

Simple AIRS applications at NASA Goddard Earth Sciences Data and Information Services Center (GES DISC)

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¹Wyle IS, ²ADNET, ³NASA/GSFC, Code 610.2, Greenbelt, MD

- New data access features
- A-Train applications
- Deep convection and upper tropospheric humidity
- Variability in the middle atmosphere in response to QBO and solar activity

➤ New data access features in Mirador

- Conversion to NetCDF
- Standard Retrieval browse imagery
- Web Map Service
- Web Coverage Service

Conversion to NetCDF, standard retrieval browse, and other services in **Mirador**, <http://mirador.gsfc.nasa.gov>

+ ACDISC+ AgDISC+ A-TRAIN+ AIRS+ HURRICANES+ NEESPI

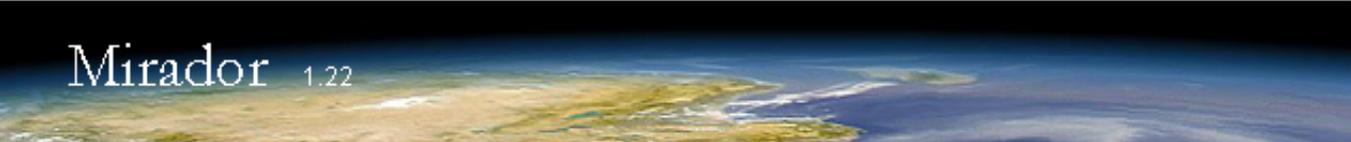
+ GES DISC Home

Mirador

- + OVERVIEW
- + HELP CENTER
- + DATA HOLDINGS
- + VIEW CART
- + CHECK OUT

Additional Features

- + News
- + Restricted Data
- + Feedback
- + FAQ



Mirador 1.22

Mirador is a fast interface for searching Earth science data at NASA Goddard Earth Sciences Data and Information Services Center

SEARCH MIRADOR

Keyword:

Time Span

From:

To:

Location:

[Show Map](#)

Event:

[Search GES-DISC](#)

Available: AIRS, OMI, MLS, GLDAS, HIRDLS2, TOMS, TRMM, UARS, SORCE, and MODIS Subsets for A-Train

What's New: [NetCDF](#), [Time Coverage Display](#), [New Download Options](#), [Consistent Filenames](#)

Acknowledgements:

Location Gazetteer by: [National GeoSpatial Information Agency](#)

Events Gazetteer by: [Unisys](#) and: [EPA](#)

LATEST NEWS



Conversion to NetCDF, standard retrieval browse, and other services in
Mirador, <http://mirador.gsfc.nasa.gov>



Mirador 1.22

Data Sets R

For event, did you mean ...

IKE tropical depression	IKE hurricane category 3
IKE tropical storm	IKE hurricane category 4
IKE hurricane category 1	IKE hurricane category 2

AIRS/Aqua Level 2 Standard Final Retrieval Product (AIRX2RET)
View Files [All](#) [v.003](#) [v.005](#) **info** [003](#) [005](#)
Approx. 29 files found (5.138 GB)
Parameters: SKIN TEMPERATURE, SURFACE AIR TEMPERATURE, AIR TEMPERATURE, TROPOPAUSE, PRECIPITABLE WATER, WATER VAPOR, SE
Spatial Resolution: 50 km x 50 km
Temporal Resolution: 6 Minute(s)

AIRS/Aqua FINAL Level 2 Products (AIRS Only) (AIRS2RET)
View Files [info](#)
Approx. 29 files found (2.079 GB)
Parameters: SKIN TEMPERATURE, SURFACE AIR TEMPERATURE, AIR TEMPERATURE, TROPOPAUSE, PRECIPITABLE WATER, WATER VAPOR, O>

Spatial Resolution: 50 km x 50 km
Temporal Resolution: 6 Minute(s)

AIRS/Aqua Level 2 Standard Final Retrieval Product

Temporal Resolution: 6 Minute(s) [info](#)

All Day Only Night Only Both On

Descriptive File Names:

Filter By Version: **005** | 003 | All

Sort by Time: [Ascending](#) | **Descending**

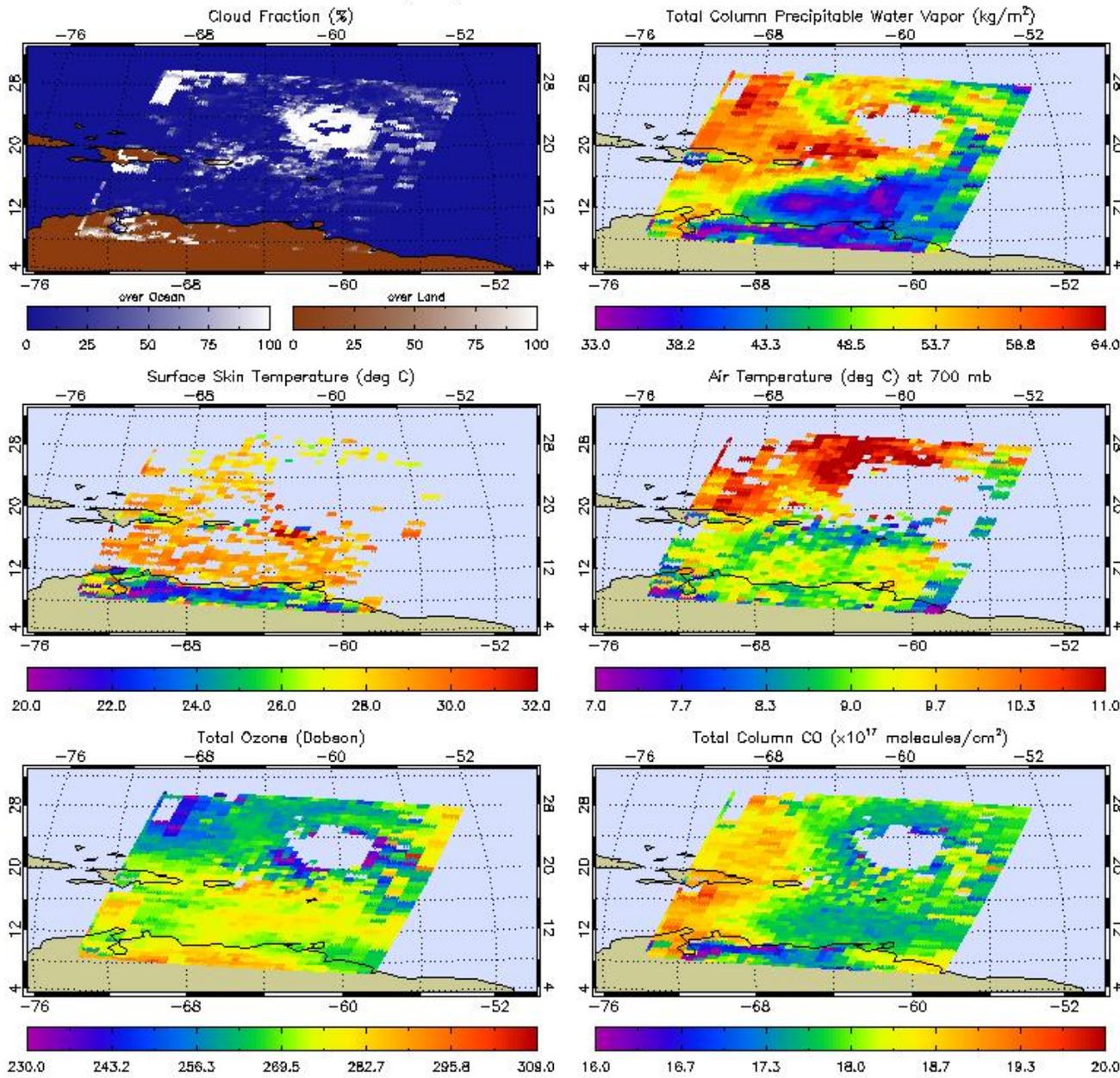
<input checked="" type="checkbox"/> Select All	File Name	Start Time
<input checked="" type="checkbox"/>	AIRS.2008.09.07.183.L2.RetStd.v5.2.2.0.G08252185024.hdf (2.24 MB)  Download Now: Data NetCDF Metadata	2008-09-07 18:17:25 Day
<input checked="" type="checkbox"/>	AIRS.2008.09.07.074.L2.RetStd.v5.2.2.0.G08252065536.hdf (2.42 MB)  Download Now: Data NetCDF Metadata	2008-09-07 07:23:25 Night
<input checked="" type="checkbox"/>	AIRS.2008.09.07.058.L2.RetStd.v5.2.2.0.G08252063549.hdf (2.39 MB)  Download Now: Data NetCDF Metadata	2008-09-07 05:47:25 Night
<input checked="" type="checkbox"/>	AIRS.2008.09.05.060.L2.RetStd.v5.2.2.0.G08250063342.hdf (2.34 MB)  Download Now: Data NetCDF Metadata	2008-09-05 05:59:25 Night
<input checked="" type="checkbox"/>	AIRS.2008.09.04.178.L2.RetStd.v5.2.2.0.G08249183523.hdf (2.32 MB)  Download Now: Data NetCDF Metadata	2008-09-04 17:47:25 Day
<input checked="" type="checkbox"/>	AIRS.2008.09.04.053.L2.RetStd.v5.2.2.0.G08249093702.hdf (2.34 MB)  Download Now: Data NetCDF Metadata	2008-09-04 05:17:25 Night

NetCDF conversion
(bulk conversion available from the shopping cart)

Browse

AIRS Level-2 Standard Retrieval Quick Browse Image

Sep 05, 2008 05:59:25 UTC Granule 060



Granule Id = AIRS.2008.09.05.060.L2.RetStd.v5.2.2.0.G08250063342.hdf

The new, six-plate view, adds total column CO, and transparent cloud cover.

Web Map Service

(should be available by the end October)

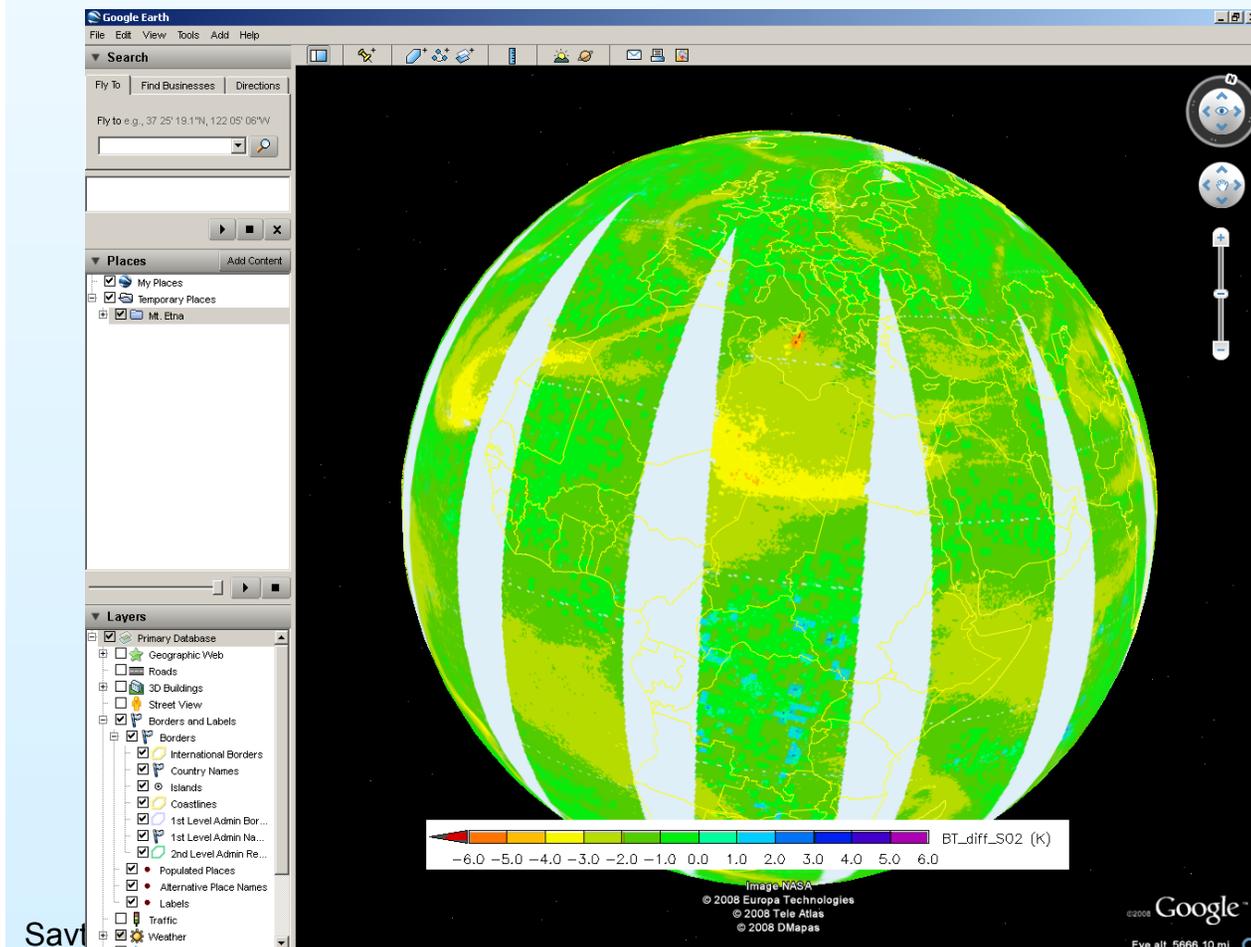
- AIRS images of BT_diff_SO2 from the Near-Real-Time flow are utilized in a new Web Map service.
- It is an experimental "quick-look" for scientists working on volcanic eruptions
- Possible interest from NOAA Satellite Analysis Branch
- Web Map Service access
 - Clients: IDV 2.6, McIDAS-V*, GoogleEarth*, Q-GIS, et al.
 - Web Browser: Users can bookmark any region for repeated views
- Web Coverage Service (geotiff) access
 - Clients: Matlab, IDL, ...

(*Still working on issues with some clients)

Web Map Service

Example URL: (use in GoogleEarth in “add overlay”, or simply in a browser)

http://g0hep12u.ecs.nasa.gov/cgi-bin/wms_airsnr?service=WMS&VERSION=1.1.1&REQUEST=GetMap&SRS=EPSG:4326&WIDTH=1080&HEIGHT=540&LAYERS=AIRS_BT_diff_SO2_A_Old,coastline&TRANSPARENT=TRUE&FORMAT=image/gif&bbox=-180,-90,180,90



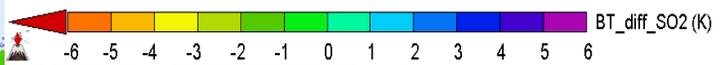
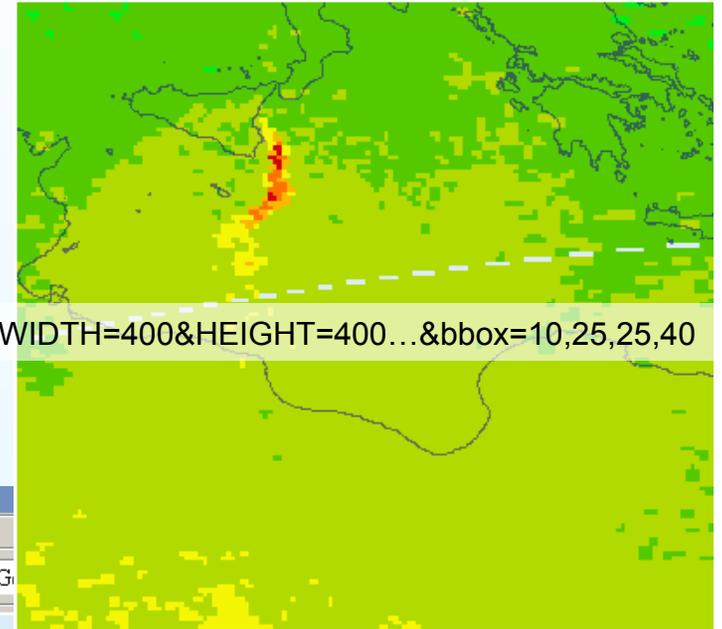
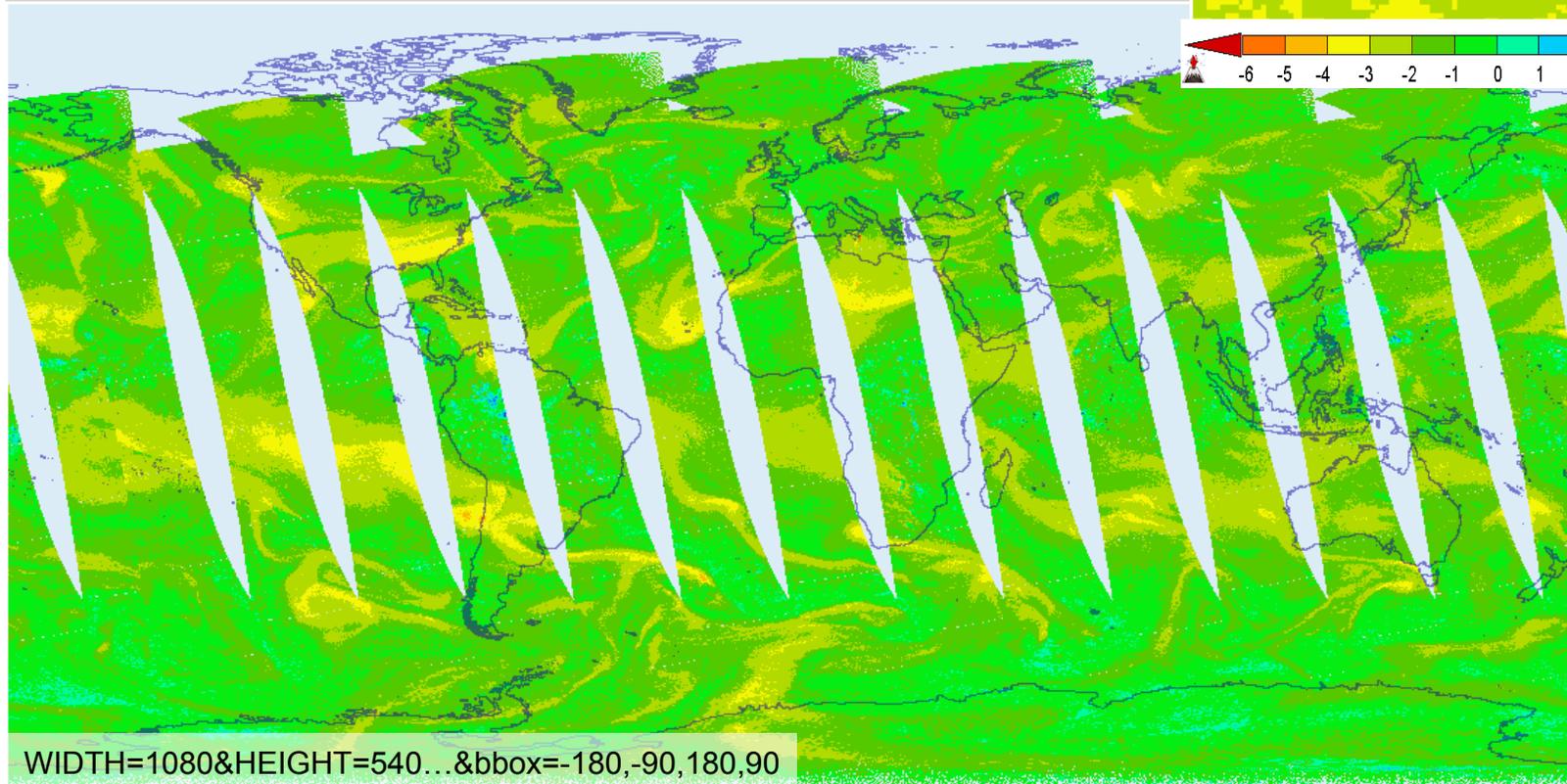
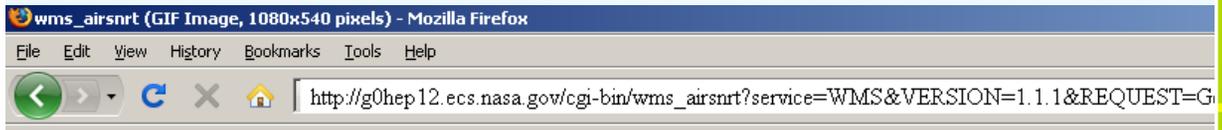
GoogleEarth Example of Web Map Service-generated map of BT_diff_SO2.

(Mt. Etna eruption; Oct 30, 2002; ascending orbits; original map is built at 10-km pixel size.)

Web Map Service

Browser example, Oct 30, 2002.

Both views can be just two bookmarks.



➤ A-Train applications

- A-Train Data Depot, incepted in 2005:

<http://disc.sci.gsfc.nasa.gov/atdd/>

- Supported by NASA HQ under ROSES 2005 NNH05ZDA001N-ACCESS

- Objectives:

- ✓ Support CloudSat with MODIS/Aqua collocated subsets
- ✓ Provide other collocated subsets: POLDER/PARASOL, OMI/Aura, and AIRS/Aqua.
- ✓ Provide previews of collocated data from CloudSat, CALIPSO, MODIS, AIRS, POLDER, OMI, MLS, and ECMWF, through “Giovanni”.

(IEEE Trans. Geosci. Remote Sensing, vol. 46, pp. 2788-2795, 2008)

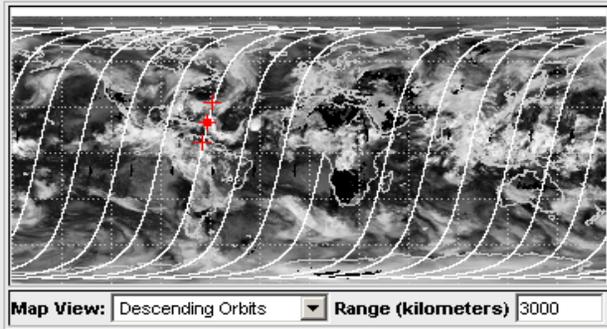
<p><u>Archived On-line A-Train Subsets</u></p> <ul style="list-style-type: none"> • Mirador search:http://mirador.gsfc.nasa.gov/ • FTP: ftp://atrain.sci.gsfc.nasa.gov/s4pa
<p>MODIS/Aqua, Level 1B, radiances</p> <ul style="list-style-type: none"> • MAC021S* ; 1-km radiances • MAC02QS* ; 250-m radiances
<p>MODIS/Aqua, Level 2, atmospheric products</p> <ul style="list-style-type: none"> • 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.
<p>OMI/Aura, Level 2, Cloud Pressure, Ozone, and UV index</p> <ul style="list-style-type: none"> • OMCLD02_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.
<p>POLDER/Parasol, Level 2, Radiation Budget processing</p> <ul style="list-style-type: none"> • PARASOLRB_CPR ; Column Water Vapor, Cloud Pressure from O2 lines, Cloud Optical Thickness, Cloud Phase, Cloud Albedo, Clear Albedo.

<p>Giovanni-Generated Subset Segments http://gdata1.sci.gsfc.nasa.gov/daacbin/G3/gui.cgi?instance_id=atrain</p>
<p>MODIS/Aqua, Level 2, atmospheric products</p> <ul style="list-style-type: none"> • MAC04S1 ; Aerosol Total Optical Depth, and Fine Mode fraction. • MAC06S1 ; Cloud Top Pressure and Temperature, Cloud Optical Thickness. • MAC07S1 ; Vertical profiles of Temperature and Moisture (dew point temperature).
<p>OMI/Aura, Level 2, Cloud Pressure, Ozone, and UV index</p> <ul style="list-style-type: none"> • OMCLD02_CPR; Effective Cloud Pressure, based on O2-O2 absorption • OMCLDRR_CPR ; Effective Cloud Pressure for O3, based on Raman scattering. • OMTO3_CPR ; Reflectivity at 360 nm, UV Aerosol Index. • OMAERUV_CPR ; Final Aerosol Absorption Optical Depth (352 nm), Lambert Equivalent Reflectivity (352 nm).
<p>POLDER/Parasol, Level 2, Radiation Budget processing</p> <ul style="list-style-type: none"> • PARASOLRB_CPR ; Clear Albedo, Cloud Cover, Cloud Optical Thickness, Cloud Phase Index, Cloud Pressure (O2), Cloud Pressure (Rayleigh), Cloud Spherical Albedo, Shortwave Albedo, Water Vapor Column
<p>AIRS Level 2 Standard Retrieval</p> <ul style="list-style-type: none"> • AIRX2RET ; Vertical profiles of Temperature and Mass Mixing Ratio, Cloud Top Temperature and Pressure, Total Cloud Liquid Water.
<p>CloudSat Level 1B Received Echo Powers</p> <ul style="list-style-type: none"> • 1B-CPR ; Vertical profiles of Received Echo Powers, and derived dBZ reflectivity.
<p>CloudSat Level 2 retrievals</p> <ul style="list-style-type: none"> • 2B-CLDCLASS ; Vertical profiles of Cloud Scenario • 2B-CWC-RO ; Vertical profiles of Ice and Liquid Water Cloud Content, radar-only retrieval.
<p>CALIPSO Lidar Level 2 retrievals</p> <ul style="list-style-type: none"> • VFM; Vertical Feature Mask (profiles) for Cloud/Aerosol types.

These subsets available in Giovanni only

*Available in 200- and 10-km swath widths; The rest are 200-km-wide, (+/-100 km) only.

http://gdata1.sci.gsfc.nasa.gov/daac-bin/G3/gui.cgi?instance_id=atrain



Temporal

Orbit Date Year Month Day (Range: 02 Jun 2006 - 29 Sep 2008)
[Help with temporal availability.](#)

Parameters

Show Parameter Units

Curtains

<input type="checkbox"/> Temperature				
<input type="checkbox"/>	Atmospheric Temperature Profile	ML2T.002	MLS	2004/08/08 - 2008/10/02
<input type="checkbox"/>	Atmospheric Temperature Profile	MAC07S0.002	MODIS Aqua	2006/06/02 - 2008/10/05
<input type="checkbox"/>	Atmospheric Temperature Profile	AIRX2RET.005	AIRS Aqua	2002/08/30 - 2008/10/05
<input type="checkbox"/>	Atmospheric Temperature Profile	ECMWF_AUX.008	ECMWF model	2006/06/15 - 2008/09/29
<input type="checkbox"/> Water Vapor				
<input type="checkbox"/>	H2O Saturation Mass Mixing Ratio	AIRX2RET.005	AIRS Aqua	2002/08/30 - 2008/10/05
<input checked="" type="checkbox"/>	H2O Vapor Mass Mixing Ratio	AIRX2RET.005	AIRS Aqua	2002/08/30 - 2008/10/05
<input checked="" type="checkbox"/>	Relative Humidity wrt Ice	ML2RHI.002	MLS	2004/08/08 - 2008/10/02
<input type="checkbox"/>	Retrieved Dew Point Temperature Profile	MAC07S0.002	MODIS Aqua	2006/06/02 - 2008/10/05
<input checked="" type="checkbox"/>	Specific Humidity Profile	ECMWF_AUX.008	ECMWF model	2006/06/15 - 2008/09/29
<input type="checkbox"/> Clouds				
<input type="checkbox"/>	Cloud/Aerosol Classification (Vertical Feature Mask)	VFM.002	Calipso - Lidar	2006/06/13 - 2008/09/28
<input type="checkbox"/>	Cloud Scenario	2B_CLDCLASS.009	CloudSat	2006/06/15 - 2008/09/28
<input type="checkbox"/>	Ice Water Content	ML2IWC.002	MLS	2004/08/08 - 2008/10/02
<input type="checkbox"/>	Ozone Mixing Ratio Profile	ML2O3.002	MLS	2004/08/08 - 2008/10/02
<input type="checkbox"/>	ReceivedEchoPowers	1B_CPR.008	CloudSat	2006/06/02 - 2008/09/29
<input checked="" type="checkbox"/>	Reflectivity dBZ	1B_CPR.008	CloudSat	2006/06/02 - 2008/09/29

Strips

<input type="checkbox"/> Surface				
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Strips

<input type="checkbox"/> Surface			
<input type="checkbox"/> Cloud Spherical Albedo	PARASOLRB_CPR.001	POLDER3 Parasol	2006/06/01 - 2008/09/20
<input checked="" type="checkbox"/> Cloud Top Pressure	MAC06S1.002	MODIS Aqua	2006/06/02 - 2008/10/03
<input checked="" type="checkbox"/> Cloud Top Pressure	AIRX2RET.005	AIRS Aqua	2002/08/30 - 2008/10/05
<input type="checkbox"/> Cloud Top Temperature	MAC06S1.002	MODIS Aqua	2006/06/02 - 2008/10/03
<input type="checkbox"/> Cloud Top Temperature	AIRX2RET.005	AIRS Aqua	2002/08/30 - 2008/10/05
<input type="checkbox"/> Effective Cloud Pressure for O3 (Raman Ring)	OMCLDRR_CPR.003	OMI Aura	2006/06/01 - 2008/10/05

Select Visualization:

Subset Parameters Along Orbit Track

[Visualization Help](#)

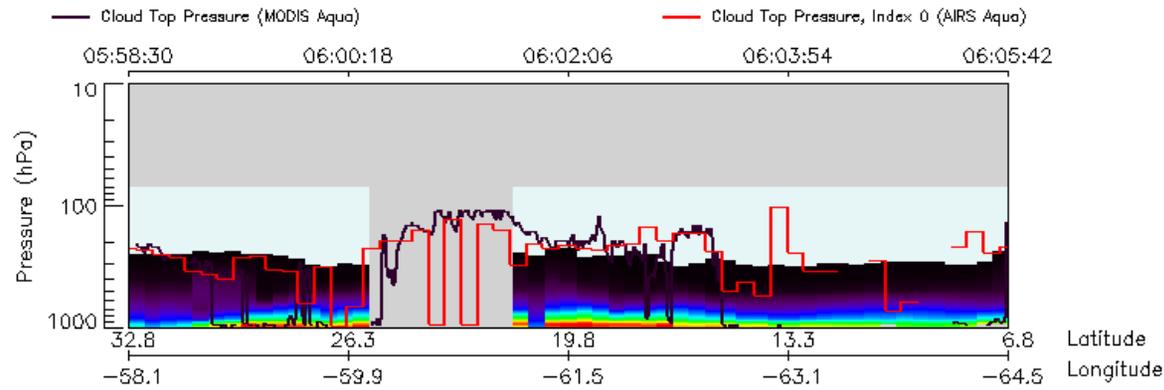
Generate Visualization

Reset

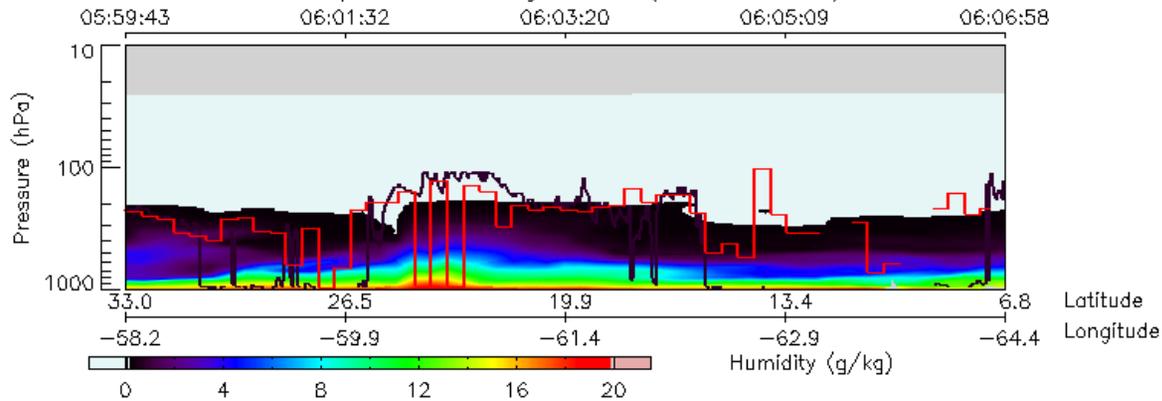
Alert: A new window will be opened when "Generate Visualization" is selected.

H2O Vapor Mass Mixing Ratio (AIRS Aqua)

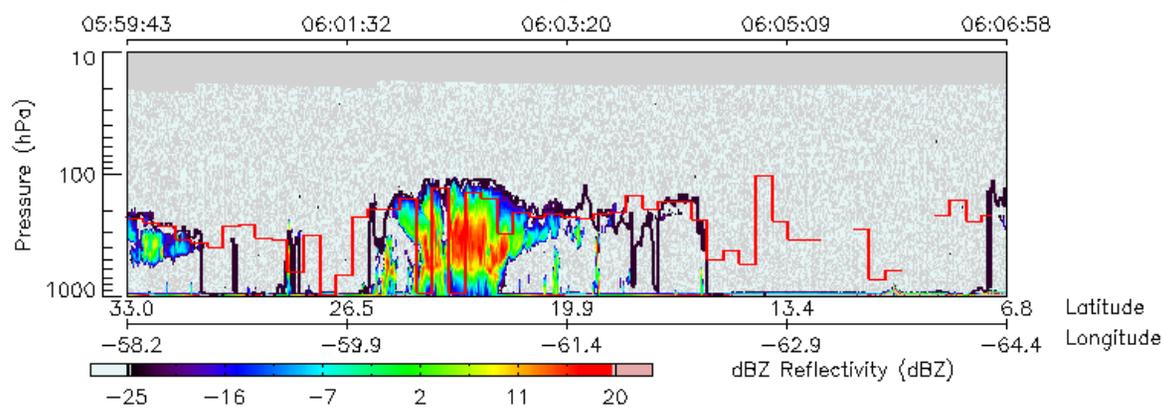
05-Sep-2008 05:58:30 - 06:05:42 GMT



Specific Humidity Profile (ECMWF model)

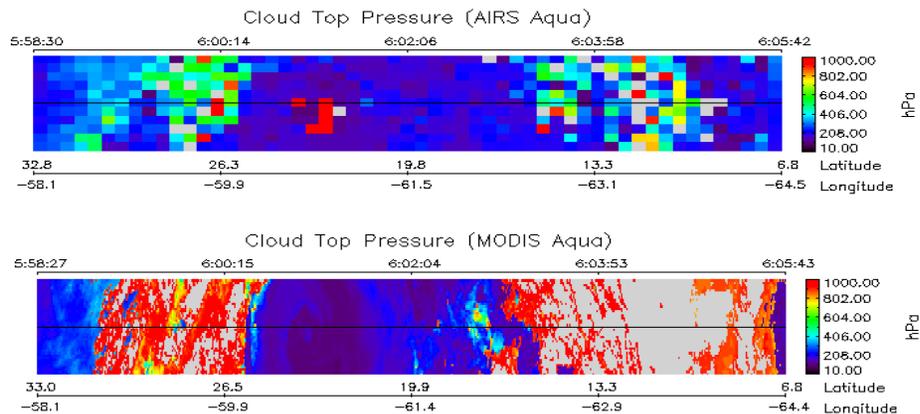


Reflectivity dBZ (CloudSat)



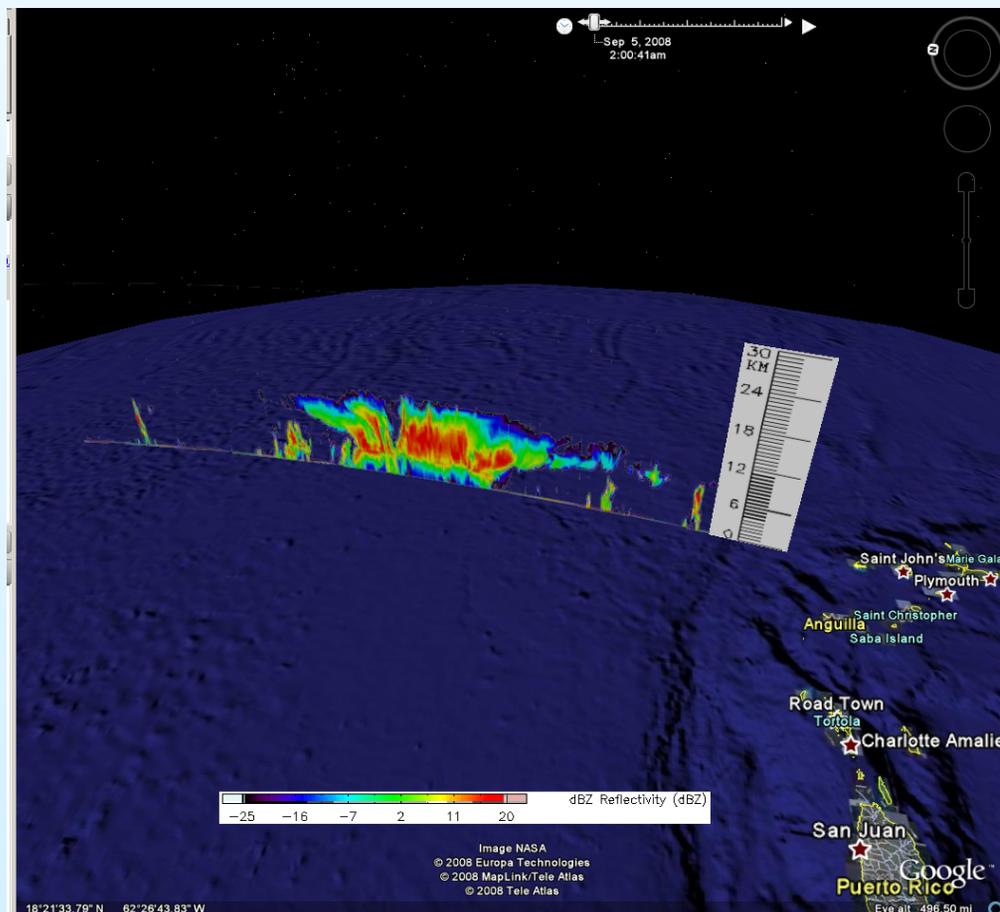
Collocated with
CloudSat vertical
profiles of AIRS and
ECMWF humidity;
line overplots of
collocated cloud top
pressures from AIRS
and MODIS.

(Hurricane Ike)



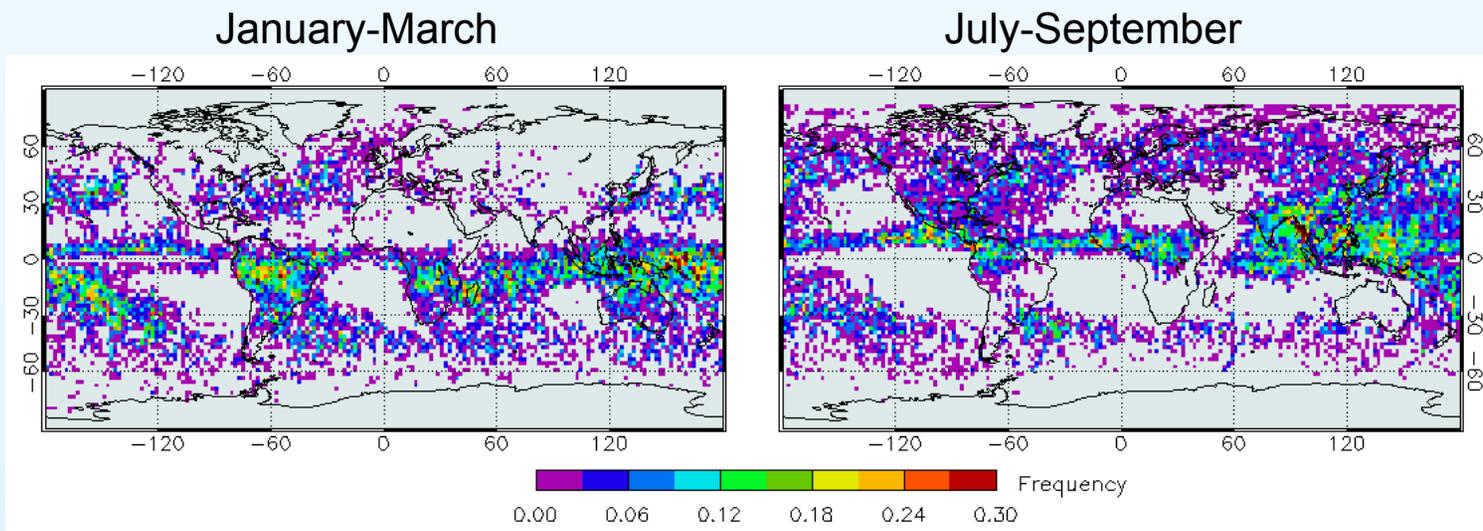
CloudSat-collocated strip plots from Giovanni

KMZ-format file, produced by Giovanni, containing CloudSat reflectivities and displayed in GoogleEarth.

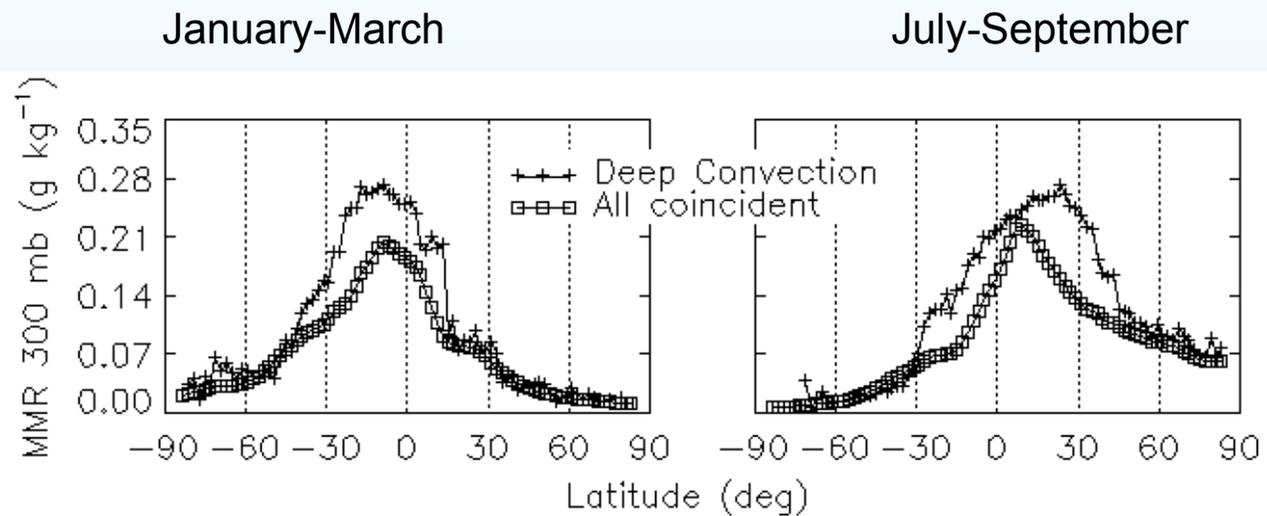


➤ Deep convection and upper tropospheric humidity – a look from the A-Train

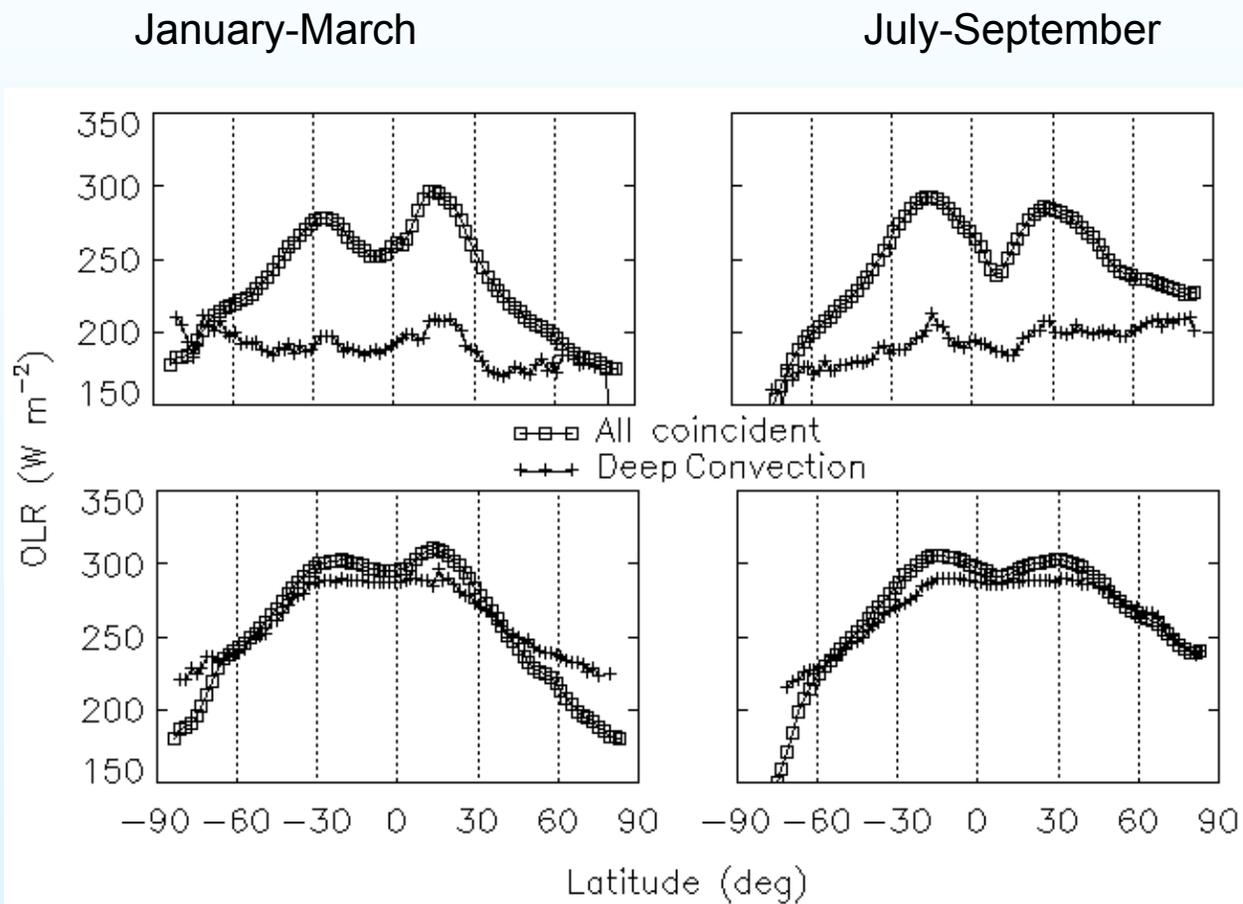
(Submitted to GRL)



Frequency of Deep Convection derived from the CloudSat cloud scenario, from 2007



Zonal averages of AIRS MMR at 300 mb, from all coincident with CPR pixels, and from those collocated with deep convective events only

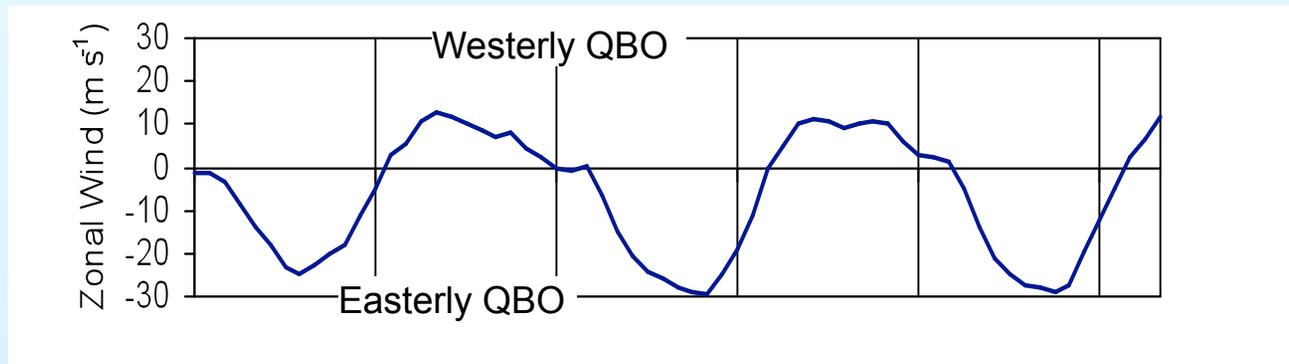
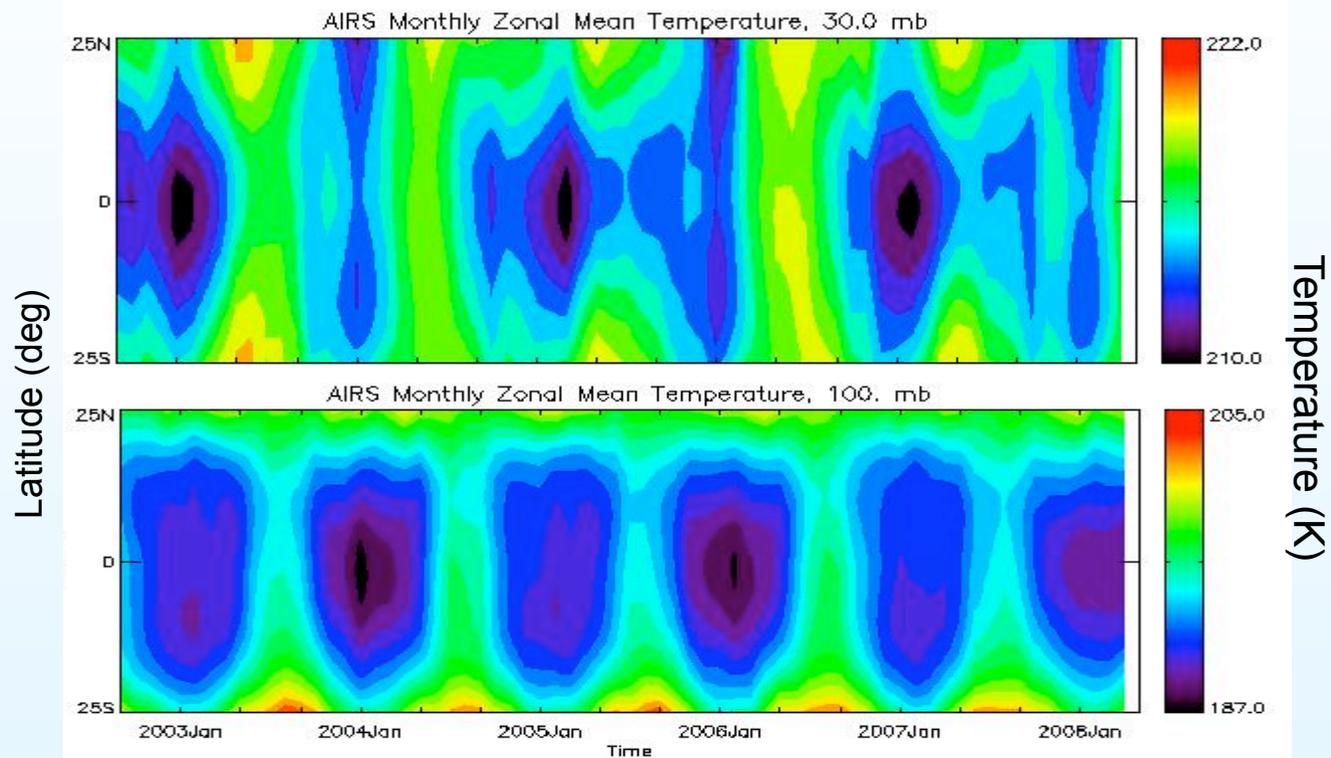


Zonal averages of AIRS all-sky (top), and clear-sky (bottom), OLR from all coincident with CPR pixels, and from those collocated with deep convective events only.

➤ Variability in the middle atmosphere in response to Quasi-Biennial Oscillation (QBO) and solar activity

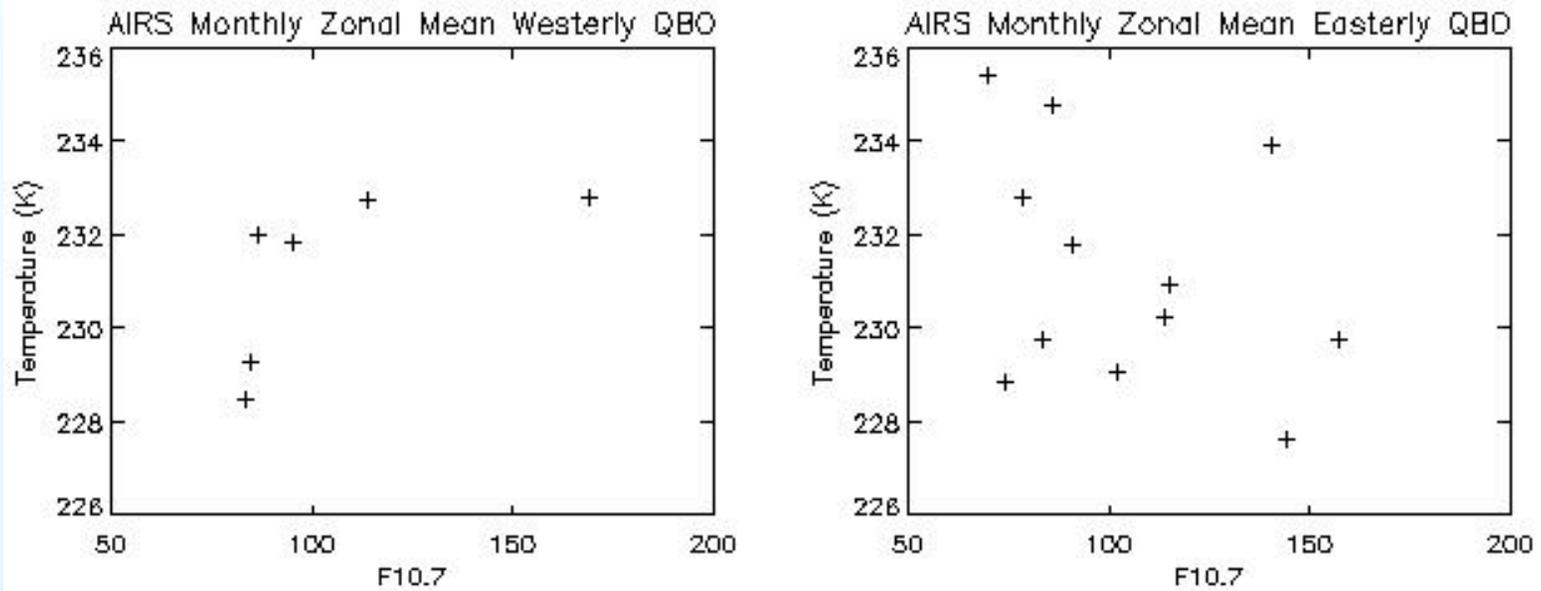
(Proposal submitted to NASA ROSES, PI Young-In Won)

- Changes in the middle atmosphere (stratosphere and mesosphere) are good indicators of climate change.
- Among the variability components are the temperature changes related to solar activity and QBO.
- The proposed work includes utilization of data from AIRS, MLS, and SORCE.



AIRS reveals well the QBO, e.g. in the 30 and 100 mb temperatures (top).
30 mb zonal wind at the Equator (bottom).

AIRS 10 mb Temperatures at the Equator, November-January, 2002-2008

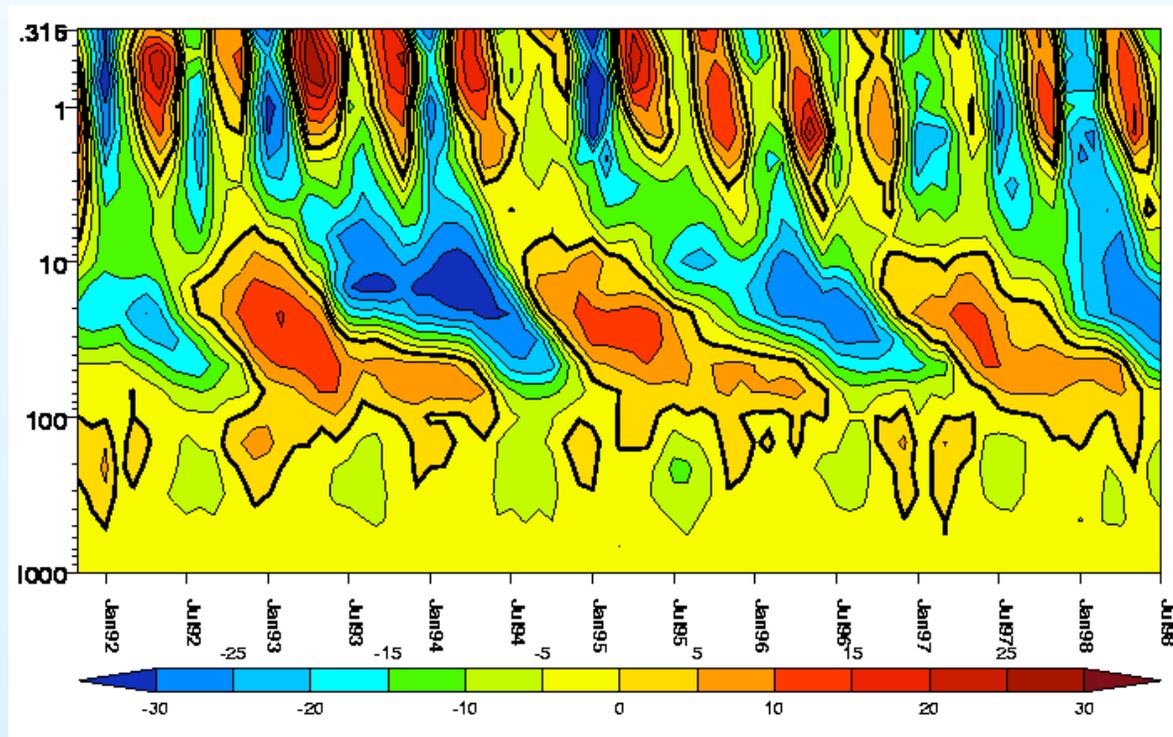


10 mb Temperatures tend to be better related with the solar activity factor F10.7 during the Westerly QBO.

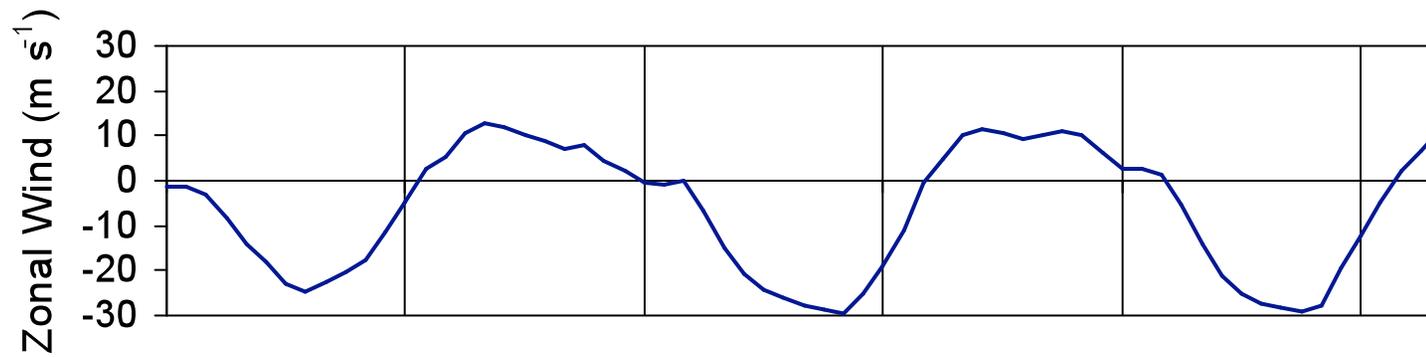
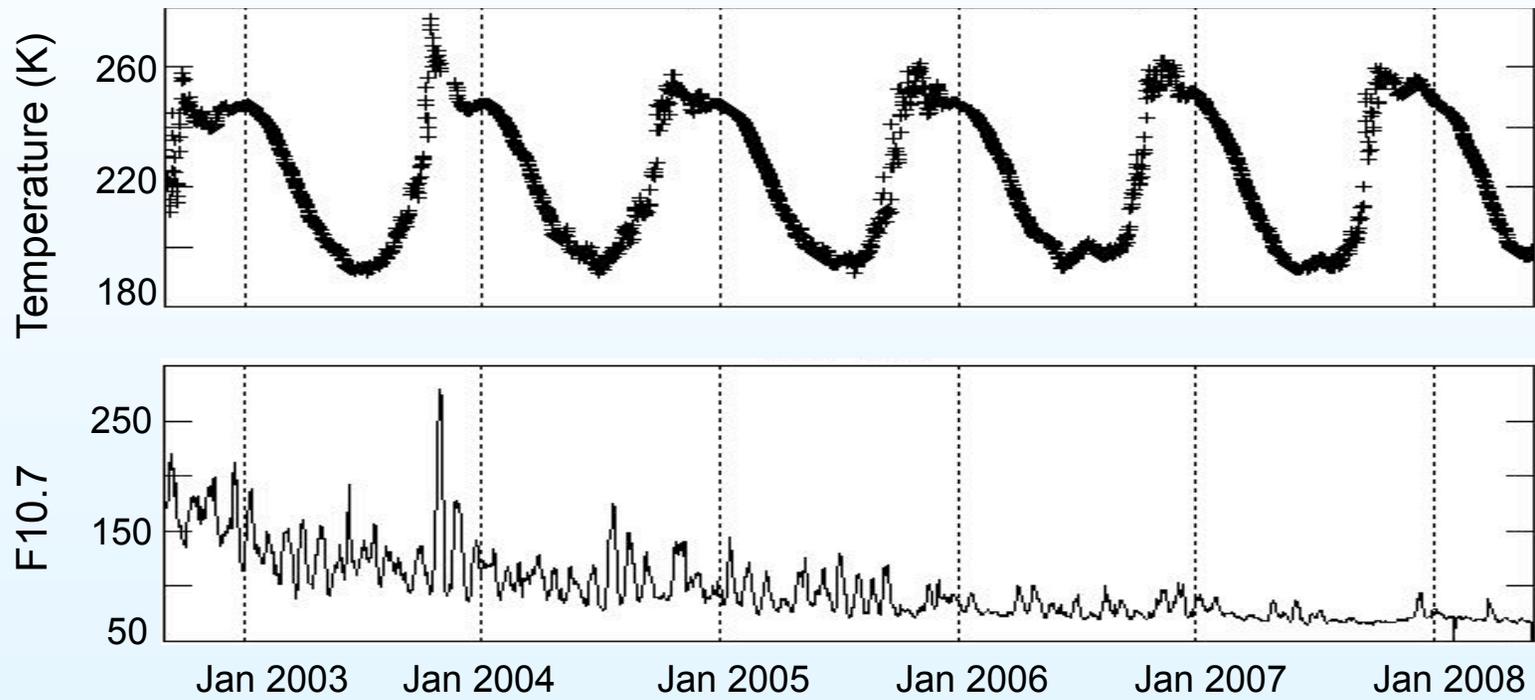
Extra slides

Quasi-Biennial Oscillation (QBO) Feature

QBO: The wind above the equator changes direction on average every ~ 26 months.



- related to upward propagating waves and consequent momentum deposition changes
- solar cycle signature can be identified in connection with the phase of QBO.



30 mb zonal wind at the Equator.