# *Exploring the Earth Sciences data with Giovanni*

Gregory Leptoukh

Code 610.2, GES DISC

*Gregory.G.Leptoukh@nasa.gov*

# *Outline*

- About Giovanni
- Current Giovanni functionalities
- Getting daily subsets through Giovanni
- Exploring events with Giovanni instances:
  - Ozone hole
  - Hurricane Katrina
- Statistics issues: averaging, biases, etc.
- Daily MODIS in Giovanni - Saharan dust transport
- A-Train Data Depot
- Giovanni-related presentations and publications
- Future of Giovanni:
  - Giovanni 3 (G3)
  - Data fusion

# *Acknowledgements*

Contributions:

- Giovanni and Science groups at the GES DISC

Supported in part by:

- Yoram Kaufman
- Ocean Color Time Series (REASoN CAN 02-OES-01)
- Integrating NASA Earth Science Enterprise Data into Global Agricultural Decision Support Systems (REASoN CAN 02-OES-01)
- NASA Earth Sciences Data Support System and Services for NEESPI (ROSES'05)
- A-Train Data Depot (ROSES'05)

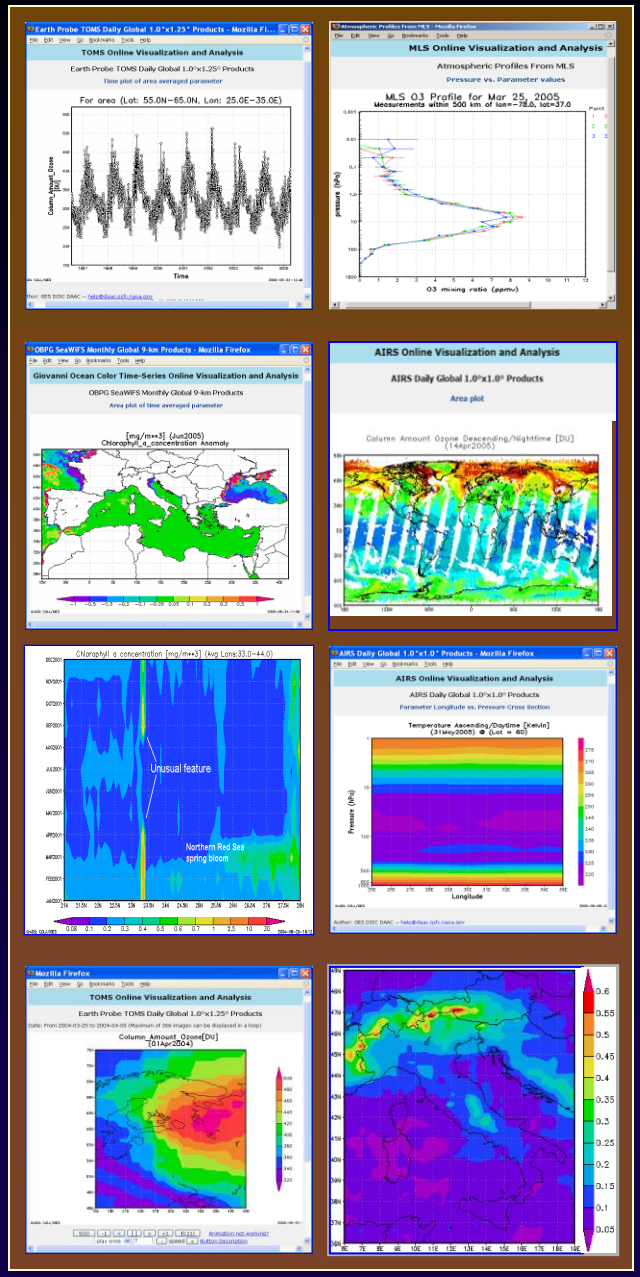
# Giovanni

## Data Inputs

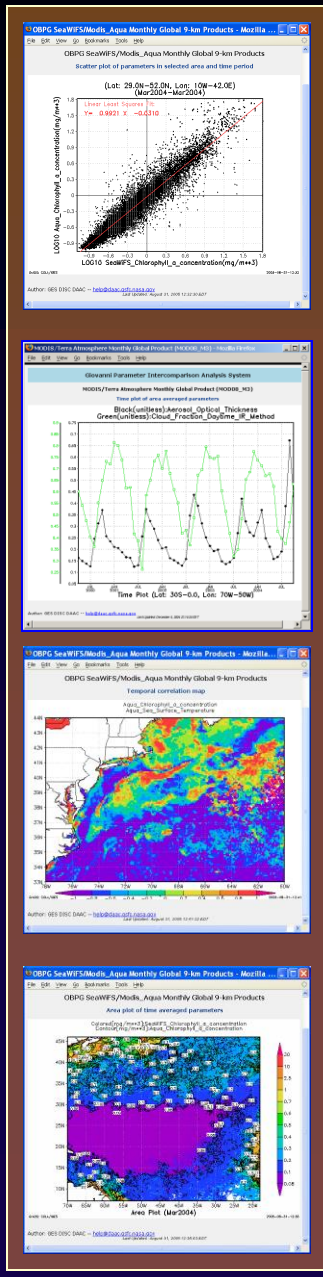
- MLS Aura
- OMI Aura
- MODIS Aqua
- AIRS Aqua
- MODIS Terra
- SeaWiFS
- TRMM
- HALOE UARS
- TOMS EP Nimbus

## Giovanni Instances

## Single Parameter View




## Parameter Intercomparison



# *GES-DISC Interactive Online Visualization and Analysis Infrastructure (Giovanni)*

- With Giovanni and a few mouse clicks, one can easily obtain information on atmosphere state from around the world
- No need to learn data formats and to retrieve and process data
- Assess various phenomena interactively
- Try various combinations of parameters measured by different instruments
- All the statistical analysis is done via a regular web browser

http://giovanni.gsfc.nasa.gov/

Caution: *Giovanni is an exploration tool*

# *Giovanni capabilities*

**Basic (one-parameter):**

- **Area plot** – averaged or accumulated over any data period for any rectangular area (various map projections)
- **Time plot** – time series averaged over any rectangular area
- **Hovmoller plots** –longitude-time or latitude-time cross sections
- **ASCII output** – for all plot types (can be used with GIS apps)
- **Image animation** – for area plot
- **Vertical profiles**
- **Vertical cross-sections, zonal means**

**Beyond basics:**

- **Area plot** - geographical intercomparison between two parameters
- **Time plot** - an X-Y time series plot of several parameters
- **Scatter plot of parameters in selected area and time period**
- **Scatter plot of area averaged parameters** - regional (i.e., spatially averaged) relationship between two parameters
- **Temporal correlation map** - relationship between two parameters at each grid point in the selected spatial area
- **Temporal correlation of area averaged parameters** - a single value of the correlation coefficient of a pair of selected parameters
- **Difference plots**
- **Anomaly plots**
- **Acquiring parameter and spatial subsets** in a batch mode through Giovanni

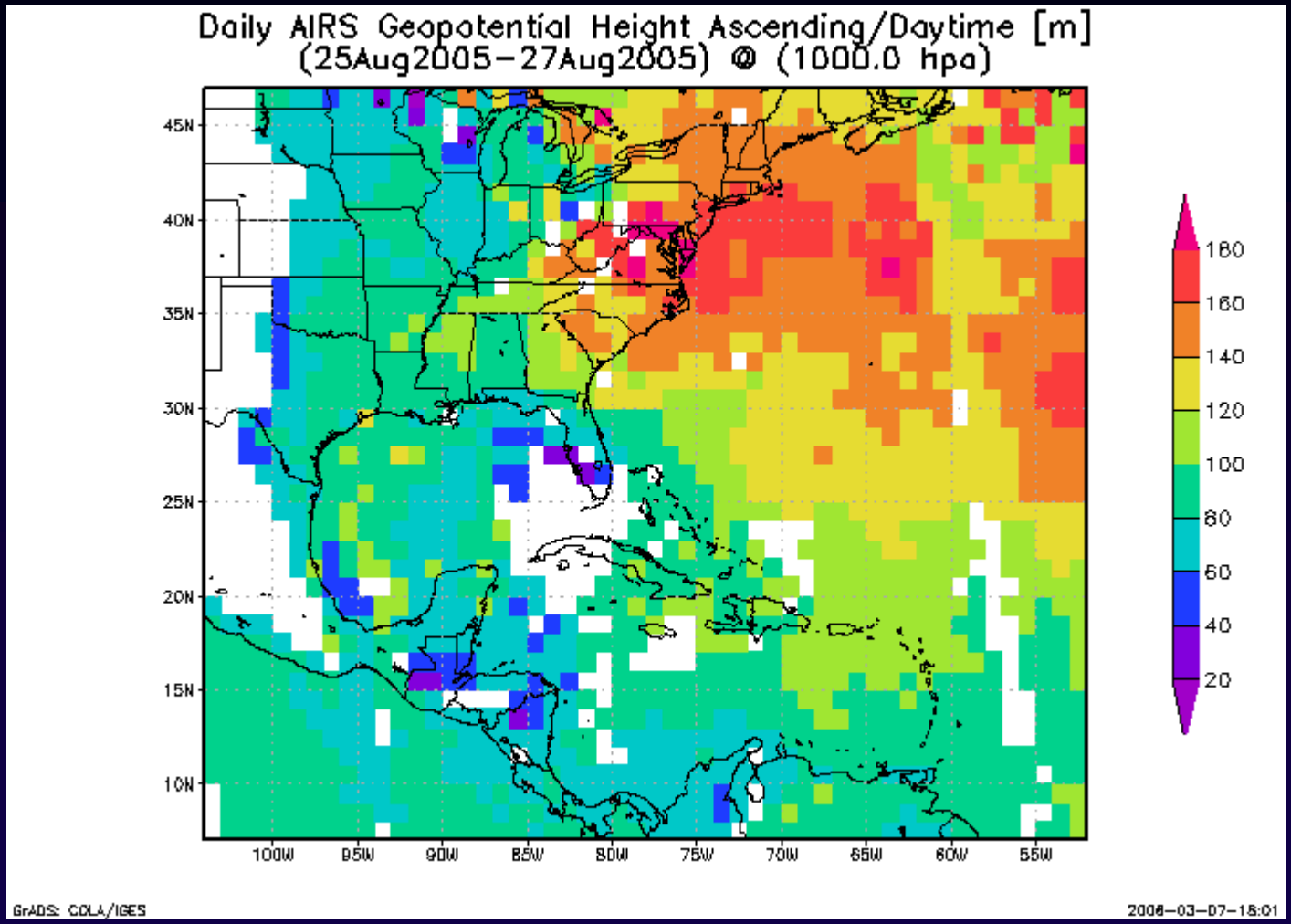

Giovanni - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://disc.gsfc.nasa.gov/techlab/giovanni/
Go
+ ABOUT NASA
+ NEWS & EVENTS
+ MULTIMEDIA
+ MISSIONS
+ POPULAR TOPICS
+ MyNASA
+ Tech Lab Home
+ GES DISC Home
Giovanni
+ OVERVIEW
SEARCH DISC
leptoukh
+ GO
+ ADVANCED SEARCH
Giovanni
The Bridge Between Data and Science
GIOVANNI
Current Giovanni Interfaces
These Giovanni interfaces are operational:
Agricultural Online Visualization and Analysis System
View snapshot
AIRS Online Visualization and Analysis System
View snapshot
Aura MLS Online Visualization and Analysis System
View snapshot
MODIS Online Visualization and Analysis System (MOVAS)
View snapshot
Ocean Color Time-Series Project
View snapshot
OMI Online Visualiation and Analysis System
View snapshot
TOMS Online Visualization and Analysis System
View snapshot
TRMM Online Visualization and Analysis System (TOVAS)
View snapshot
UARS HALOE Online Visualization and Analysis System
View snapshot
For full descriptions, features, and list of parameters available in each of our Giovanni interfaces, please check our Giovanni Interface Description Web page.
What is Giovanni?
The GES-DISC Interactive Online Visualization ANd aNalysis Infrastructure (Giovanni) is the underlying infrastructure for a growing family of Web interfaces that allows users to analyze gridded data interactively online without having to download any data. Through Giovanni, users are invited to discover and explore our data using sophisticated analyses and visualizations.
In the future, there will be more instances of Giovanni available and we
GIOVANNI NEWS
04.18.2006 OMI Level 2G now available in Giovanni
The OMI Level 2G total column ozone gridded product is now available in OMI Giovanni. This OMI Giovanni (now separated from TOMS Giovanni) allows users to interactively filter by quality flag and viewing zenith angle.
+ Explore OMI Giovanni
04.05.2006 GPCP Data now available in TOVAS Giovanni
Global Precipitation (GPCP, 1979 - 2005) data are available through TOVAS Giovanni. In addition, TRMM V5 data products have been replaced by TRMM V6. Also, new options have been made available on resultant image page, including "Unit options (mm or inch)" and "Nonlinear color scale".
+ Explore TOVAS
03.31.2006 New MODIS Aqua SST available in Giovanni
A new version of MODIS Aqua Sea Surface Temperature (SST) has been added to the Ocean Color Time-Series Project Giovanni subsequent to the full dataset reprocessing by the OBPG.
The data product used in


# *Scenarios*

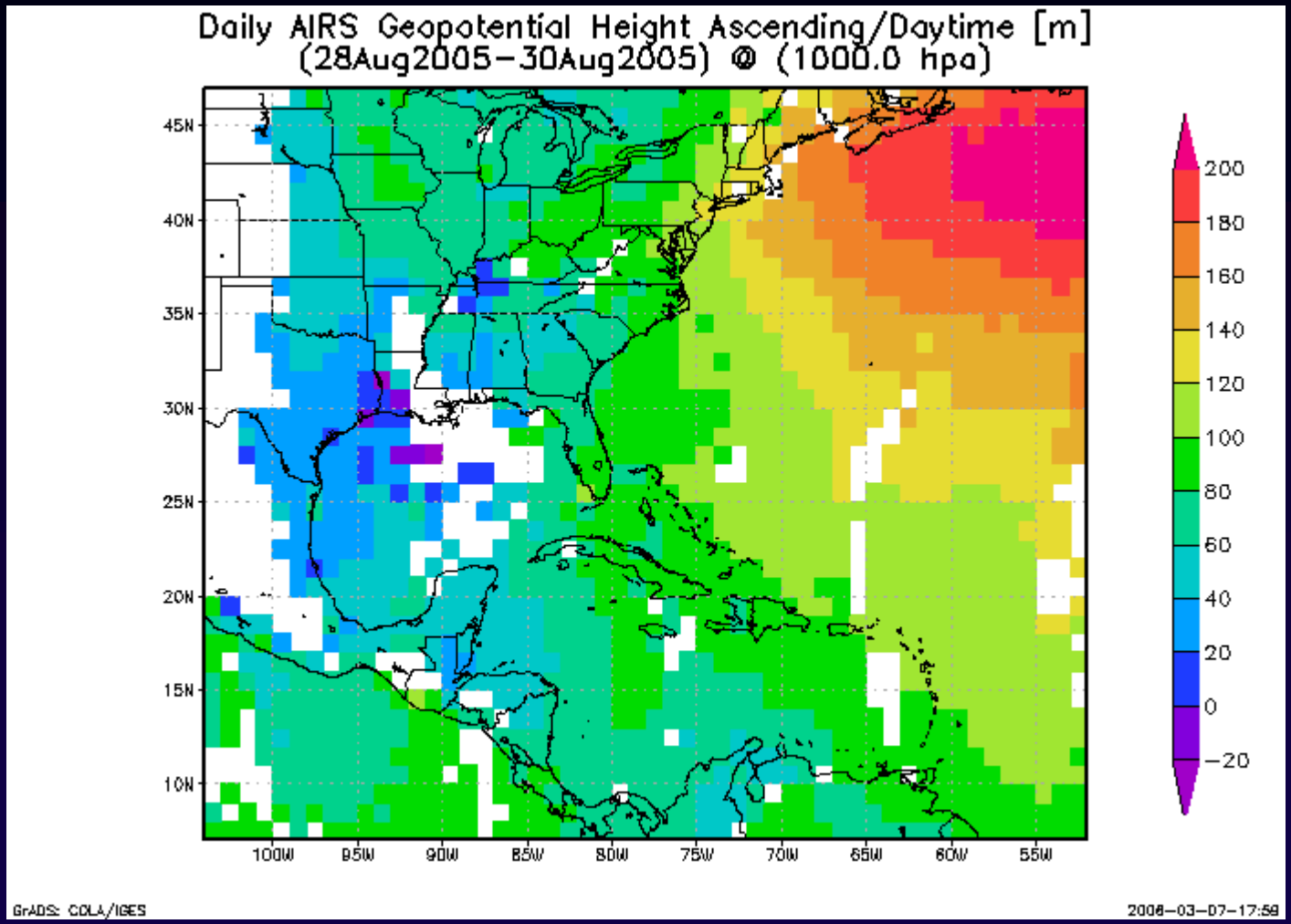
# *Hurricane Katrina*

- Examples of Precipitation, Geopotential Height, for the end of August 2005
- Measurements by OMI, MODIS, and TRMM
- Area maps of  Ozone and Surface reflectivity
- Lon-time Hovmoller plot

# *Pre-Katrina*


Daily AIRS Geopotential Height Ascending/Daytime [m]
(25Aug2005-27Aug2005) @ (1000.0 hpa)
45N
40N
35N
30N
25N
20N
15N
10N
100W
95W
90W
85W
80W
75W
70W
65W
60W
55W
180
160
140
120
100
80
60
40
20
GrADS: COLA/IGES
2006-03-07-18:01

# *Katrina*


Daily AIRS Geopotential Height Ascending/Daytime [m]
(28Aug2005-30Aug2005) @ (1000.0 hpa)
45N
40N
35N
30N
25N
20N
15N
10N
100W
95W
90W
85W
80W
75W
70W
65W
60W
55W
200
180
160
140
120
100
80
60
40
20
0
-20
GrADS: COLA/IGES
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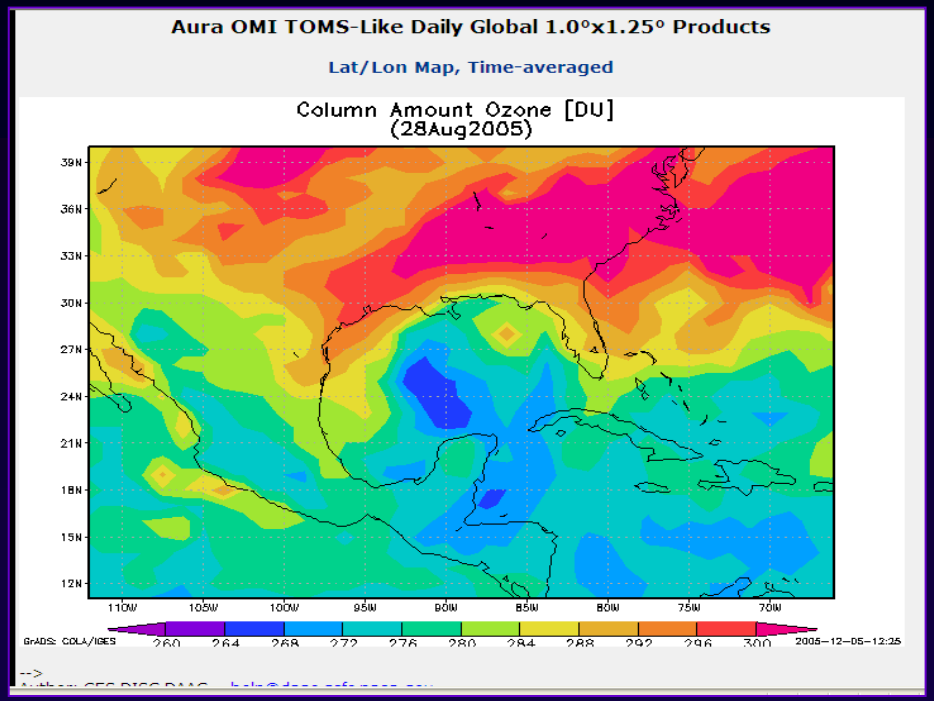
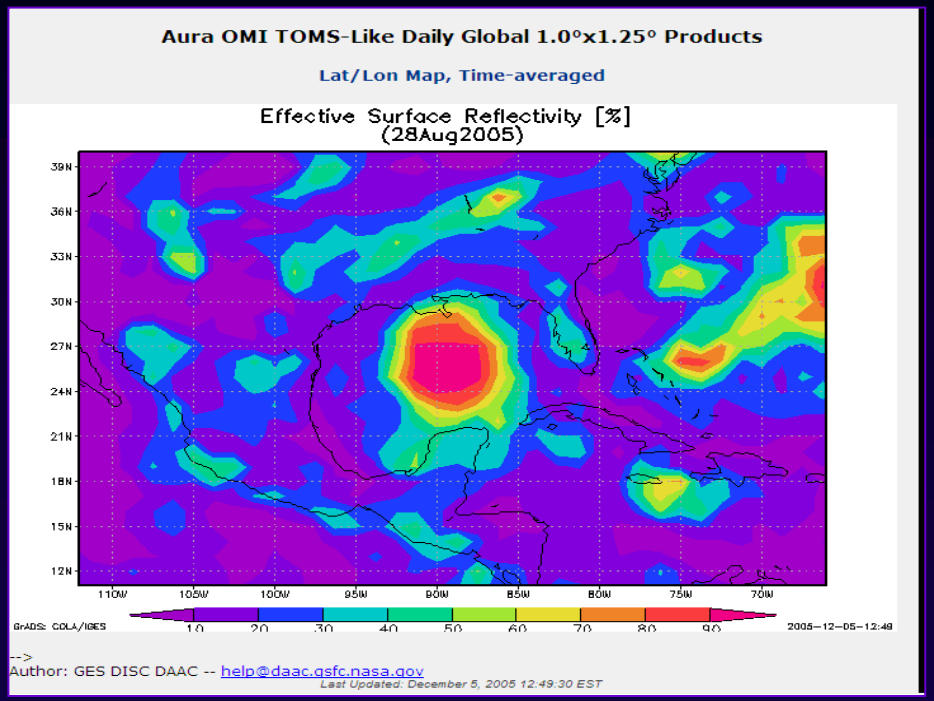
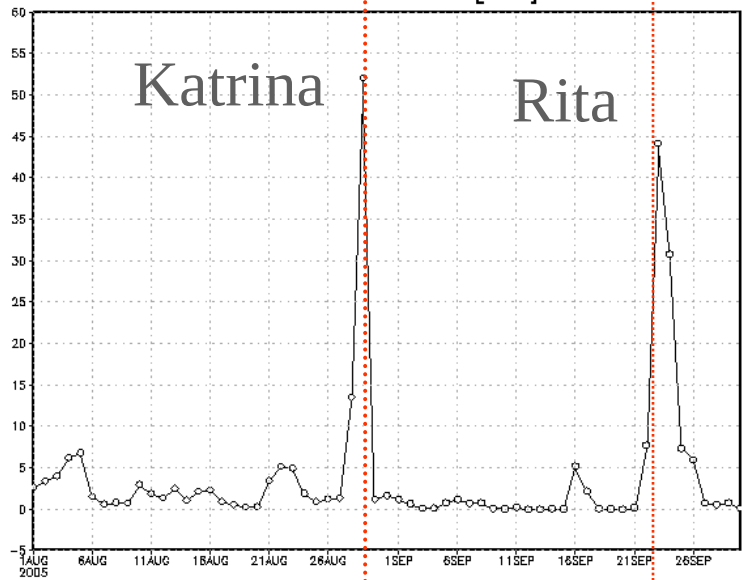
# *Hurricane Katrina, August 28, 2005*

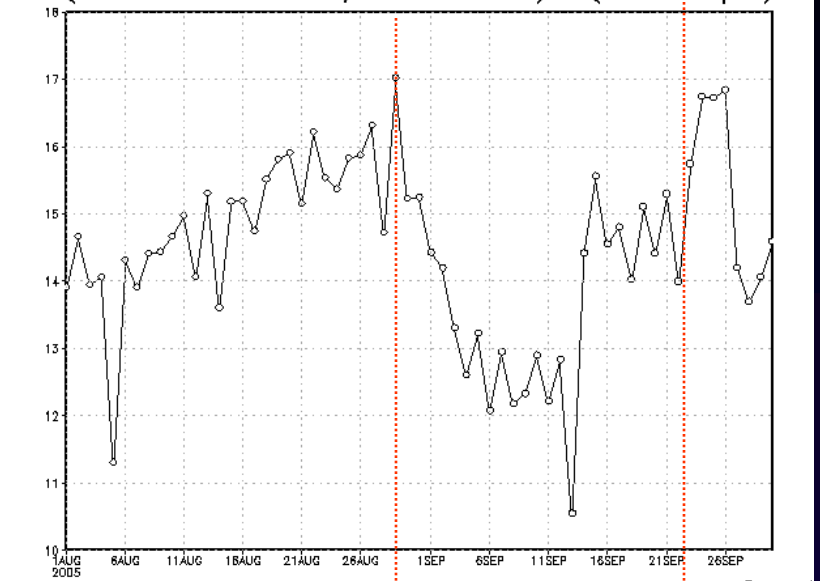


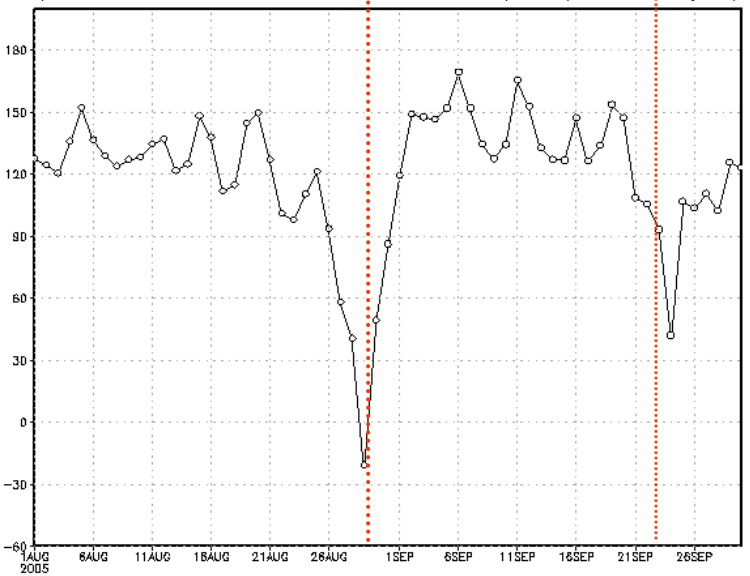

OMI total column ozone (left bottom)

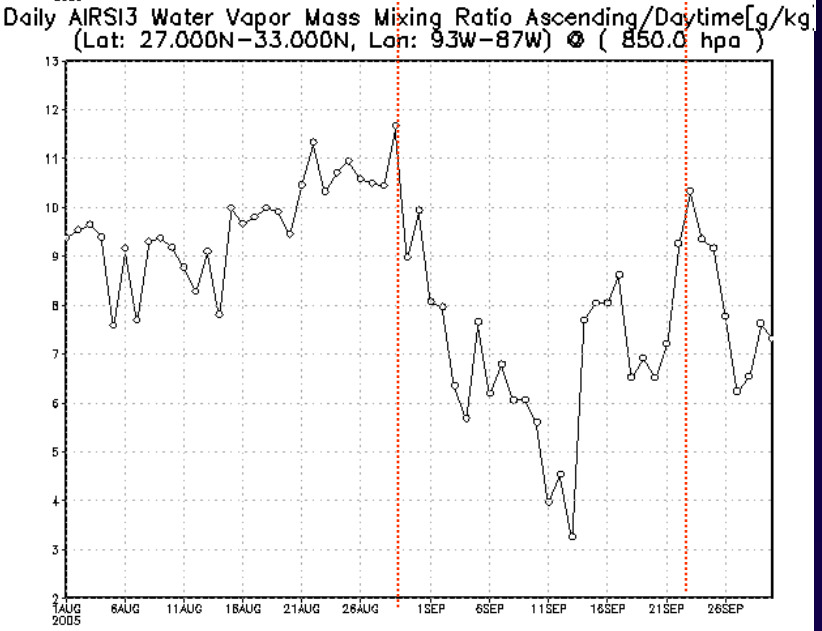



OMI effective surface reflectivity



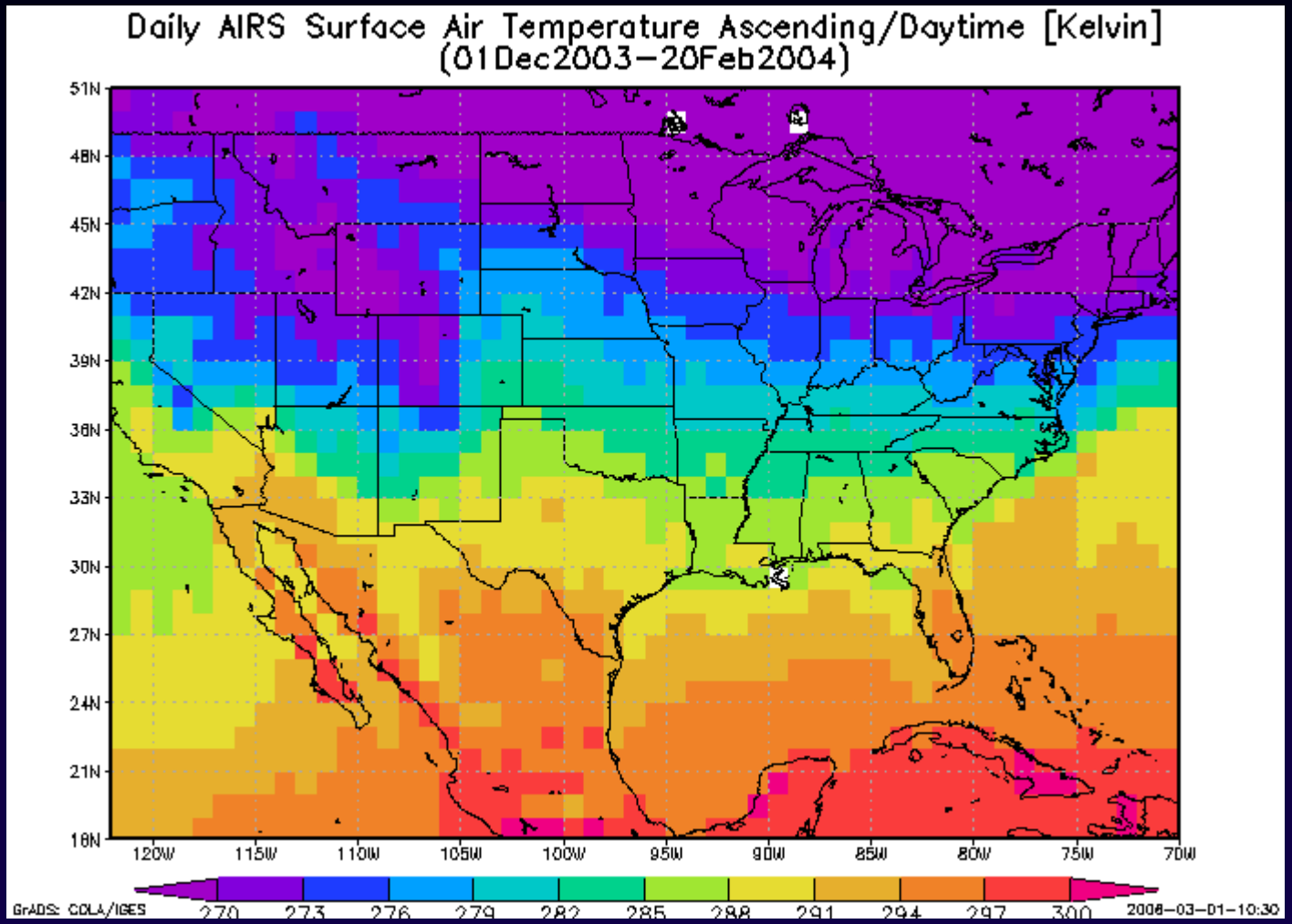




GrADS: COLA/IGES 2006-03-02-20:51 GrADS: COLA/IGES 2006-03-02-20:58

# *La Niña scenario*

- Supporting evidences:
  - the warmer surface air temperature contours (from AIRS retrievals) moved further north this winter than past two winters
  - after having a relatively wetter year in Texas last year which has promoted growth of trees and brushes, this warmer and dryer winter has created favorable conditions for wildfire hazards as being reported in the media lately


Daily AIRS Surface Air Temperature Ascending/Daytime [Kelvin]
(01Dec2003-20Feb2004)
51N
48N
45N
42N
39N
36N
33N
30N
27N
24N
21N
18N
120W
115W
110W
105W
100W
95W
90W
85W
80W
75W
70W
GrADS: COLA/IGES
270
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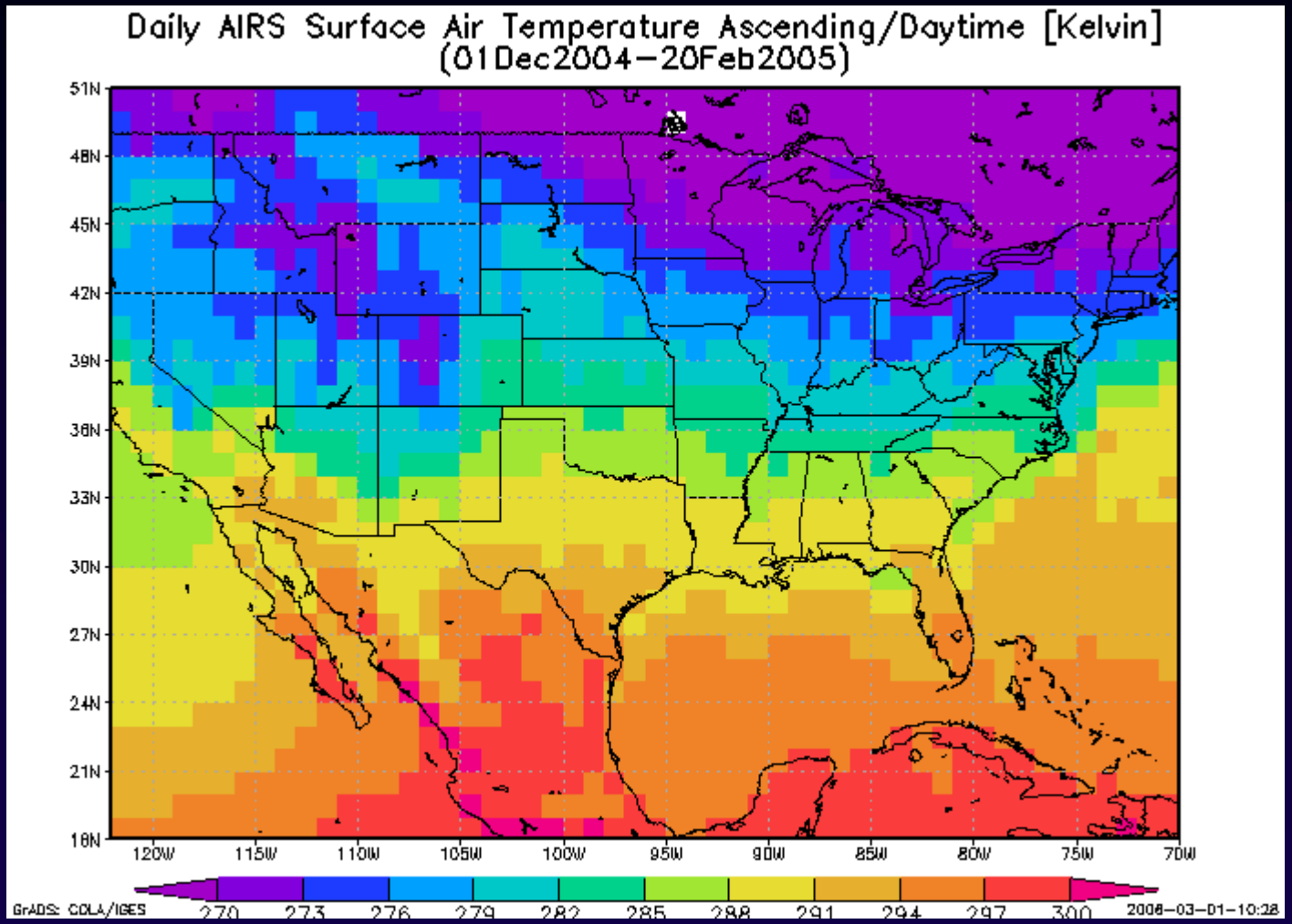
297
300
2006-03-01-10:30


Daily AIRS Surface Air Temperature Ascending/Daytime [Kelvin]
(01Dec2004–20Feb2005)
51N
48N
45N
42N
39N
36N
33N
30N
27N
24N
21N
18N
120W
115W
110W
105W
100W
95W
90W
85W
80W
75W
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GrADS: COLA/IGES
270
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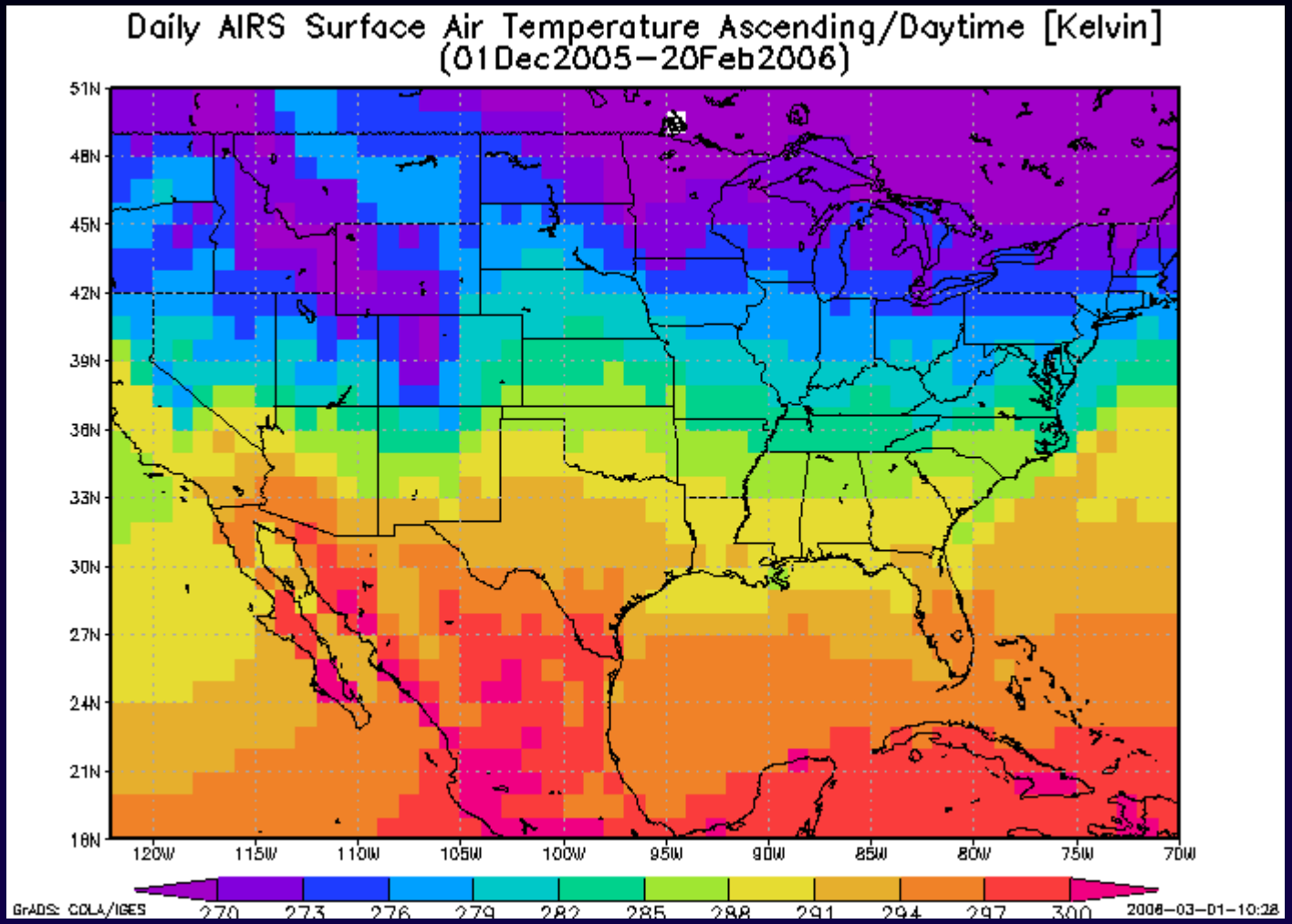
297
300
2006–03–01–10:28


Daily AIRS Surface Air Temperature Ascending/Daytime [Kelvin]
(01Dec2005-20Feb2006)
51N
48N
45N
42N
39N
36N
33N
30N
27N
24N
21N
18N
120W
115W
110W
105W
100W
95W
90W
85W
80W
75W
70W
GrADS: COLA/IGES
270
273
276
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282
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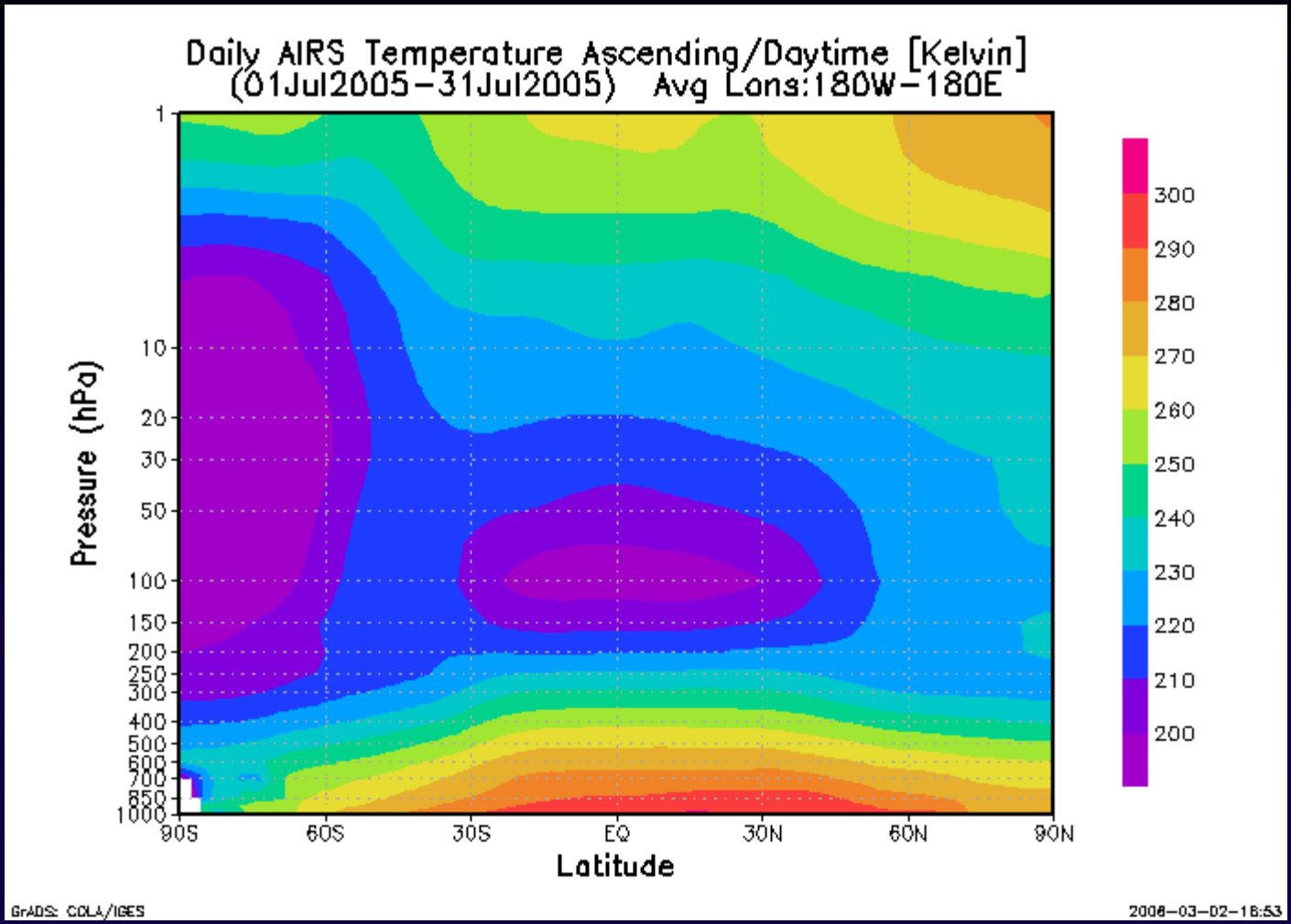
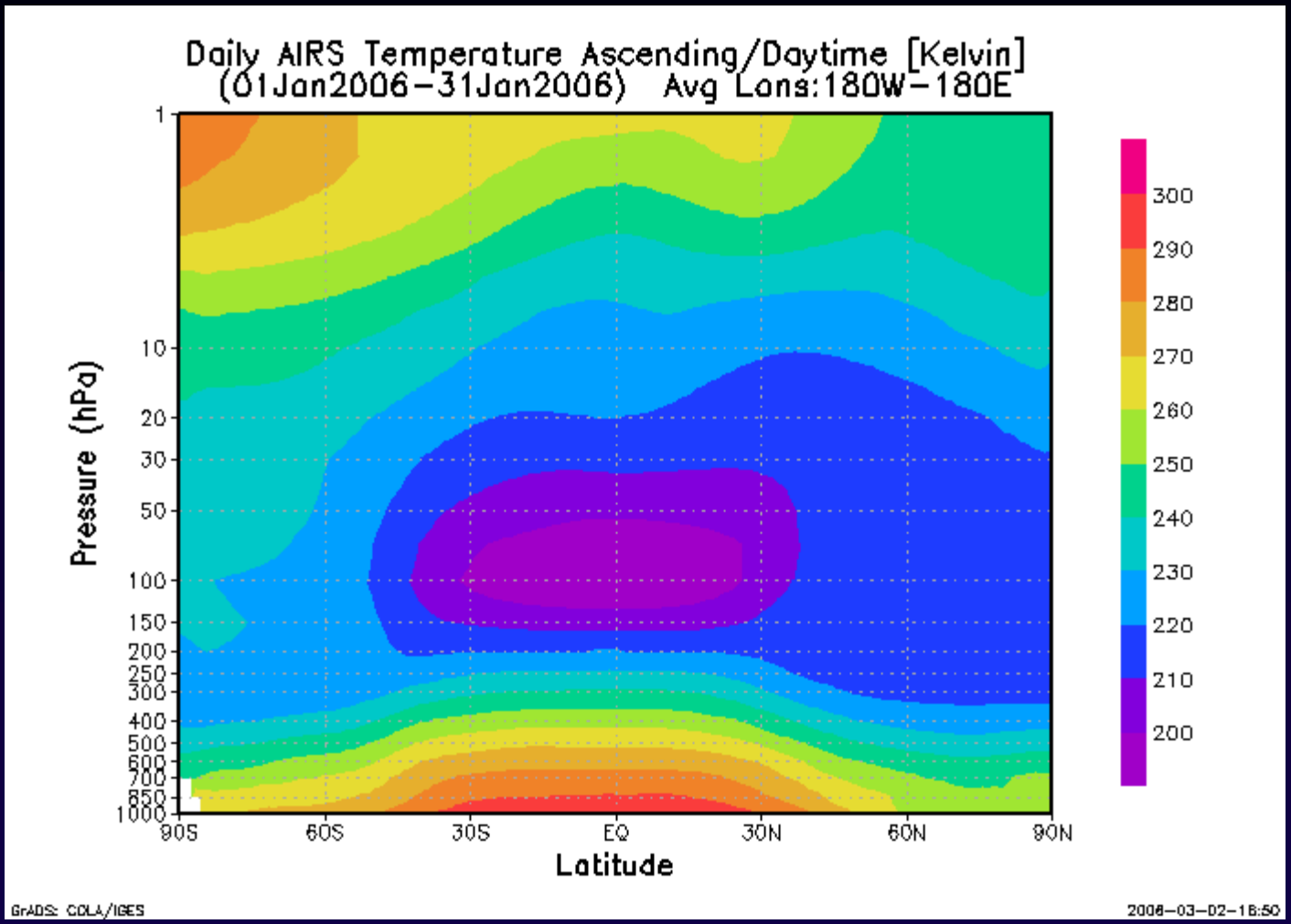
294
297
300
2006-03-01-10:28

# *Zonal Mean of Temperature Cross-sections*

- Throughout a year, tropospheric temperature is horizontally uniform within the tropics, with poleward temperature decrease concentrated in the mid latitudes. The inverse temperature gradients are characteristic of the stratosphere. A temperature minimum reflects the tropical tropopause near 100 mb.




During the boreal summer (JJA), the zone of highest lower-troposphere temperature is located well north of the Equator and meridional temperature gradient in the NH is relatively slack

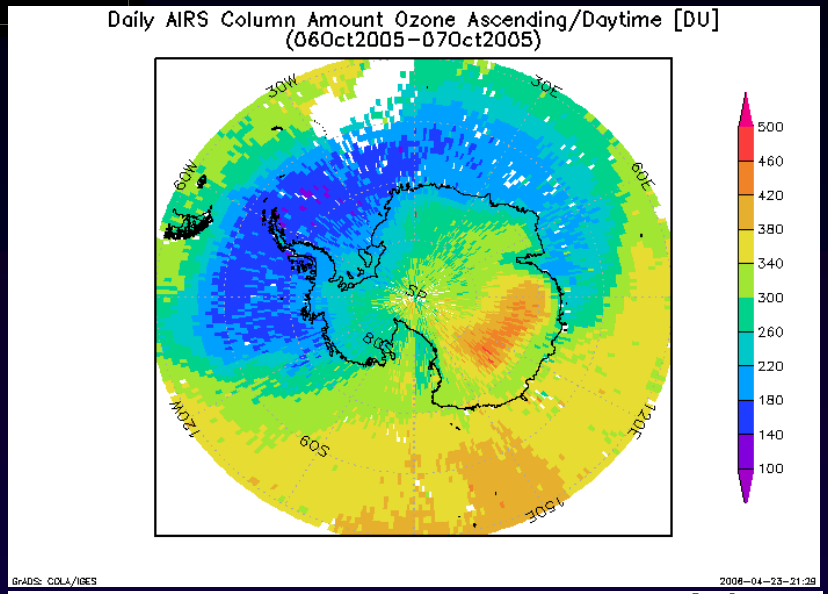


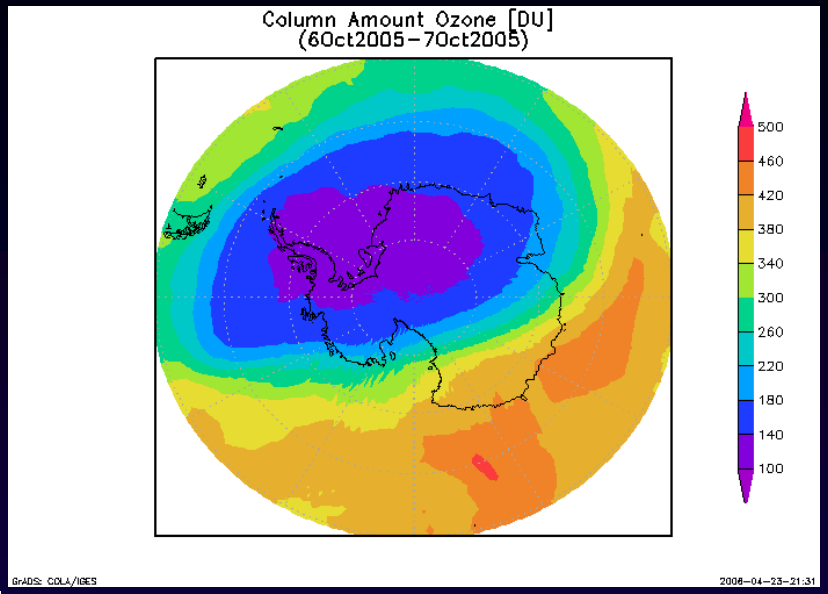

During austral summer (DJF), the maximum of the lower-troposphere temperature is around the Equator, and the meridional temperature gradient in the NH mid latitudes is very steep, while the SH extratropical cap shows meridional contrasts moderately weaker than in the austral winter

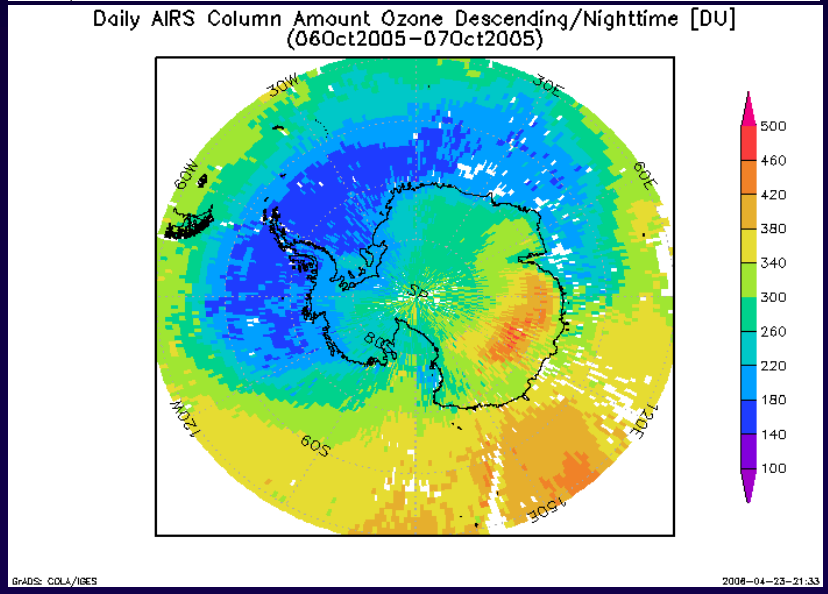
# *Ozone Hole*

Examples of Ozone and other gases measurements by OMI, MLS, and AIRS for October 6 – 13, 2005:

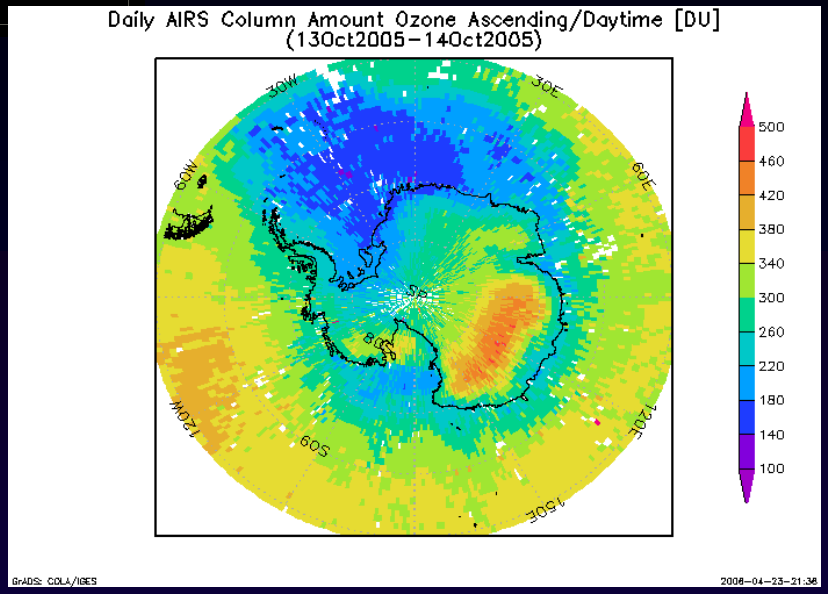
- Area maps of ozone
- Profiles at 65 South, 66 West (Antarctic Peninsula). This point is below ozone minimum on October, and 7 days later Oct 13 the point is outside the ozone hole.

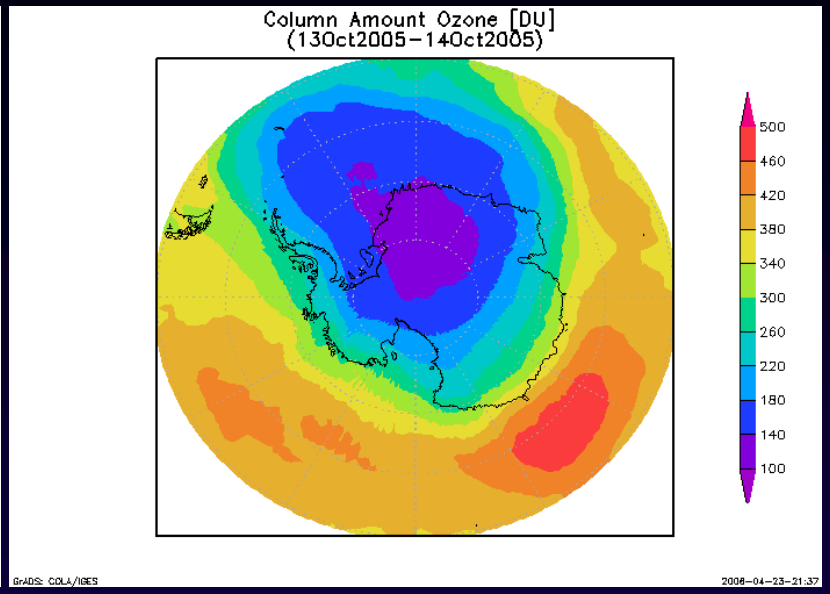


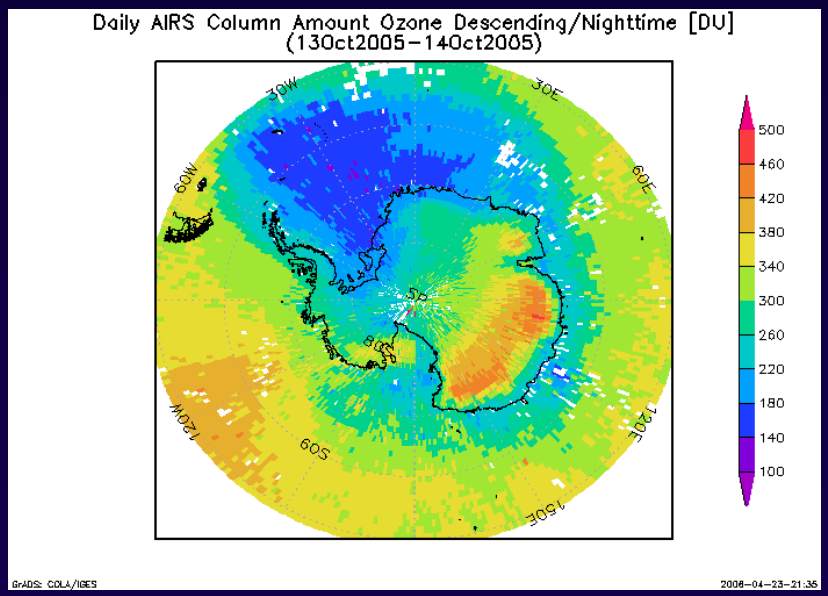




October 6, 2005

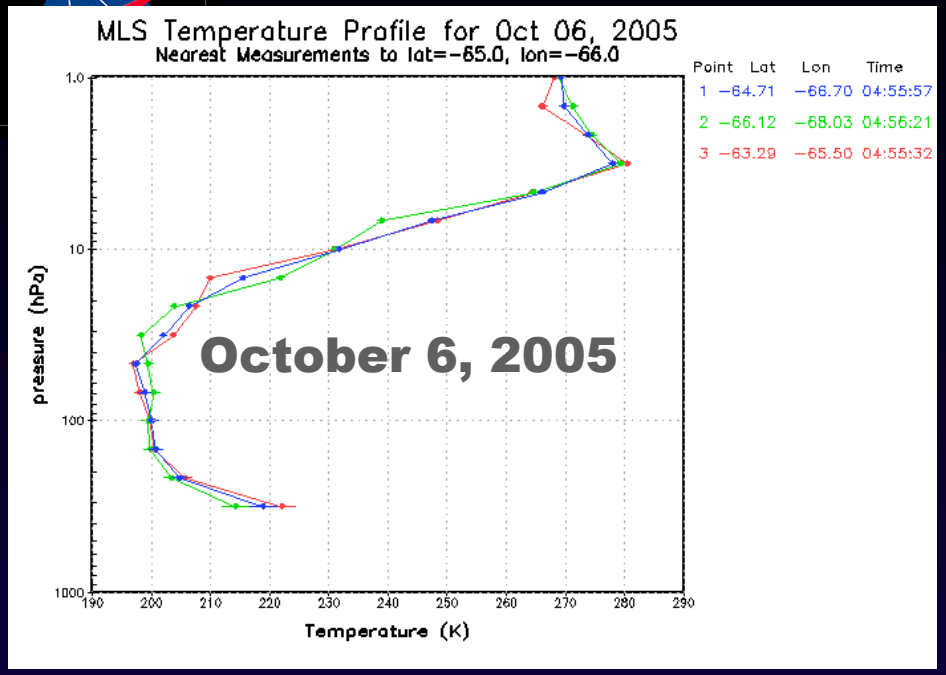


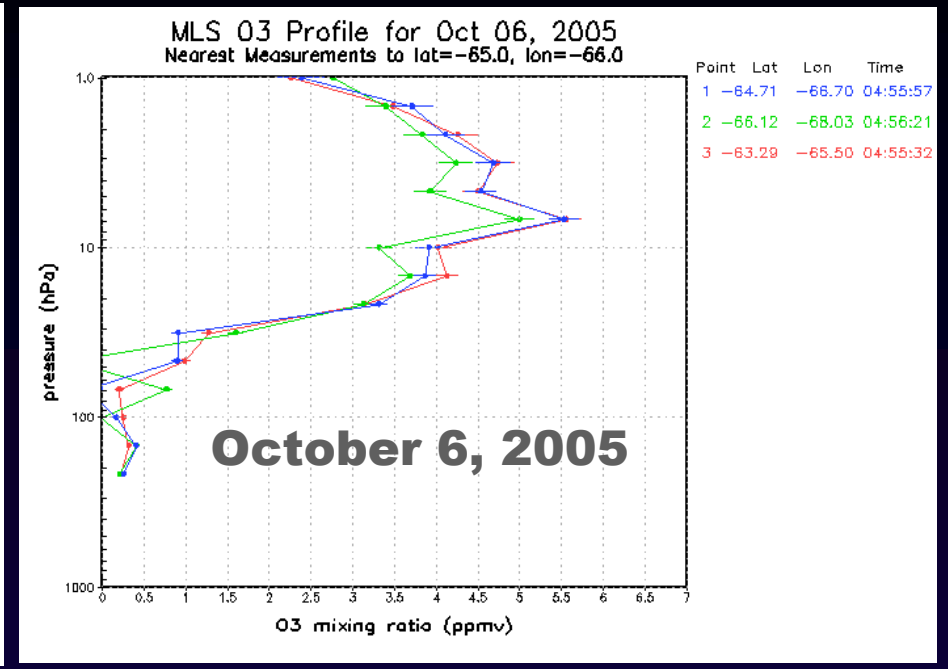



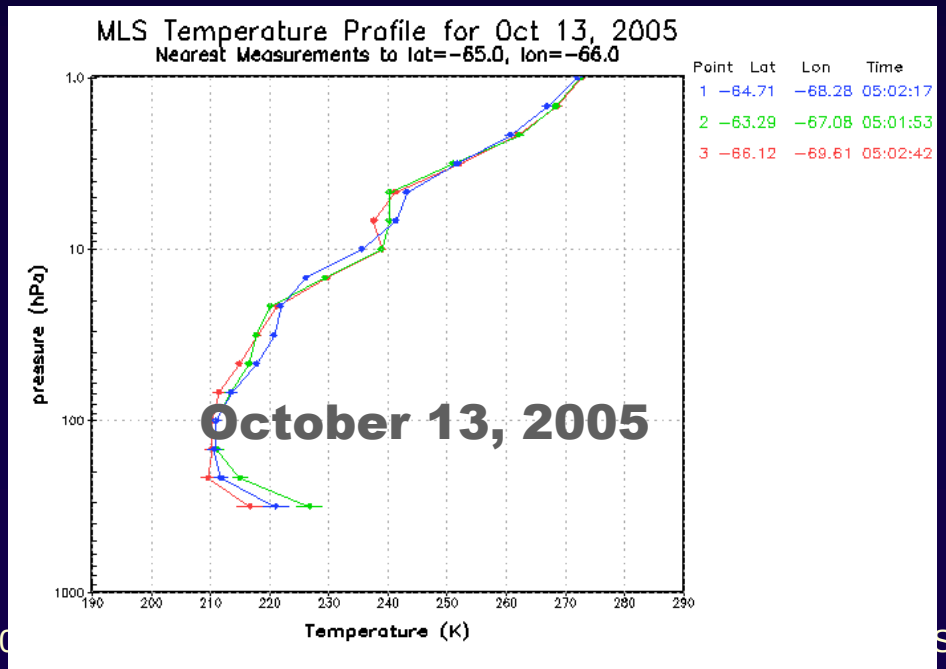



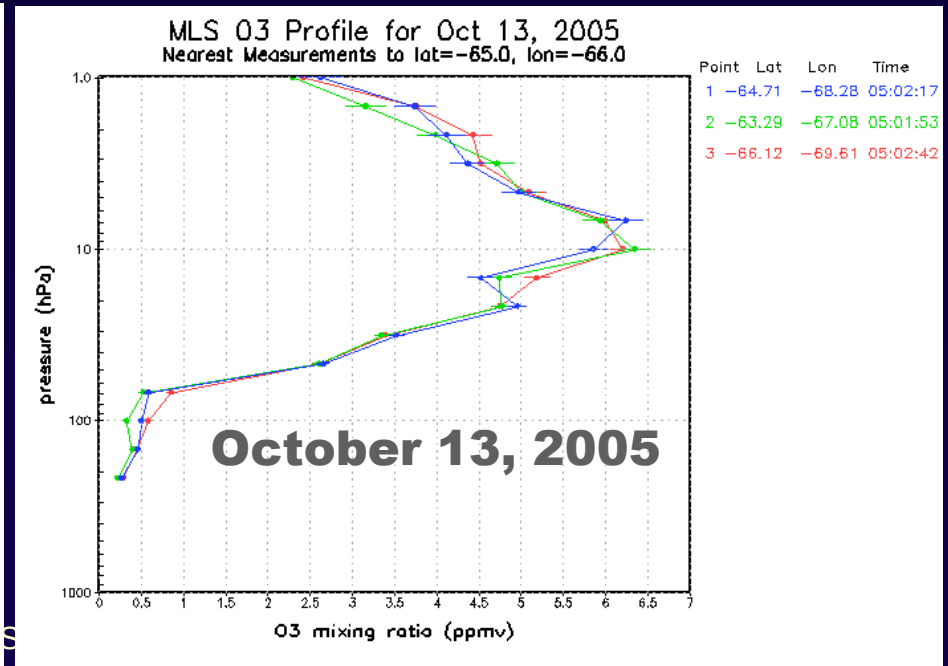

October 13, 2005

# Temperature MLS Ozone

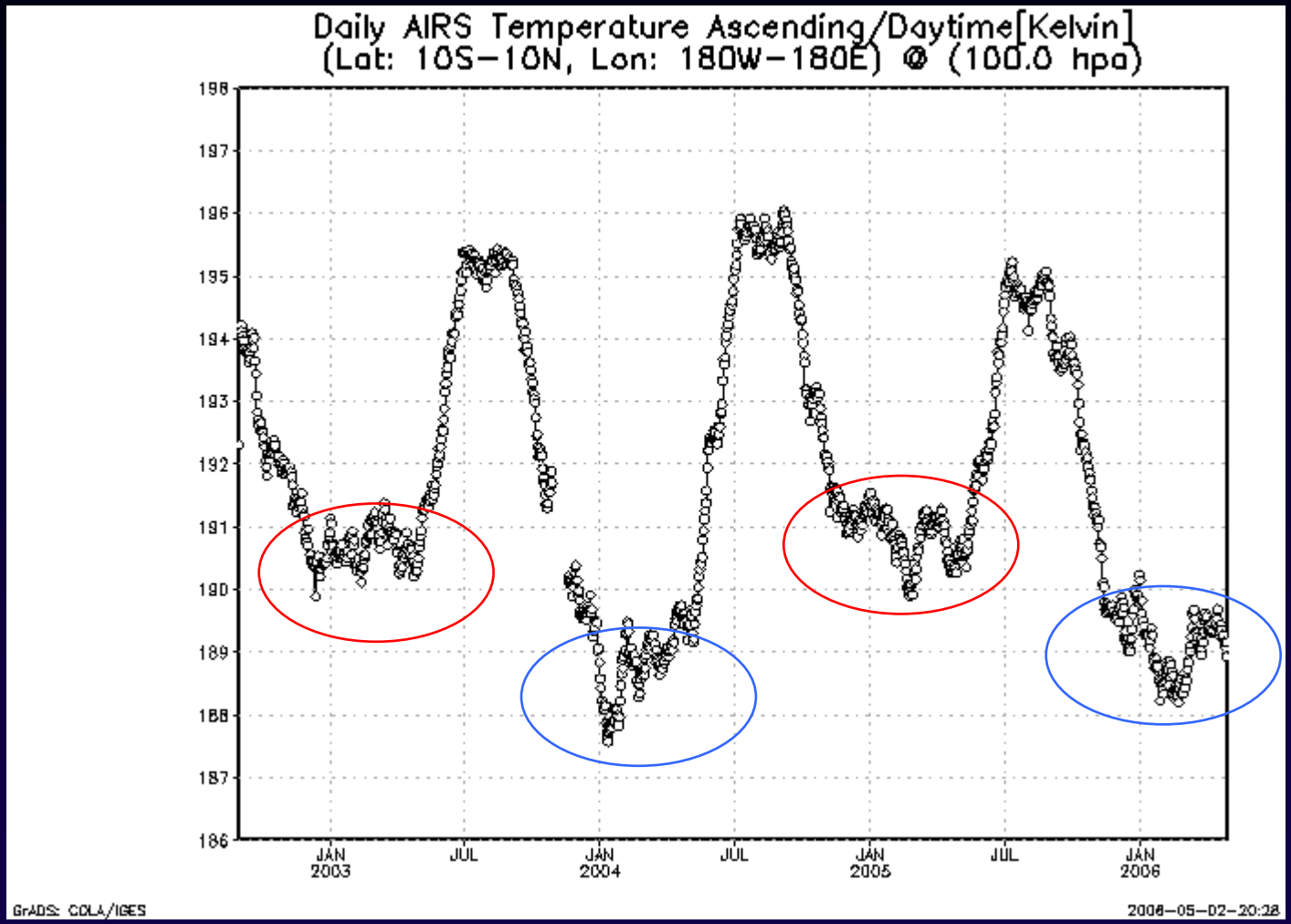


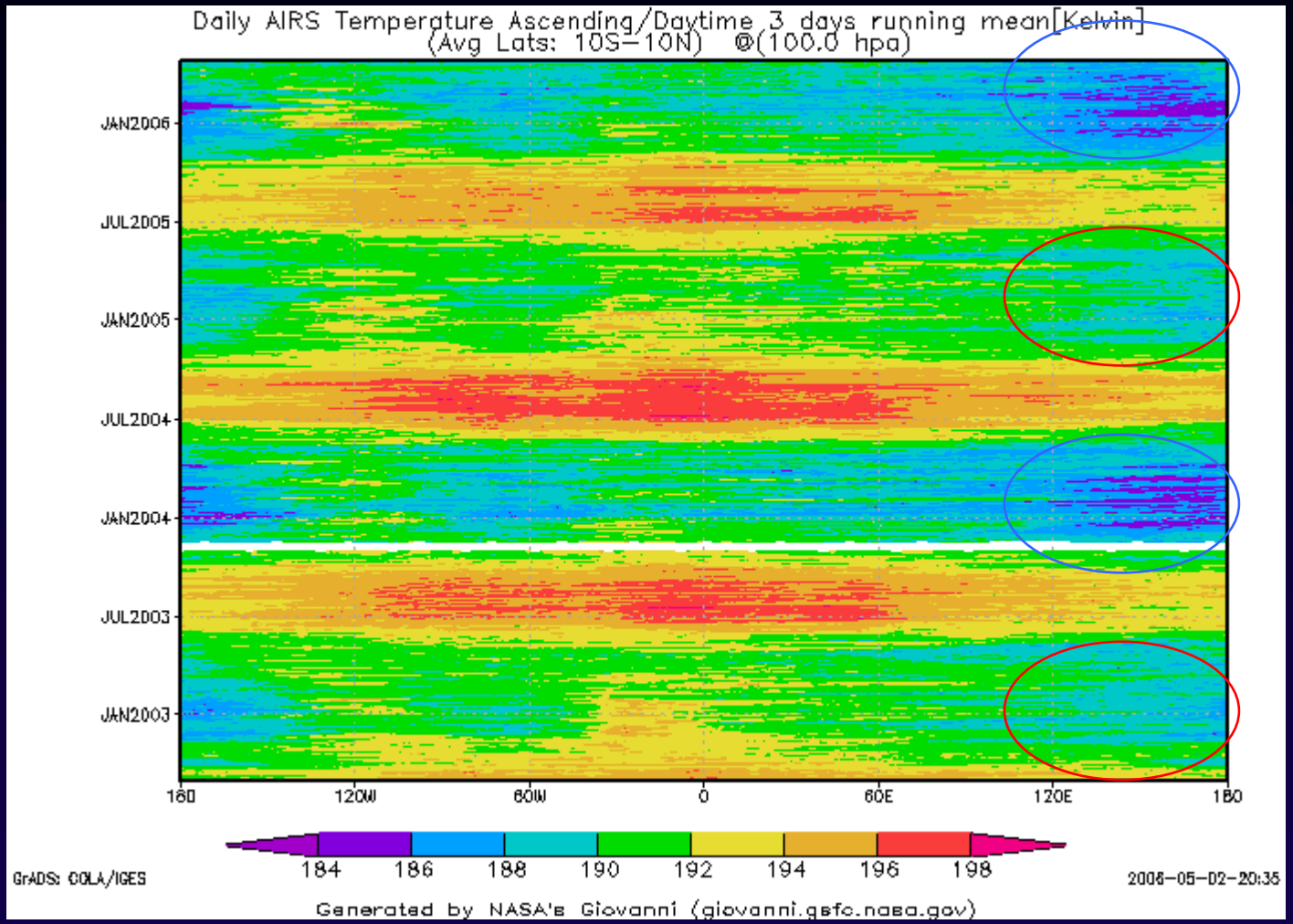



# *Quasi Biennial Oscillation (QBO)*


Daily AIRS Temperature Ascending/Daytime[Kelvin]
(Lat: 10S-10N, Lon: 180W-180E) @ (100.0 hpa)
198
197
196
195
194
193
192
191
190
189
188
187
186
JAN 2003
JUL
JAN 2004
JUL
JAN 2005
JUL
JAN 2006
GrADS: COLA/IGES
2006-05-02-20:28


Daily AIRS Temperature Ascending/Daytime 3 days running mean[Kelvin]
(Avg Lats: 10S-10N) @(100.0 hpa)
JAN2006
JUL2005
JAN2005
JUL2004
JAN2004
JUL2003
JAN2003
180
120W
60W
0
60E
120E
180
184
186
188
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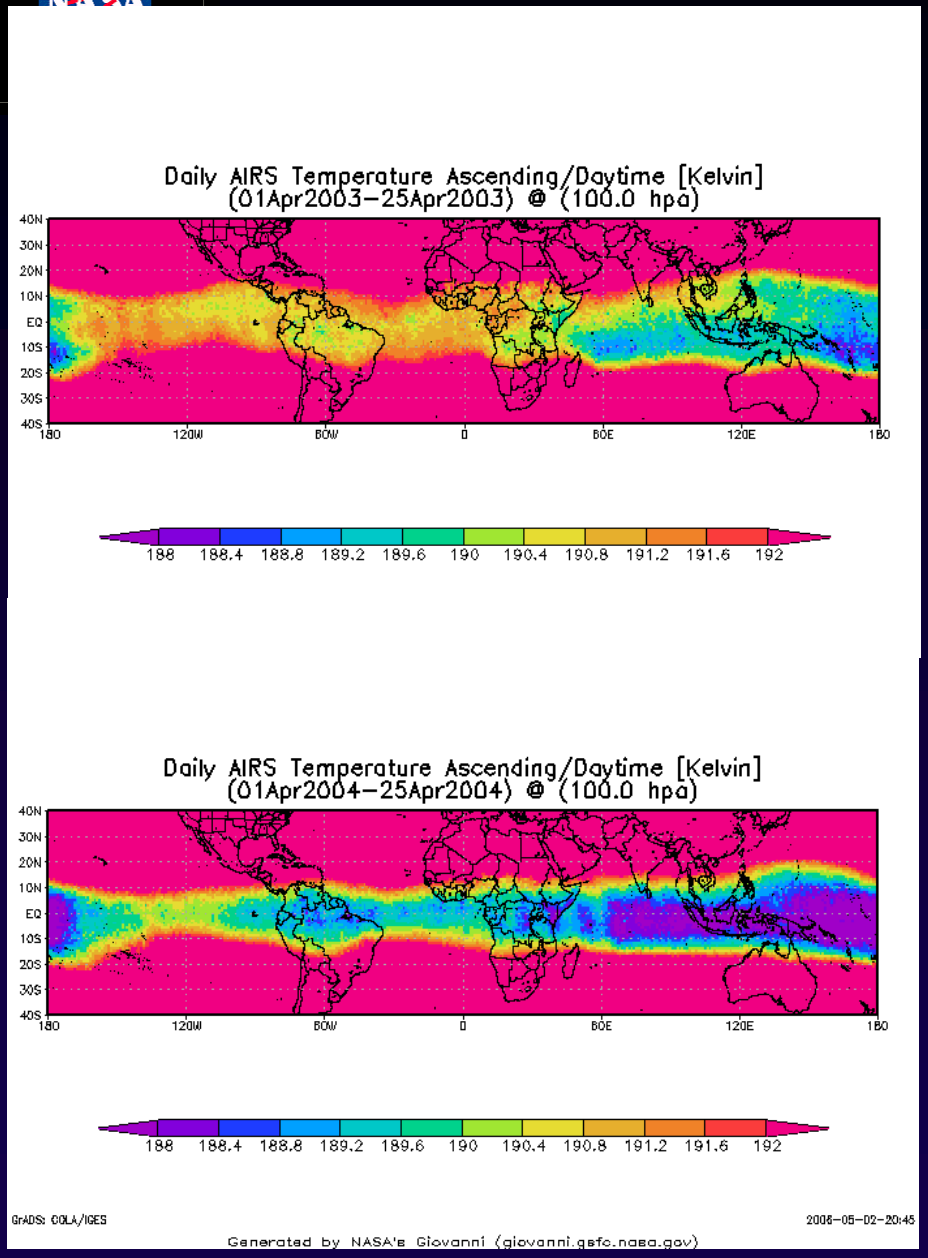
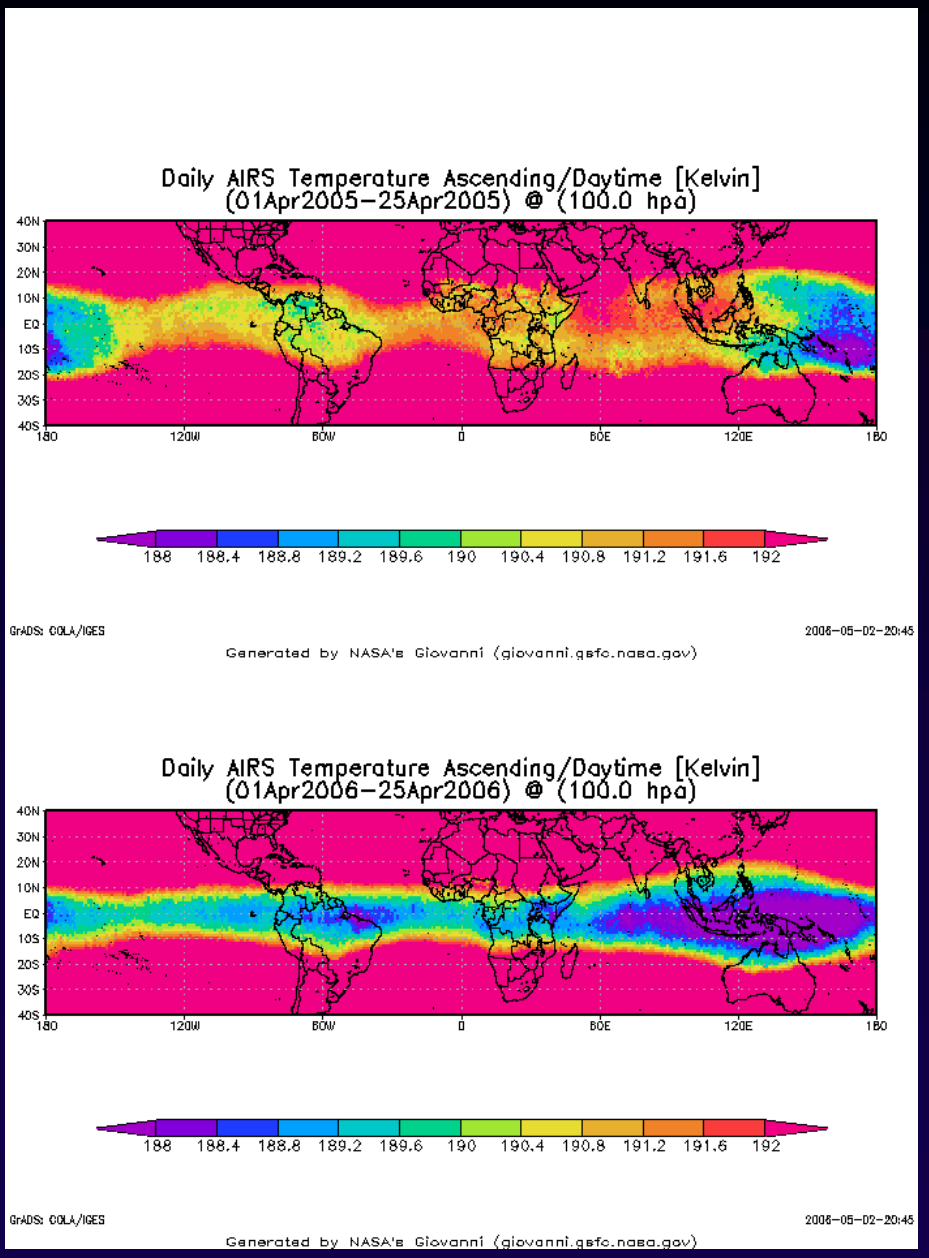
198
GrADS: COLA/IGES
2006-05-02-20:35
Generated by NASA's Giovanni (giovanni.gsfc.nasa.gov)


Daily AIRS Temperature Ascending/Daytime [Kelvin]
(01Apr2003-25Apr2003) @ (100.0 hpa)
40N
30N
20N
10N
EQ
10S
20S
30S
40S
180
120W
60W
0
60E
120E
180
188
188.4
188.8
189.2
189.6
190
190.4
190.8
191.2
191.6
192
GrADS: COLA/IGES
2006-05-02-20:45
Generated by NASA's Giovanni (giovanni.gsfc.nasa.gov)

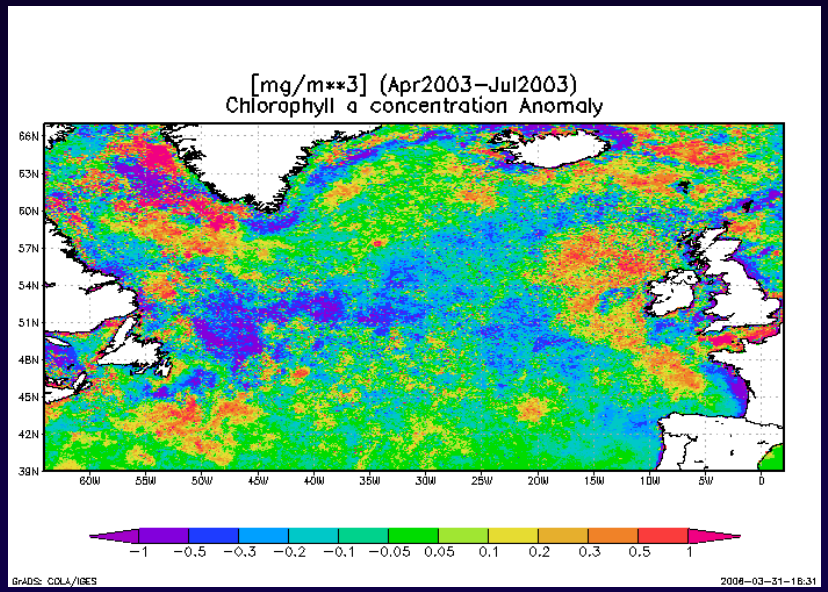

Daily AIRS Temperature Ascending/Daytime [Kelvin]
(01Apr2005-25Apr2005) @ (100.0 hpa)
40N
30N
20N
10N
EQ
10S
20S
30S
40S
180
120W
60W
0
60E
120E
180
188
188.4
188.8
189.2
189.6
190
190.4
190.8
191.2
191.6
192
GrADS: COLA/IGES
2006-05-02-20:45
Generated by NASA's Giovanni (giovanni.gsfc.nasa.gov)


Daily AIRS Temperature Ascending/Daytime [Kelvin]
(01Apr2004-25Apr2004) @ (100.0 hpa)
40N
30N
20N
10N
EQ
10S
20S
30S
40S
180
120W
60W
0
60E
120E
180
188
188.4
188.8
189.2
189.6
190
190.4
190.8
191.2
191.6
192
GrADS: COLA/IGES
2006-05-02-20:45
Generated by NASA's Giovanni (giovanni.gsfc.nasa.gov)

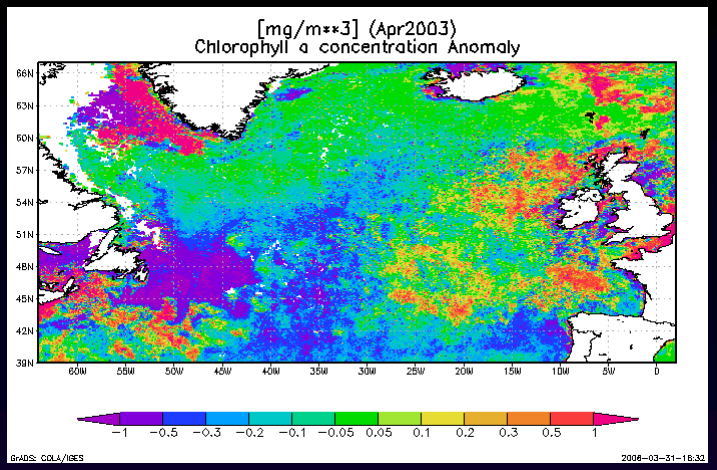

Daily AIRS Temperature Ascending/Daytime [Kelvin]
(01Apr2006-25Apr2006) @ (100.0 hpa)
40N
30N
20N
10N
EQ
10S
20S
30S
40S
180
120W
60W
0
60E
120E
180
188
188.4
188.8
189.2
189.6
190
190.4
190.8
191.2
191.6
192
GrADS: COLA/IGES
2006-05-02-20:45
Generated by NASA's Giovanni (giovanni.gsfc.nasa.gov)

# Chlorophyll climatological anomaly plots for the North Atlantic Bloom in spring 2003

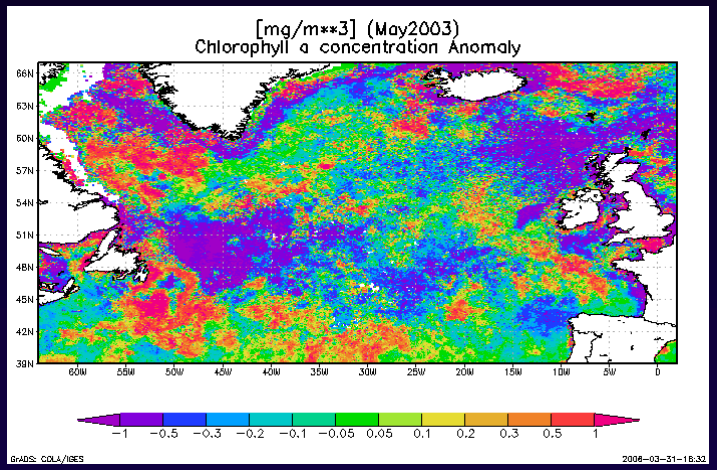
April – July 2003



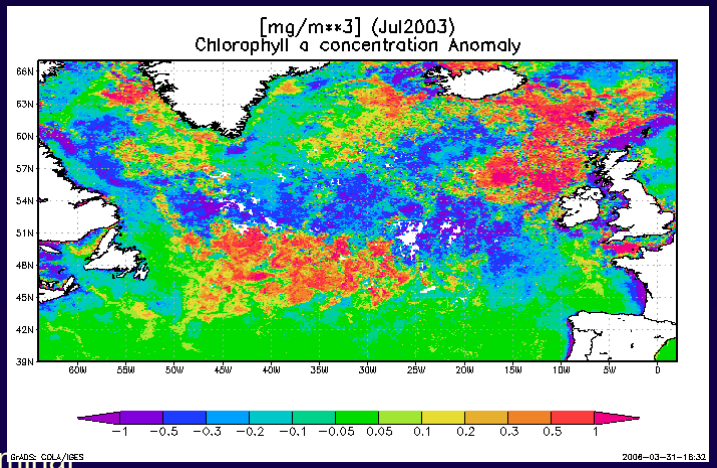

April 2003




May 2003

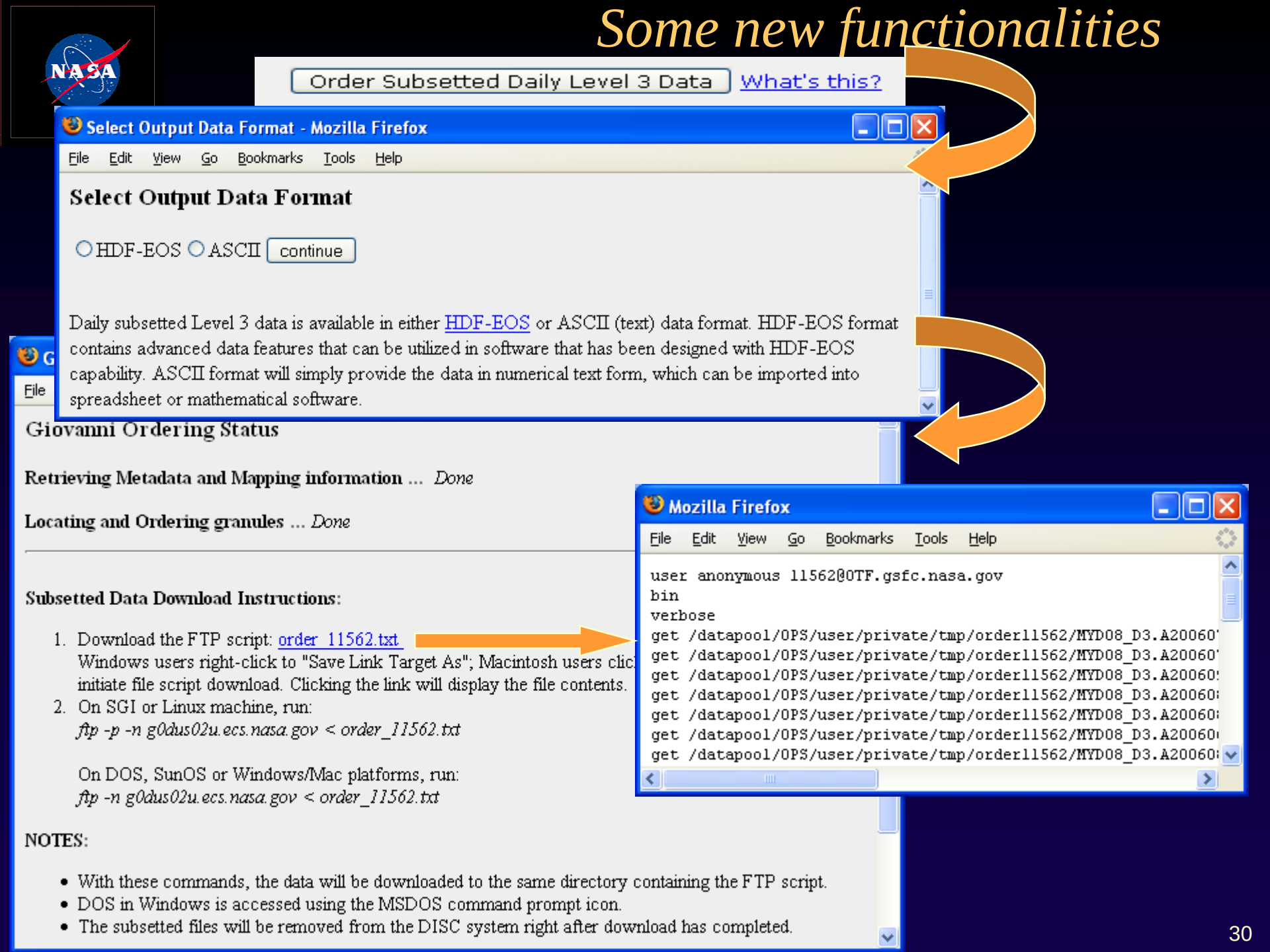



July 2003




*Anomaly plots also implemented in TRMM instance*

# Some new functionalities



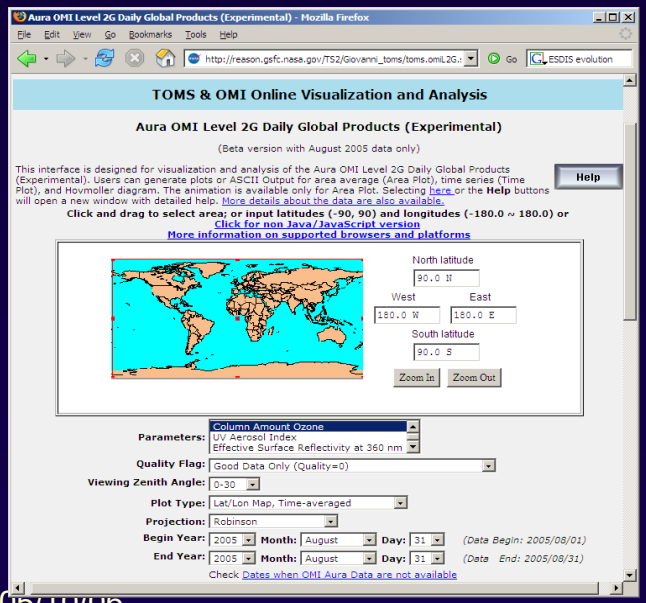
# *Between Level 2 and 3*

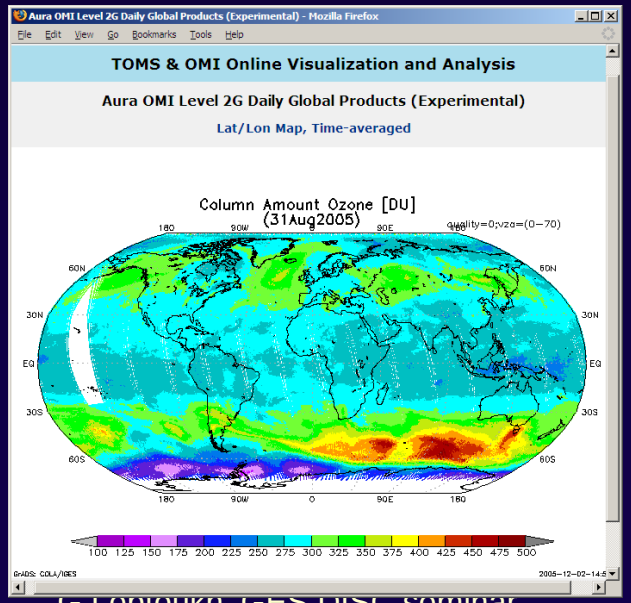
- OMI L2G is an example of saving most of the L2 information to allow users generate gridded maps (”on-the-fly” Level 3) based on user-specific mapping, filtering and averaging methods
- To compare Level 3 from various instruments in Giovanni, L2G-like products are vital
- For AIRS, to compare with MODIS and other instruments, L2G-lie product is needed

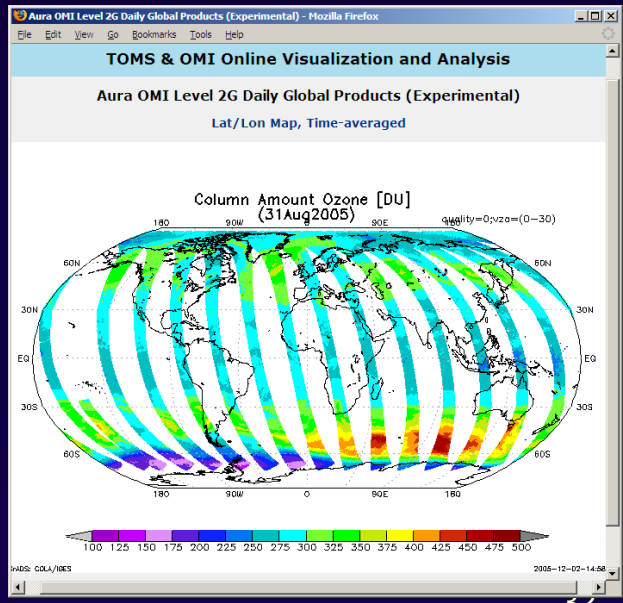
# Visualization, subsetting, and online analysis of OMI L2G

Giovanni is able to create virtual OMI gridded global/regional products on-line from L2G data with filtering/selection options:

- In addition to selecting parameters, area, and time period, users will be able to filter results based on the algorithm quality flags, viewing and solar zenith angles ranges, surface reflectivity ranges, aerosol index values, etc.
- Users will also have the option to obtain for a grid value with either the best pixel or a simple average of the data points, or the area weighted average
- The ASCII output for a selected region will contain grid average values as well as the original values (including lat and long, viewing and solar zenith angles or path length, surface reflectivity or aerosol index) of the pixels that are used in averaging over a grid cell



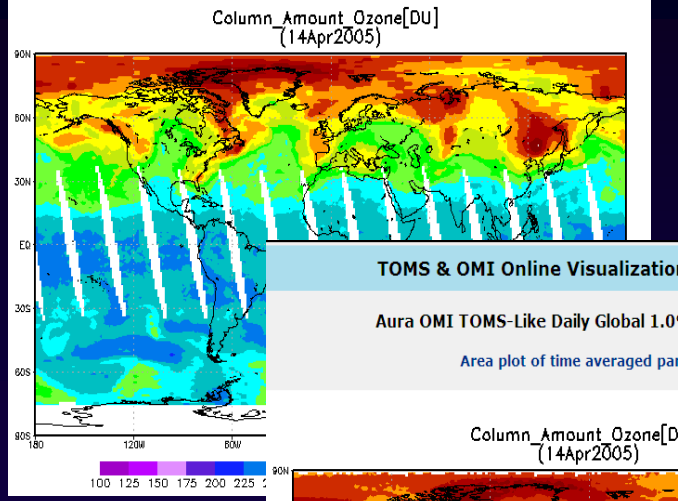

# *Multi-sensor intercomparison*

# Multi-sensor ozone measurements

**TOMS & OMI Online Visualization and Analysis**

Earth Probe TOMS Daily Global 1.0°x1.25° Products

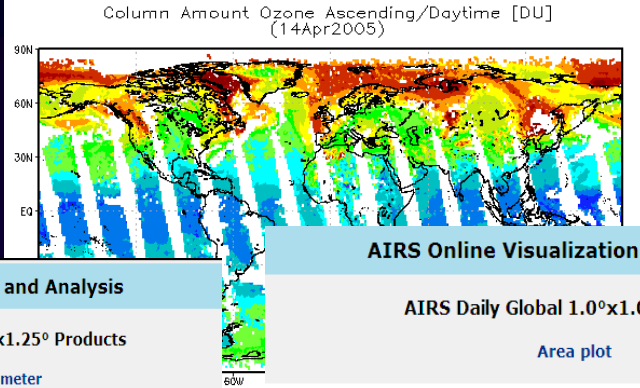
Area plot of time averaged parameter




**AIRS Online Visualization and Analysis**

AIRS Daily Global 1.0°x1.0° Products

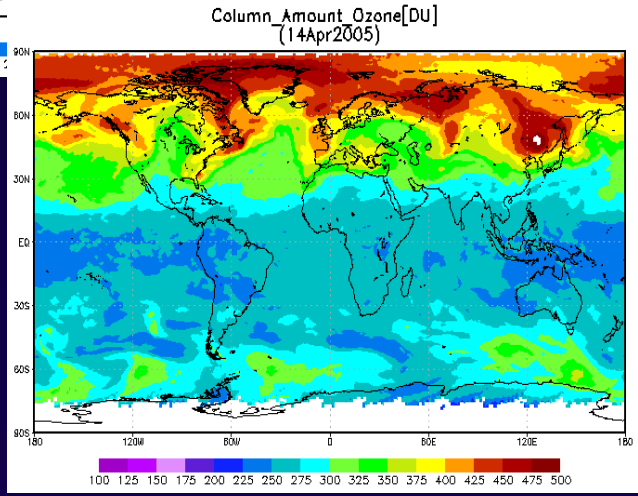
Area plot




**TOMS & OMI Online Visualization and Analysis**

Aura OMI TOMS-Like Daily Global 1.0°x1.25° Products

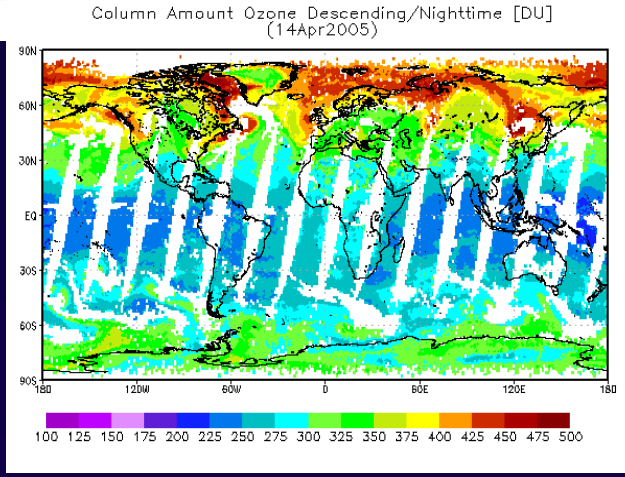
Area plot of time averaged parameter



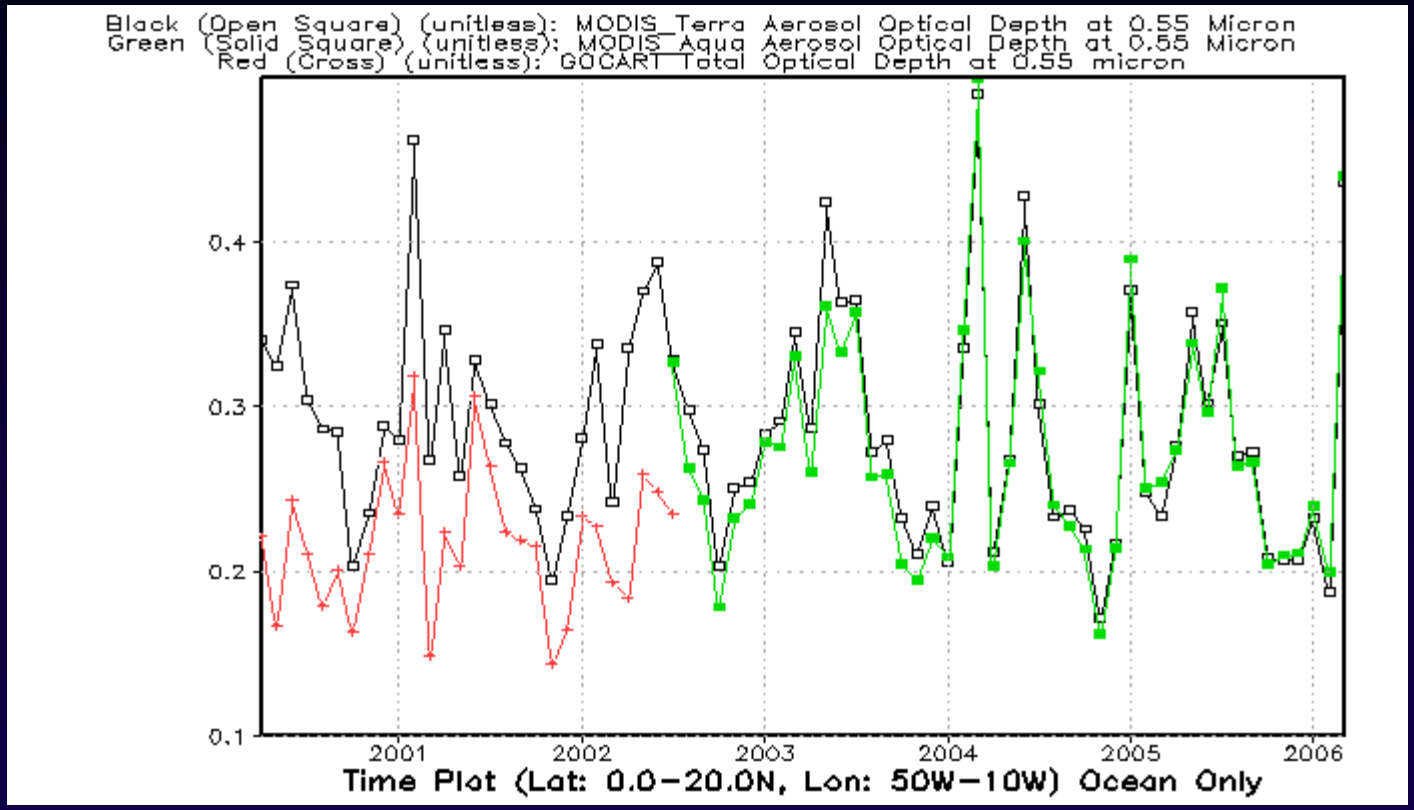

**AIRS Online Visualization and Analysis**

AIRS Daily Global 1.0°x1.0° Products

Area plot



# *Multi-parameter intercomparison*



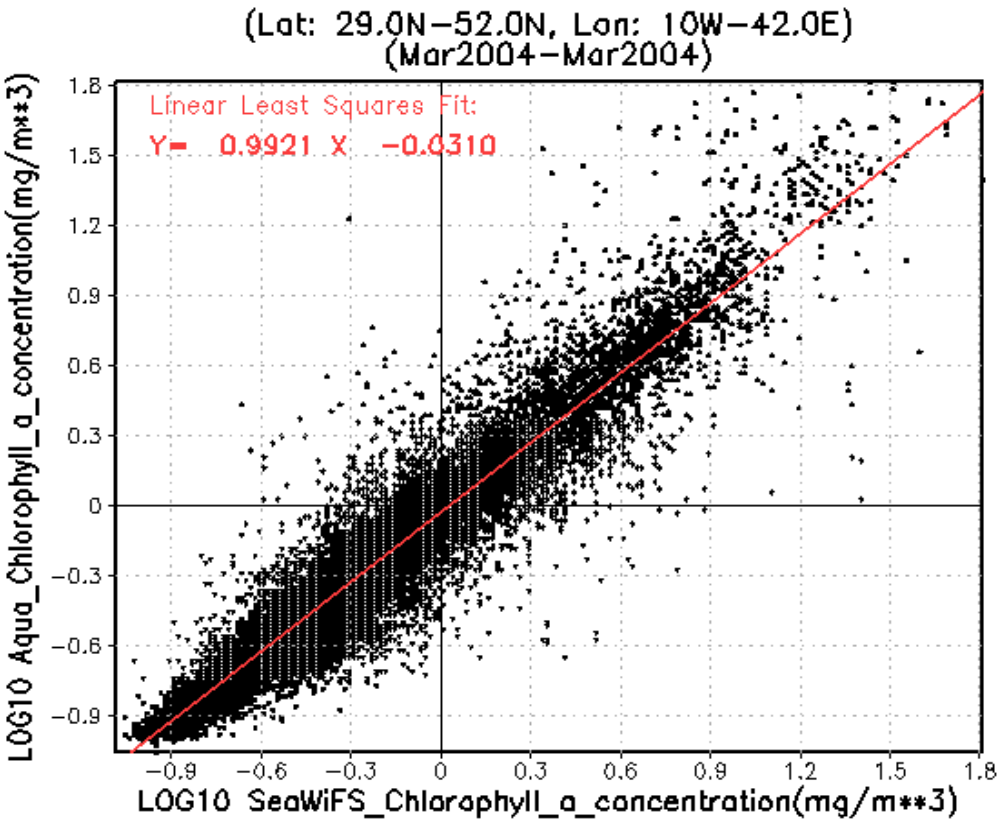

Time-series of AOD from MODIS Terra, MODIS Aqua and GOCART

OBPG SeaWiFS/Modis_Aqua Monthly Global 9-km Products - Mozilla ...

File Edit View Go Bookmarks Tools Help

# OBPG SeaWiFS/Modis_Aqua Monthly Global 9-km Products

## Scatter plot of parameters in selected area and time period




GrADS: COLA/IGES 2005–08–31–12:32

Author: GES DISC DAAC -- help@daac.gsfc.nasa.gov

*Last Updated: August 31, 2005 12:32:30 EDT*

# *Statistics*

# *Giovanni Averaging Function 1*

**Interval- Weighted Averaging (GrADS Function Name: *ave*)**

This averaging is weighted by grid interval to account for the uneven grid spacing. Missing data values do not participate - the average is taken with fewer data points. The average in the latitude dimension is weighted by the difference between the sines of the latitude at the northern and southern edges of the grid box. The edges of the grid box are always defined as being the mid point between adjacent grid points.

**For grid box "i":**

$$X_{ave} = \frac{\sum_{i=1}^{n} X_i w_i}{\sum_{i=1}^{n} w_i}$$

For Averaging in Time

$$w_i = (t_{i+1} - t_i)$$

For Averaging in Longitude

$$w_i = [Lon_i^{east} - Lon_i^{west}]$$

For Averaging in Latitude

$$w_i = [Sin(Lat_i^{north}) - Sin(Lat_i^{south})]$$

# *Giovanni Averaging Function 2*

**Area- Weighted Averaging (GrADS Function Name: *aave*)**

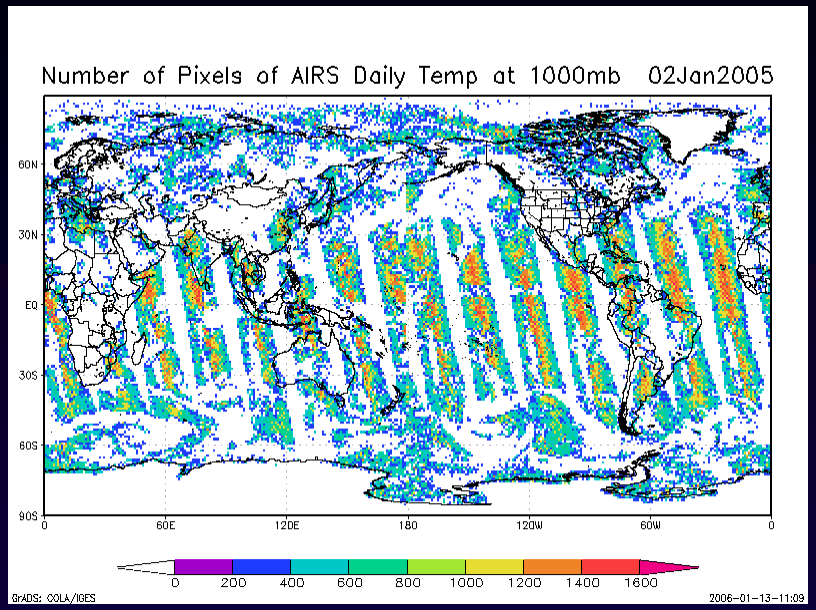
This function takes an areal average over a user-selected latitude-longitude region. This average does weighting in the latitude dimension by the difference between the sines of the latitude at the northern and southern edges of the grid box and weighting in the longitude dimension by the interval between the two adjacent grid points as well. Missing data values do not participate in this average.

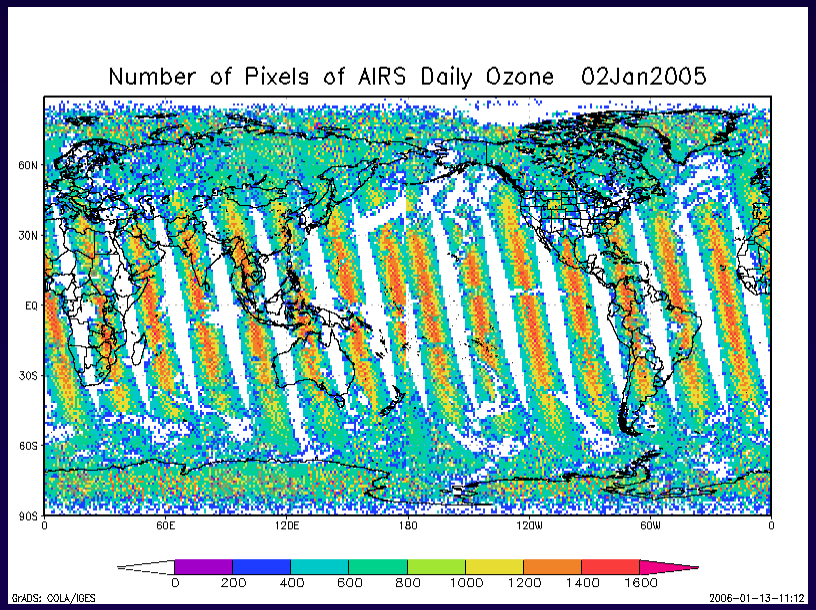
**For Grid Box "i":**

$$X_{area\_ave} = \frac{\sum_{i=1}^{n} X_i w_i}{\sum_{i=1}^{n} w_i}$$

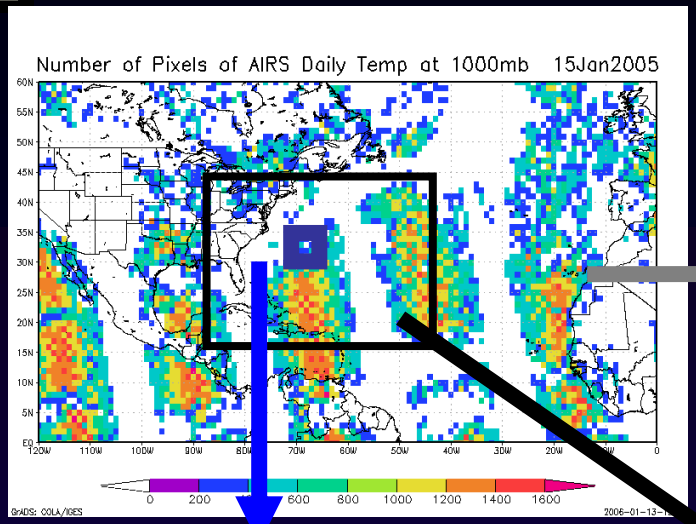
$$w_i = [Sin(Lat_i^{north}) - Sin(Lat_i^{south})] * [Lon_i^{east} - Lon_i^{west}]$$

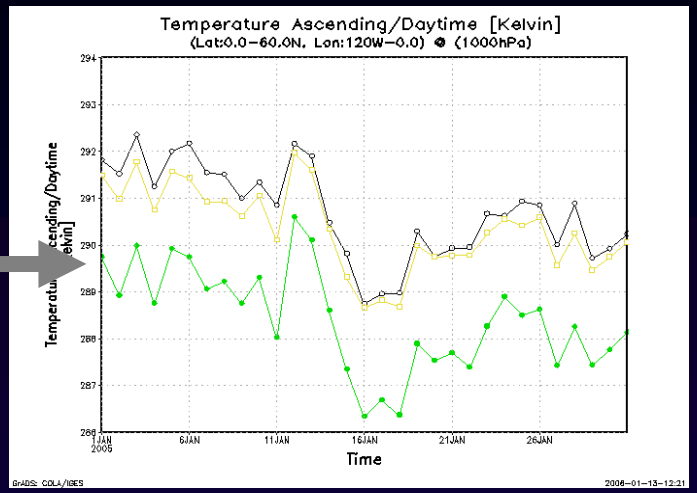
# Number of Pixels for AIRS

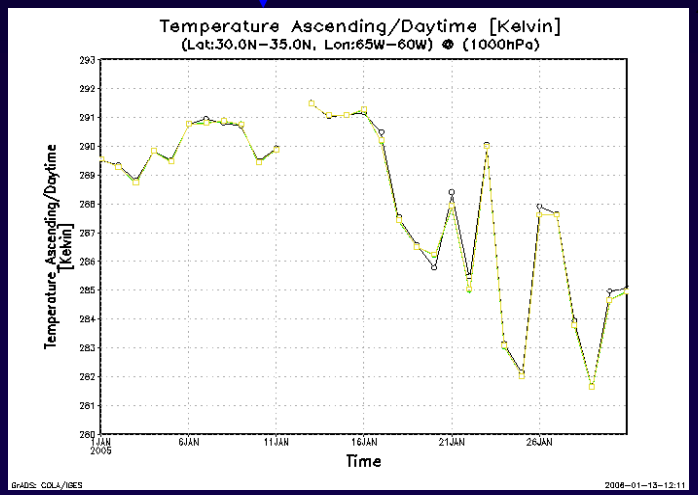


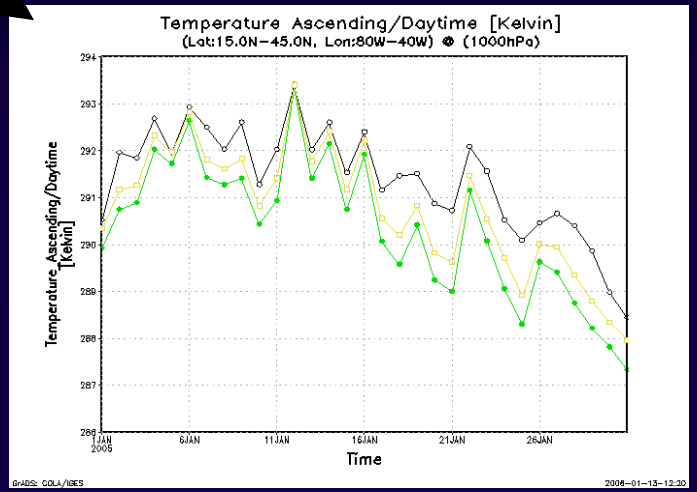



# AIRS Temperature time-series



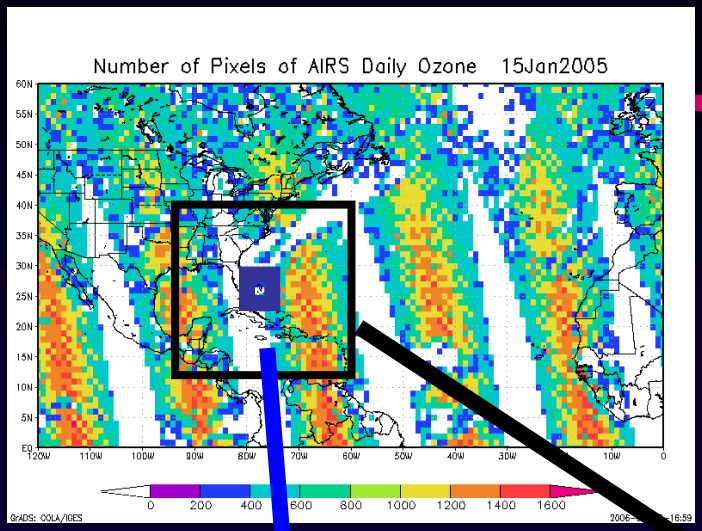



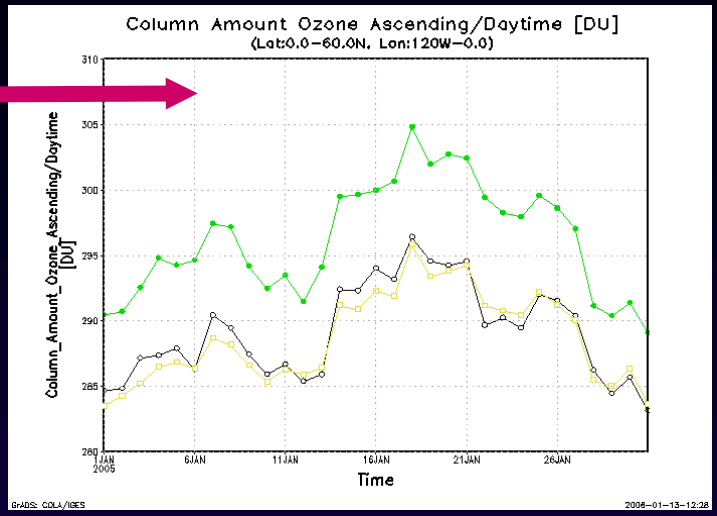



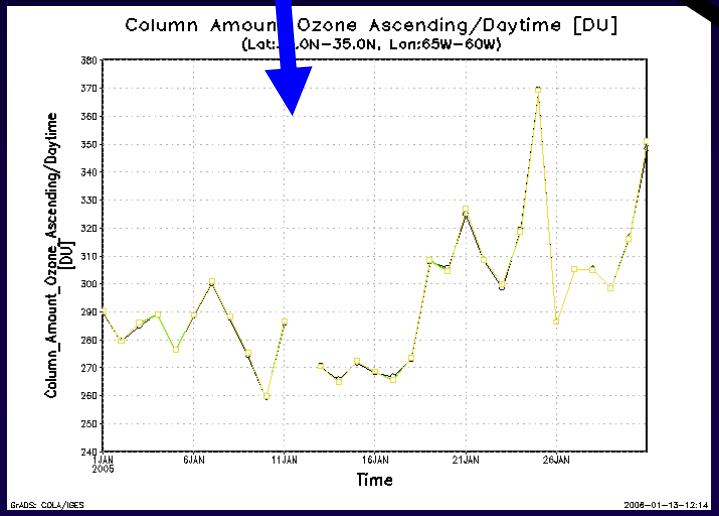



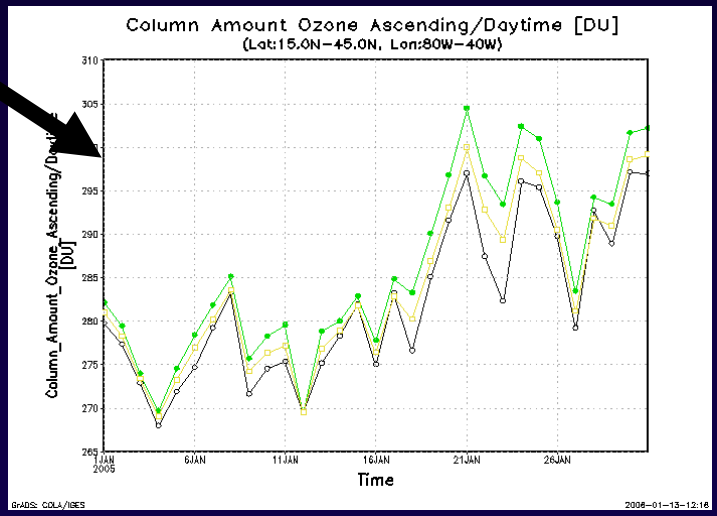

Green - no weighting, black - NP weighting, yellow area weighting

# AIRS Ozone time-series



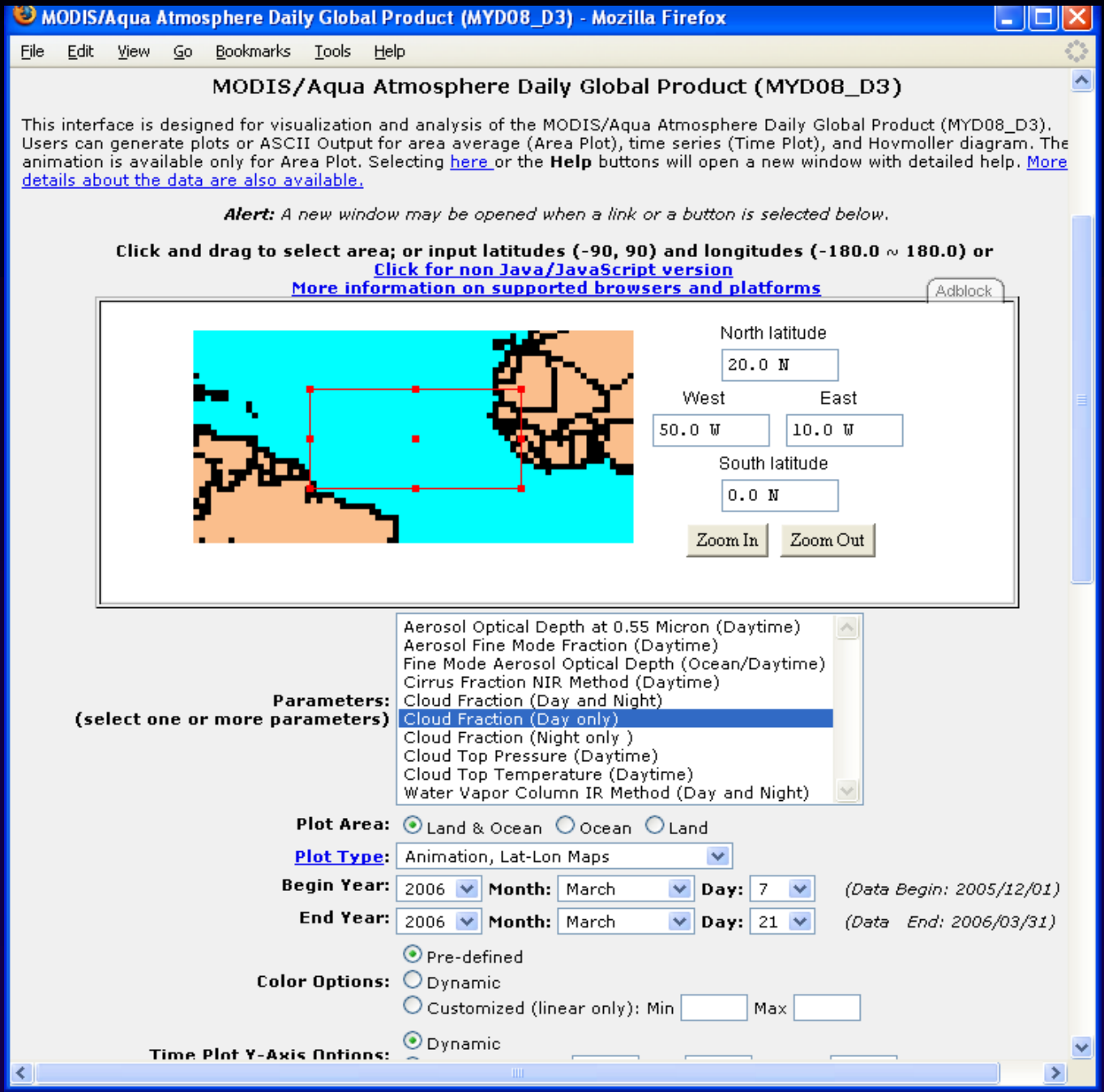




Green - no weighting, black - NP weighting, yellow area weighting

# Adding daily MODIS products to Giovanni (in testing)



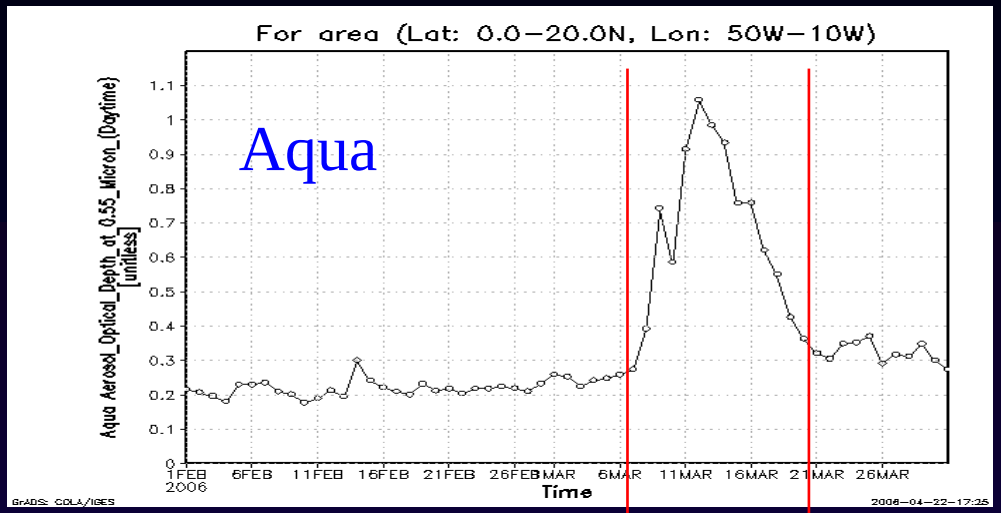
# *Saharan Dust transport*

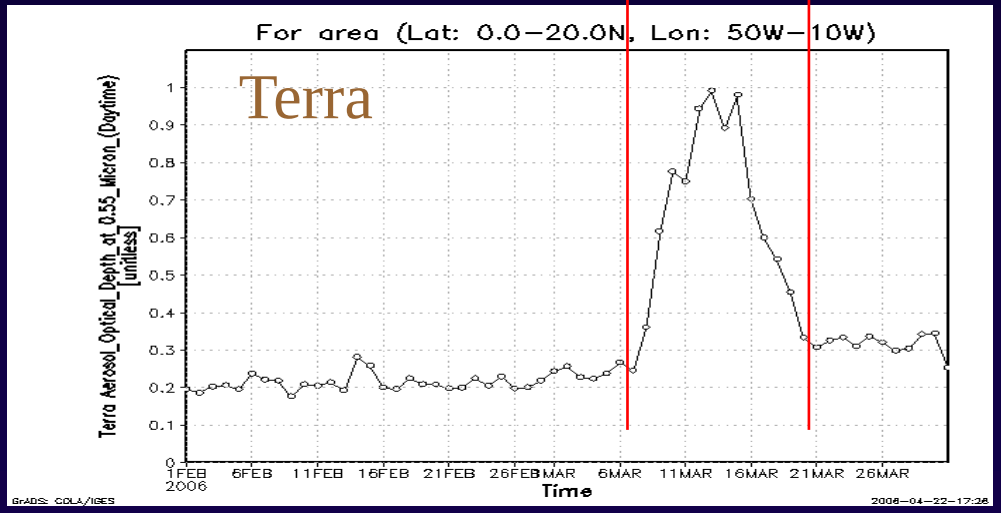
Examples of Aerosol Optical Depth, UV Aerosol Index, Precipitation for Saharan dust event March 7 – 19, 2006:

Measurements by OMI, MODIS, and TRMM

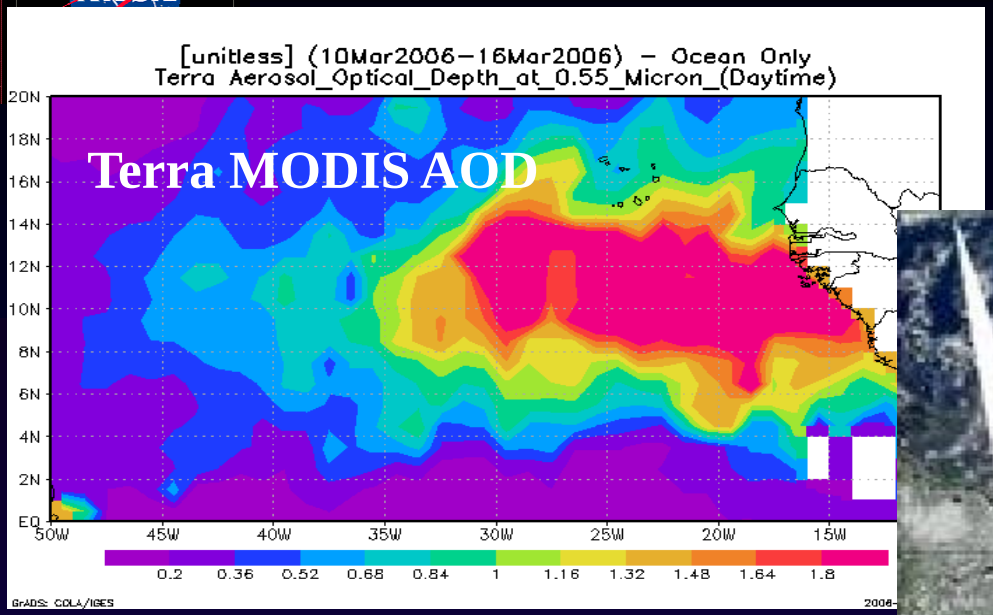
- Area maps of AOD, Cloud fraction, Cirrus fraction
- Lon-time and lat-time Hovmoller plots and
- Some true-color images for orientation

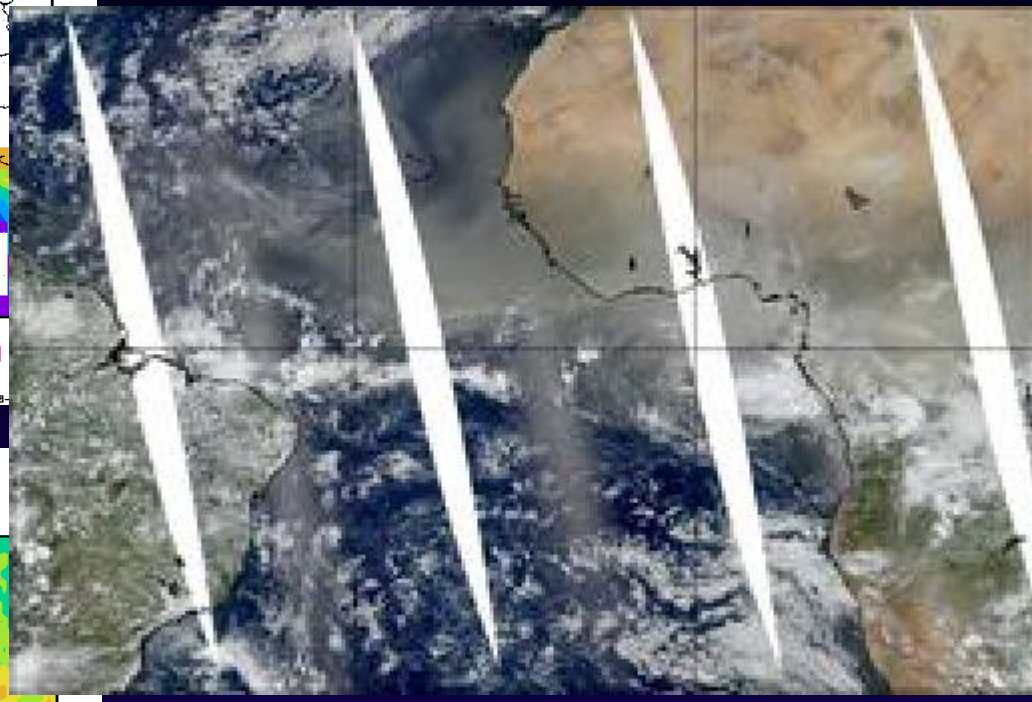
# MODIS AOD Time-series

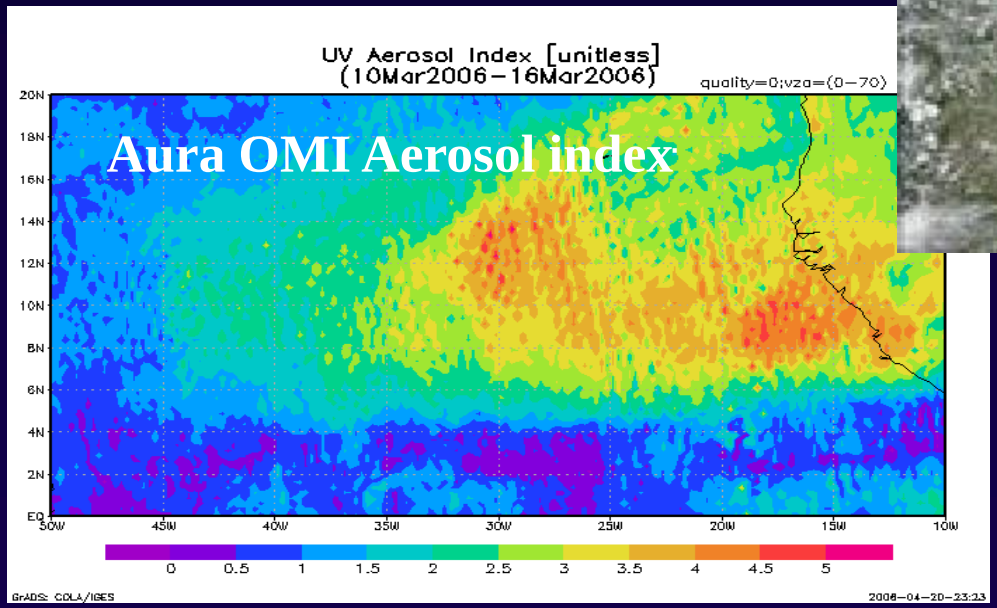


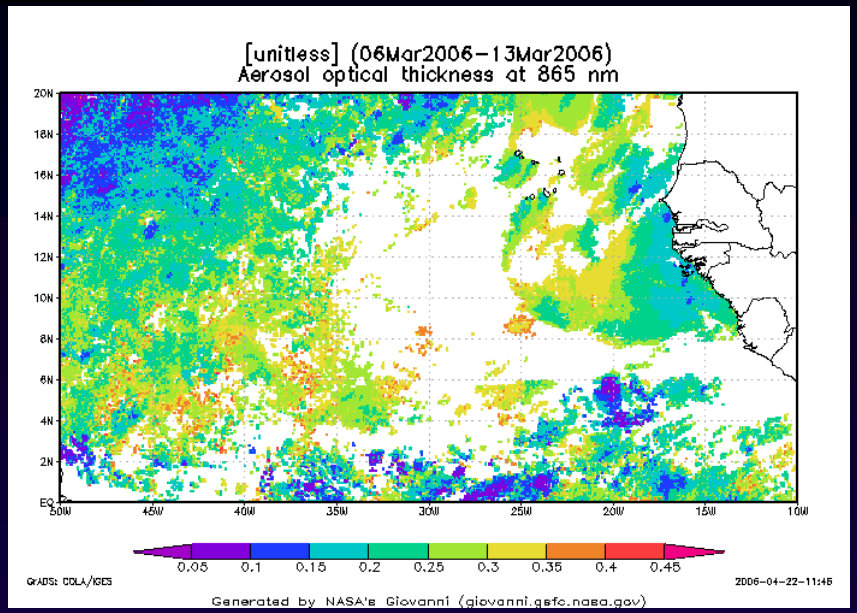
# Dust from Sahara, 10-16 March, 2006



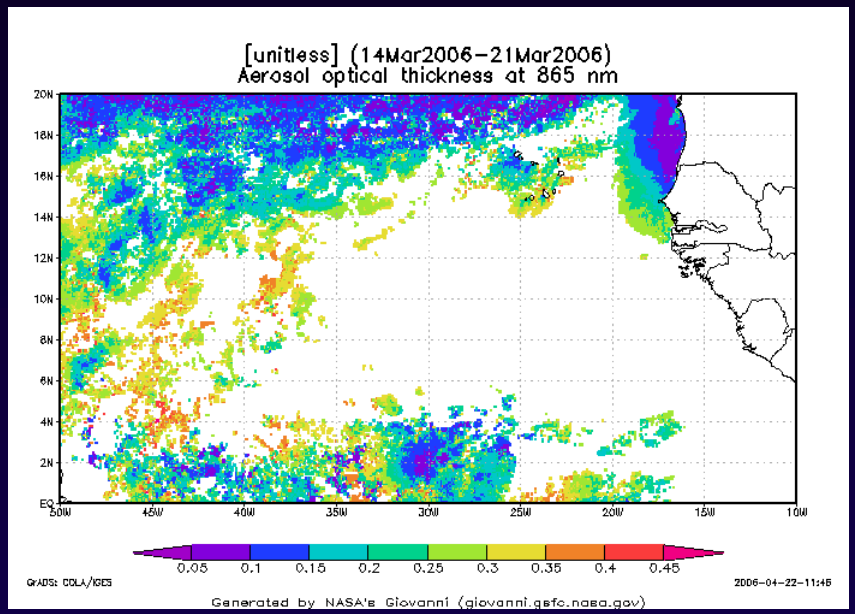





# SeaWiFS AOT at 865 nm

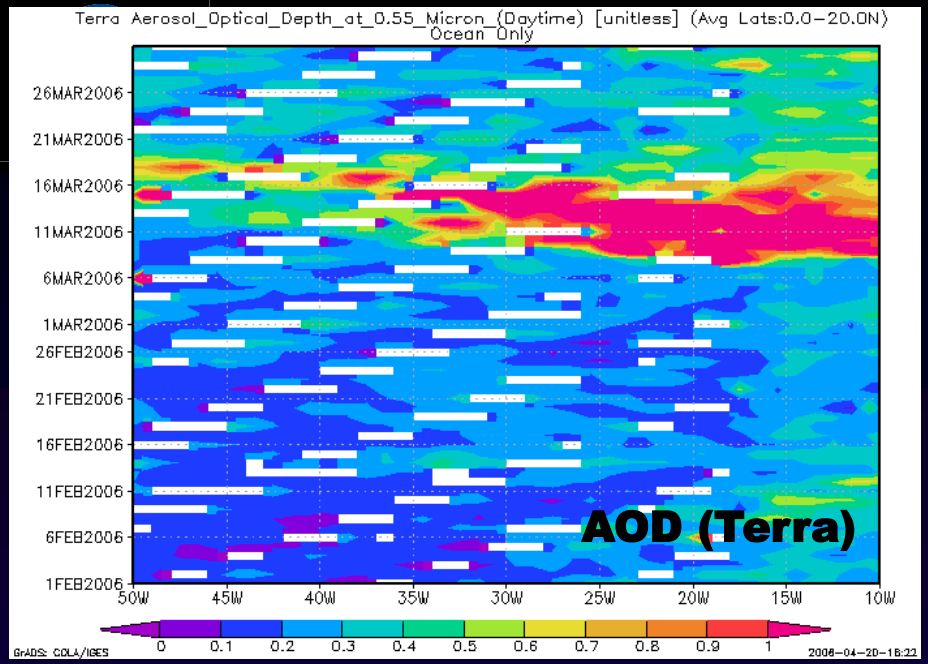


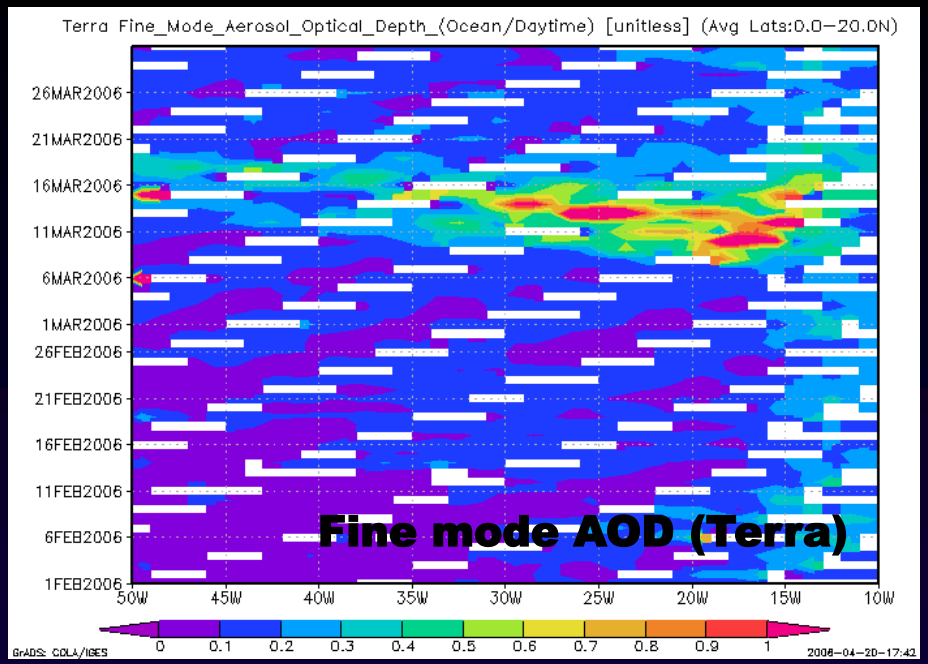

6 – 13 March, 2006

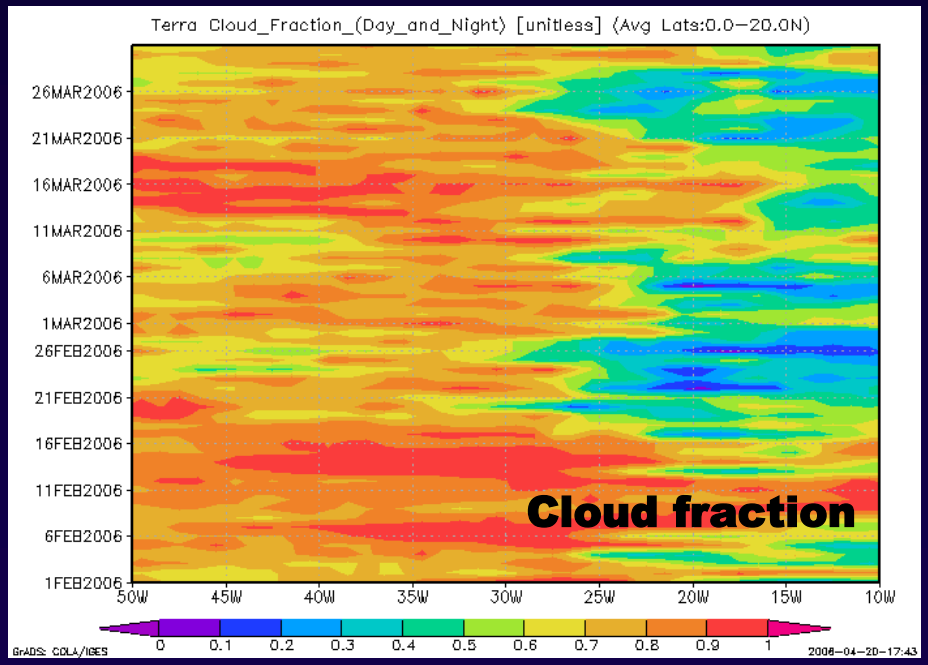


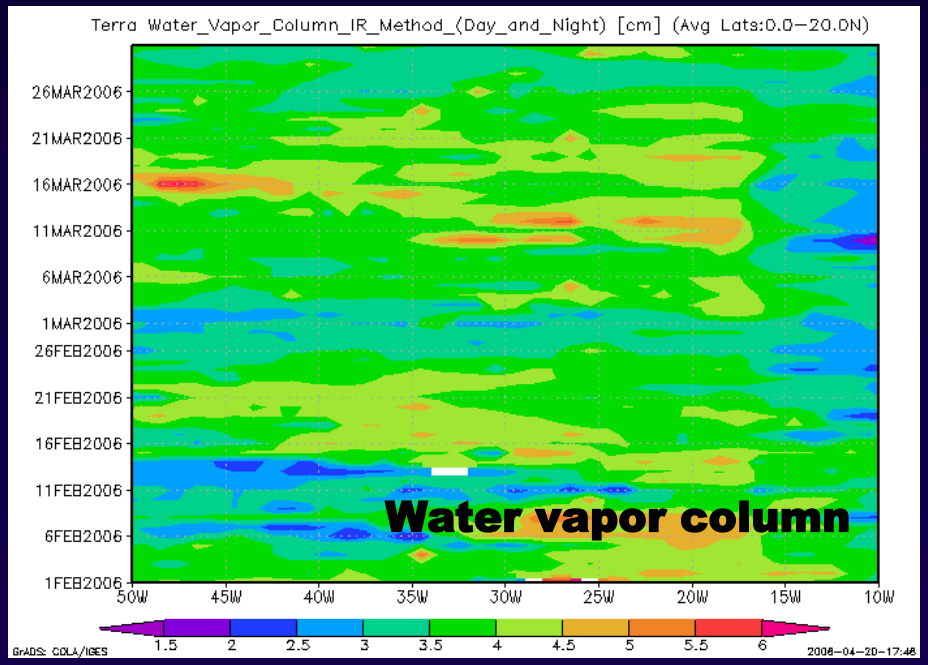

*Can't see through clouds?*

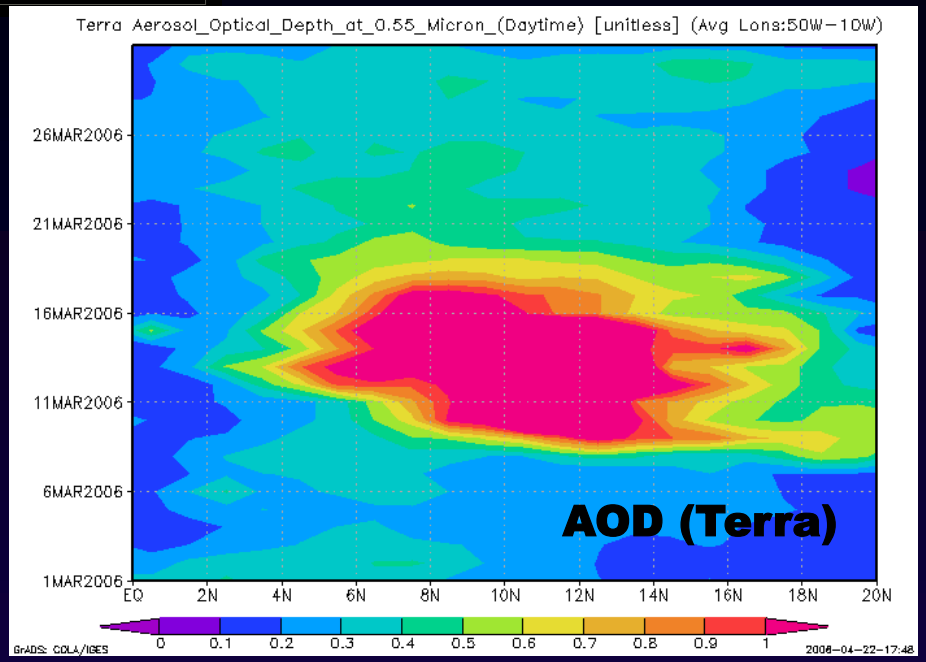
14 - 21 March, 2006

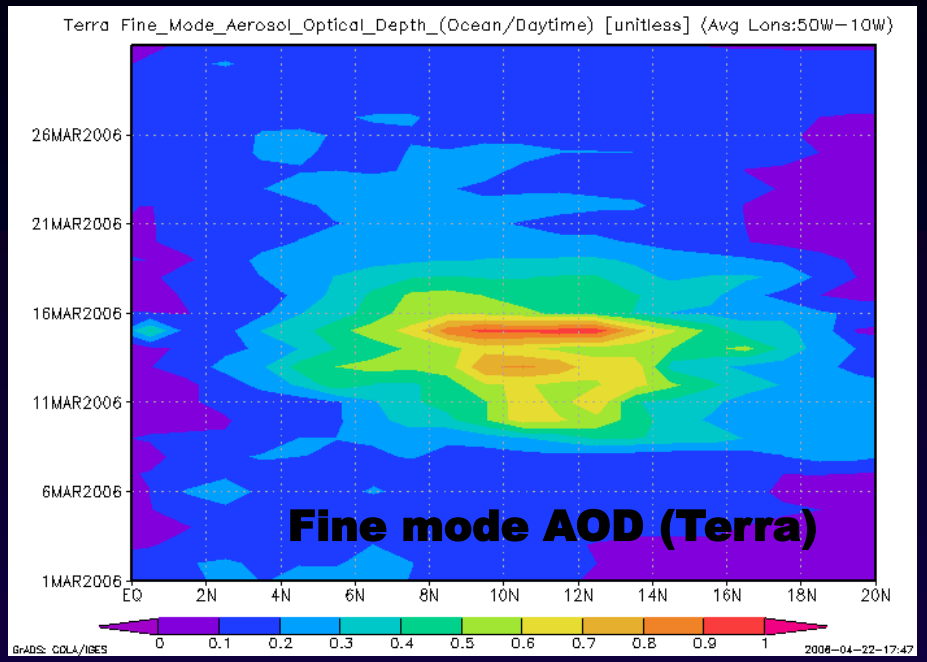

Terra Aerosol_Optical_Depth_at_0.55_Micron_(Daytime) [unitless] (Avg Lats:0.0–20.0N)
Ocean Only
AOD (Terra)


Terra Fine_Mode_Aerosol_Optical_Depth_(Ocean/Daytime) [unitless] (Avg Lats:0.0–20.0N)
Fine mode AOD (Terra)


Terra Cloud_Fraction_(Day_and_Night) [unitless] (Avg Lats:0.0–20.0N)
Cloud fraction

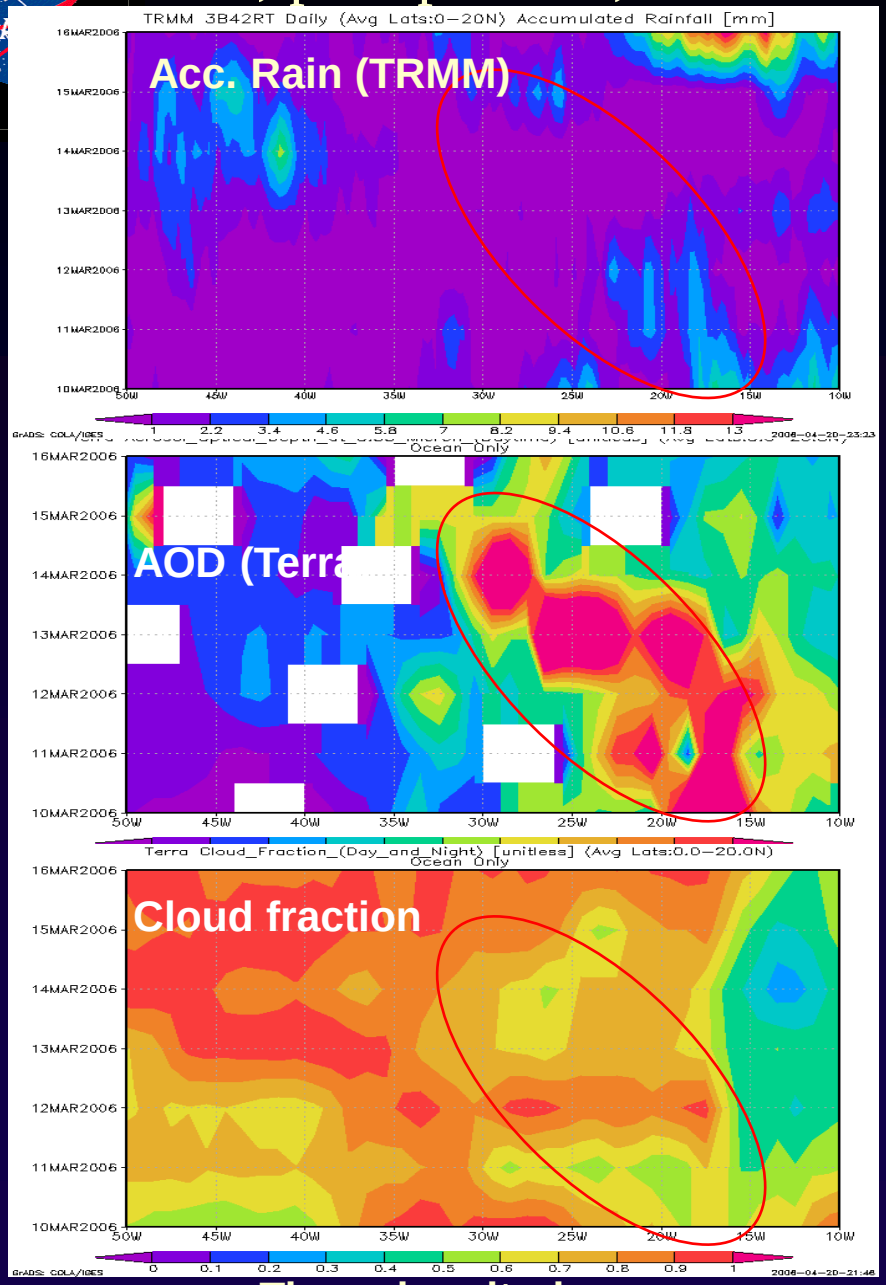

Terra Water_Vapor_Column_IR_Method_(Day_and_Night) [cm] (Avg Lats:0.0–20.0N)
Water vapor column



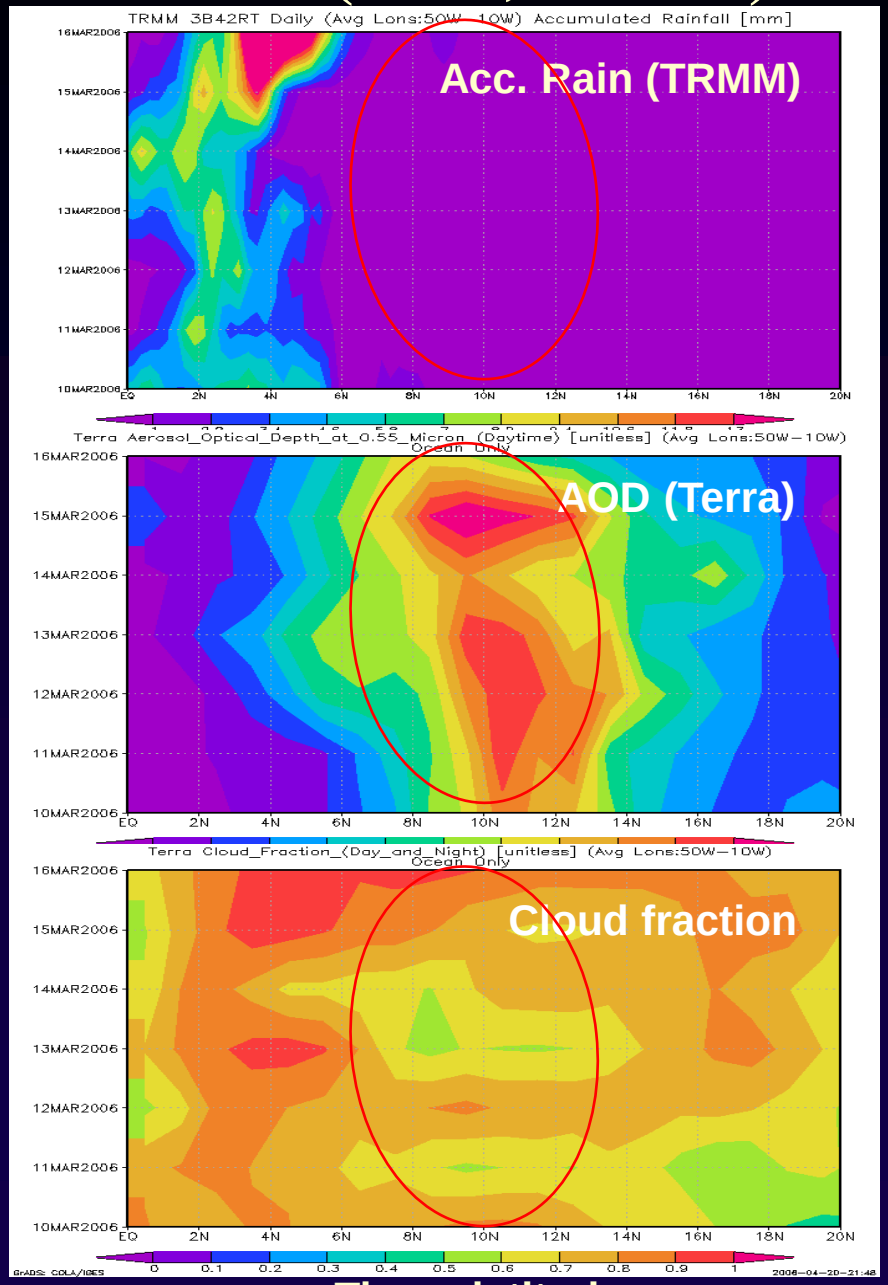




# Lat-parameter Hovmoller (zonal) for March 2006

# AOD, precipitation, and cloud fraction for (0 - 20, -50 – 10)

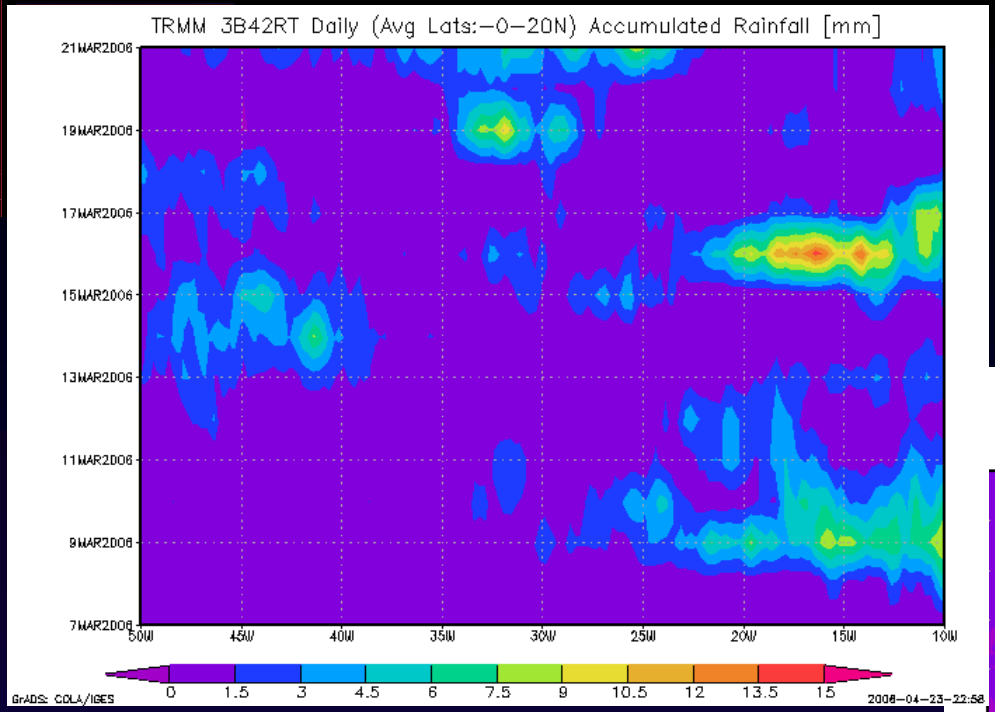


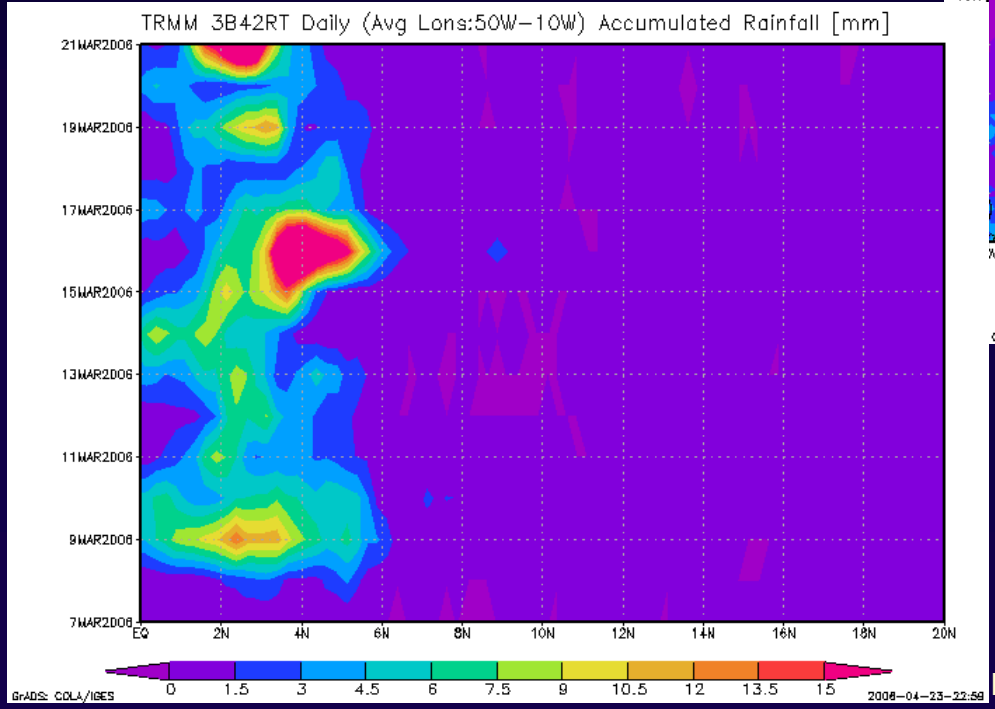

Time - longitude

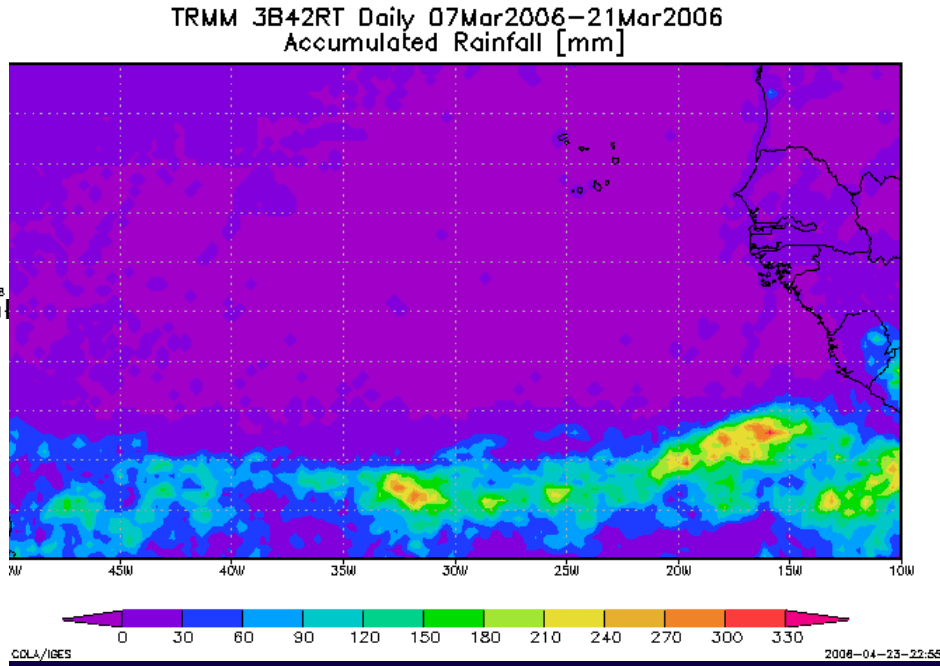



Time - latitude

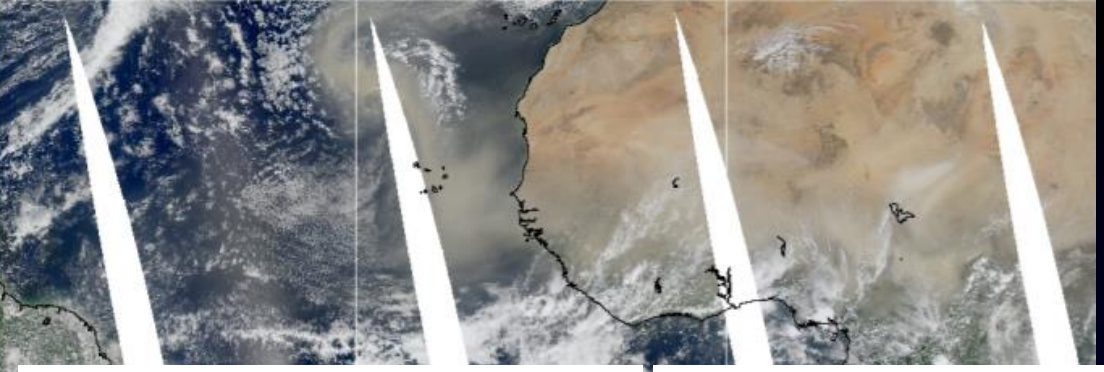
# TRMM Accumulated rainfall

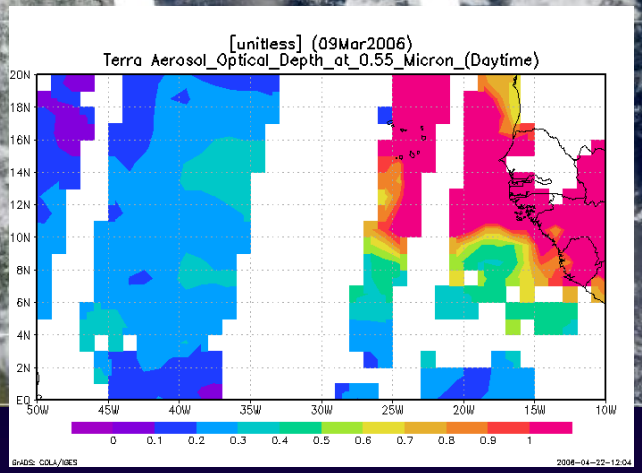


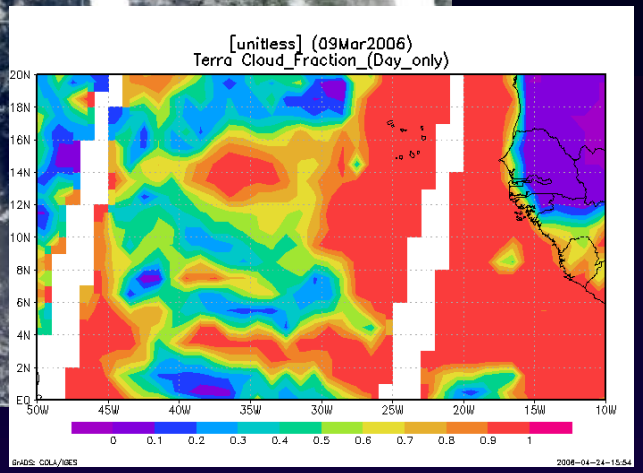



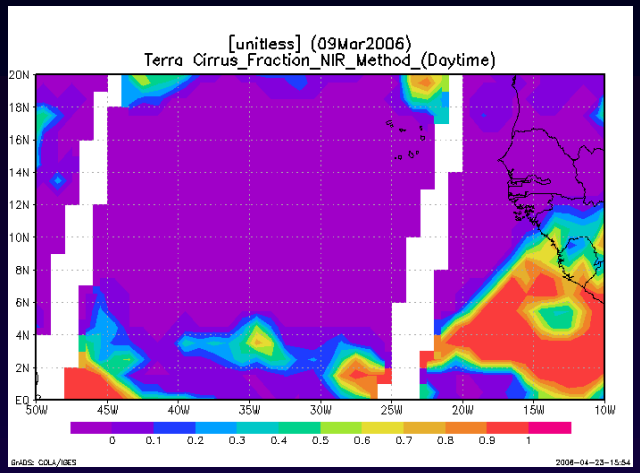



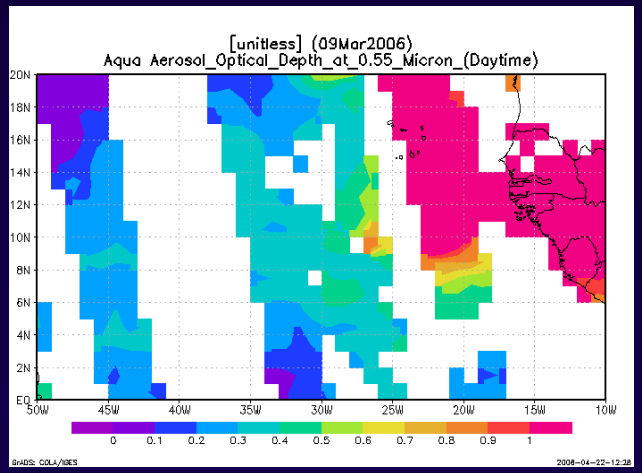
# March 9, 2006

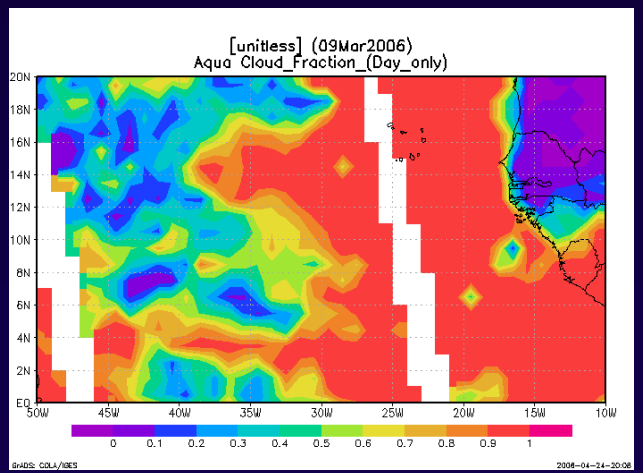


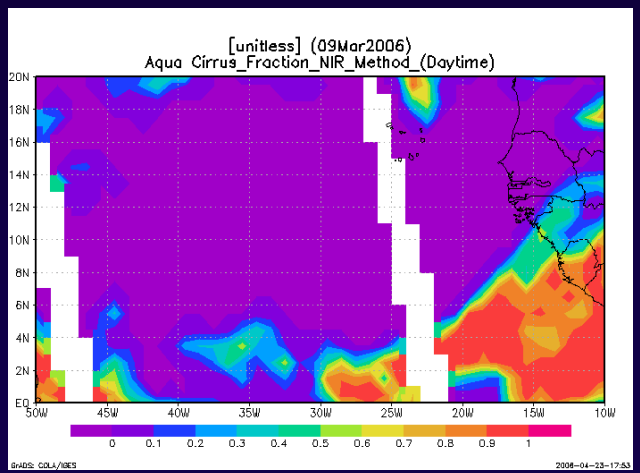


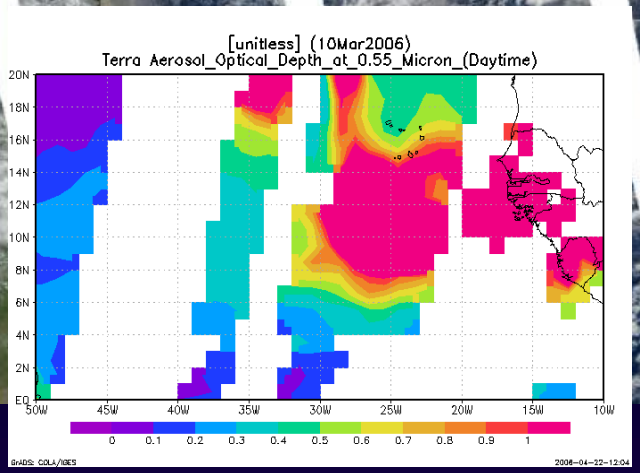



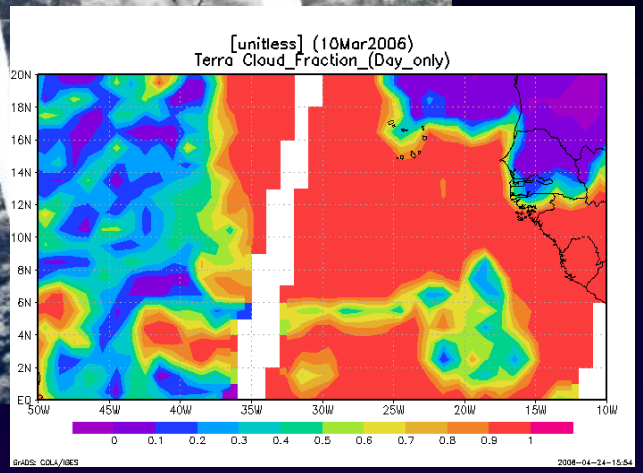

AOD

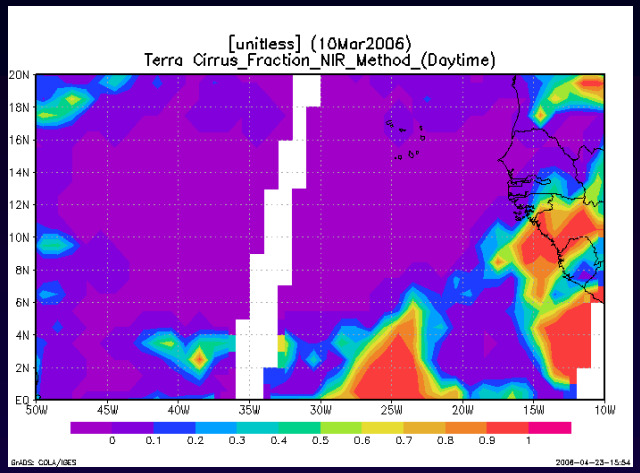
Cloud fraction (daytime)

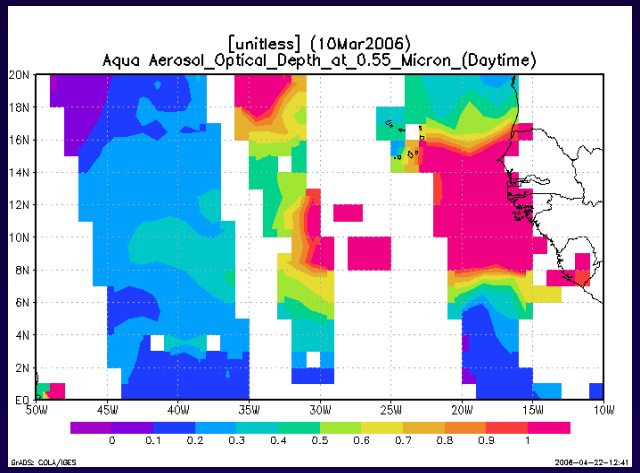
Cirrus fraction (daytime)

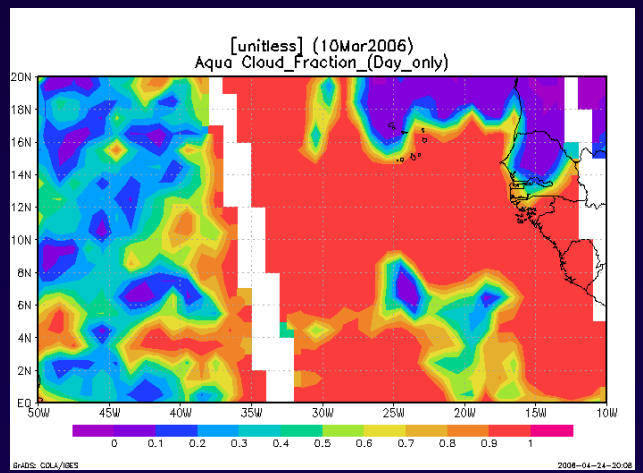
# March 10, 2006

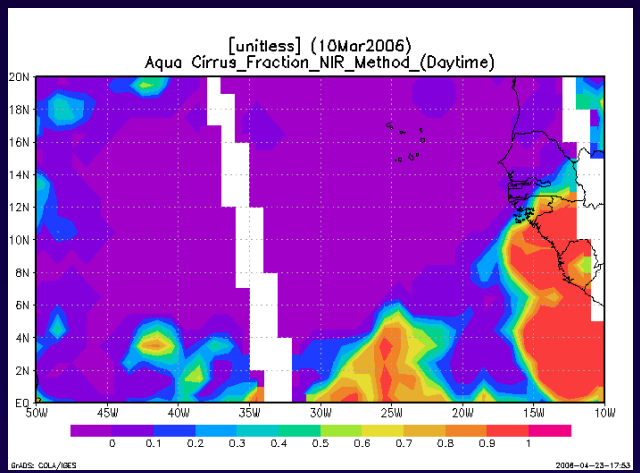


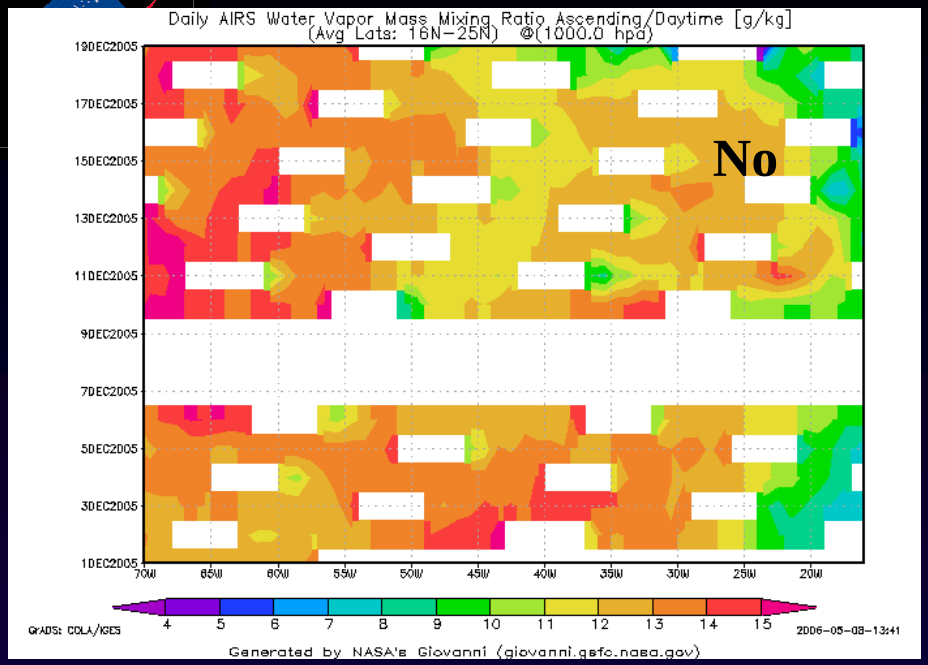



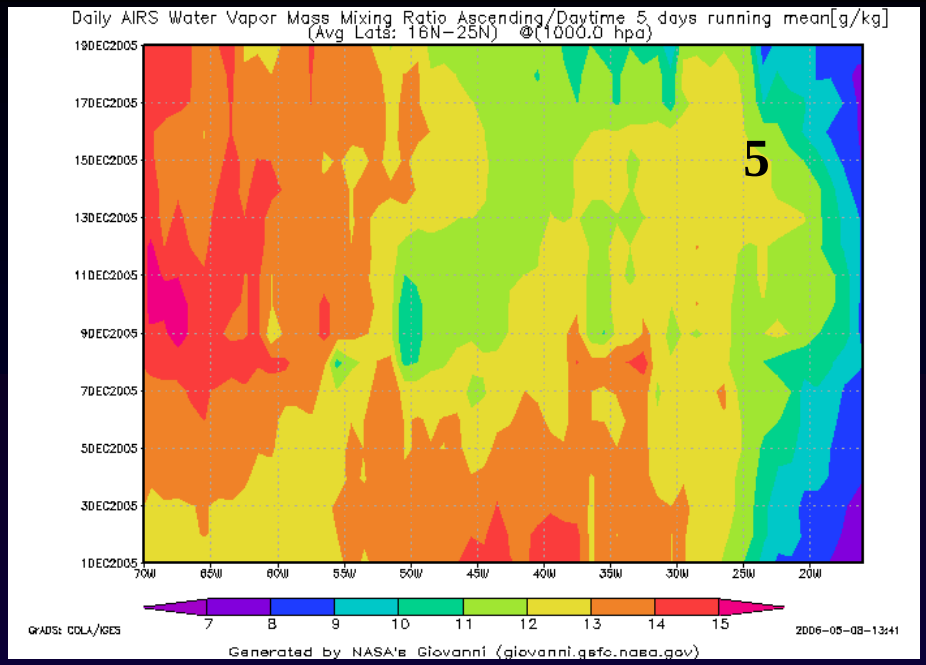

AOD

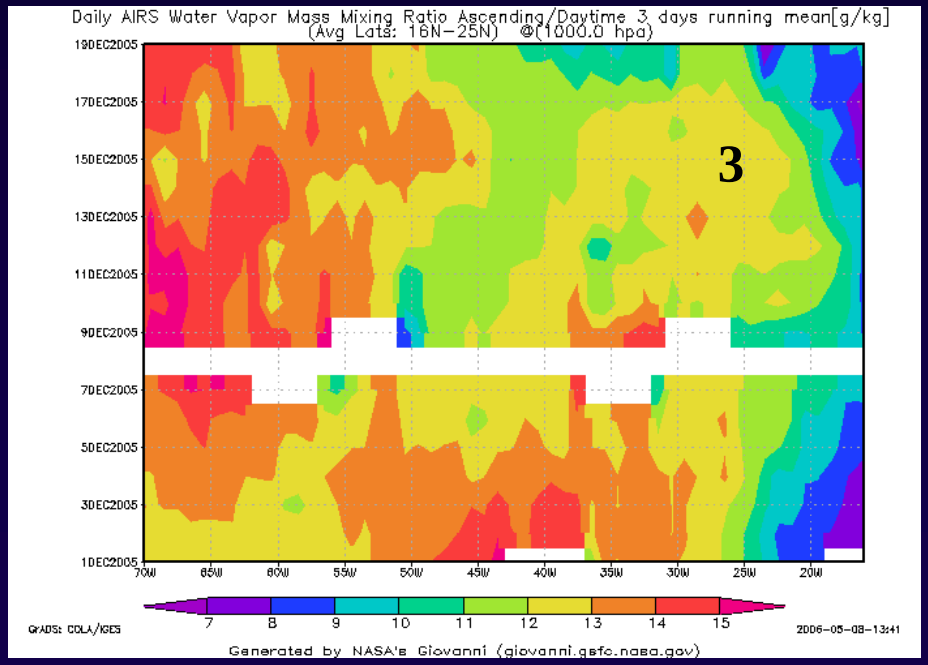
Cloud fraction (daytime)

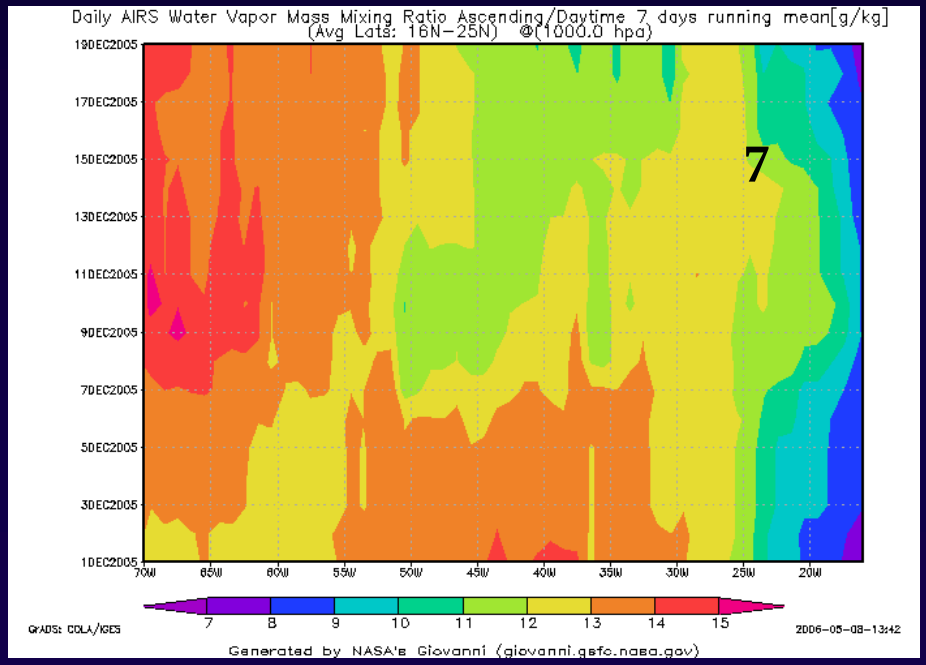
Cirrus fraction (daytime)

# *Adding new functionalities to the AIRS Giovanni*


Daily AIRS Water Vapor Mass Mixing Ratio Ascending/Daytime [g/kg]
(Avg Lats: 16N-25N) @(1000.0 hpa)
No
Generated by NASA's Giovanni (giovanni.gsfc.nasa.gov)


Daily AIRS Water Vapor Mass Mixing Ratio Ascending/Daytime 5 days running mean[g/kg]
(Avg Lats: 16N-25N) @(1000.0 hpa)
5
Generated by NASA's Giovanni (giovanni.gsfc.nasa.gov)


Daily AIRS Water Vapor Mass Mixing Ratio Ascending/Daytime 3 days running mean[g/kg]
(Avg Lats: 16N-25N) @(1000.0 hpa)
3
Generated by NASA's Giovanni (giovanni.gsfc.nasa.gov)


Daily AIRS Water Vapor Mass Mixing Ratio Ascending/Daytime 7 days running mean[g/kg]
(Avg Lats: 16N-25N) @(1000.0 hpa)
7
Generated by NASA's Giovanni (giovanni.gsfc.nasa.gov)

# *Giovanni –related publications and presentations*

# Publications

JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 110, D10S12, doi:10.1029/2003JD004436, 2005

**Dust transport and deposition observed from the Terra-Moderate Resolution Imaging Spectroradiometer (MODIS) spacecraft over the Atlantic Ocean**

Y. J. Kaufman,[1] I. Koren,[2,3] L. A. Remer,[1] D. Tanré,[4] P. Ginoux,[5] and S. Fan[5]

Received 9 December 2003; revised 6 March 2004; accepted 3 June 2004; published 23 February 2005.



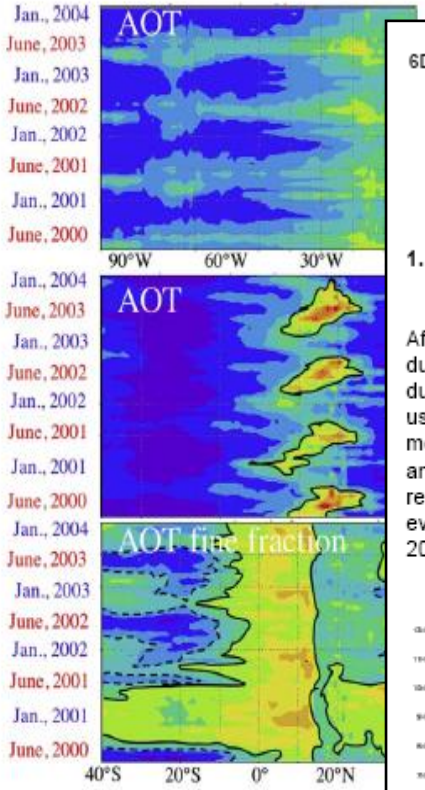



Figure 7. Aerosol optical thickness (see color bar on the right) as fun
longitude, and (center) latitude. The figures are averaged over 5°–20°N
The top panel shows the annual dust transport westward from Africa to
the Atlantic Ocean, observed as a reduction in the optical thickness. The
emissions in May–September, with its maximum moving north fro
September. Contour line shows the value for optical thickness of 0.

6D.6 AN UNUSUAL DRY-SEASON PRECIPITATION E
THE ROLE OF AN EXTRATROPICAL UPPER-LEV
HEAT LOW AND A SURGE IN THE MONSOON

Peter Knippertz[1]*, and Andreas
[1]Johannes Gutenberg-University of Mainz, Mainz, Germany; [2]U

## 1. INTRODUCTION

The monsoonal climate of southern West Africa is characterized by a distinct rainy season during the boreal summer half-year. Rainfall during the winter months November to March is usually quite rare and thus long-term January mean precipitation around 10°N ranges between 1 and 5 mm. The present paper presents preliminary results of a detailed study of a significant rainfall event that occurred during the dry season of 2003/04.

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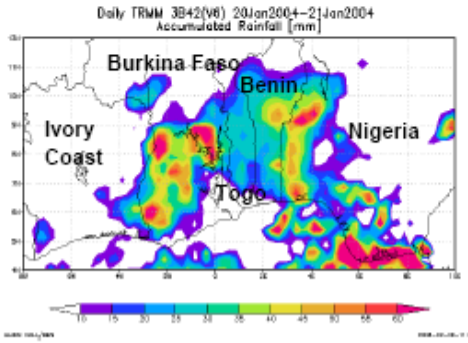



FIG. 1: Two-day accumulated precipitation [mm] over tropical West Africa for January 20 and 21, 2004. Database is the 3B42(V6) daily rainfall estimate from the Tropical Rainfall Measuring Mission (TRMM)

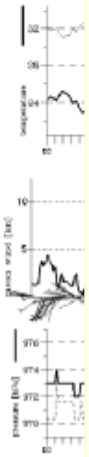


FIG.
measuring
20 to 00 UTC 22 January 2004. Upper panel:

JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 109, D05203, doi:10.1029/2003JD004329, 2004

**Radiative forcing by aerosols over the Bay of Bengal region derived from shipborne, island-based, and satellite (Moderate-Resolution Imaging Spectroradiometer) observations**

V. Vinoj,[1] S. Suresh Babu,[2] S. K. Satheesh,[1] K. Krishna Moorthy,[2] and Y. J. Kaufman[3]

Received 5 November 2003; revised 13 January 2004; accepted 22 January 2004; published 12 March 2004.

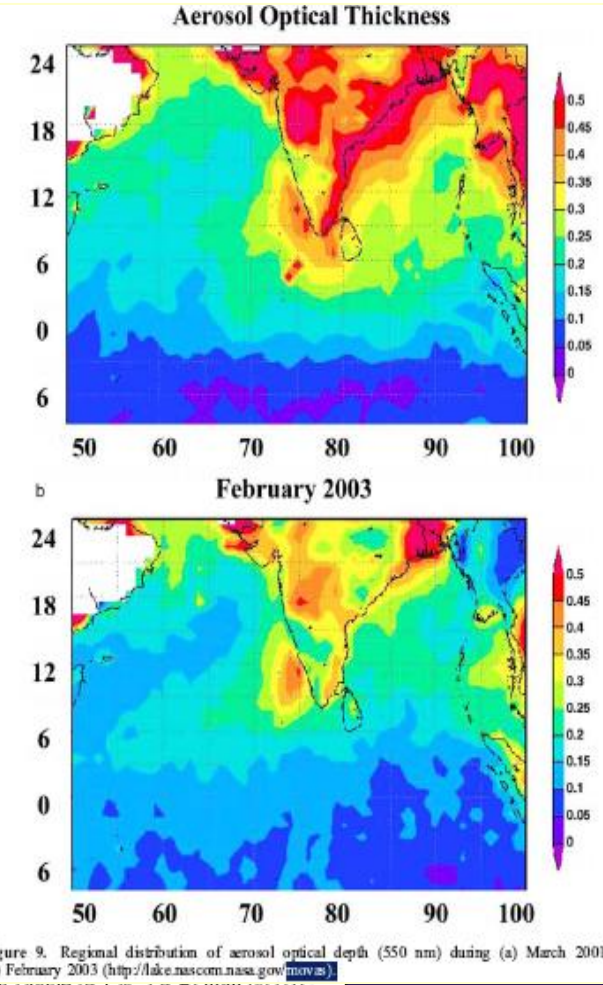



Figure 9. Regional distribution of aerosol optical depth (550 nm) during (a) March 2001 and (b) February 2003 (http://lake.nascom.nasa.gov/movas).

# Presentations

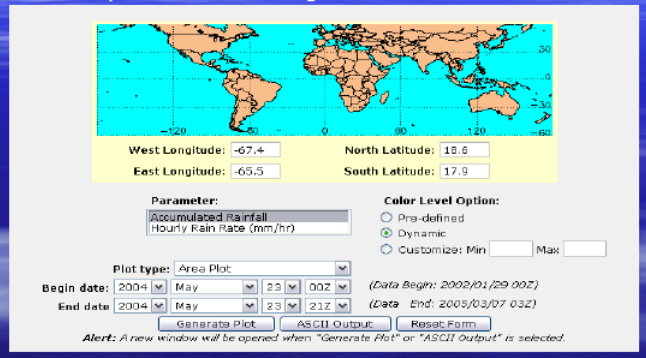
CLiMMATE
CLoud Microwave Measurements of ATmospheric Events

**Precipitation Study using Radar and Rain Gauges during Hurricane Jeanne and a main Rain Event in May 2004 over Puerto Rico**

Roger Saltares, Soralis Pimentel, Luis D. Pérez, Sonymar Pérez, Carlos Rodríguez, Nesmary Hernández and Ricardo Ríos
Under supervision of Dr. Sandra Cruz Pol

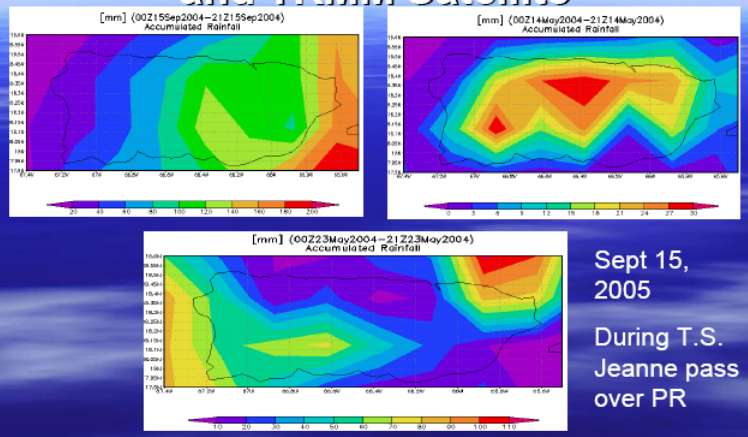
**Obtaining data from Rain Gauges and TRMM Satellite**

http://lake.nascom.nasa.gov/tovas/3B42RT/index2.shtml




**NASA - TRMM**

**Obtaining data from Rain Gauges and TRMM Satellite**




Sept 15, 2005

During T.S. Jeanne pass over PR

**NASA - TRMM**

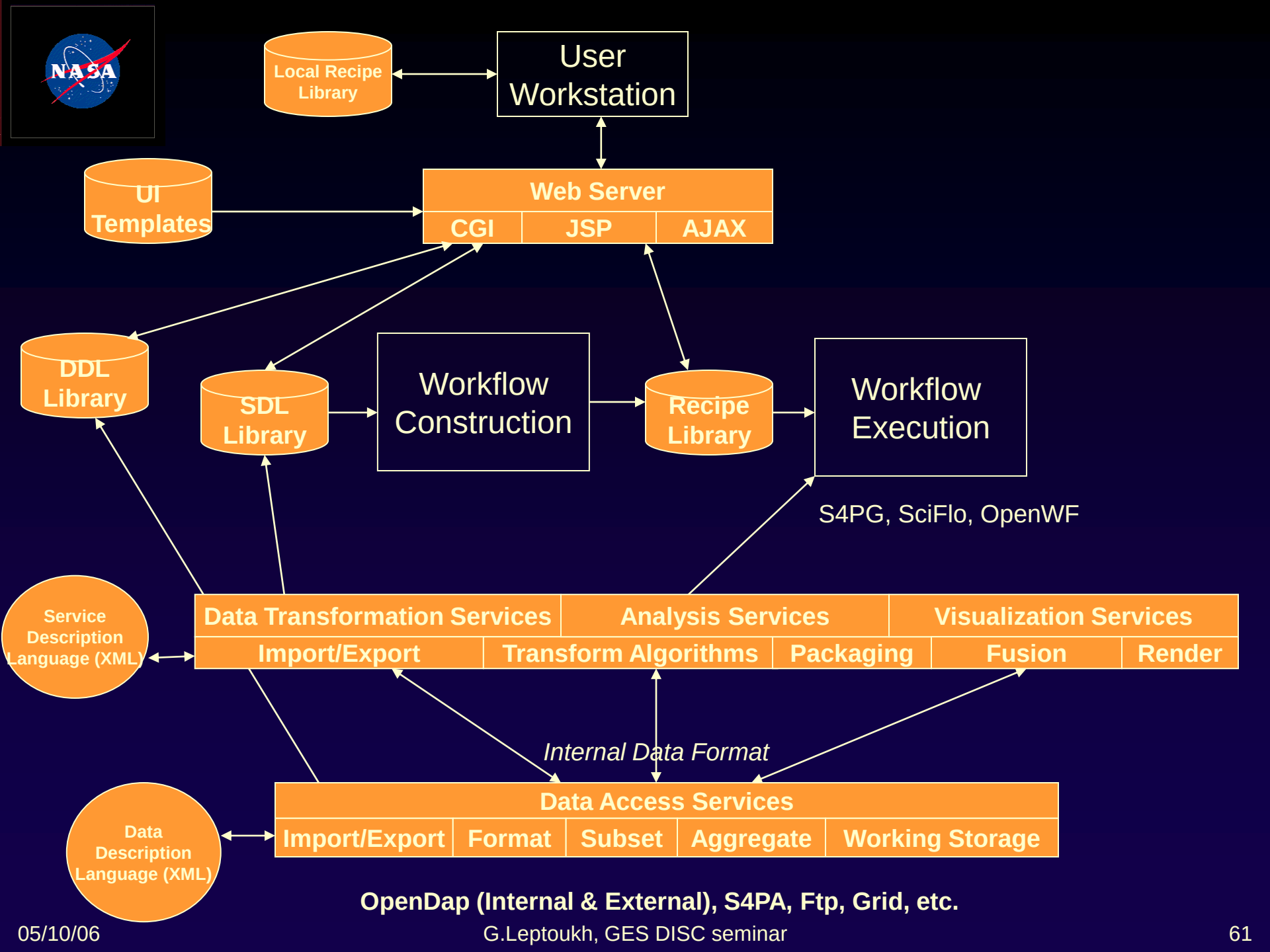

# *Future*

# Giovanni 3 (G3)

The G3 is to simplify the creation and maintenance of Giovanni instances - enable our staff to spend less time upon the computer science aspects of Giovanni and more time on the Earth sciences aspects. This requires a computer-science focused modernization of the Giovanni architecture.

Key drivers of the architecture modernization are:

- ***ourGiovanni/myGiovanni*** -- Data and analysis services will be available through ourGiovanni. For a particular Giovanni instance, only a subset of those data & services will be available. The subset is easily customized for each instance. No coding should be required to add/remove data and services for an instance. This capability is used by DISC staff to create/customize a new instance. Some power users will have the capability to construct their own instance (myGiovanni). As new data types and services are created, they will be added to ourGiovanni which will automatically make them available to myGiovanni.
- ***Location transparency*** -- Instead of moving data to accommodate a new Giovanni instance, enable the instance to access the data at its current location. Provide modular components that can access the data from datapool, S4PAs, OPeNDAP, etc.
- ***Eliminate GrADS dependency*** -- Support other analysis packages besides GrADS, e.g., IDL for some analysis and rendering. Separate the data preprocessing functions from the analysis functions.
- ***Modular/Generic components*** -- Use of workflow management software to enable the rapid creation of processing strings that use generic modules to fetch data, transform the data, and finally perform the data analysis functions. A standard internal data format will be used for data transformation steps. Existing preprocessing algorithms will be modified to fit into the workflow architecture.
- ***Simplify customization of processing*** -- Eliminate the need for DISC staff to change preferences such as colors, fonts, scaling, etc. Provide intelligent defaults for small set of plotting preferences. Provide the capability to override the defaults for a specific instance as well as for individual users. In future versions, expand this capability to allow customization of algorithms (e.g. select interpolation mechanism).


Local Recipe Library
User Workstation
UI Templates
Web Server
CGI
JSP
AJAX
DDL Library
SDL Library
Workflow Construction
Recipe Library
Workflow Execution
S4PG, SciFlo, OpenWF
Service Description Language (XML)
Data Transformation Services
Analysis Services
Visualization Services
Import/Export
Transform Algorithms
Packaging
Fusion
Render
Internal Data Format
Data Access Services
Import/Export
Format
Subset
Aggregate
Working Storage
Data Description Language (XML)
OpenDap (Internal & External), S4PA, Ftp, Grid, etc.

# *A-Train Data Depot (ATDD)*

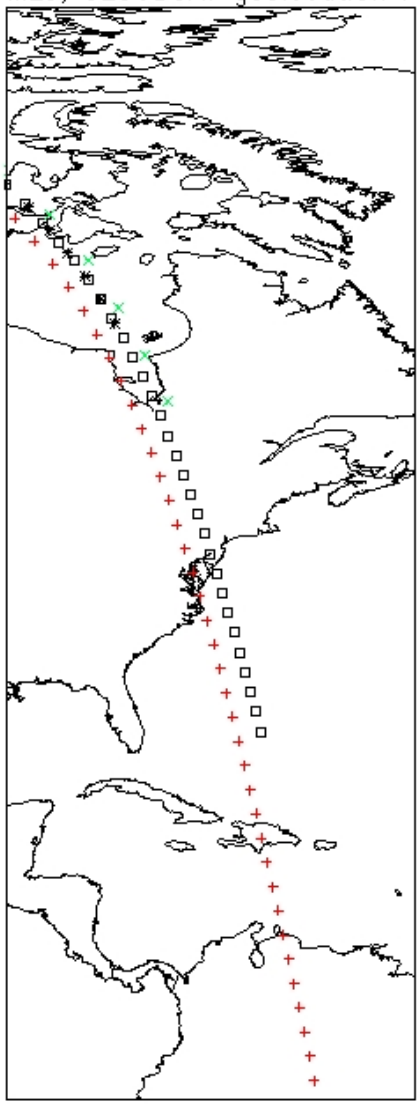
ACCESS Award:

"A-Train Data Depot: Integrating Atmospheric Measurements Along the A-Train Tracks Utilizing Data from the Aqua, CloudSat and CALIPSO Missions"

The purpose of the A-Train Data Depot is to:

- Facilitate A-Train science research by …
- Provide multi-mission datasets that specifically fall on the A-Train formation flying path…
- Provide specific science research and applications services

AQUA, AURA, MLS, CLOUDSAT geolocation Feb 1st, 2006



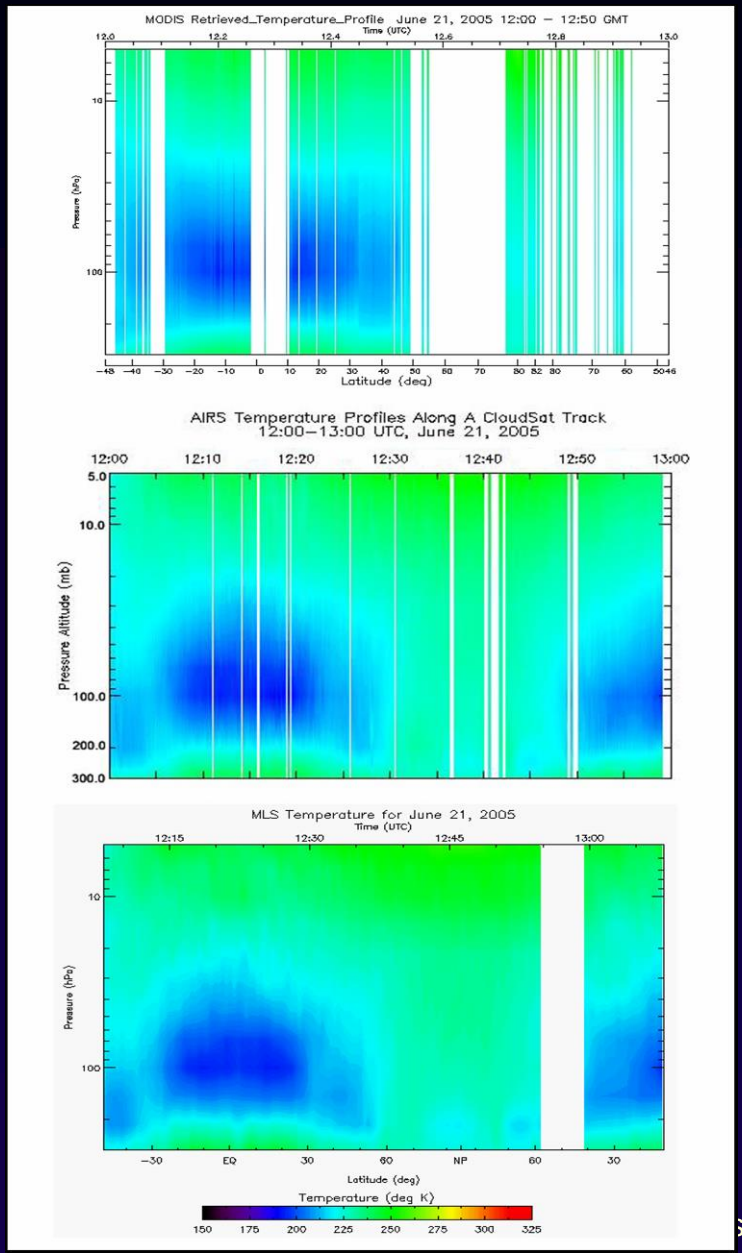
AQUA
AURA
MLS
CLDSAT

# *Example of* AIRS-MODIS-MLS *intercomparison*

**MODIS**

**AIRS**

**MLS**



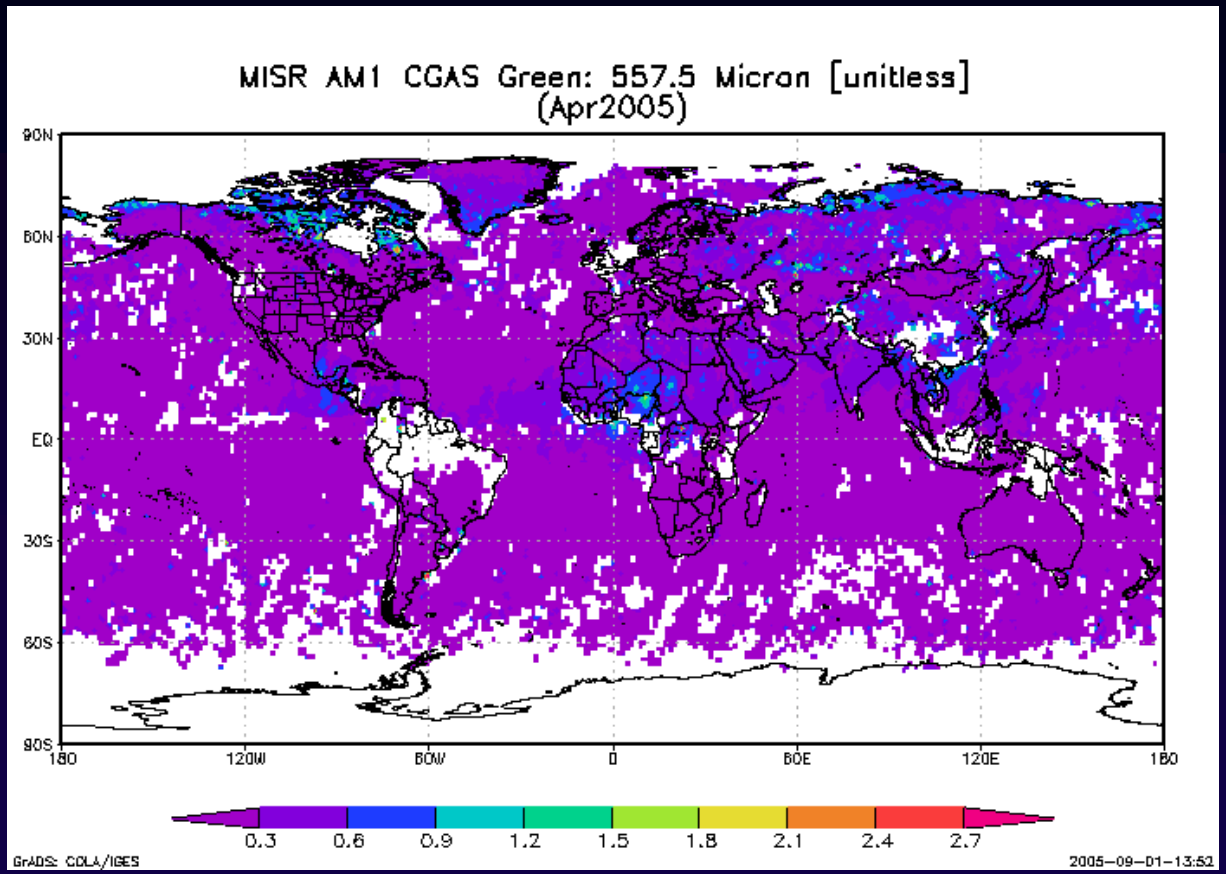

**MODIS--AIRS--MLS Temperature "curtains" along the CloudSat track**

**300.0-5.0 mb**

**06/21/05**

**12:00 to 12:50 GMT**

# *MISR in Giovanni?*




Aerosol Optical Depth at 557.5 micron

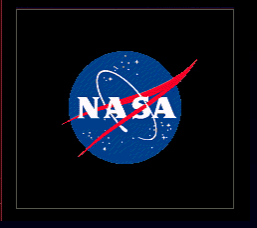
# *Future additions in G2 (going to G3)*

**For MOVAS:**

- **Move to Collection 5**
- **Add more parameters for dailies (to be consistent with monthlies)**
- **Add MISR and data from other instruments (pending)**
- **Add Aeronet (as point data or gridded?)**

**General Giovanni:**

- More and better documentation
- Better statistics handling (weighting schemes, vertical gridding, etc.)
- **CONSTRAINED** Scatter Plots (to make sense of the scatter!)
  - **Time-Altitude or Pressure Cross-Section** (AIRS, MLS)
  - **Zonal Mean Cross-Section Latitude-Altitude or Pressure** (MLS)
- More user options for flags, weights, etc.
- **Anomaly Plots** (Adjustable Climatology, Seasonal Means, etc).
- **Spatial Correlation Plots**
- Lagged temporal correlations
- Giovanni for Clouds (clouds from various instruments/algorithms, Cloud Mask)
- Data Fusion – allow various compositing methods



# *Conclusions*

- Giovanni is useful tool for various studies of atmosphere
- It is perfect for quick interactive multi-sensor visualization and analysis
- It is relatively easy to add parameters and functionalities to Giovanni (will be even easier with G3!)
- For those planning multi-sensor studies and data fusion, Giovanni can provide the needed infrastructure