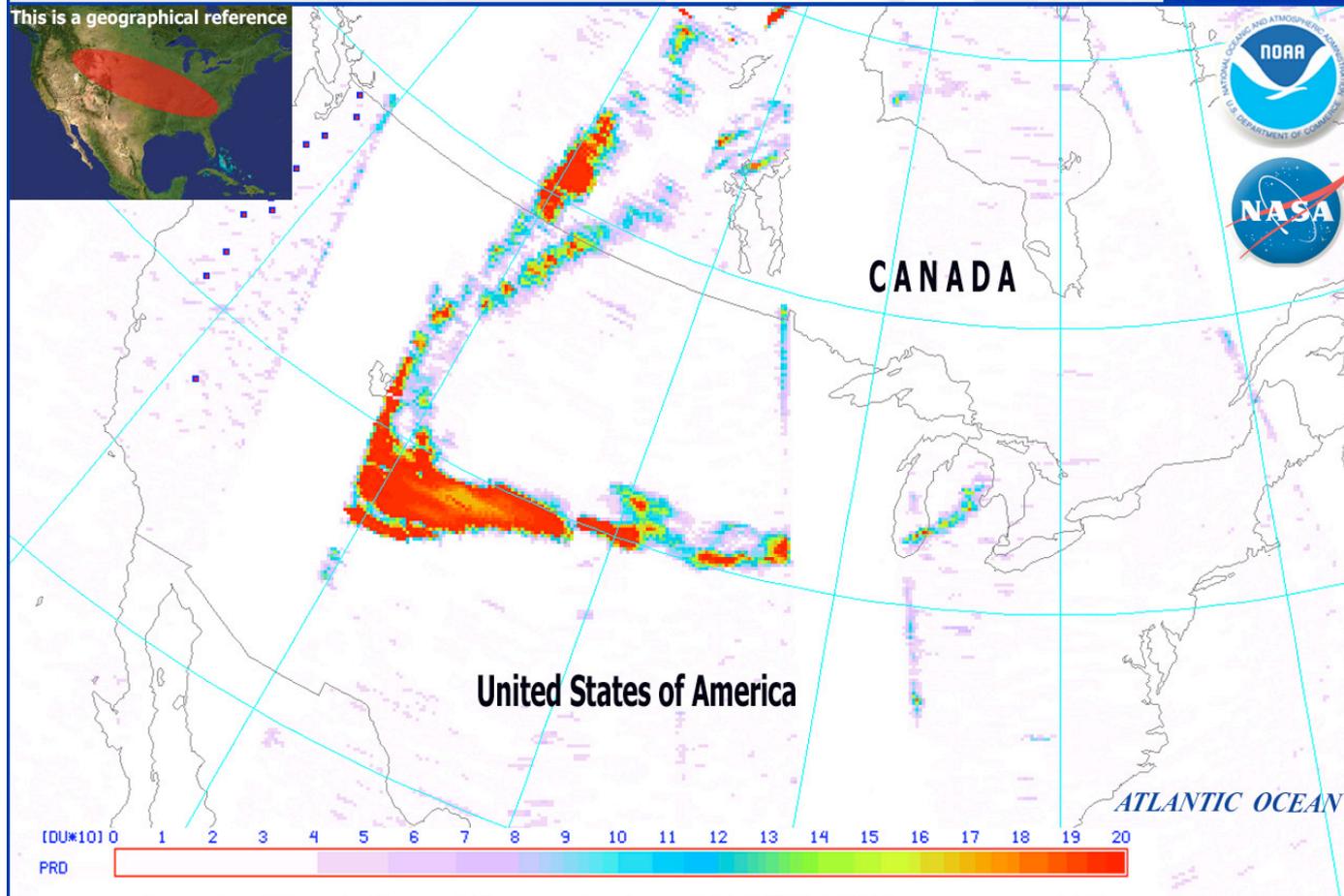


Aura/OMI SO₂

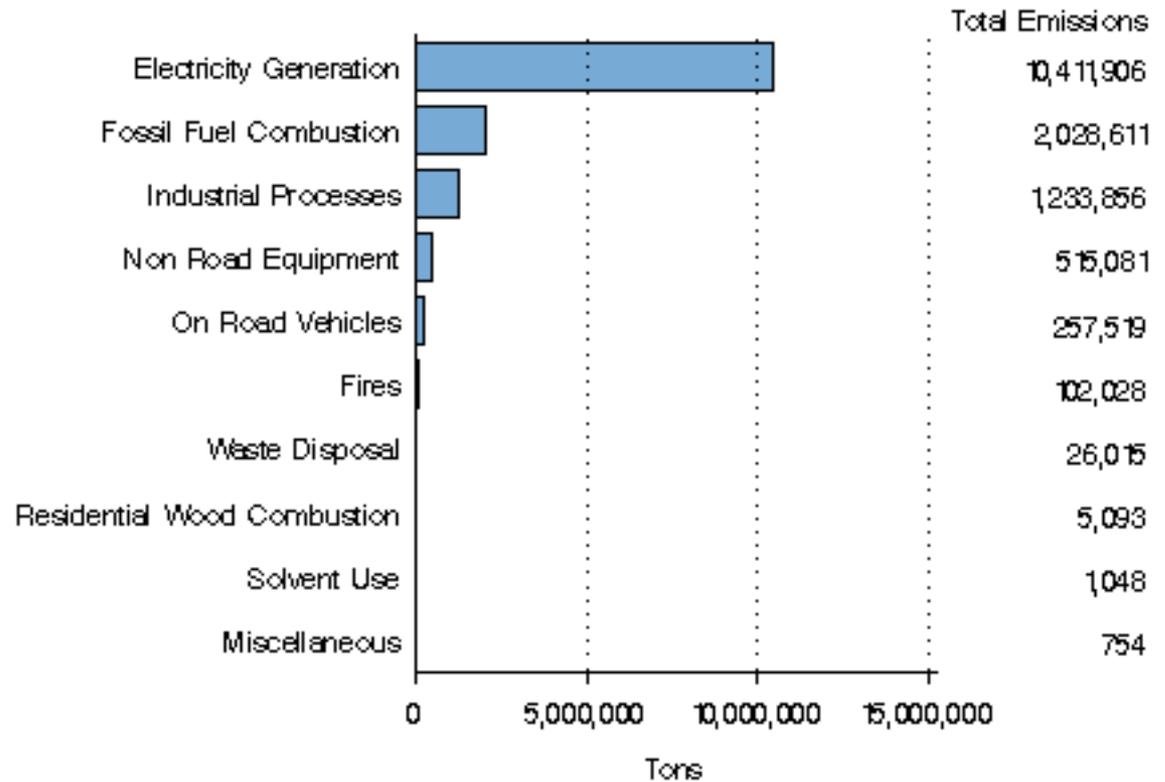
The OMI (Ozone Monitoring Instrument) onboard the Aura satellite is able to detect SO₂ levels in the atmosphere. The image below is a composite which shows the amount of SO₂ across the United States from the eruption of the Redoubt volcano. Further information can be found at: <http://satepsanone.nesdis.noaa.gov/pub/OMI/OMISO2>

Credit: NOAA





National Sulfur Dioxide Emissions by Source Sector in 2002

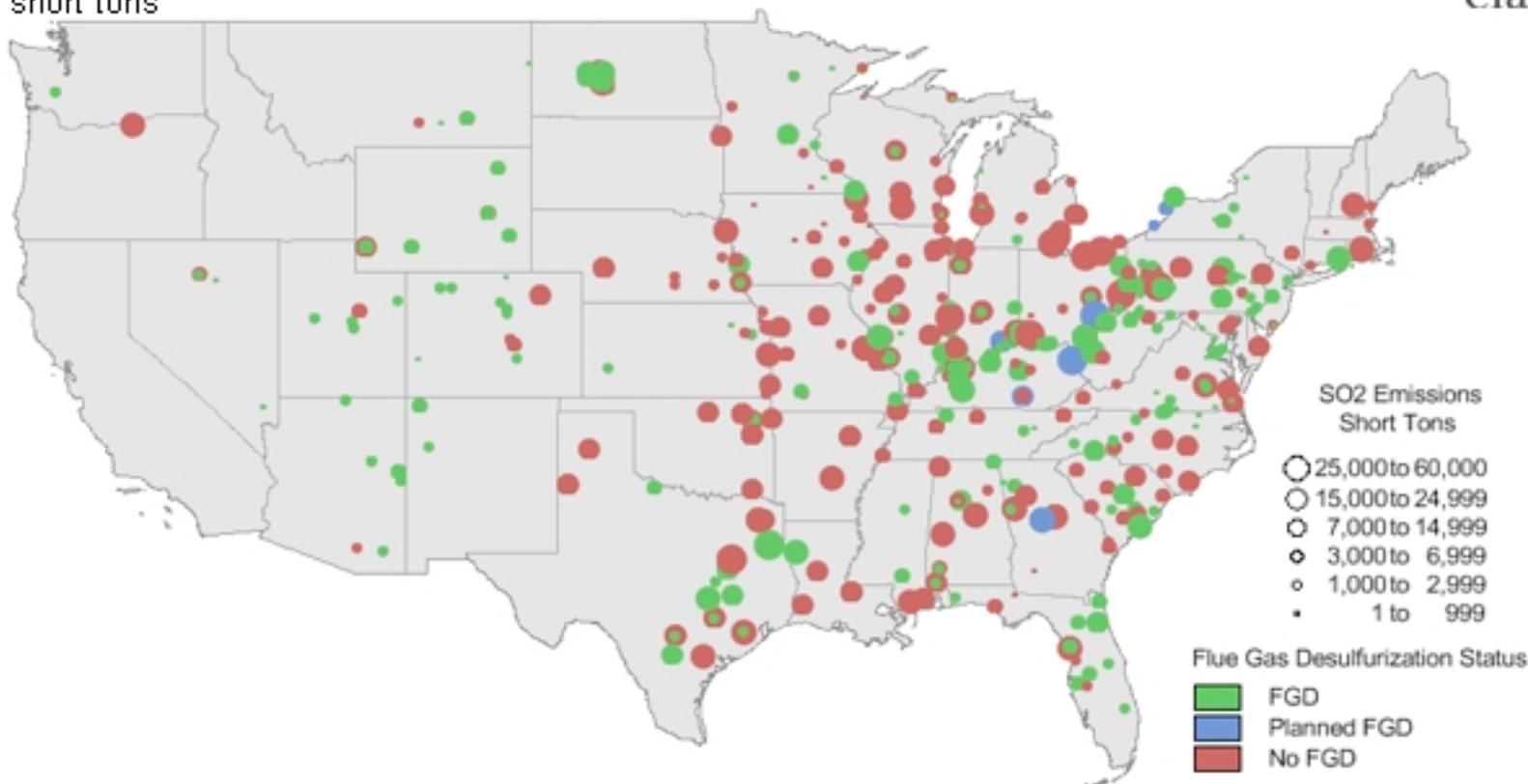


The largest sources of SO₂ emissions are from fossil fuel combustion at power plants (73%) and other industrial facilities (20%).

The Clean Air Act requires EPA to set national ambient air quality standards for “criteria pollutants” - of which SO₂ is one of them.

SO₂ emissions by coal plant, 2010

short tons



http://www.realclearenergy.org/charticles/2012/01/16/sulphur_emissions_concentrated_in_the_midwest_106416.html

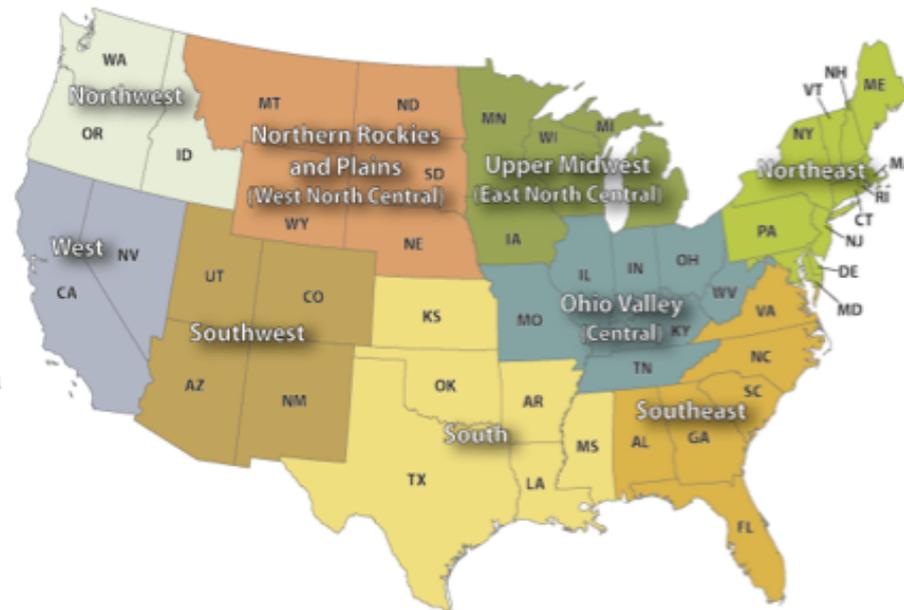
With a lifetime of about a day in the lower troposphere, the amount of SO₂ in the PBL is typically very small (less than 0.5 DU except very near to a source). In non-polluted regions, the amount is near zero.

Select a region: (graph below)

- Central
- Upper Midwest
- Northeast
- South**
- Southeast
- Southwest
- West
- Northern Rockies and Plains

Note: The Northwest region does not have enough data to construct a regional trend.

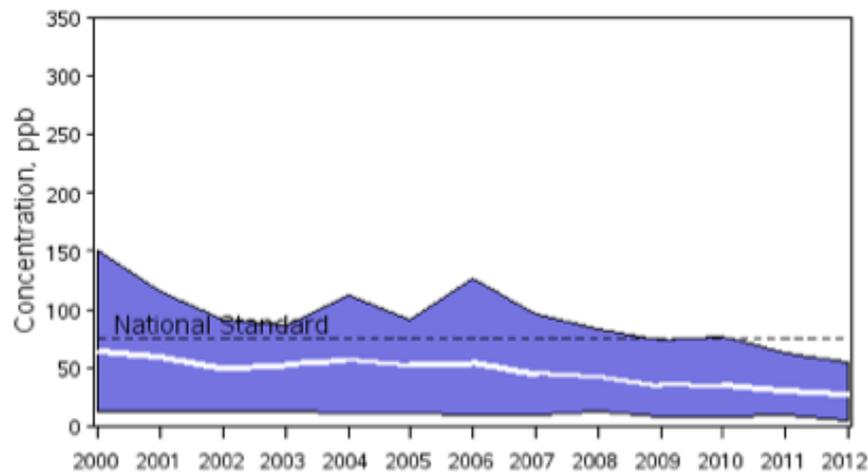
U.S. Climate Regions



Source: NOAA National Climatic Data Center

SO2 Air Quality, 2000 - 2012

(Annual 99th Percentile of Daily Max 1-Hour Average)
South Trend based on 28 Sites

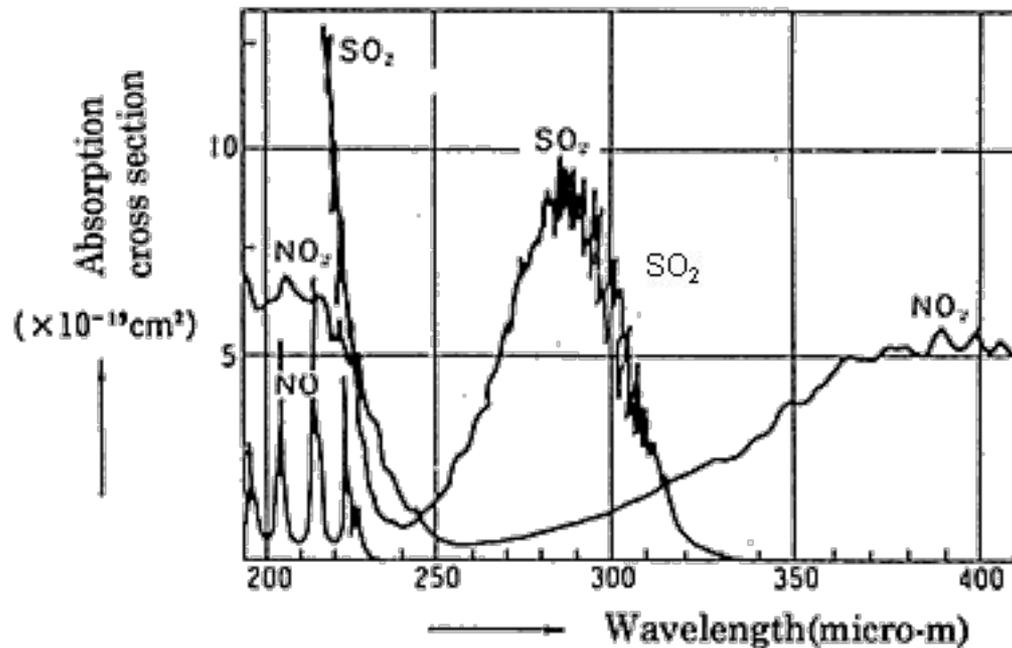
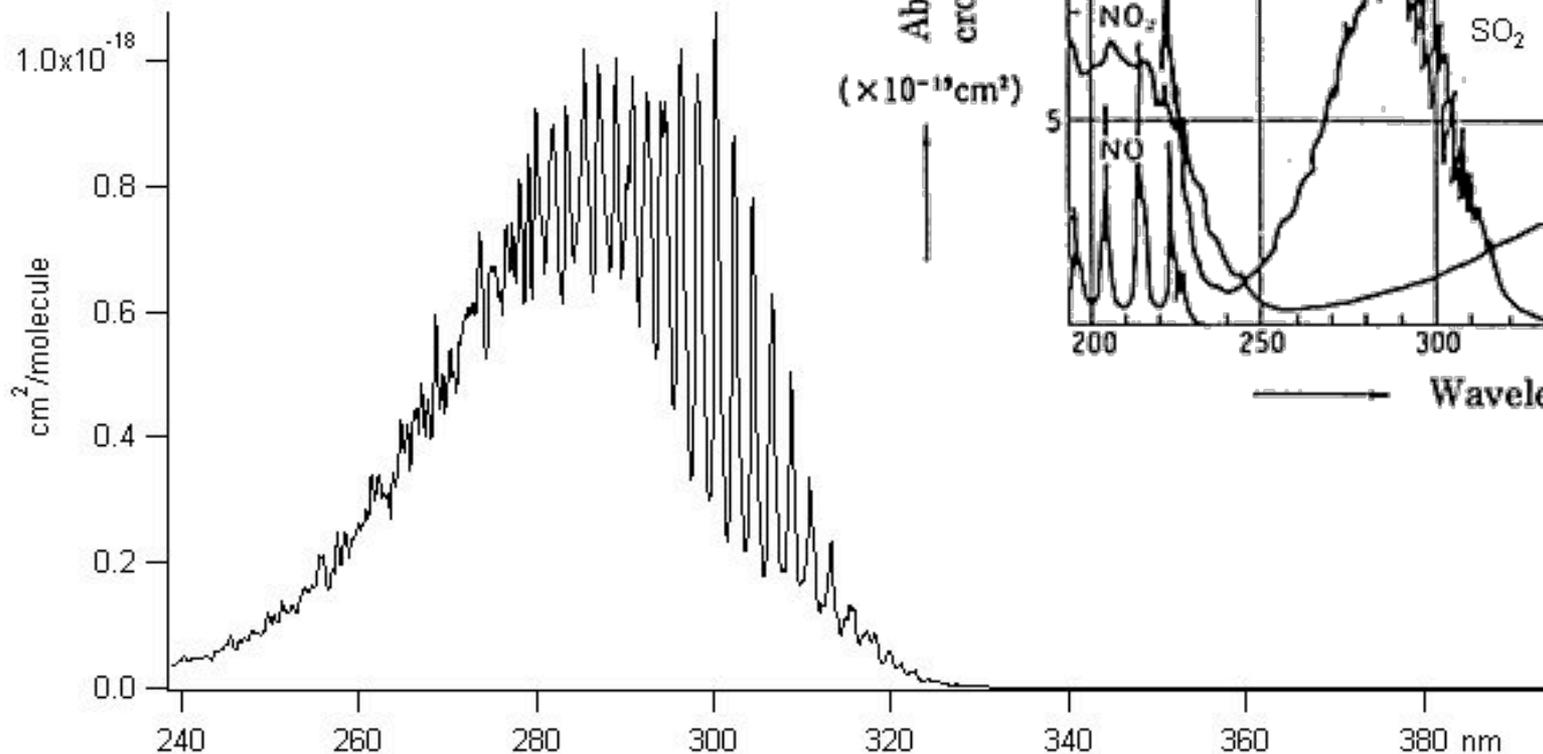


2000 to 2012 : 57% decrease in Regional Average

<http://www.epa.gov/airtrends/sulfur.html>

SO₂ is a strong absorber in the UV part of the spectrum which can be used to retrieve its atmospheric abundance.

For the SO₂ retrieval, a “*band residual difference*” algorithm (BR) has been applied to 4 wavelengths between 310.8 and 314.4 nm



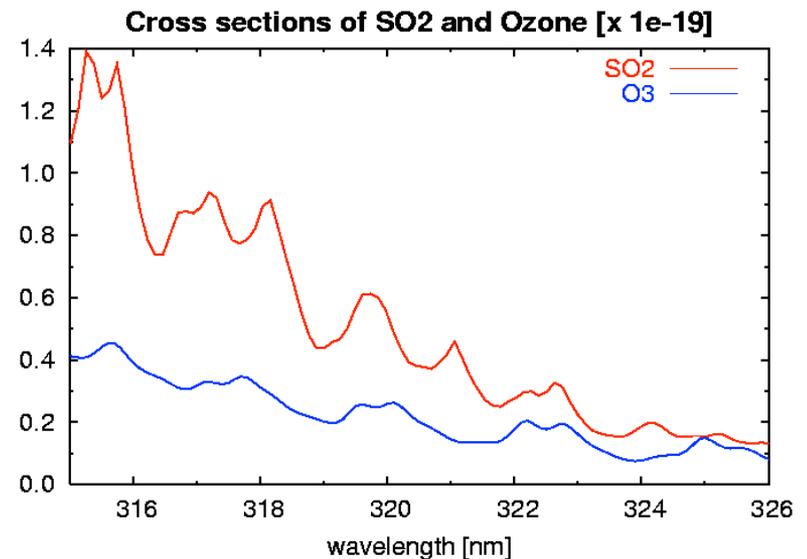
OMI SO₂ Retrieval: In a Nutshell

SO₂ slant column retrieval

- The SO₂ slant column density, usually given in [Dobson Units \(DU\)](#), are retrieved using a "band residual method" for columns in the PBL, using the residuals of the DOAS-based ozone retrieval.
- SO₂ Air Mass Factors are based on GEOS-CHEM model.

Krotkov, N.A., S.A. Carn, A.J. Krueger, P.K. Bhartia, and Kai Yang, *Band Residual Difference Algorithm for Retrieval of SO₂ From the AURA Ozone Monitoring Instrument (OMI)*, IEEE Trans. Geo. Rem. Sens., 2006, Vol. **44**, No. 5, 1259-1266, [doi:10.1109/TGRS.2005.861932](https://doi.org/10.1109/TGRS.2005.861932).

- Retrieval wavelength range = 310-331 nm.
 - In the same wavelength range, however, there is also absorption by ozone (O₃).
- The retrieval algorithm takes into account this "interference" of the two absorption signals when matching the measured spectrum with the absorption cross sections of SO₂ and ozone.



OMI SO₂ Gridded Product Summary

- The OMI data product file contains 4 estimates of the total SO₂ column in Dobson Units.
- These correspond to 4 a-priori (climatological) vertical profiles for the SO₂ used in the retrieval algorithm.
- The 4 vertical profiles represent typical SO₂ vertical distributions for three SO₂ source regimes:

SO ₂ Product	Level	Data Short Name	Sensitivity	Use
PBL SO ₂	L3, 0.25°x0.25°	OMSO2e	< 1 km	Fossil fuel, industry
TRL SO ₂ (Lower Troposphere)	L2G, 0.25°x0.25°	OMSO2G	~ 3 km	Industry outflow
TRM SO ₂ (Mid-Troposphere)	L2G, 0.25°x0.25°	OMSO2G	5 - 10 km	optimized for volcanic degassing with vents at ~5km altitude or above and emissions from effusive eruptions.
STL SO ₂ (Lower Stratosphere)	L2G, 0.25°x0.25°	OMSO2G	15 – 20 km	intended for use with explosive volcanic eruptions

**Note: OMSO2e 'best' product: Screens anomalous values due to cloudiness, high terrain and instrumental effects (row anomaly)
. L2G data are NOT screened.**

TRL, TRM and STL columns are produced with the Linear Fit (LF) Algorithm:

- *Yang, K., N. Krotkov, A. Krueger, S. Carn, P. K. Bhartia, and P. Levelt (2007), Retrieval of Large Volcanic SO₂ columns from the Aura Ozone Monitoring Instrument (OMI): Comparisons and Limitations, J. Geophys. Res., 112, D24S43, doi:10.1029/2007JD008825*

The Band Residual Method algorithm works best in presence of anthropogenical SO₂ – i.e. in the vicinity of industrial activity.

NOTE: The largest errors are expected for cloudy and partially cloudy conditions. Depending on their location - clouds can shield at low altitudes or artificially enhance the signal above them.

Level 1 – Raw

**Highest Resolution,
Difficult**

Level 2 – Orbit

Which level data meets your science objectives ?

Level 3 - Gridded

**Lower Resolution,
Easy**



Level 2 OMSO2 (28 Mb)

Name	Long Name
OMI-Aura_L2-OMS02_2008m0724t2130-o21416_v003-2012m0406t022256.he5	OMI-Aura_L2-OMS02_2008m0724t2130-o21416_v003-2012...
▼ HDFEOS	HDFEOS
▶ ADDITIONAL	HDFEOS/ADDITIONAL
▼ SWATHS	HDFEOS/SWATHS
▼ OMI Total Column Amount SO2	HDFEOS/SWATHS/OMI Total Column Amount SO2
▼ Data Fields	HDFEOS/SWATHS/OMI Total Column Amount SO2/Data Fields
AlgorithmFlag_PBL	Algorithm Flag for PBL
AlgorithmFlag_STL	Algorithm Flag for STL
AlgorithmFlag_TRL	Algorithm Flag for TRL
AlgorithmFlag_TRM	Algorithm Flag for TRM
ChiSquareLfit	Chi-Square for least square fit
CloudPressure	Effective Cloud Pressure
ColumnAmountO3	Best Total Ozone Solution
ColumnAmountSO2_PBL	Vertical Column Amount SO2 (PBL)
ColumnAmountSO2_PBLbrd	Column Amount SO2 (PBL)
ColumnAmountSO2_STL	Vertical Column Amount SO2 (STL)
ColumnAmountSO2_STLbrd	Column Amount SO2 (STL)
ColumnAmountSO2_TRL	Vertical Column Amount SO2 (TRL)
ColumnAmountSO2_TRM	Vertical Column Amount SO2 (TRM)
ColumnAmountSO2_TRMbrd	Column Amount SO2 (TRM)
deltaO3	Ozone adjustment from least square fit
deltaRefl	Reflectivity adjustment from least square fit
dN_dSO2_STL	Umkehr Layer 3 SO2 Sensitivity Ratio, dN/dSO2
dN_dSO2_TRL	Umkehr Layer 0 SO2 Sensitivity Ratio, dN/dSO2
dN_dSO2_TRM	Umkehr Layer 1 SO2 Sensitivity Ratio, dN/dSO2
fc	Mixed LER Model (Cloud Fraction) Parameter
LayerEfficiency	Algorithmic Layer Efficiency
QualityFlags_PBL	Quality Flags for PBL
QualityFlags_STL	Quality Flags for STL
QualityFlags_TRL	Quality Flags for TRL
QualityFlags_TRM	Quality Flags for TRM
RadiativeCloudFraction	Radiative Cloud Fraction
Reflectivity331	Effective Surface Reflectivity at 331 nm
Residual	N-Value Residual
ResidualAdjustment	N-Value Residual Adjustment
Rlambda1st	1st order R vs. wavelength coefficient
Rlambda2nd	2nd order R vs. wavelength coefficient
SO2indexP1	Pair 1 SO2 Index
SO2indexP2	Pair 2 SO2 Index
SO2indexP3	Pair 3 SO2 Index
TerrainPressure	Terrain Pressure
UVAerosolIndex	UV Aerosol Index
Wavelength	Wavelength
▼ Geolocation Fields	HDFEOS/SWATHS/OMI Total Column Amount SO2/Geolocation Fiel
GroundPixelQualityFlags	Ground Pixel Quality Flags
Latitude	Geodetic Latitude
Longitude	Geodetic Longitude
RelativeAzimuthAngle	Relative Azimuth Angle (sun + 180 - view)
SecondsInDay	Seconds after UTC midnight
SolarAzimuthAngle	Solar Azimuth Angle
SolarZenithAngle	Solar Zenith Angle
SpacecraftAltitude	Spacecraft Altitude
SpacecraftLatitude	Spacecraft Latitude
SpacecraftLongitude	Spacecraft Longitude
TerrainHeight	Terrain Height
Time	Time at Start of Scan (TAI93)
ViewingAzimuthAngle	Viewing Azimuth Angle
ViewingZenithAngle	Viewing Zenith Angle
▼ HDFEOS INFORMATION	HDFEOS INFORMATION
ArchivedMetadata	ArchivedMetadata
CoreMetadata	CoreMetadata
StructMetadata.0	StructMetadata.0

Level 3 OMSO2e 0.25x0.25 deg (5.6Mb)

Name	Long Name
OMI-Aura_L3-OMSO2e_2012m0713_v003-2012m0830t080523.he5	OMI-Aura_L3-OMSO2e_2012m0713_v003-2012m0830t08...
HDFEOS	HDFEOS
ADDITIONAL	HDFEOS/ADDITIONAL
GRIDS	HDFEOS/GRIDS
OMI Total Column Amount SO2	HDFEOS/GRIDS/OMI Total Column Amount SO2
Data Fields	HDFEOS/GRIDS/OMI Total Column Amount SO2/Data Fields
ColumnAmountO3	Best Total Ozone Solution
ColumnAmountSO2_PBL	Vertical Column Amount SO2 (PBL)
Latitude	Geodetic Latitude
LineNumber	Line Number of Candidate Scene
Longitude	Geodetic Longitude
OrbitNumber	Orbit Number of Candidate Scene
RadiativeCloudFraction	Radiative Cloud Fraction
RelativeAzimuthAngle	Relative Azimuth Angle (sun + 180 - view)
SceneNumber	Scene Number of Candidate Scene
SlantColumnAmountSO2	Slant Column Amount SO2
SolarZenithAngle	Solar Zenith Angle
TerrainHeight	Terrain Height
Time	Time at Start of Scan (TAI93)
ViewingZenithAngle	Viewing Zenith Angle
HDFEOS INFORMATION	HDFEOS INFORMATION
StructMetadata.0	StructMetadata.0

OMI AQ SO₂ product in the boundary Layer

Data Set Short Name = OMSO2e

Product Level = 3

Begin Date = October 1, 2004

Resolution = 0.25°lon x 0.25°lat

Version = 003

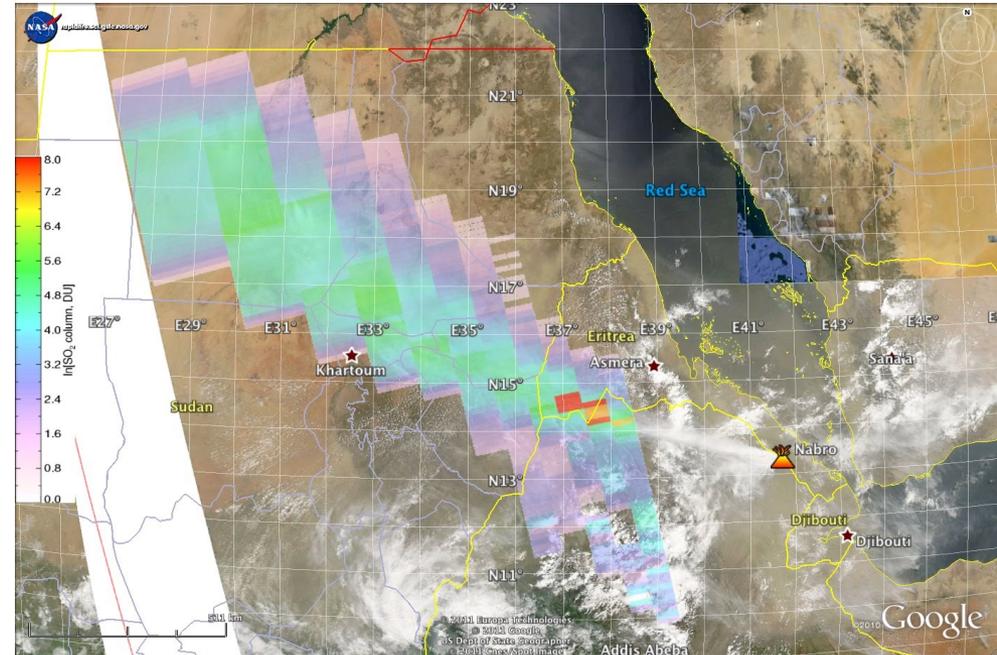
Cloud-screened best measurement

Production Frequency: Daily

Granule (File) Coverage: 15 orbits

File Size(Approx): 5 MB

Contains **best** pixel data, screened for OMI row anomaly, clouds, and other data quality flags.

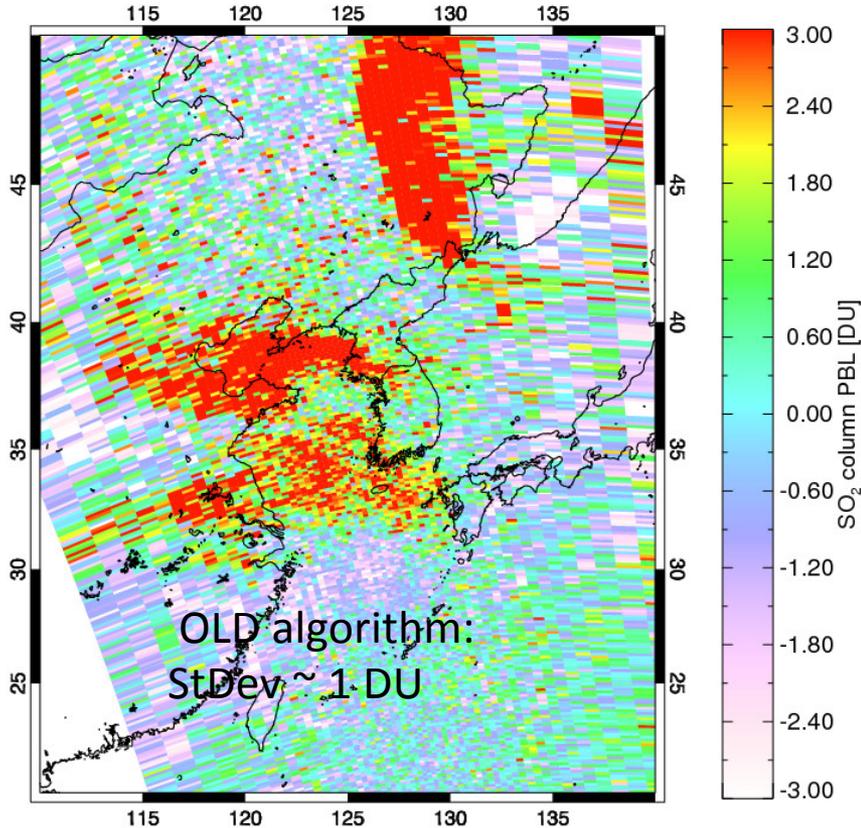


Aqua MODIS visible image of the Nabro (Eritrea) eruption on June 13, 2011 and the SO₂ plume overlaid.

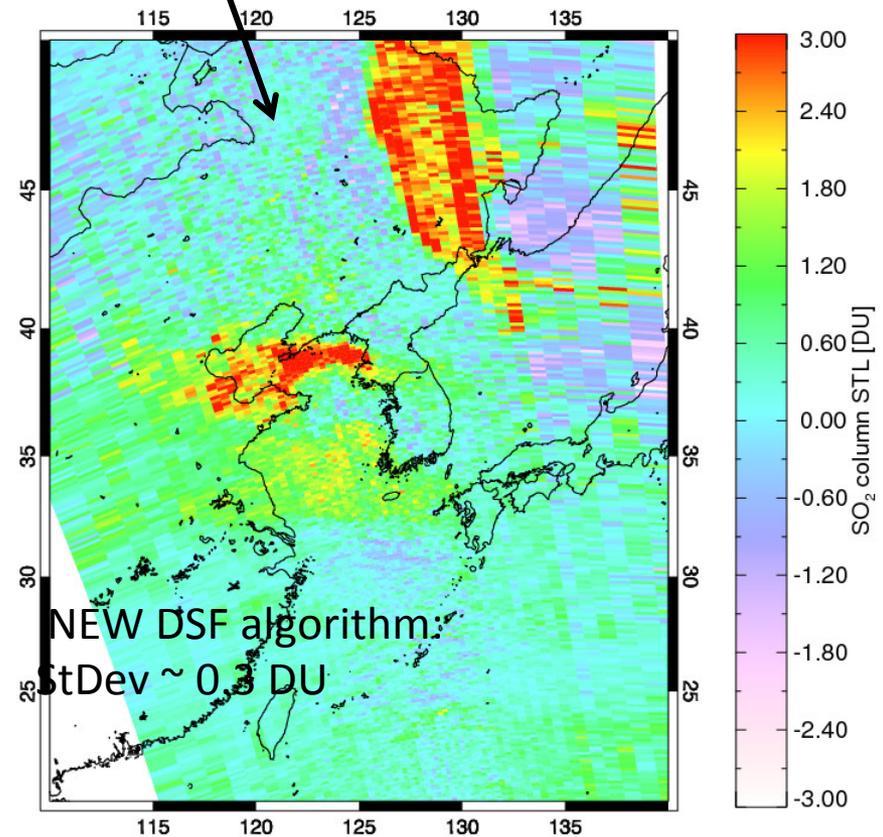
Operational use of direct spectral fitting SO₂ alg.

Aura/OMI - 04/04/2008 04:55-05:04 UT - Orbit 19789

SO₂ mass: 54.58 kt; Area: 478827 km²; SO₂ max: 10.58 DU at lon: 121.91 lat: 39.05 ; 05:01UTC

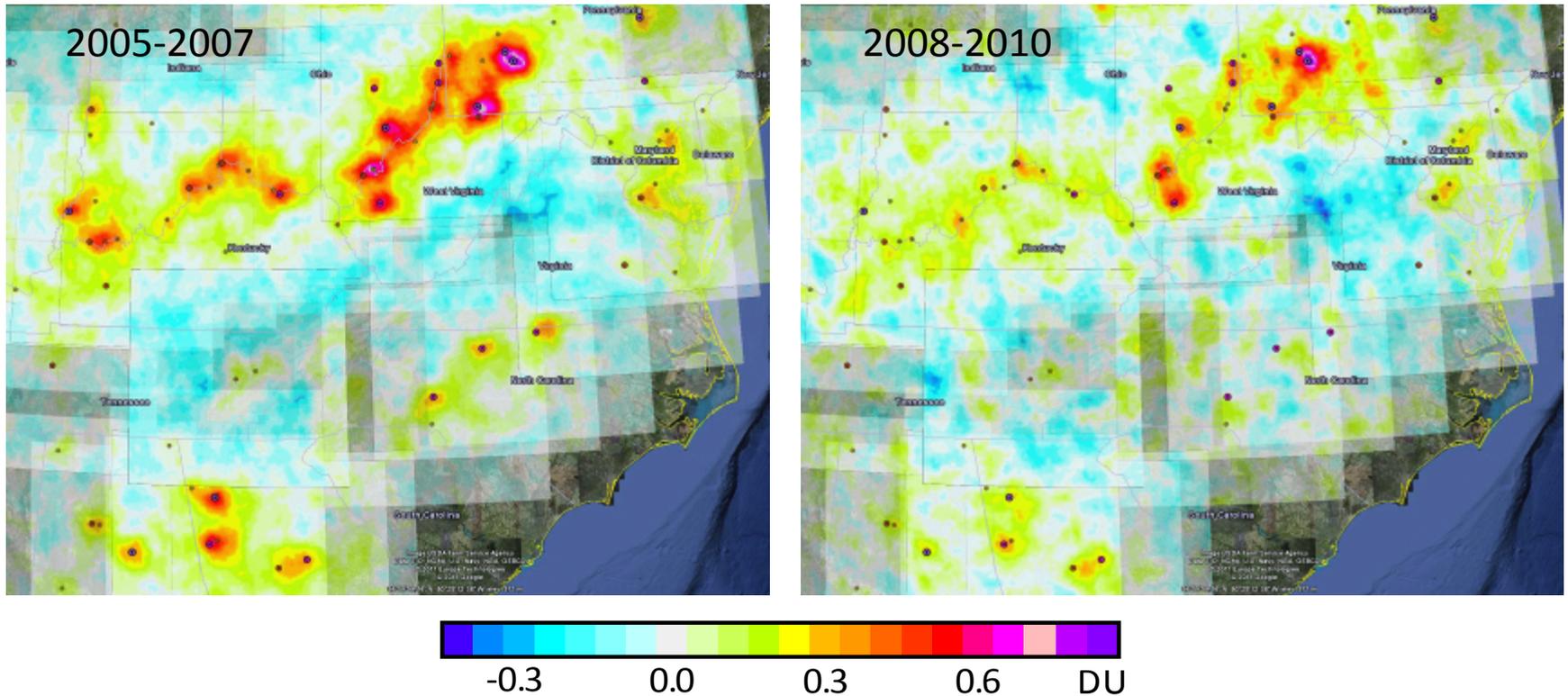


Aura/OMI - 04/04/2008 04:55-05:04 UT - Orbit 19789



Background noise is substantially reduced, allowing better observation of regional pollution and pollution transport in free troposphere [Yang et al., 2011]

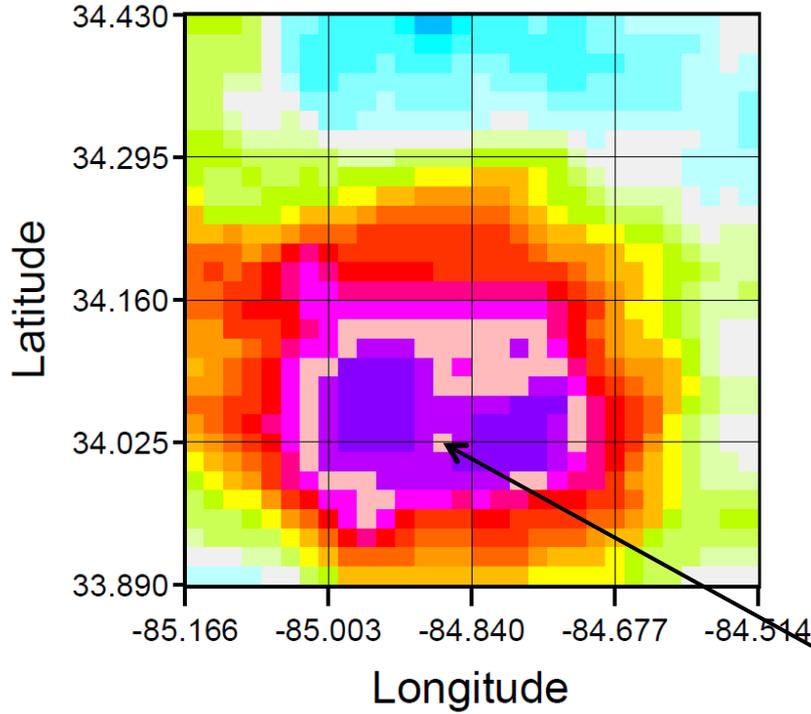
OMI data indicate a 40% decline in SO₂ pollution from the largest US coal power plants



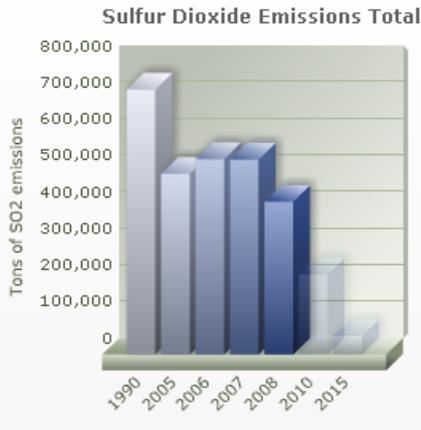
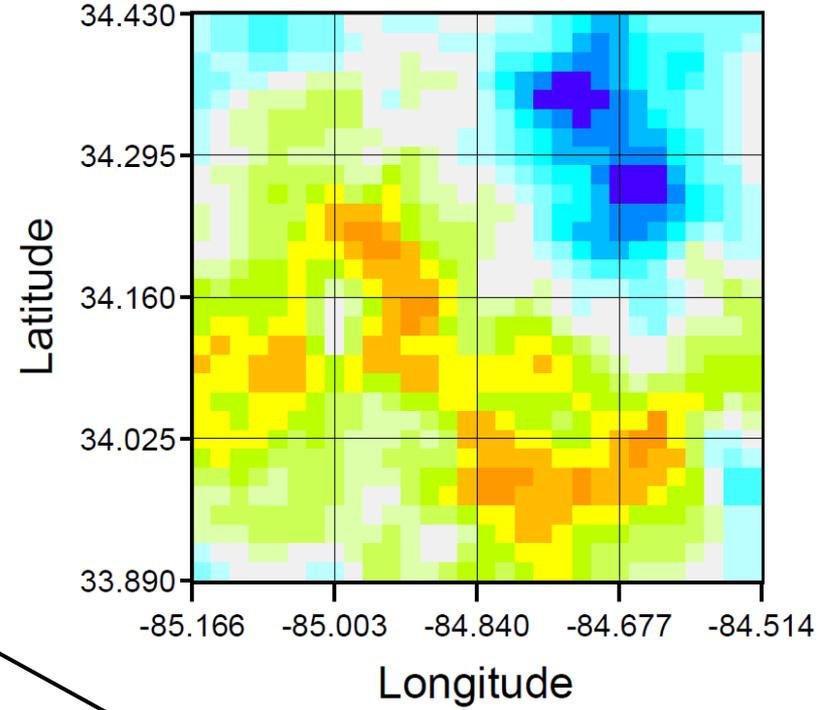
- 1) OMI can see individual SO₂ emission sources in the US
- 2) There is a high correlation (~ 0.9) between SO₂ emissions and OMI data
- 3) OMI confirms a decline in SO₂ emissions as a result of pollution controls

V. Fioletov, C. McLinden, N. Krotkov, M. Moran, K. Yang, Estimation of SO₂ emissions using OMI retrievals, 2011, GRL, under review

US Source #1. Bowen Coal Power Plant, Georgia (3500 MW),
 SO₂ emissions: 170 kT in 2006
 2005-2007

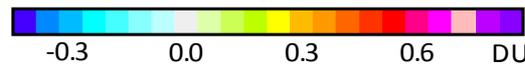


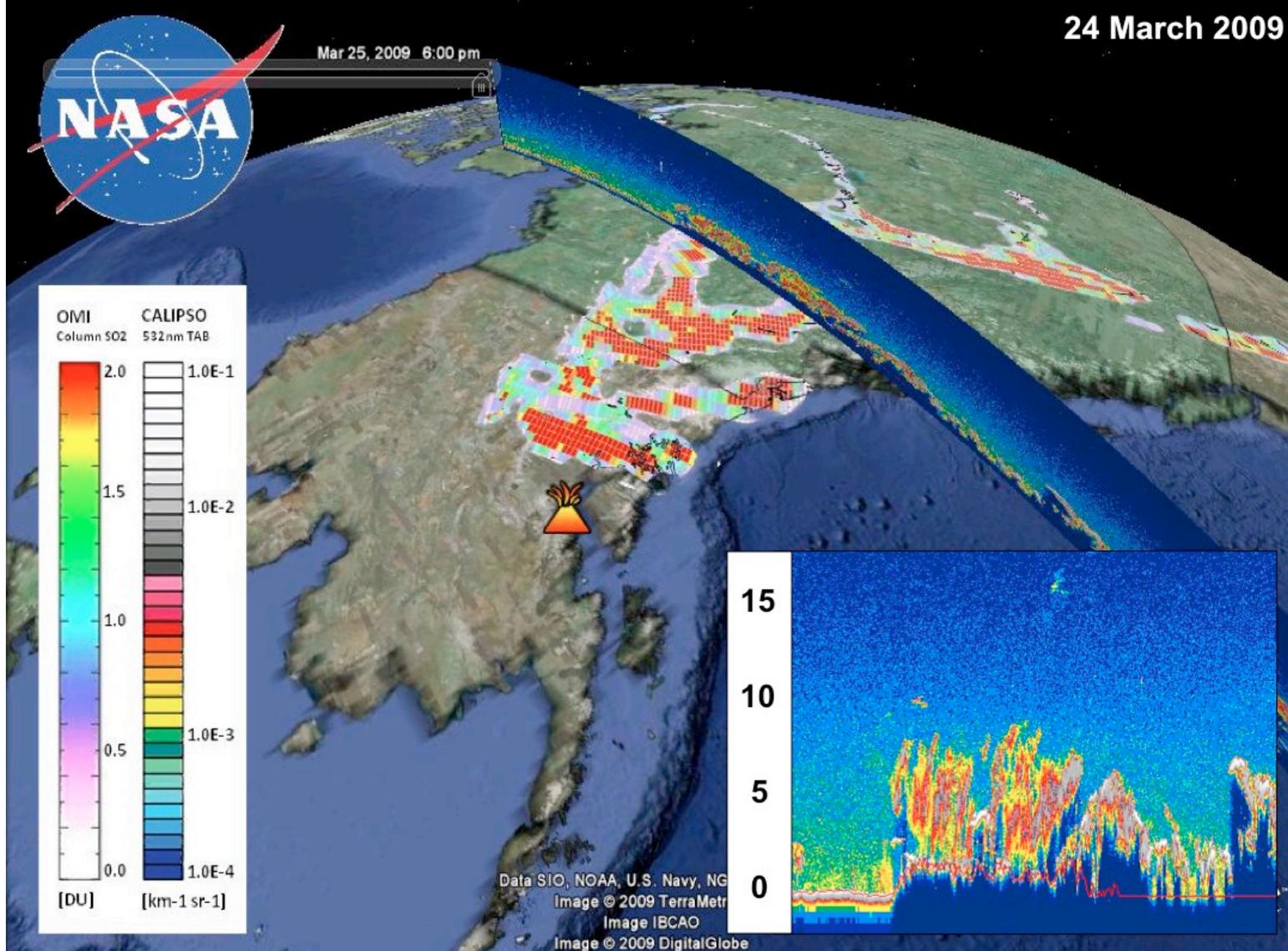
2008-2010



“In 2008, the mammoth construction program yielded the first scrubbers, sophisticated equipment that will reduce our overall systems emissions by as much as 90 percent”

Georgia Power website





Source: <http://sun.aos.wisc.edu/research>

A case study of the 2009 eruption of Mt. Redoubt, AK
The dispersion of volcanic ash was monitored using OMI column SO₂ and CALIPSO backscatter data.



ColumnAmountSO2_STL

2010 Merapi Eruption

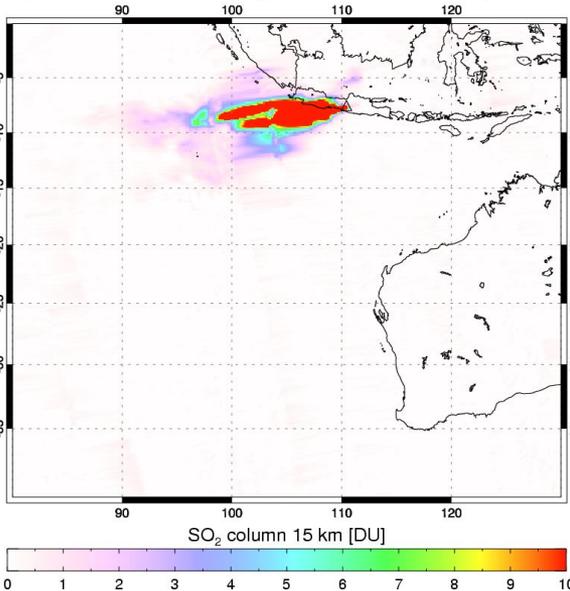


Upper tropospheric and Stratospheric SO₂ column produced by explosive volcanic eruption.

The noise level in background data is about 0.2 DU. This sensitivity has permitted tracking of volcanic SO₂ clouds for great distances from the source.

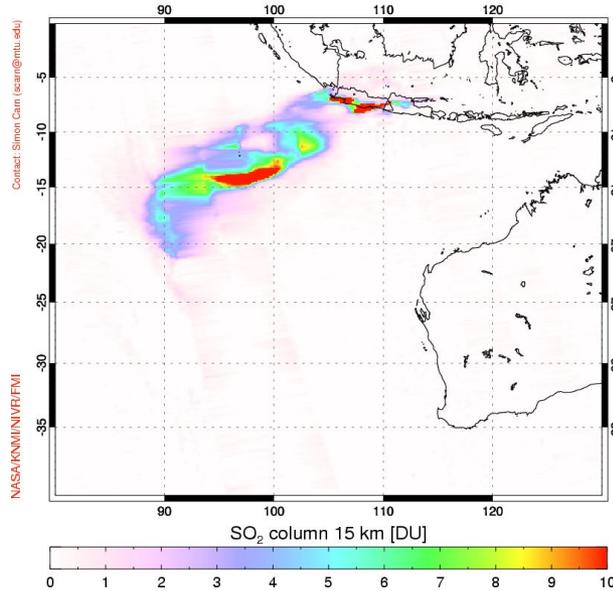
Aura/OMI - 11/05/2010 05:20-08:48 UT

SO₂ mass: 215.34 kt; Area: 2541337 km²; SO₂ max: 55.35 DU at lon: 106.65 lat: -8.03 ; 07:07UTC



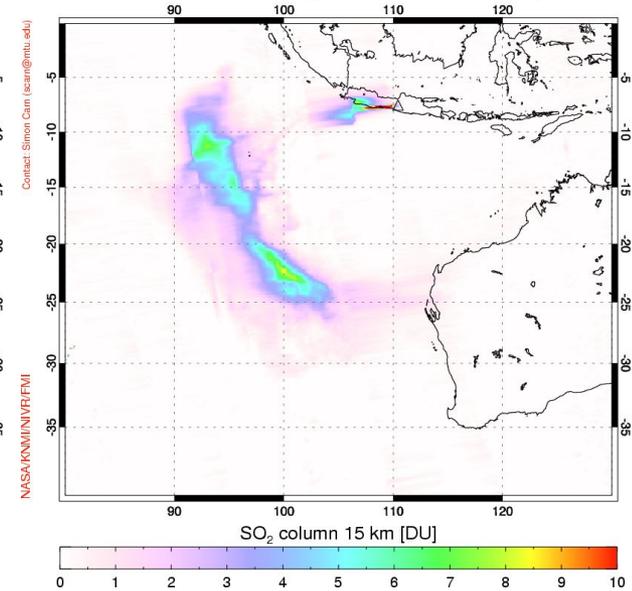
Aura/OMI - 11/06/2010 04:27-09:26 UT

SO₂ mass: 222.69 kt; Area: 3256821 km²; SO₂ max: 37.85 DU at lon: 108.45 lat: -7.65 ; 06:12UTC



Aura/OMI - 11/07/2010 05:08-08:36 UT

SO₂ mass: 206.76 kt; Area: 4568486 km²; SO₂ max: 20.45 DU at lon: 109.64 lat: -7.62 ; 06:55UTC





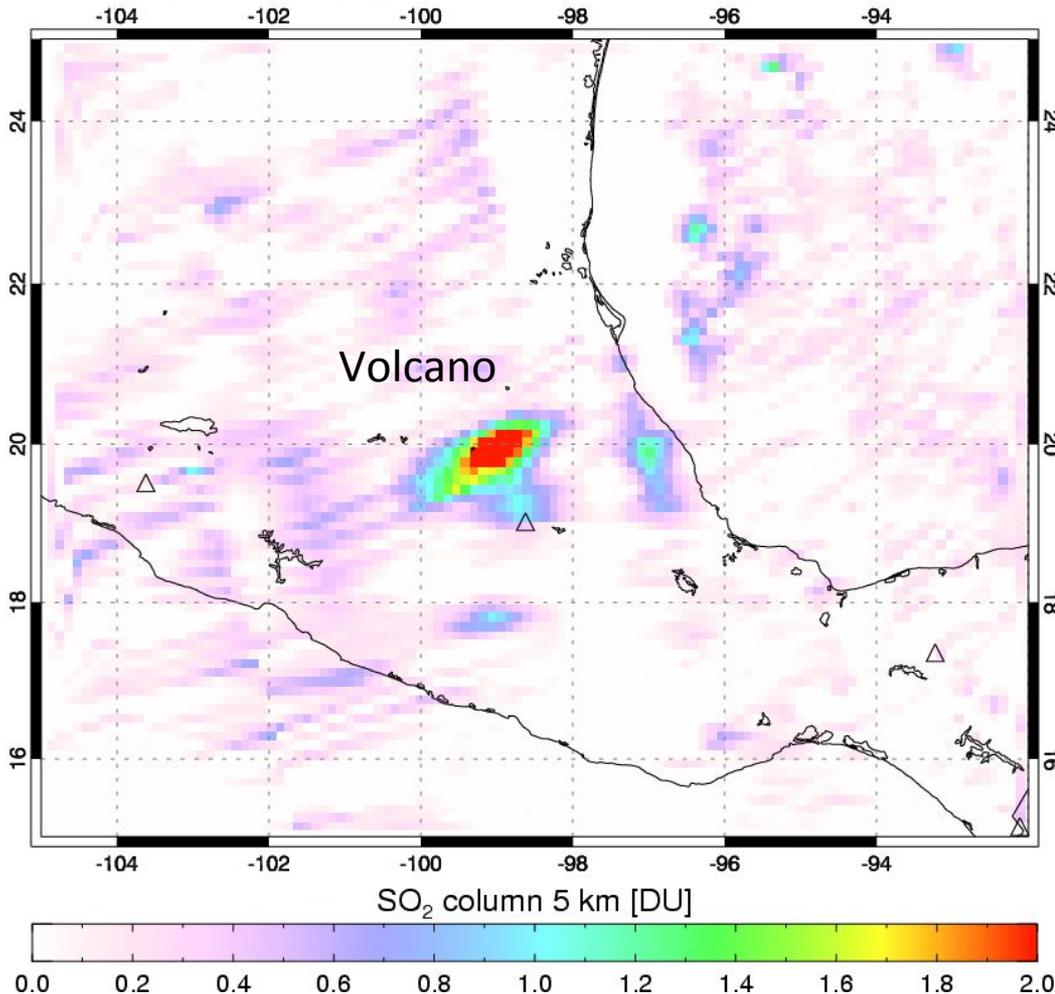
ColumnAmountSO2_TRM

Aura/OMI - 07/18/2007 19:31-21:13 UT

Mass: 0.596 kt; Area: 13652 km²; SO₂ max: 3.04 DU at lon: -98.90 lat: 20.00 ; 19:33UTC

Contact: Simon Carn (scarn@umbc.edu)

NASA/KMI/NIVR/FMI



- Middle tropospheric SO₂ column optimized for typical volcanic degassing and emissions from effusive eruptions.
- The standard deviation of TRM retrievals in background areas is about 0.3 DU at low and mid-latitudes.

Data/Images Access

Global Sulfur Dioxide Monitoring Homepage

- Images, Documentation, Publications and Links

GES-DISC (Goddard Earth Science Data and Information Services Center)

- Level 2, L2G, Level 3 (OMSO2e)
- HDF and NetCDF
- Documentation

GIOVANNI – An interactive visualization tool

- L2G, Level 3 (OMSO2e)
- HDF, ASCII, KML for Google Earth
- Subsetting available



Atmospheric Chemistry and Dynamics Laboratory (Code 614)

Global Sulfur Dioxide Monitoring Home Page

FMI VFD SO₂
maps

Home	News	Past SO ₂ Images	Documentation	Publications	Personnel	Links
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Volcanic Hazards Project

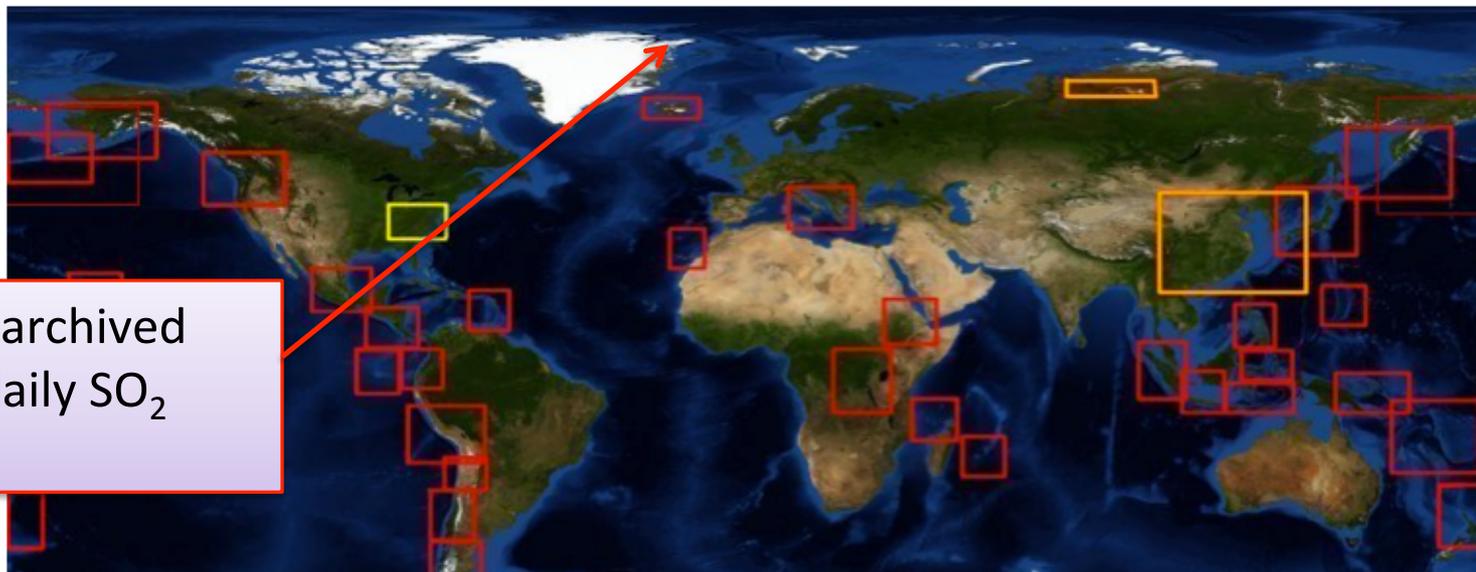
Latest SO₂ eruption alerts NOAA-NESDIS. SACS_BIRA. IASI-ULB.
SO₂ Near Real-Time Images: Real-Time (15 mins). NOAA Near Real-Time (3 hours). AIRS NRT. NASA NRT. SACS-BIRA NRT.

MEaSURES project:

TOMS images (1979-2005) | AIRS images (2003-2004) | OMI images (2004-present) | OMPS images (May 2012-present)

Latest Daily (OMI/OMPS) Images of SO₂ (click on a highlighted rectangle)

Red = daily volcanic regions, orange = daily pollution regions, yellow = long-term pollution images



NASA archived
OMI daily SO₂
maps



OMI Very Fast Delivery Images (over Europe ONLY): <http://omivfd.fmi.fi/volcanic.html>

omi vfd omi very fast delivery



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HOME

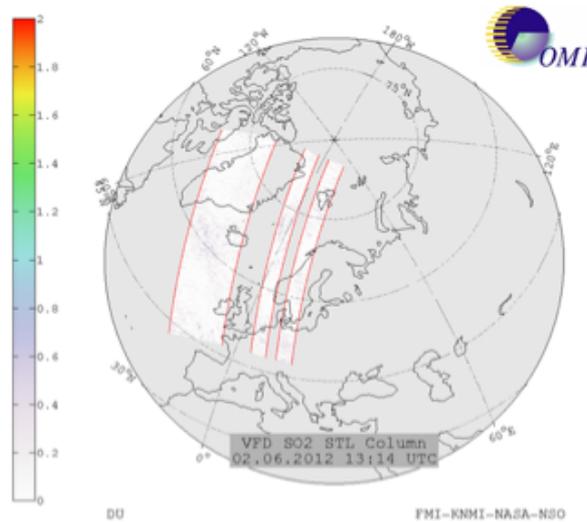
PRODUCTS

CONTACT

FAQ

volcanic products

These products can be used to monitor volcanic eruptions.



[SO2](#) [AI](#) [CF](#)

[SO21](#) [AI1](#) [CF1](#)

[SO22](#) [AI2](#) [CF2](#)

[SO23](#) [AI3](#) [CF3](#)

[SO24](#) [AI4](#) [CF4](#)

[SO25](#) [AI5](#) [CF5](#)

[SO26](#) [AI6](#) [CF6](#)

AI = Aerosol Index

CF = Cloud Fraction



archives

[Image search](#)

[Info about OMI row anomaly](#)

[Volcanic products](#)

[Ozone products](#)

[OMI VFD highlights](#)



Netherlands
Space
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istry and Dynamics Laboratory (Code 614)

Dioxide Monitoring Home Page

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Volcanic Hazards Project

Latest SO₂ eruption alerts NOAA-NESDIS. SACS_BIRA. IASI-ULB.

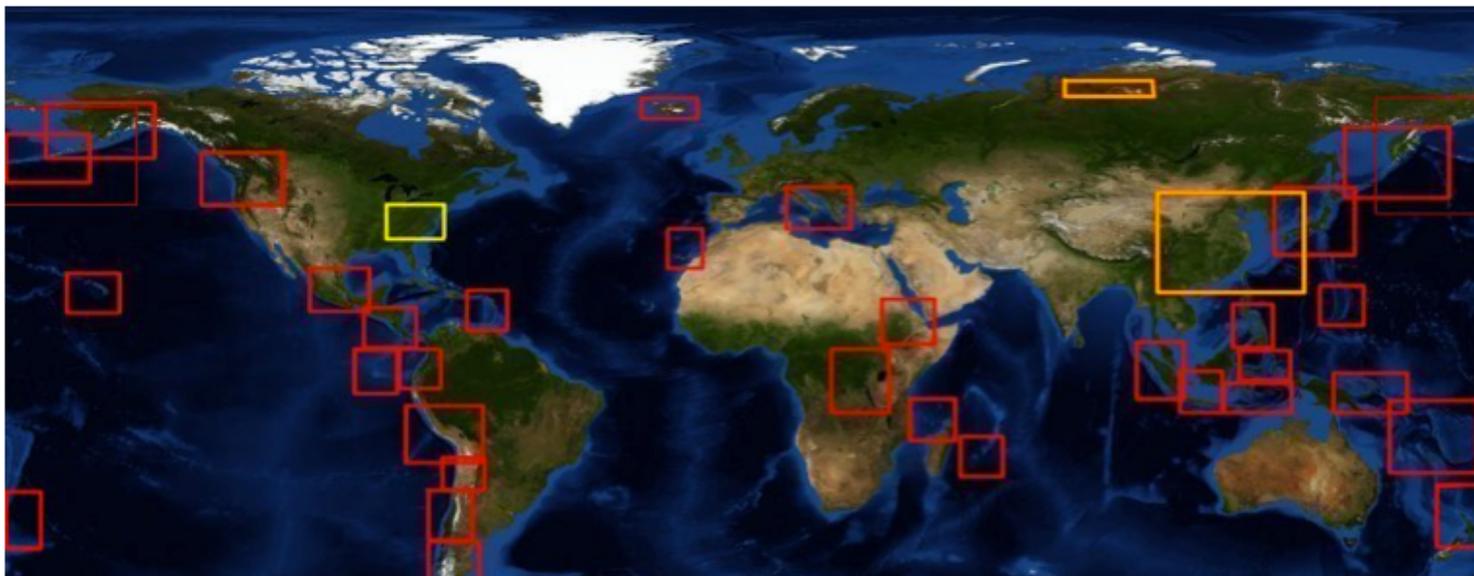
SO₂ Near Real-Time Images: Real-Time (15 mins) NOAA Near Real-Time (3 hours). AIRS NRT. NASA NRT. SACS-BIRA NRT.

MEaSURES project:

TOMS images (1979-2005) | AIRS images (2003-2004) | OMI images (2004-present) | OMPS images (May 2012-present)

Latest Daily (OMI/OMPS) Images of SO₂ (click on a highlighted rectangle)

Red = daily volcanic regions, orange = daily pollution regions, yellow = long-term pollution images



NOAA Level 2 volcanic SO₂ images and archived data (various formats, specific sites)



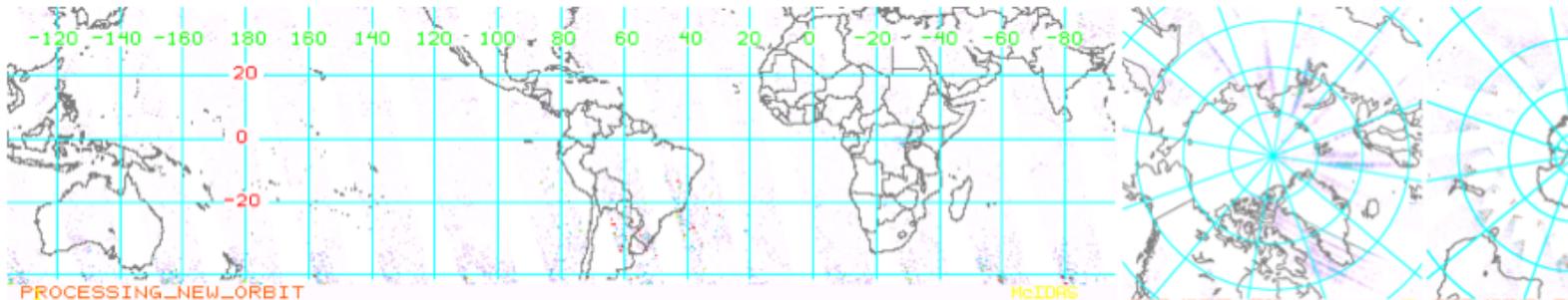
OMI near real-time SO₂ maps:

<http://satepsanone.nesdis.noaa.gov/pub/OMI/OMISO2/index.html>



Latest OMI SO₂ Column 5Km - 24-Hour Composite Images

[Important Information for OMI Data Users](#)



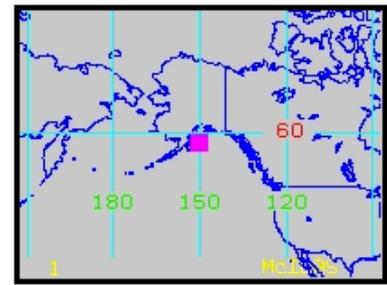
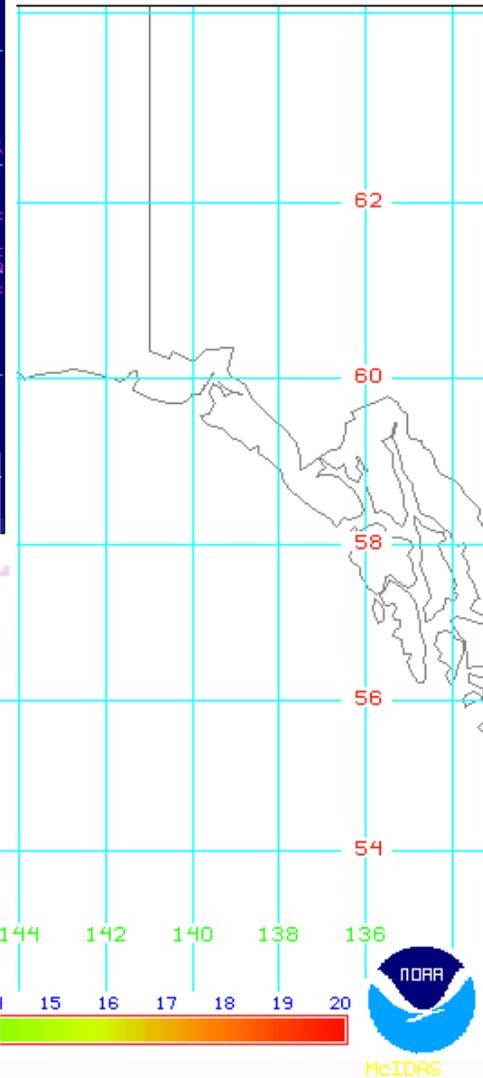
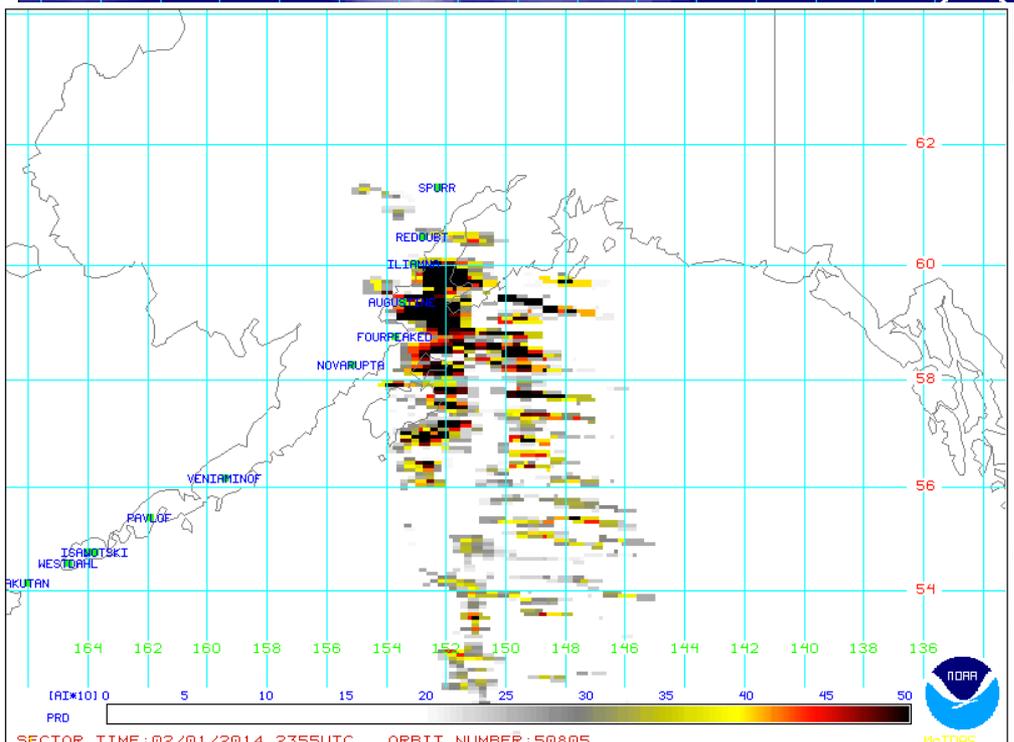
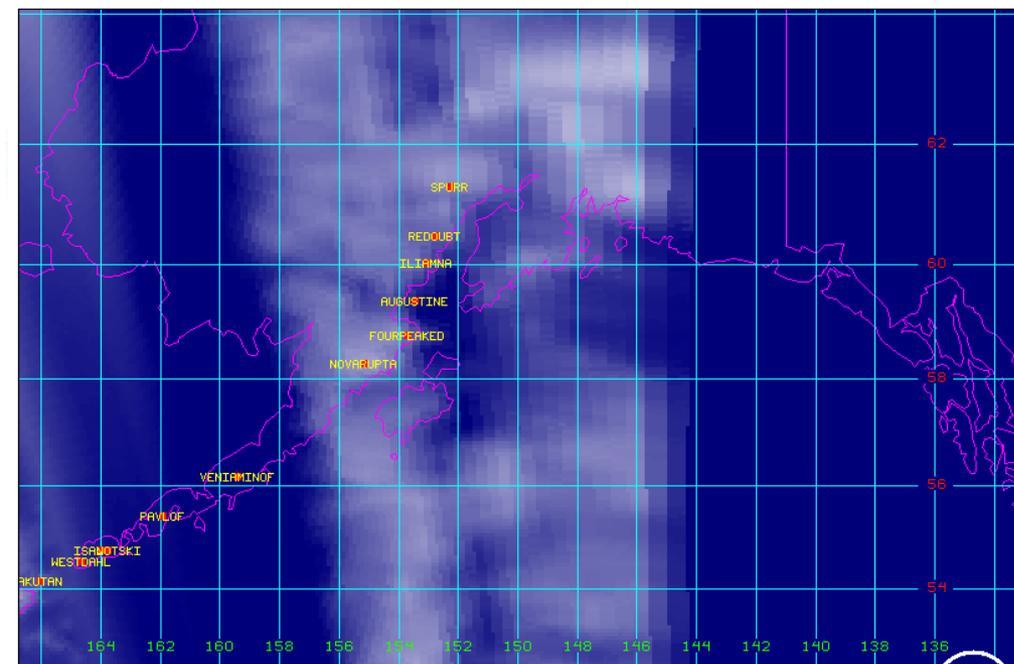
Current OMI SO ₂ Composites	Tropics	Northern Hemisphere	Southern Hemisphere
Current & Previous Digital Images GeoTiff, NetCDF, McIDAS, GIF	Tropics	Northern Hemisphere	Southern Hemisphere

Latest OMI_SO₂ Column 5Km by Volcano

Alaska, USA	Aleutian Islands, Alaska, USA	Anatahan, Mariana Islands	Cascade
Central America	Comoro Islands	Eastern China	Ecuador
Etna, Sicily, Italy	Galapagos Islands, Ecuador	Hawaii, USA	Iceland
Japan	Java, Indonesia	Kamchatka, Russia	Mexico
Montserrat, West Indies	New Zealand	North Western Europe	Northern Atlantic
Northern Chile	Nyiragongo, DR Congo	Peru	Philippines
Papua New Guinea	Red Sea	Reunion Island	Southern Chile
Sulawesi Sangihe, Indonesia	Sumatra, Indonesia	Tanzania	Vanuatu, South Pacific

For OMI and AIRS SO₂ Alerts check the [OMI SO₂ Alert Site](#) and the [AIRS SO₂ Alert Site](#)

For science quality products check with [NASA GES DISC](#) and with the [NASA Global Sulfur Dioxide Monitoring](#)



Latest Data:

TIME : SENSOR	OMI		
Current	SO2	CLOUD	AI
Previous 1	SO2	CLOUD	AI
Previous 2	SO2	CLOUD	AI
Previous 3	SO2	CLOUD	AI
Previous 4	SO2	CLOUD	AI
Previous 5	SO2	CLOUD	AI
Previous 6	SO2	CLOUD	AI
Previous 7	SO2	CLOUD	AI

GeoTiff, NetCDF, McIDAS and JPEG formats:

[\[SO2 \]](#) [\[AI \]](#)

[BACK TO MAIN PAGE](#)



SO2 Product for Alaska

Right Click to Download File

GeoTiff	NetCDF	McIDAS	GIF
GEOTIFF-Alaska-OMI-SO2-20140203-0038.tif	NetCDF-Alaska-OMI-SO2-20140203-0038.nc.gz	AREA-Alaska-OMI-SO2-20140203-0038.gz	Alaska-OMI-SO2-20140203-0038.gif
GEOTIFF-Alaska-OMI-SO2-20140202-2259.tif	NetCDF-Alaska-OMI-SO2-20140202-2259.nc.gz	AREA-Alaska-OMI-SO2-20140202-2259.gz	Alaska-OMI-SO2-20140202-2259.gif
GEOTIFF-Alaska-OMI-SO2-20140202-2122.tif	NetCDF-Alaska-OMI-SO2-20140202-2122.nc.gz	AREA-Alaska-OMI-SO2-20140202-2122.gz	Alaska-OMI-SO2-20140202-2122.gif
GEOTIFF-Alaska-OMI-SO2-20140201-2355.tif	NetCDF-Alaska-OMI-SO2-20140201-2355.nc.gz	AREA-Alaska-OMI-SO2-20140201-2355.gz	Alaska-OMI-SO2-20140201-2355.gif
GEOTIFF-Alaska-OMI-SO2-20140201-2217.tif	NetCDF-Alaska-OMI-SO2-20140201-2217.nc.gz	AREA-Alaska-OMI-SO2-20140201-2217.gz	Alaska-OMI-SO2-20140201-2217.gif
GEOTIFF-Alaska-OMI-SO2-20140201-2041.tif	NetCDF-Alaska-OMI-SO2-20140201-2041.nc.gz	AREA-Alaska-OMI-SO2-20140201-2041.gz	Alaska-OMI-SO2-20140201-2041.gif
GEOTIFF-Alaska-OMI-SO2-20140131-2312.tif	NetCDF-Alaska-OMI-SO2-20140131-2312.nc.gz	AREA-Alaska-OMI-SO2-20140131-2312.gz	Alaska-OMI-SO2-20140131-2312.gif
GEOTIFF-Alaska-OMI-SO2-20140131-2134.tif	NetCDF-Alaska-OMI-SO2-20140131-2134.nc.gz	AREA-Alaska-OMI-SO2-20140131-2134.gz	Alaska-OMI-SO2-20140131-2134.gif
GEOTIFF-Alaska-OMI-SO2-20140130-2229.tif	NetCDF-Alaska-OMI-SO2-20140130-2229.nc.gz	AREA-Alaska-OMI-SO2-20140130-2229.gz	Alaska-OMI-SO2-20140130-2229.gif
GEOTIFF-Alaska-OMI-SO2-20140130-2052.tif	NetCDF-Alaska-OMI-SO2-20140130-2052.nc.gz	AREA-Alaska-OMI-SO2-20140130-2052.gz	Alaska-OMI-SO2-20140130-2052.gif
GEOTIFF-Alaska-OMI-SO2-20140129-0020.tif	NetCDF-Alaska-OMI-SO2-20140129-0020.nc.gz	AREA-Alaska-OMI-SO2-20140129-0020.gz	Alaska-OMI-SO2-20140129-0020.gif
GEOTIFF-Alaska-OMI-SO2-20140128-2241.tif	NetCDF-Alaska-OMI-SO2-20140128-2241.nc.gz	AREA-Alaska-OMI-SO2-20140128-2241.gz	Alaska-OMI-SO2-20140128-2241.gif
GEOTIFF-Alaska-OMI-SO2-20140128-2104.tif	NetCDF-Alaska-OMI-SO2-20140128-2104.nc.gz	AREA-Alaska-OMI-SO2-20140128-2104.gz	Alaska-OMI-SO2-20140128-2104.gif
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GEOTIFF-Alaska-OMI-SO2-20140125-2349.tif	NetCDF-Alaska-OMI-SO2-20140125-2349.nc.gz	AREA-Alaska-OMI-SO2-20140125-2349.gz	Alaska-OMI-SO2-20140125-2349.gif
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GEOTIFF-Alaska-OMI-SO2-20140121-2235.tif	NetCDF-Alaska-OMI-SO2-20140121-2235.nc.gz	AREA-Alaska-OMI-SO2-20140121-2235.gz	Alaska-OMI-SO2-20140121-2235.gif
GEOTIFF-Alaska-OMI-SO2-20140121-2058.tif	NetCDF-Alaska-OMI-SO2-20140121-2058.nc.gz	AREA-Alaska-OMI-SO2-20140121-2058.gz	Alaska-OMI-SO2-20140121-2058.gif
GEOTIFF-Alaska-OMI-SO2-20140120-2330.tif	NetCDF-Alaska-OMI-SO2-20140120-2330.nc.gz	AREA-Alaska-OMI-SO2-20140120-2330.gz	Alaska-OMI-SO2-20140120-2330.gif
GEOTIFF-Alaska-OMI-SO2-20140120-2329.tif	NetCDF-Alaska-OMI-SO2-20140120-2329.nc.gz	AREA-Alaska-OMI-SO2-20140120-2329.gz	Alaska-OMI-SO2-20140120-2329.gif

Data/Images Access

Global Sulfur Dioxide Monitoring Homepage

- Images, Documentation, Publications and Links

GES-DISC (Goddard Earth Science Data and Information Services Center)

- Level 2, L2G, Level 3 (OMSO2e)
- HDF and NetCDF
- Documentation

GIOVANNI – An interactive visualization tool

- L2G, Level 3 (OMSO2e)
- HDF, ASCII, KML for Google Earth
- Subsetting available

http://disc.sci.gsfc.nasa.gov/Aura/data-holdings/OMI/omso2e_v003.shtml

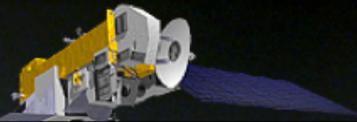


GES DISC Goddard Earth Sciences Data and Information Services Center

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 - Science Portals
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 - SORCE
 - TRMM
 - More...

AURA



- >> DATA HOLDINGS
- + Access
- >> OMI

You are here: [GES DISC Home](#) » [Aura](#) » [Data Holdings](#) » [OMI](#) » Aura OMI Sulphur Dioxide Level 3 Best Pixel Global (0.25 deg Lat/Lon grids) Data Product-OMSO2e

Aura OMI Sulphur Dioxide Level 3 Best Pixel Global (0.25 deg Lat/Lon grids) Data Product-OMSO2e

Principal Investigator (PI):
Nickolay A. Krotkov
(NASA GSFC)

Data Version and Data Holdings

Processing	Version	Begin Date	End Date
Forward	003	Oct 1, 2004	---

Production Frequency: 1 file/day
Granule (File) Coverage: one day
File Size(Approx): 5 MB

- OMI Algorithm Documents Related to OMSO2 (the data used in OMSO2e)
- OMI Algorithm Theoretical Basis Documents

- Other Related Documents:**
- OMSO2e Document for Global Change Master Directory
 - HDF-EOS Aura File Format Guidelines

- Tools:**
- Data Read Software & Tools
 - Giovanni Data Exploration Tool
 - OMI SO2 Images (GSFC-NASA)
 - OMI SO2 Images Near Real Time (NOAA)

- Other Links :**
- EOS-Aura OMI Page
 - OMI Home Page (KNMI-Netherlands)
 - OMI/TOMS Home Page (GSFC-NASA)
 - OMI/TOMS SO2 Page (GSFC-NASA)
 - Aura Validation Data Center (AVDC)

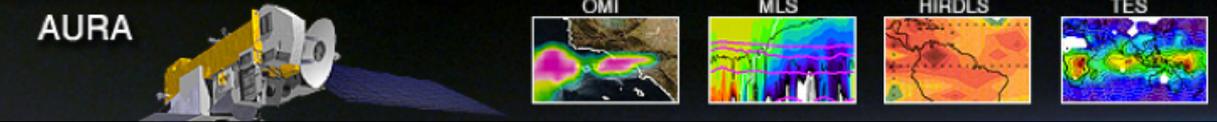
http://disc.sci.gsfc.nasa.gov/Aura/data-holdings/OMI/omso2e_v003.shtml

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- DATA HOLDINGS**
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- Additional Features**
- + Documentation
 - + Tools
 - + Links
 - + FAQ
 - + News

You are here: [GES DISC Home](#) » [Aura](#) » [Data Holdings](#) » [OMI](#) » Aura OMI Sulphur Dioxide Level 3 Best Pixel Global (0.25 deg Lat/Lon grids) Data Product-OMSO2e

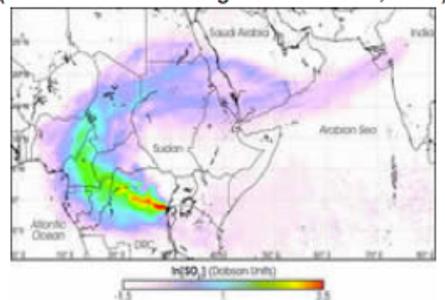
Aura OMI Sulphur Dioxide Level 3 Best Pixel Global (0.25 deg Lat/Lon grids) Data Product-OMSO2e

NEWS: OMSO2e is a Level-3 product (contains best pixel data, screened for OMI row anomaly and other data quality flags)

Data Access

- [Mirador - fast search & download](#)

SO2 Plume from Nyamuragira Volcano
(OMI SO2 Amount, avg Nov 26- Dec 4, 2006)



Principal Investigator (PI):
Nickolay A. Krotkov
(NASA GSFC)

Platform: EOS-Aura
Instrument: OMI

Product: Level-3 OMI Sulphur Dioxide (SO2) Data Product

Data Set Short Name: OMSO2e

Data Set Long Name: OMI/Aura Sulfur Dioxide (SO2) Total Column Daily L3 Best Pixel Global 0.25deg Lat/Lon Grid

OMI Data Documents:

- [Short Readme for OMSO2e](#)
- [File Format Specification](#)
- [OMI Data User's Guide](#)

- **OMI Algorithm Documents Related to OMSO2 (the data used in OMSO2e)**

- [OMI Algorithm Theoretical Basis Documents](#)



Mirador

Data Access Made Simple

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You are here: [KeywordSearch](#) » [Data sets from OMSO2e search](#) » [File Listing](#) » [Service Selection](#) » [Your Cart](#) » [Checkout](#)

Keyword

Projects

Science Areas

Data Sets

Results 1 - 1 of 1 for **OMSO2e** (1 seconds)

-More Services (e.g. http download, format conversion, subsets etc) are available for the data set(s). Whenever you add files to the shopping cart, you will be presented with options for selecting a service and service parameters for any data set which has these services.

 OMSAura Sulfur Dioxide (SO2) Total Column Daily L3 Best Pixel Global 0.25deg Lat/Lon Grid (OMSO2e) [View Files](#) | [Info](#) | [Giovanni Analysis](#) | [Data Calendar](#)

Approx. 4 files found (Avg Size: 5.37 MB)

Parameters: SULFUR OXIDES, TRACE GASES/TRACE SPECIES, INDUSTRIAL EMISSIONS, ERUPTION DYNAMICS, SULFUR DIOXIDE

Spatial Resolution: 0.25 degree x 0.25 degree

Temporal Resolution: Approx 1 hour (day time orbit)

Select All

Reset

List Selected Files By Time

See Timeline View

Add Selected Files To Cart

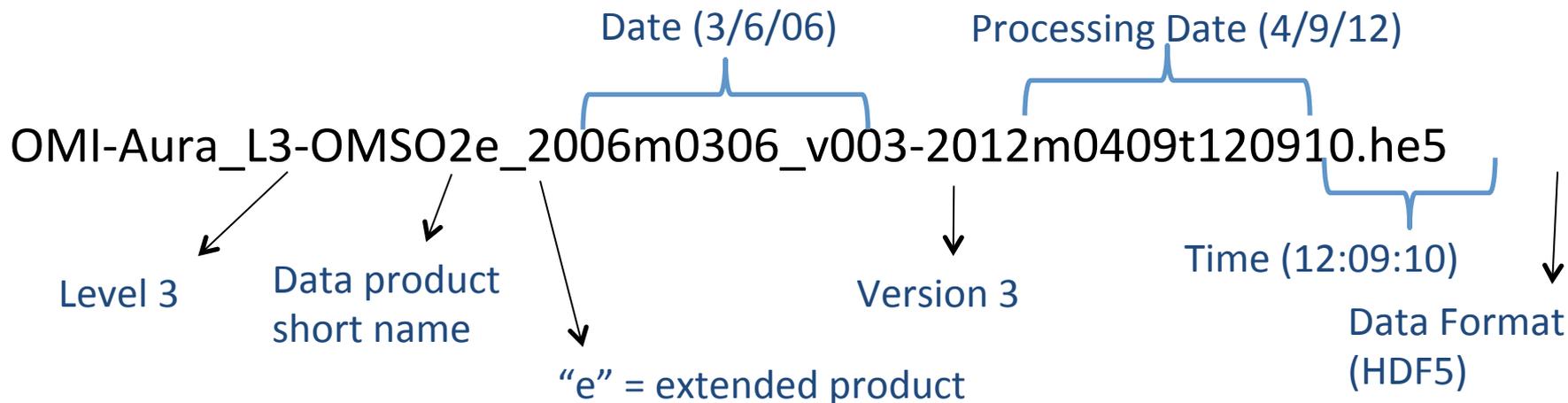
NASA Search Results

(Number of files found may not be entirely accurate)

Page: 1



File Name Convention



Mirador (<http://mirador.gsfc.nasa.gov/>) Keyword search : SO2

Results 1 - 1 for **OMSO2e** (1 second)

OMI/Aura Sulfur Dioxide (SO2) Total Column Daily L3 Best Pixel Global 0.25deg Lat/Lon Grid [Info](#)

The following services are available for the data set(s). Whenever you add files to the shopping cart, you will be presented with options for selecting these services.

[Download via HTTP](#) [Convert to NetCDF](#)

<input checked="" type="checkbox"/> Select All in Page <input type="checkbox"/> File Names/Descriptive File Names	Start Time ▲
<input checked="" type="checkbox"/> OMI-Aura_L3-OMSO2e_2007m0815_v003-2012m0409t132333.he5 (7.04 MB) One Click Download: (FTP) (HTTP) NetCDF OPeNDAP	2007-08-15 00:00:00 Metadata

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Data/Images Access

Global Sulfur Dioxide Monitoring Homepage

- Images, Documentation, Publications and Links

GES-DISC (Goddard Earth Science Data and Information Services Center)

- Level 2, L2G, Level 3 (OMSO2e)
- HDF and NetCDF
- Documentation

GIOVANNI – An interactive visualization tool

- L2G, Level 3 (OMSO2e)
 - HDF, ASCII, KML for Google Earth
 - Subsetting available
- Worldview Images

Giovanni - The Bridge Between Data and Science

» OVERVIEW

- + What is Giovanni?
- + Who Uses Giovanni?
- + Giovanni Parameters
- + Giovanni Plot Types
- + How to Use Giovanni
- + How to Acknowledge Giovanni
- + Acknowledgements

Additional Features

- + News
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- + Publications
- + Newsletters
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- + FAQ

You are here: [GES DISC Home](#) » Giovanni - Interactive Visualization and Analysis

Giovanni - Interactive Visualization and Analysis

Contributors: tonyr, rchowdhury

Giovanni - Interactive Visualization and Analysis - GES DISC: Goddard Earth Sciences, Data and Information Services Center

Giovanni-4 Now Available

New! Please try out [Giovanni-4](#), the next generation of Giovanni, with dramatically improved performance and interactive plotting and mapping. (Currently, only select Aerosols, Hydrology and Turbulent Flux data are available in Giovanni-4, with more on the way.)

Giovanni Portals

Giovanni Parameter List

▼ Atmospheric Portals (Scroll down to view complete list)

- [Aqua/AIRS Global: Monthly](#)
- [Terra and Aqua MODIS: Daily](#)
- [Terra and Aqua MODIS: Monthly](#)
- [Aura OMI Level 3](#)
- [Aura OMI Level 2G](#)
- [Aura Microwave Limb Sounder \(MLS\)](#)
- [Aura High Resolution Dynamics Limb Sounder \(HIRDLS\)](#)
- [Aura Tropospheric Emission Spectrometer \(TES\)](#)
- [Earth Probe and Nimbus-7 TOMS](#)
- [Upper Atmosphere Research Satellite \(UARS\) Halogen Occultation Experiment \(HALOE\)](#)

▼ Application and Education Portal (Scroll down to view complete list)

GIOVANNI NEWS

Hide News ▼

- Giovanni Image Hall of Fame issue of The Giovanni News is online
Jan 10, 2014
- Several members of the GES DISC attend ESIP Federation Winter Meeting 2014
Jan 07, 2014
- December 2013 AGU special issue of The Giovanni News is online
Dec 19, 2013
- GES DISC participates in AGU Fall Meeting 2013
Dec 06, 2013
- October-November 2013 issue of The Giovanni News is online
Nov 22, 2013
- MODIS observes progressive development of air pollution crisis in China
Oct 25, 2013
- Staff from the GES DISC participate in NSF EarthCube Workshop
Oct 21, 2013
- Newest additions to Giovanni publications list
Sep 30, 2013

Giovanni - Interactive Visualiza... x Giovanni - OMI/Aura Online Vis... x +

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gdata1.sci.gsfc.nasa.gov/daac-bin/G3/gui.cgi?instance_id=omi ☆ Google

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OMI Aerosol Wavelength

Select a wavelength value from the pulldown list. **This option is only enabled if a parameter from the OMAEROe product is selected!** Otherwise this option is greyed-out and not available.

Wavelength

NOTE: Selected 3D parameters **must** have the same 3rd dimension (e.g., pressure, altitude, wavelength, etc.) units in order to enable the vertical level menu.

Parameters

Display: Data Product Info Units Parameters with > 2 Dimensions

Daily 0.25 x 0.25 Degree Grid

OMAEROe(2004/10/01 - 2014/01/21) ▲

Parameter	Data Product Info		
<input type="checkbox"/> Absorbing Aerosol Optical Thickness	OMAEROe.003	Aura OMI	2004/10/01 - 2014/01/21
<input type="checkbox"/> Aerosol Optical Thickness	OMAEROe.003	Aura OMI	2004/10/01 - 2014/01/21
<input type="checkbox"/> Aerosol Single Scattering Albedo	OMAEROe.003	Aura OMI	2004/10/01 - 2014/01/21

OMDOAO3e(2004/10/01 - 2014/01/21) ▲

Parameter	Data Product Info		
<input type="checkbox"/> Column Amount Ozone	OMDOAO3e.003	Aura OMI	2004/10/01 - 2014/01/21

OMTO3e(2004/10/01 - 2014/01/21) ▲

Parameter	Data Product Info		
<input type="checkbox"/> Column Amount Ozone	OMTO3e.003	Aura OMI	2004/10/01 - 2014/01/21
<input type="checkbox"/> Radiative Cloud Fraction	OMTO3e.003	Aura OMI	2004/10/01 - 2014/01/21

OMSO2e(2004/10/01 - 2014/01/21) ▲

Parameter	Data Product Info		
<input checked="" type="checkbox"/> Vertical Column Amount SO ₂ (PBL)	OMSO2e.003	Aura OMI	2004/10/01 - 2014/01/21

OMNO2d(2004/10/01 - 2014/01/21) ▲

Parameter	Data Product Info		
<input type="checkbox"/> NO ₂ Total Column Amount	OMNO2d.003	Aura OMI	2004/10/01 - 2014/01/21
<input type="checkbox"/> NO ₂ Total Column Amount (Cloud-Screened at 30%)	OMNO2d.003	Aura OMI	2004/10/01 - 2014/01/21
<input type="checkbox"/> NO ₂ Tropospheric Column Amount	OMNO2d.003	Aura OMI	2004/10/01 - 2014/01/21
<input type="checkbox"/> NO ₂ Tropospheric Column Amount (Cloud-Screened at 30%)	OMNO2d.003	Aura OMI	2004/10/01 - 2014/01/21

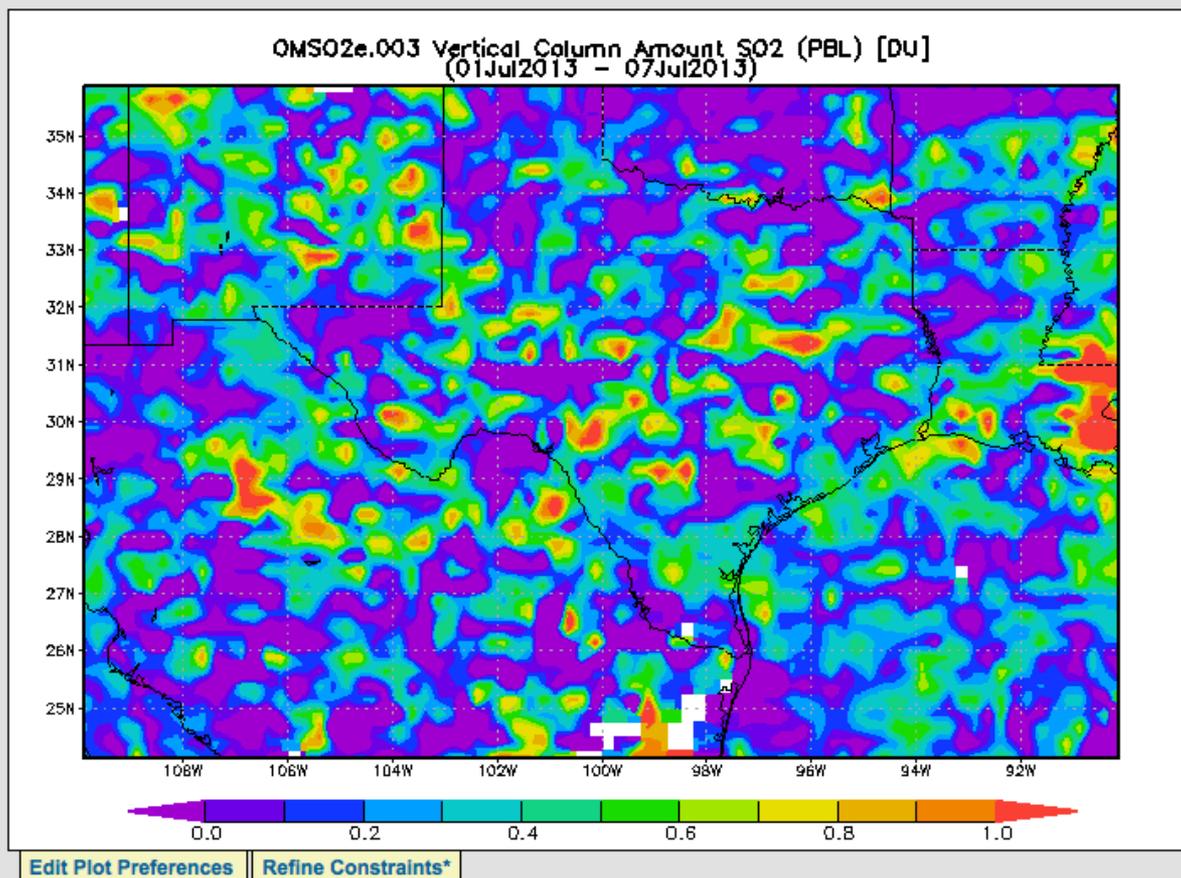


OMI/Aura Online Visualization and Analysis

Daily Level 3 Global Gridded Products

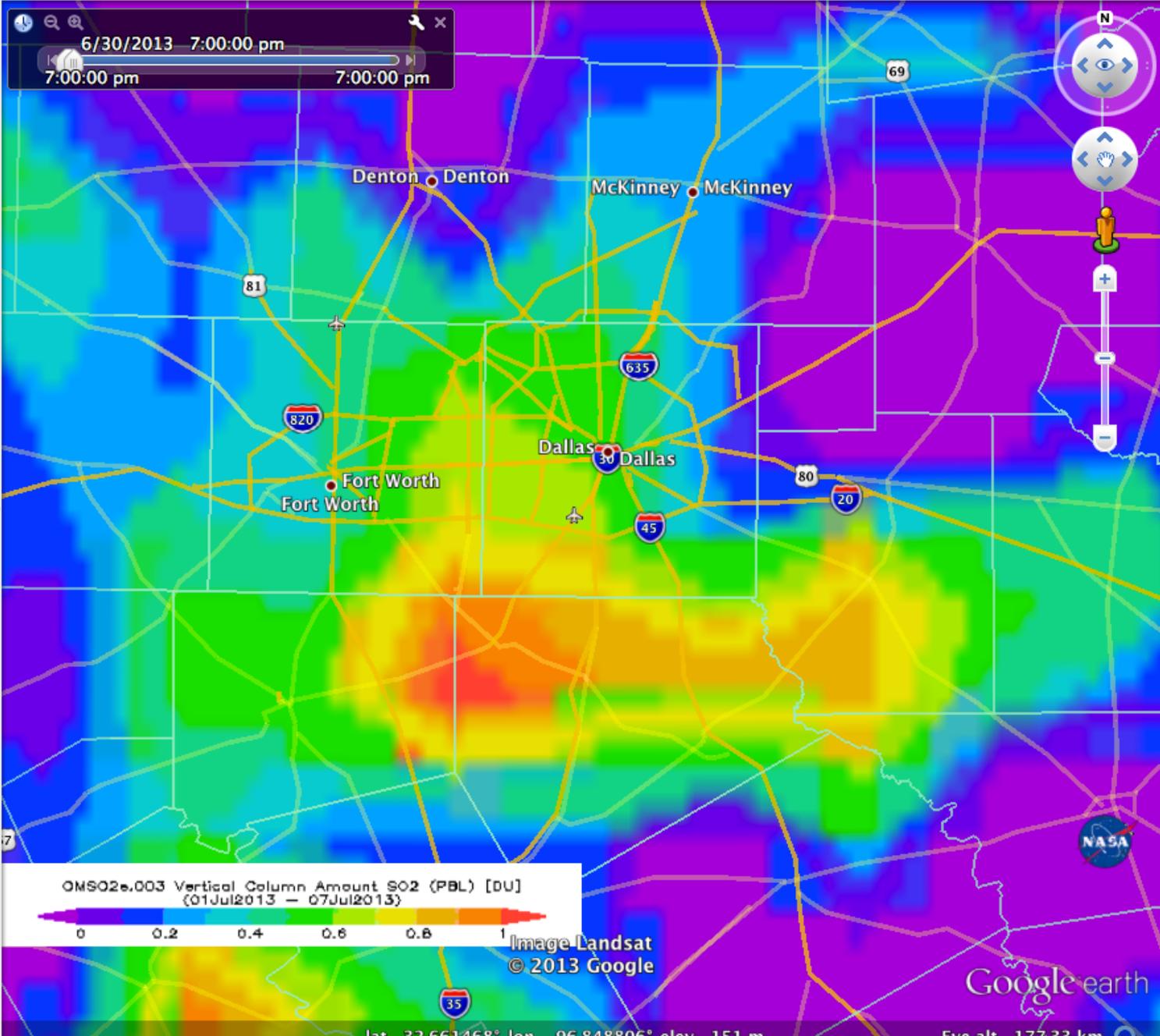
Home | Result #6 | Result #7 | Result #8 | Result #9 | Result #10 | Results #11 | Remove All

Visualization Results | Download Data | Product Lineage | Acknowledgment Policy



6/30/2013 7:00:00 pm

7:00:00 pm 7:00:00 pm



OMSO2e.003 Vertical Column Amount SO2 (PBL) [DU]
 (01Jul2013 - 07Jul2013)

0 0.2 0.4 0.6 0.8 1

Image Landsat
 © 2013 Google

Google earth

lat 32.661468° lon -96.848806° elev 151 m

Eye alt 177.33 km

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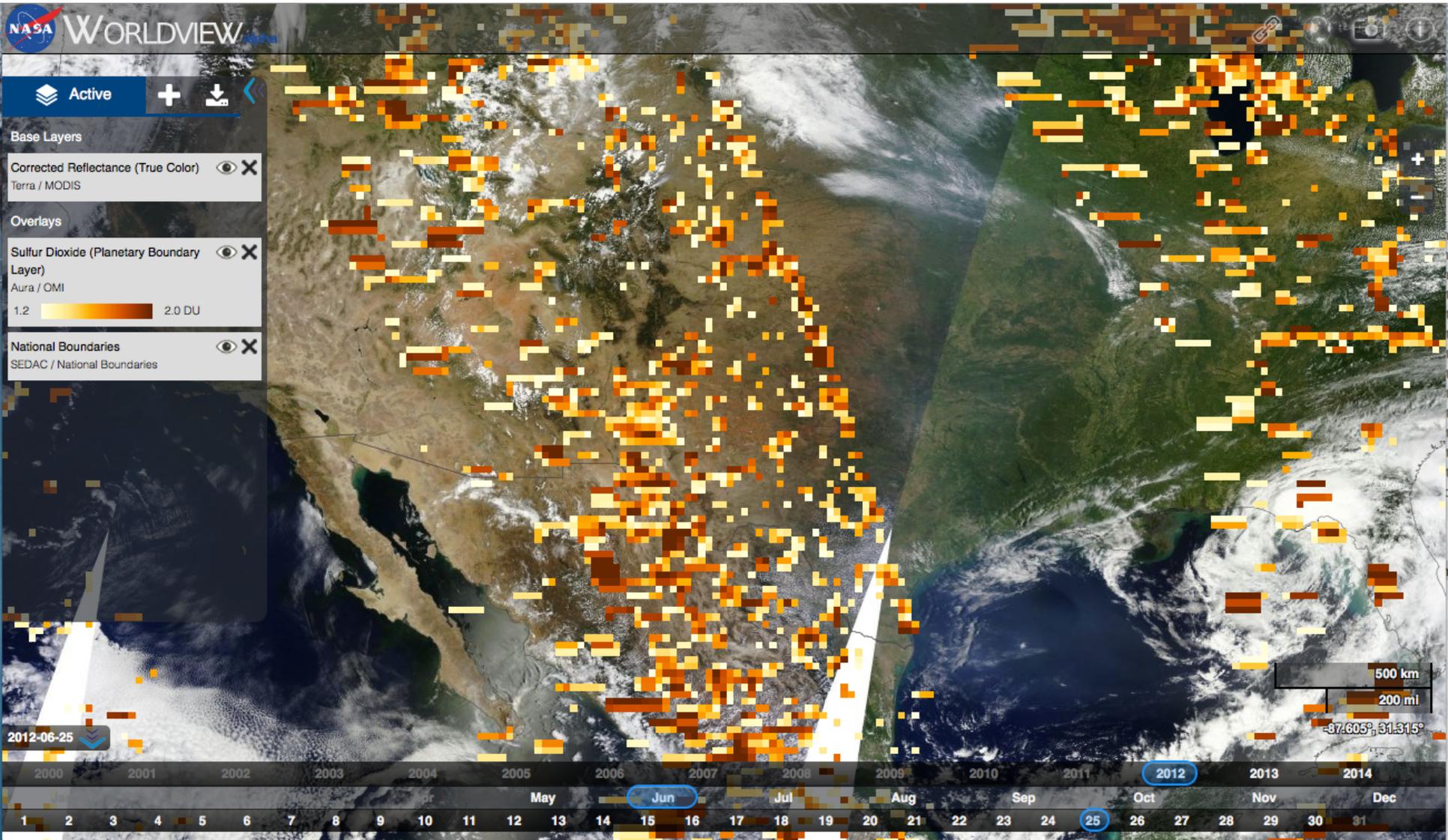
OMSC

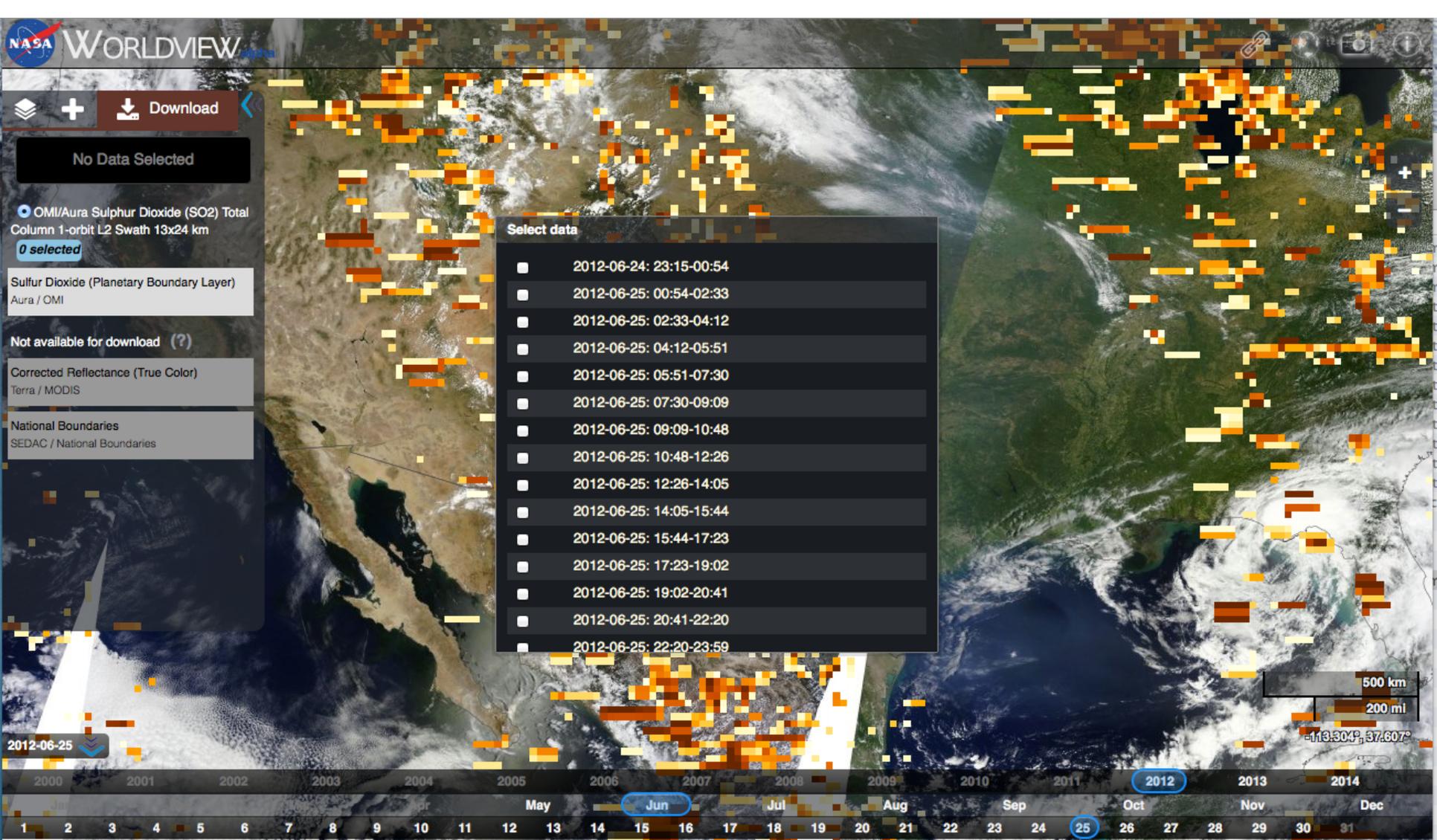
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Worldview

<https://earthdata.nasa.gov/labs/worldview/>





NOTE: Data can be downloaded (HDF5 Format only) from Worldview BUT it does not subset the data so you don't know which orbit to pick for your region of interest, i.e. over CONUS.

Data discovery, visualization, and analysis resources for the end-user.

Name	Description	Website
ARSET	NASA Applied Remote SENSing Training.	http://airquality.gsfc.nasa.gov/
AQAST	NASA Air Quality Applied Sciences Team.	http://acmg.seas.harvard.edu/aqast/
Multi-Purpose*		
EOSDIS	Earth Observing System Data and Information System. Useful web tools are available to search data files by instrument and pollutant type.	http://earthdata.nasa.gov
EOSDIS/ LANCE	Land Atmosphere Near Real-time Capability for EOS is NASA's main tool for visualization and download of near-real-time data and imagery.	https://earthdata.nasa.gov/data/near-real-time-data/
EOSDIS/ Reverb	Search, access and download data files, with spatial and temporal sub-setting.	http://reverb.echo.nasa.gov/reverb
GES DISC	Goddard Earth Sciences Data and Information Services Center. A NASA data center where pollution and aerosol files may be found.	http://disc.sci.gsfc.nasa.gov
GES DISC/ Giovanni	An interactive visualization and analysis web tool.	http://disc.sci.gsfc.nasa.gov/giovanni/
GES DISC/ Mirador	Search on time, space, and keywords for datasets and data files.	http://mirador.gsfc.nasa.gov
LaRC ASDC	Langley Research Center Atmospheric Science Data Center. A NASA data center where pollution and aerosol files may be found.	http://eosweb.larc.nasa.gov
LAADS Web	Level 1 and Atmosphere Archive and Distribution System Access MODIS L1, Atmosphere and Land data products and VIIRS L1 and Land data products	http://ladsweb.nascom.nasa.gov
True color imagery and Smoke		
Worldview	An interactive visualization and analysis web tool.	https://earthdata.nasa.gov/labs/worldview/
HMS	NOAA Hazard Mapping System Fire and Smoke Product. Near-real-time data.	http://www.ospo.noaa.gov/Products/land/hms.html
EOSDIS/ FIRMS	Fire Information for Resource Management System. Near-real-time data access.	http://earthdata.nasa.gov/data/near-real-time-data/firms
Application Specific		
IDEA	NOAA Infusing Satellite Data into Environmental Applications. Near-real-time access to MODIS and GOES aerosol products and meteorological information.	http://www.star.nesdis.noaa.gov/smcd/spb/aq/
RSIG	EPA Remote Sensing Information Gateway. Web tool that facilitates comparisons between NASA imagery and CMAQ model output.	http://ofmpub.epa.gov/rsig/rsigserver?index.html
EE DSS	Exceptional Event Decision Support System. Facilitates the analysis of both surface and satellite data for exceptional event demonstration submissions.	http://www.datafed.net