 50 models
- EPA and Aeronet stations

Multiple visualization and statistical analysis functionalities including data intercomparison

Data lineage

Subsetted data downloads in multiple formats

YOTC-GS Portal

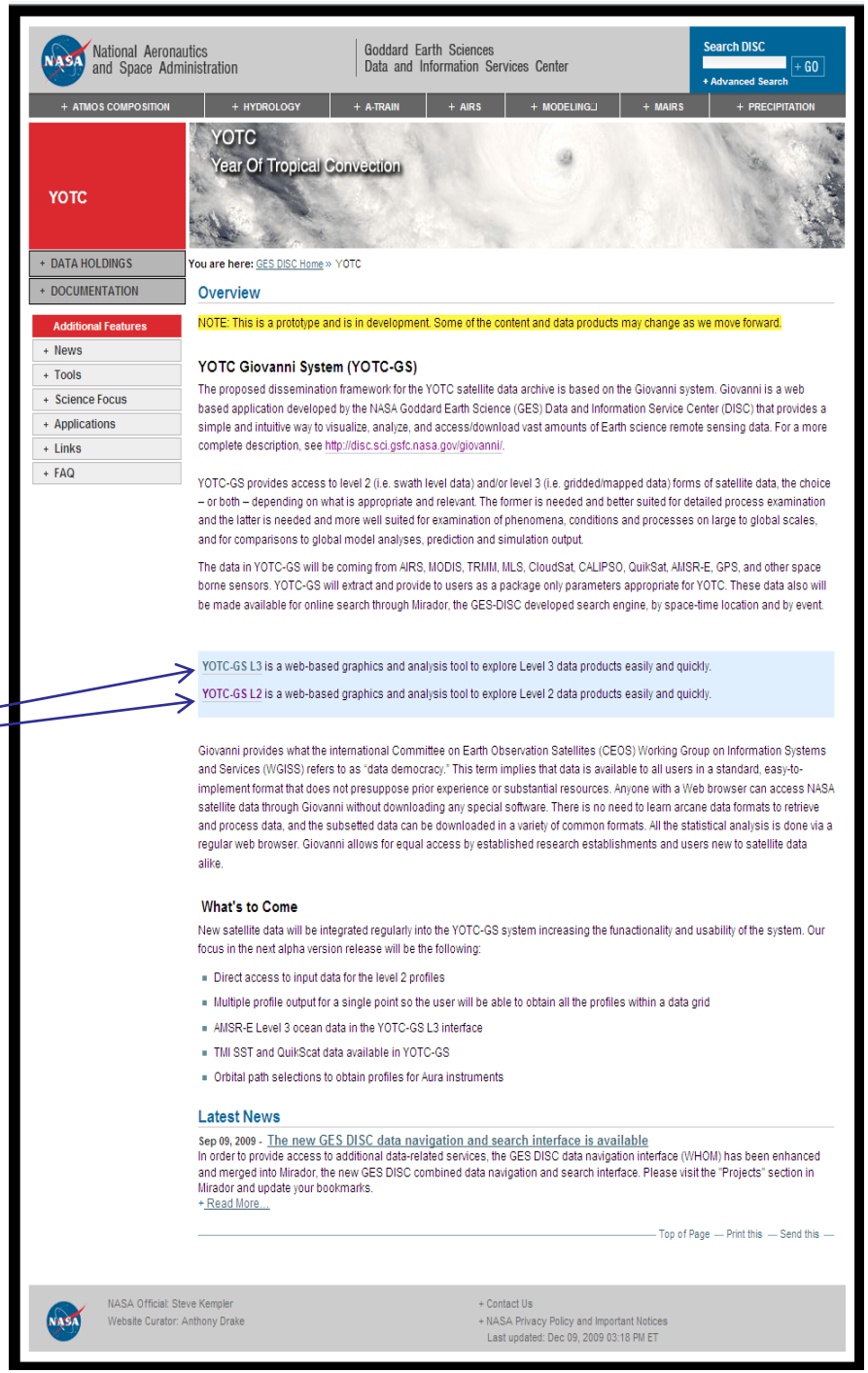
The **YOTC Portal** is a web-based information portal that provides the user community with information on the YOTC program satellite data sets.

Information Includes:

Documentation
Data Visualization
Data Access
Dataset Information
Applications
Science Focus

L3 data

L2 data



http://disc.sci.gsfc.nasa.gov/yotc

YOTC-GS Level 3 Beta Prototype

YOTC-GS L3 contains daily mosaics of ~88 parameters ranging from cloud top temperature to aerosol optical depth, providing environmental conditions of both global and regional scales in 2 and 3 dimensions. 7 functions are available for data analysis and visualization.

*U*sers make selections:

Spatial Area

Parameters

Time Range

Visualization

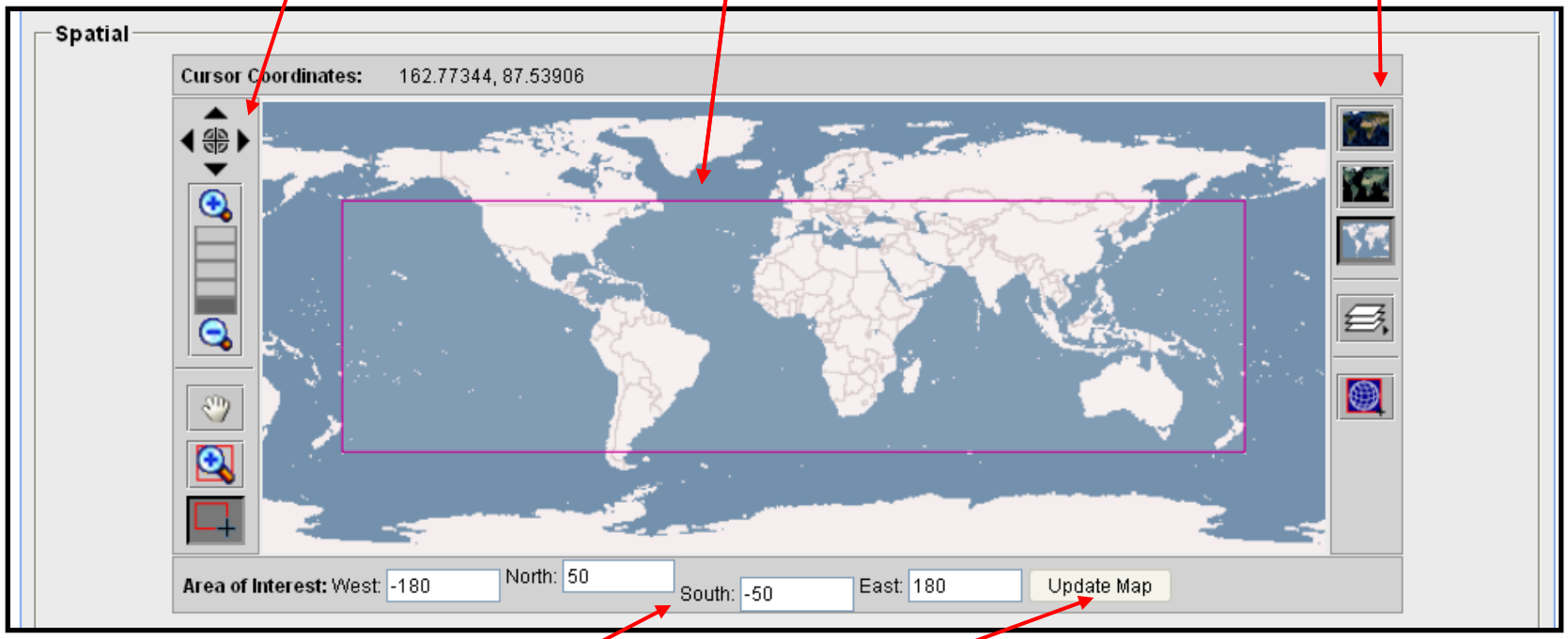
Vertical Levels for 3D

Spatial Selection

Panning and Zoom

Click and drag

Click to select a map layer



Type latitude and longitude coordinates and click Update button

Parameter Selection

Select to display more product information

Check to select a group of parameters

Parameters

Display: ☑ Data Product Info ☐ Units ☐ Parameters with > 2 Dimen

Atmosphere

☐ Clouds(2000/02/24 - 2009/07/08)

Parameter	Data Product Info		
☐ Cirrus Reflectance (QA-w)	MOD08_D3.005	MODIS-Terra Ver. 5	2000/02/24 - 2009/07/08
☐ Cloud Effective Emissivity	MOD08_D3.005	MODIS-Terra Ver. 5	2000/02/24 - 2009/07/08
☐ Cloud Effective Emissivity Day	MOD08_D3.005	MODIS-Terra Ver. 5	2000/02/24 - 2009/07/08
☐ Cloud Effective Emissivity Night	MOD08_D3.005	MODIS-Terra Ver. 5	2000/02/24 - 2009/07/08
☐ Cloud fraction_ascending (CloudFrc_A)	AIRX3STD.005	Aqua - AIRS standard	2002/08/31 - 2009/07/07
☐ Cloud Fraction (Day and Night)	MOD08_D3.005	MODIS-Terra Ver. 5	2000/02/24 - 2009/07/08

☐ Aerosols(1978/11/01 - 2009/07/08)

Parameter	Data Product Info		
☐ Absorbing Aerosol Optical Thickness	OMAEROe.003	Aura OMI	2004/10/01 - 2009/07/08
☐ Aerosol Optical Depth at 550 nm	MOD08_D3.005	MODIS-Terra Ver. 5	2000/02/24 - 2009/07/08
☐ Aerosol Optical Thickness	OMAEROe.003	Aura OMI	2004/10/01 - 2009/07/08
☐ Aerosol R_eff - Ocean (QA-w)	MOD08_D3.005	MODIS-Terra Ver. 5	2000/02/24 - 2009/07/08
☐ Aerosol Single Scattering Albedo	OMAEROe.003	Aura OMI	2004/10/01 - 2009/07/08
☐ Aerosol Small Mode Fraction Ocean	MOD08_D3.005	MODIS-Terra Ver. 5	2000/02/24 - 2009/07/08

Check to select a parameter

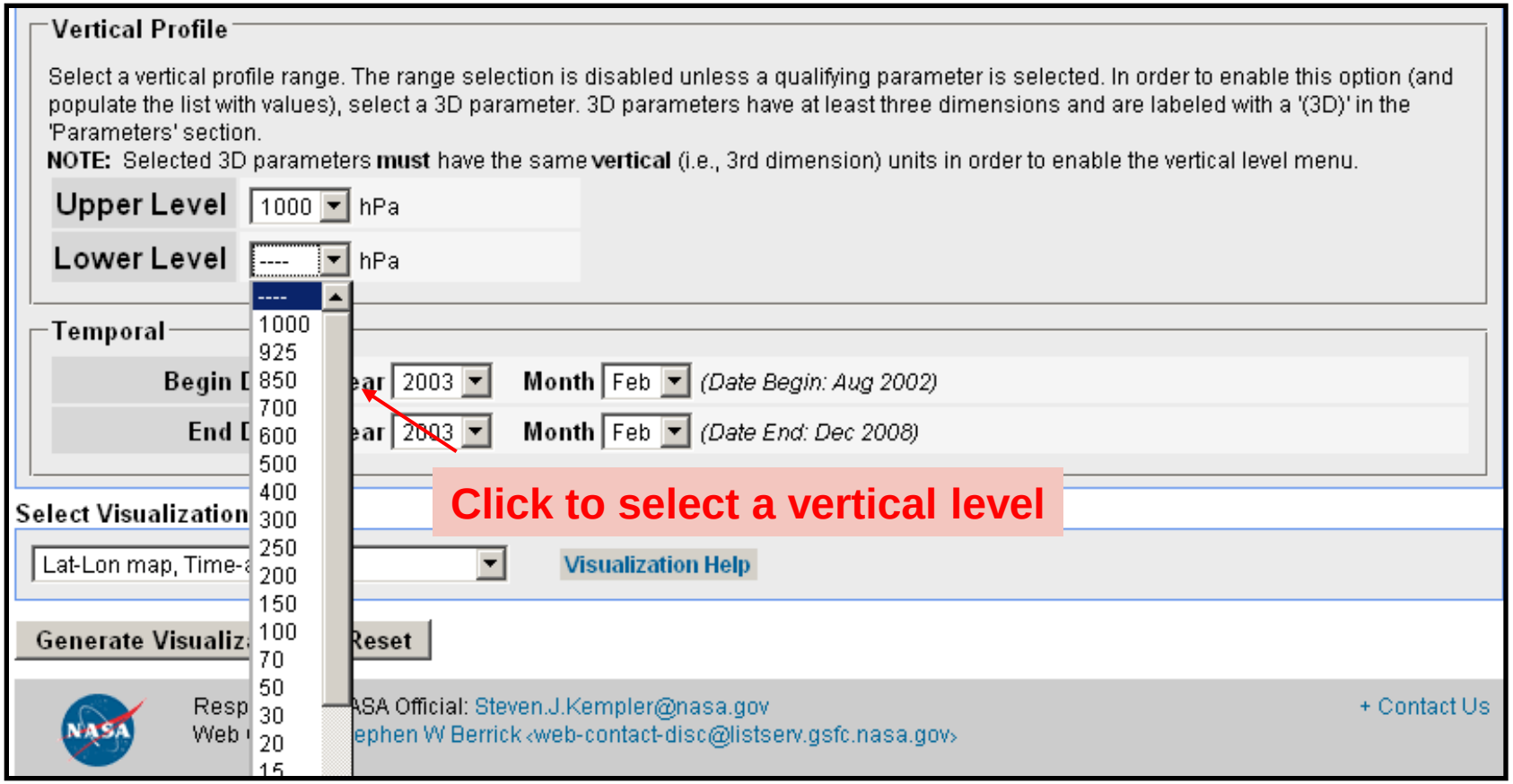
☐ Temperature(1978/11/01 - 2009/07/08)

Parameter	Data Product Info		
☐ Clear-sky outgoing long-wave radiation flux_ascending (ClrOLR_A)	AIRX3STD.005	Aqua - AIRS standard	2002/08/31 - 2009/07/07
☐ Clear-sky outgoing long-wave radiation flux_descending (ClrOLR_D)	AIRX3STD.005	Aqua - AIRS standard	2002/08/31 - 2009/07/07
☐ Cloud Top Pressure (Day and Night)	MOD08_D3.005	MODIS-Terra Ver. 5	2000/02/24 - 2009/07/08
☐ Cloud Top Pressure (Day only)	MOD08_D3.005	MODIS-Terra Ver. 5	2000/02/24 - 2009/07/08

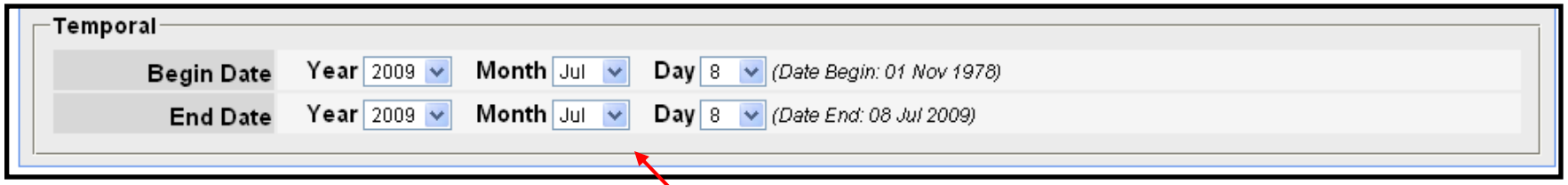
Click to show parameter description

Click to hide the parameter group

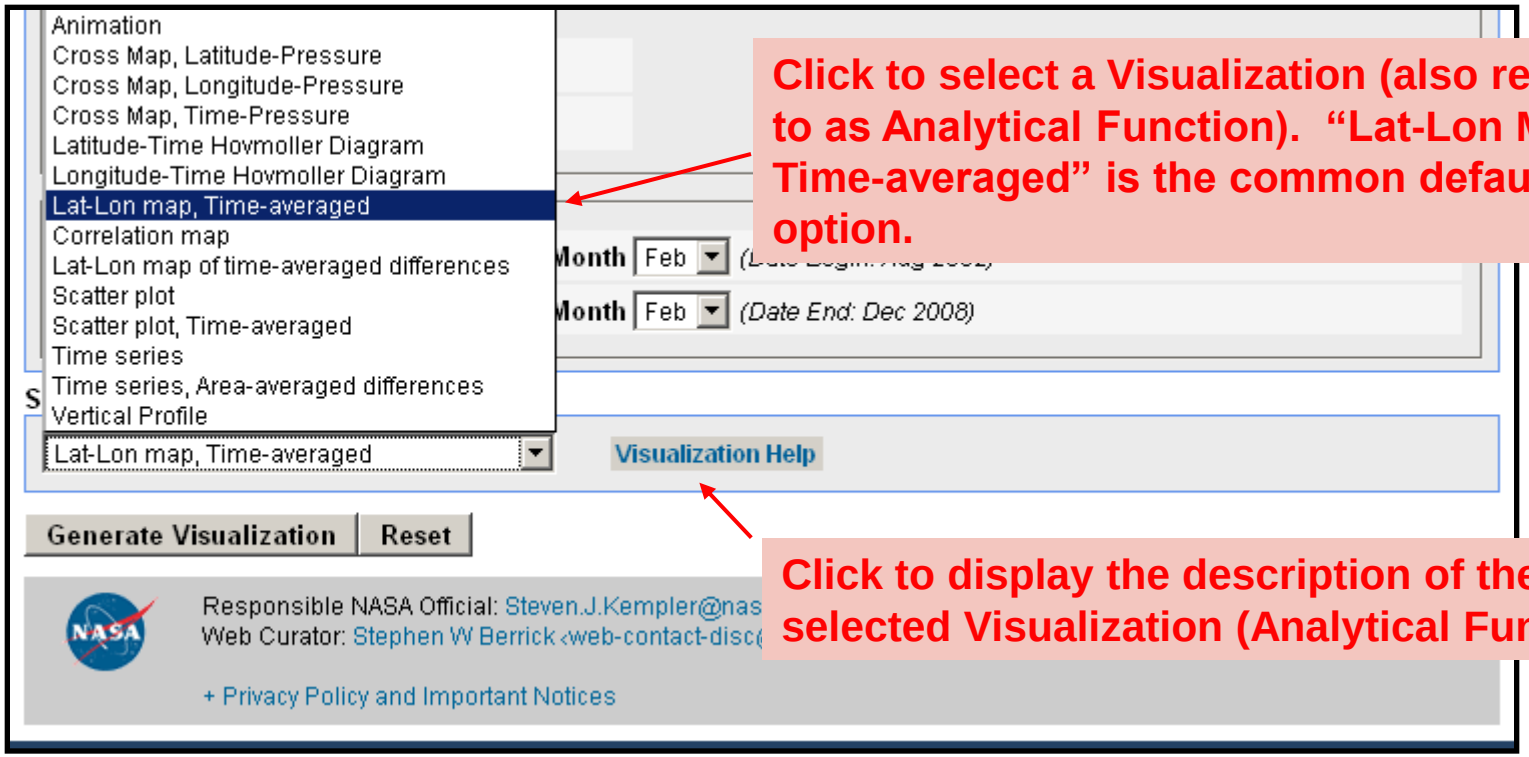
Vertical Selection



Temporal and Visualization Selection



Dropdown menus for Date and Time selections.



Click to select a Visualization (also referred to as Analytical Function). "Lat-Lon Map, Time-averaged" is the common default option.

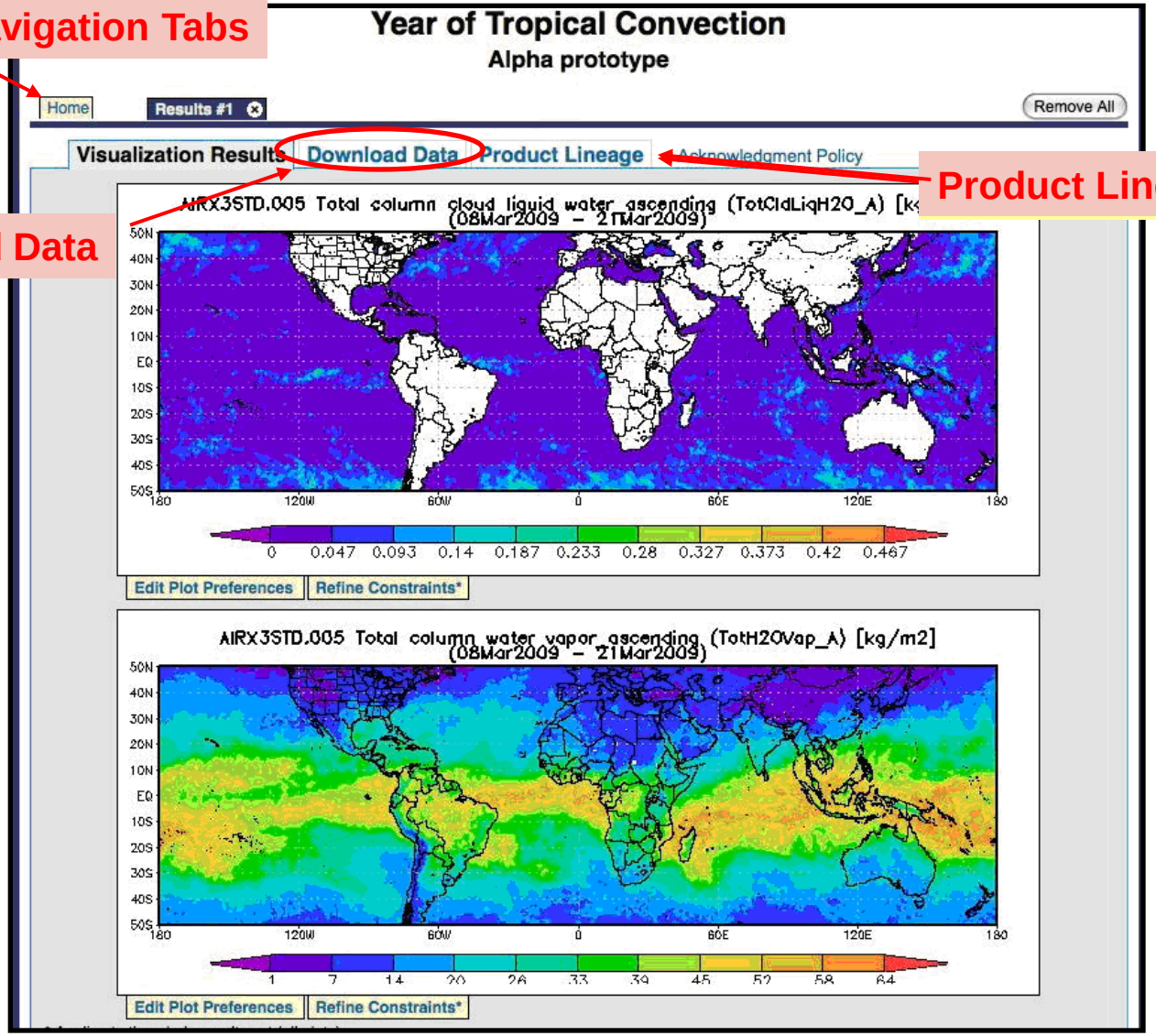
Click to display the description of the selected Visualization (Analytical Function).

Results Page – Visualization Result (example total column Cloud liquid water and total column water vapor)

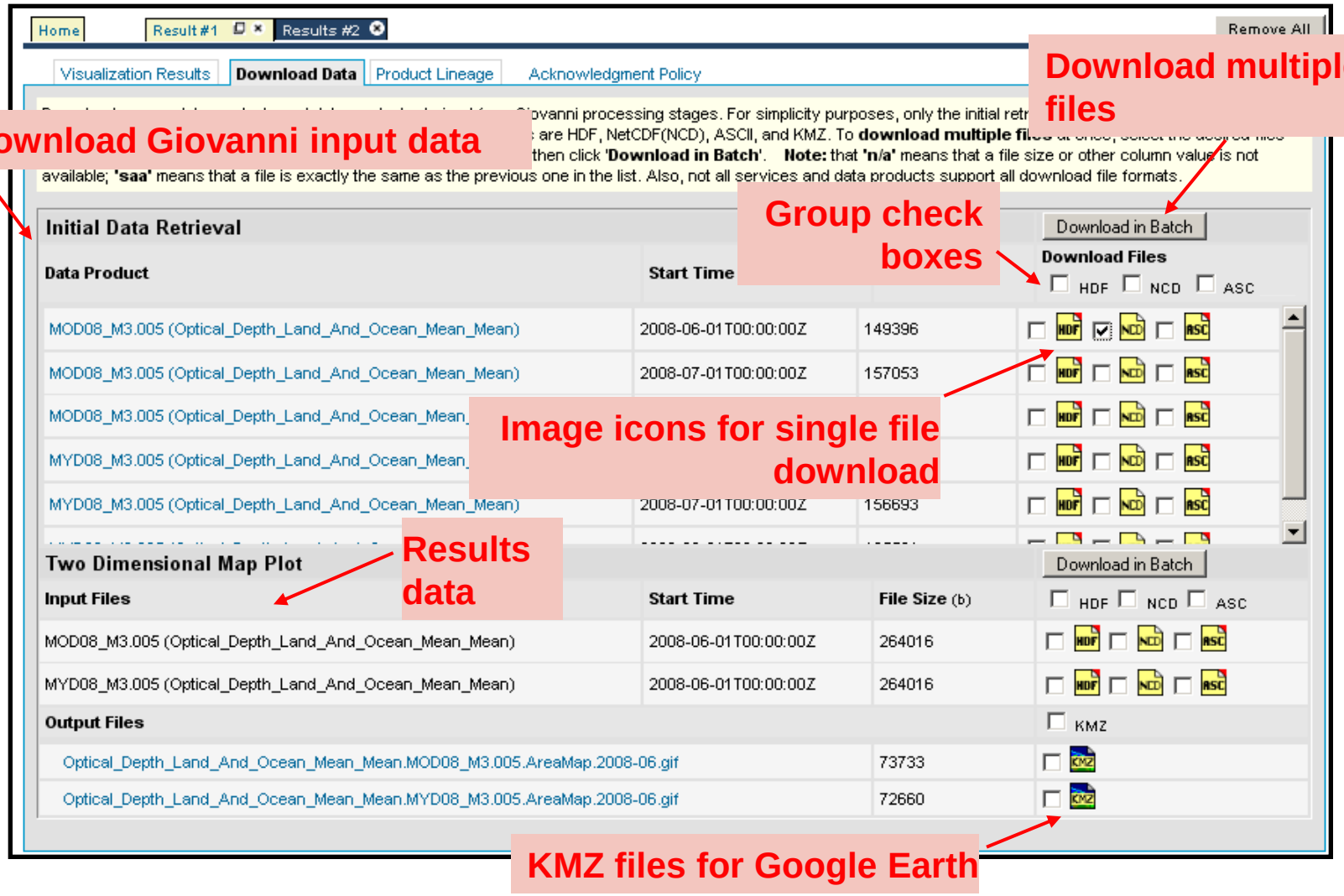
Results Navigation Tabs

Download Data

Product Lineage



Results Page – Download Data



Output data format: hdf, netCDF, ascii
Output image format: gif, png, KMZ

Results Page – Product Lineage

Home | Result #1 | Results #2

Visualization Results | Download Data | **Product Lineage** | Acknowledgment Policy

Browse the processing details of the ***Lat-Lon map, Time-averaged*** visualization service.

Data Fetching

Fetched data file(s) using and temporal constraints of 2008-11-01T00:00:00Z to 2008-11-30T00:00:00Z , then extracted parameter(s): Aerosol Opti

Parameter Masking

No masking was performed, as specified by the inputs.

Grid Subsetter

Extracted spatial subset of each parameter in previous step using spatial constraint of South: -90 North: 90 East: 180 West: -180

Time Averaging

Averaged all parameters at each grid point over a time period of 2008-11-01T00:00:00Z to 2008-11-30T00:00:00Z

Dimension Averaging

Averaged parameter(s) over the selected spstial area of South: -90 North: 90 East: 180 West: -180 for collapse with area averaging method: Area V

Two Dimensional Map Plot

Generated image(s) with options:
Map Projection = latlon
Smooth Type = 3

Lineage page shows product information and describes data processing steps.

Responsible NASA Official: Steven.J.Kempler@nasa.gov
Web Curator: Stephen W Berrick ‹web-contact-disc@listserv.gsfc.nasa.gov›

+ Privacy Policy and Important Notices

YOTC-GS Level 2 Beta Prototype

YOTC-GS L2 provides an easy access to Level-2 satellite orbital data, also known as swath data. Currently there are ~14 parameters for profile and 60 parameters for swath.

Select a service

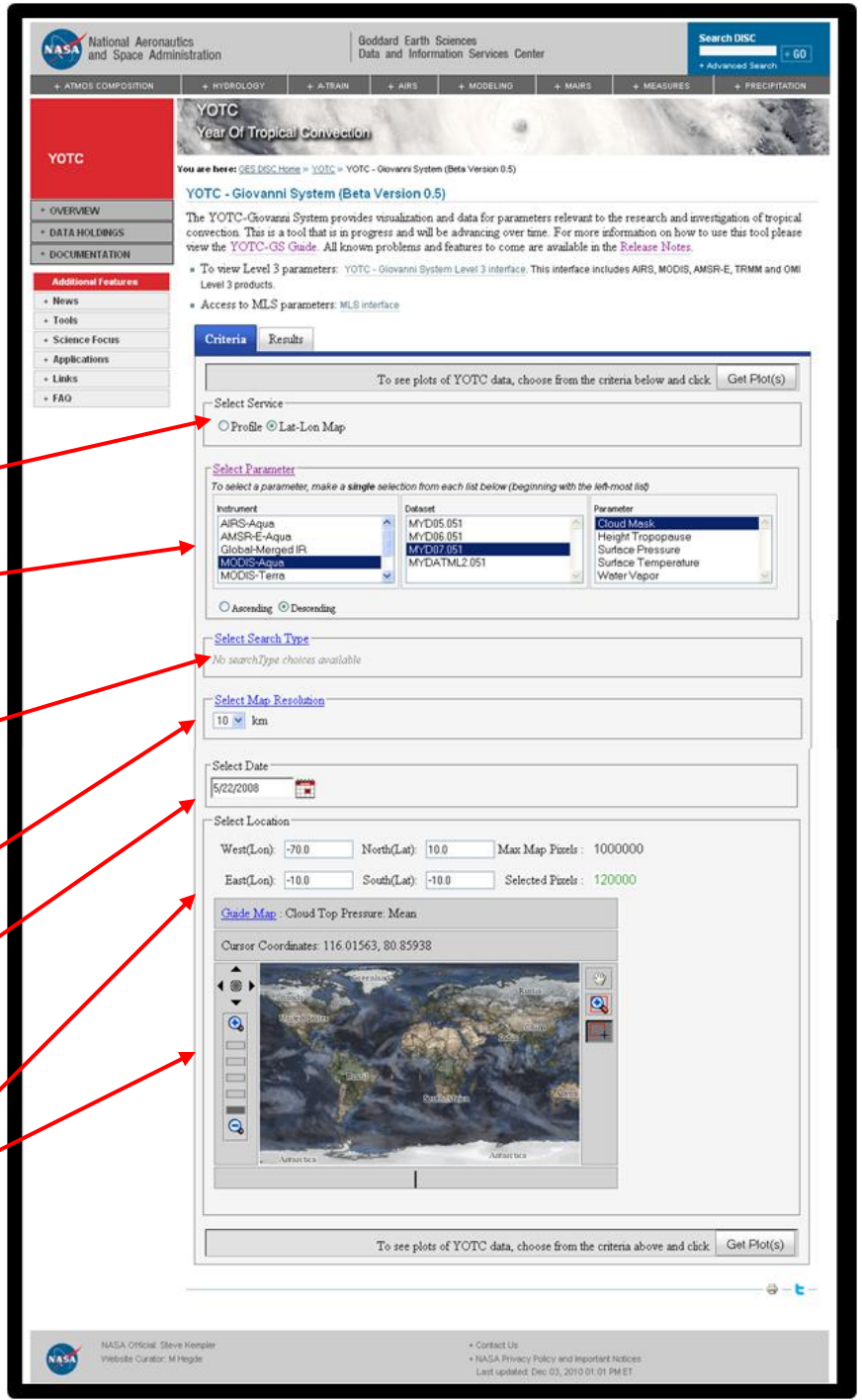
Select a parameter from available products

Select search type, single point or entire grip for profiles; or Pressure levels for 3D parameters

Select resolution for lat/lon maps

Select a date

Select a single point or spatial region. Guide maps available for location of atmospheric features



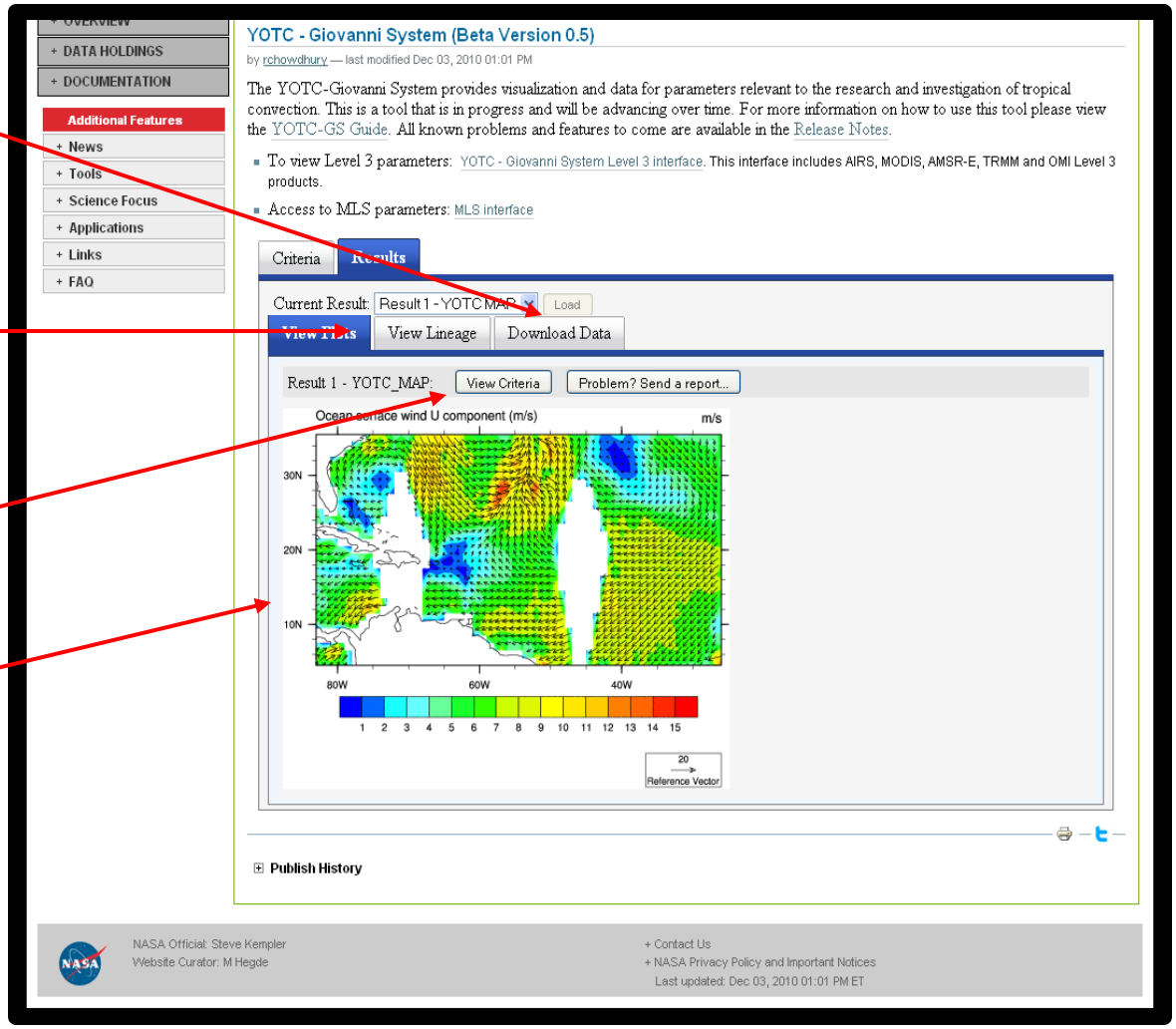
YOTC-GS Level 2 Beta Prototype Results

Download the subsetted data file used to generate the output.

View the lineage to know the subsetter call

Reload and revise input criteria

View and download the output image



Current single parameter output generation

YOTC-GS Prototype – Future Goals

This project has currently completed funding and is working on limited support.

We are currently working on a NASA ACCESS proposal to obtain funding to enhance the application, in the following ways:

1. Add YOTC model data such as MERRA, ECMWF, NCEP, etc

2. Add additional service methods such as parameter based search with multiple output from all relevant satellites to that parameter.

YOTC-GS Prototype – What's to Come

The following are currently in prototype testing or application development:

1. Parameters from the following products will be added to the interface:

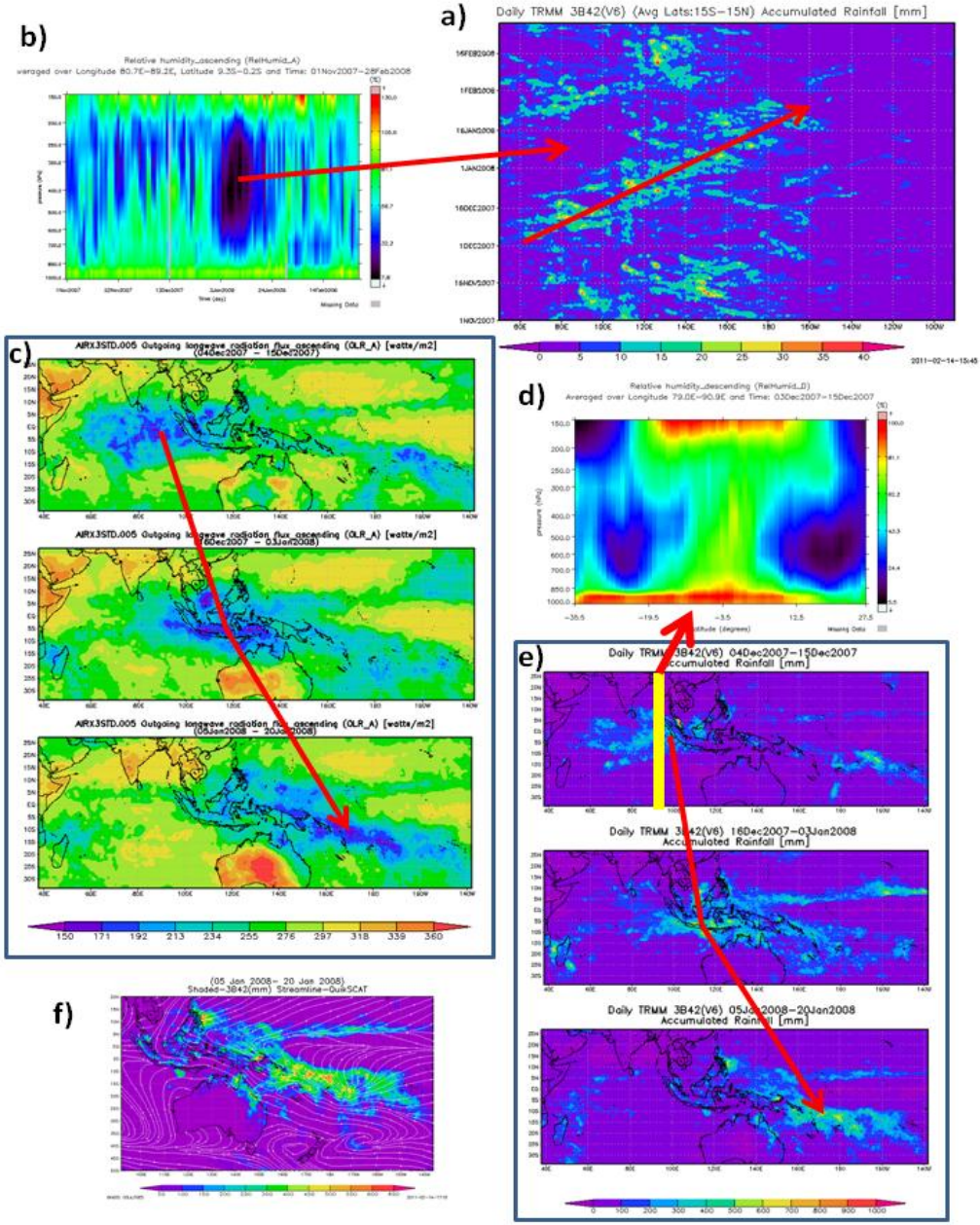
Calipso	Profiles of cloud presence, emissivity, and particle size, and associated radiative and geophysical properties (height, optical depth, extinction)
CERES	Cloud properties, TOA and surface fluxes.
CloudSat	Profiles of liquid and ice water, cloud classification, cloud optical depth, surface precipitation flags/estimates, and profiles of radiative fluxes and heating rates
ISCCP	Cloud parameters
CMORPH	High resolution precipitation

2. A Single seamless interface integrating the services for all the parameters.

Example 1

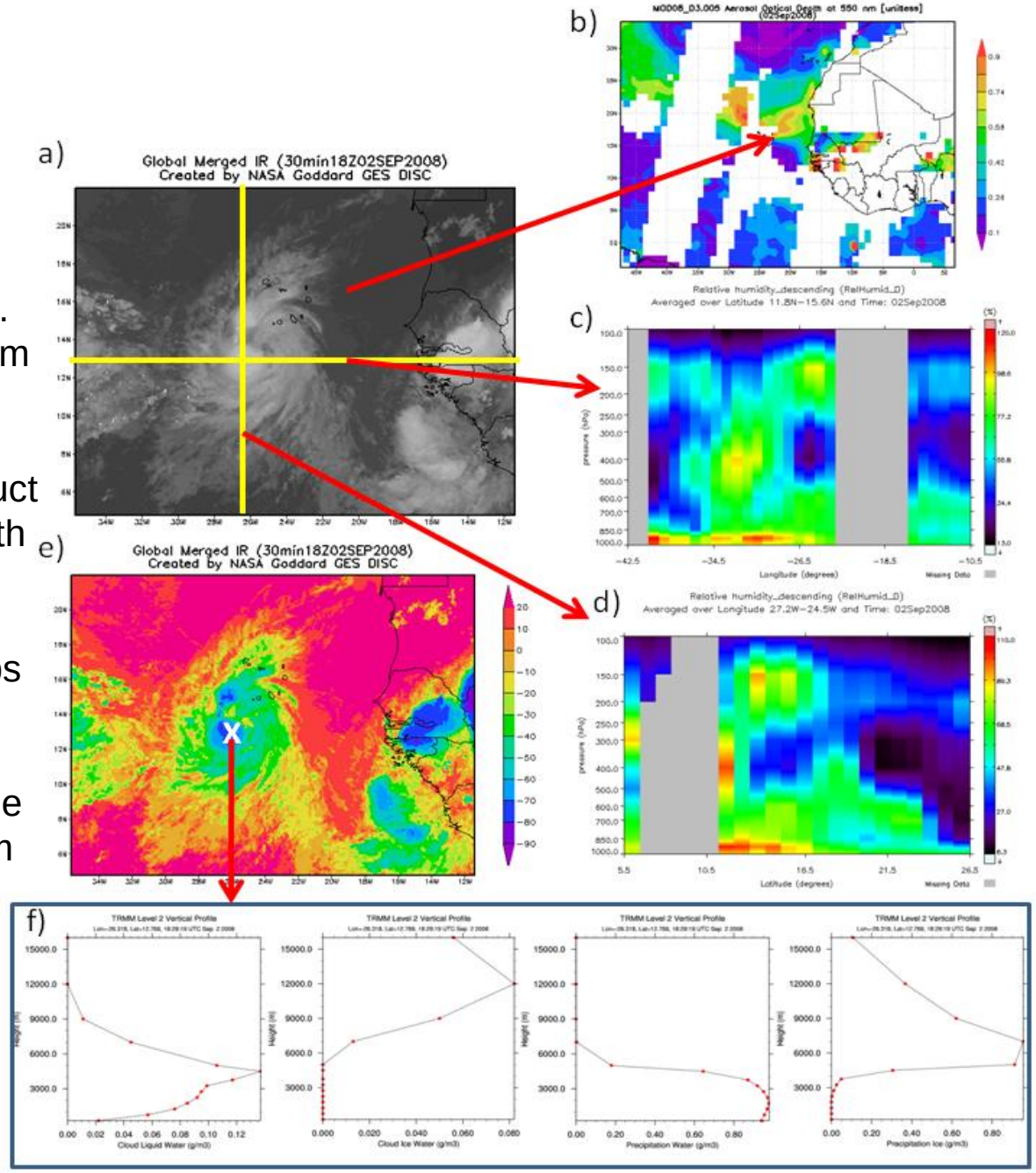
Example 1 of a MJO event analysis using YOTC-GS and other Giovanni tools at the DISC.

a) Hovemoller diagram shows an eastward propagation of precipitation; b) Relative humidity time-pressure cross section map showing a dry period after the rain event; c) Averaging OLR maps shows the eastward propagation of convective clouds; d) Relative humidity latitude-pressure cross section map averaged during the rain event, shows high concentration of moisture near the surface in the south of the raining area and dry areas centered at 600 mb in both north and south of the raining area; e) Accumulated rainfall maps shows the eastward propagation of Precipitation and f) Overlay of the TRMM daily rainfall and the QuikSCAT streamlines shows cyclonic flows near the southern edge of the rainband.



Example 2

Example 2 is of an African Easterly Waves (AEW) event and tropical cyclone analysis using the YOTC-GS and other Giovanni tools.
a) Black/white satellite imagery from the Hurricane Data Analysis Tool (HDAT) showing Tropical Storm Josephine; b) MODIS aerosol product showing a SAL is located in the north of Josephine; c) and d) Relative humidity longitude- and latitude-pressure cross section maps showing the dry SAL, respectively;
e) False color satellite imagery of
a) and X denotes the location of the vertical hydrometeor profiles (f) from the TRMM microwave imager.



Recognition and Thanks to NASA Headquarters for supporting this project

Questions???

GES DISC

http://disc.gsfc.nasa.gov/

YOTC-GS Portal

http://disc.sci.gsfc.nasa.gov/yotc

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