

Accessing Air Quality Lessons on MY NASA DATA

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Search “Air Quality”

The image shows a screenshot of the MY NASA DATA website. At the top, a banner features the text "MY NASA DATA" and "and inquiry using NASA Data on Atmospheric and earth science for Teachers and Amateurs". A yellow arrow points to the "MY NASA DATA" text in the banner. Below the banner is a navigation menu with buttons for "Home", "Live Access Server", "Lesson Plans", and "Data Sources". A "Mission" section includes buttons for "SAGE III on ISS", "Observe Your World", "Conferences", and "Meet the Team". A "MND News" section is partially visible at the bottom left. On the right side, there is a "Google™ Custom Search" box with a search button circled in yellow. Below the search box is a large banner with vertical text for "Educators", "Students", "Citizen Scientists", and "Researchers", and "Using My NASA Data". To the right of this banner is a globe and three smaller images: a world map, a data visualization, and a satellite image. At the bottom right, there are buttons for "Photos", "Connect", "Apps", and "Contact". A watermark "from the satellite to your classroom" is visible over the bottom part of the page.

MY NASA DATA

Home

Live Access Server

Lesson Plans

Data Sources

Mission

SAGE III on ISS

Observe Your World

Conferences

Meet the Team

MND News

Virginia Space Grant Consortium Announces 2013-2014 STEM Scholarship and Fellowship Opportunities

Google™ Custom Search

Educators

Students

Citizen Scientists

Researchers

Using My NASA Data

Photos

Connect

Apps

Contact

Select Top Link

Google custom search

air quality

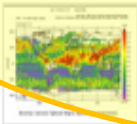


About 244 results (0.55 seconds)

powered by Google™ Custom Search

[Air Quality and Composition | MY NASA DATA](https://mydasdata.larc.nasa.gov/air-quality-and-composition/)

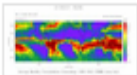
mydasdata.larc.nasa.gov/air-quality-and-composition/



Welcome to the **Air Quality** and Composition page on MY NASA DATA. This page links you to a powerful data viewer that will allow you to examine all of the air ...

[MY NASA DATA Featured Page: New Air Quality and Atmospheric ...](https://mydasdata.larc.nasa.gov/.../my-nasa-data-featured-page-new-air-quality-and-atmospheric-composition-theme-page/)

<https://mydasdata.larc.nasa.gov/.../my-nasa-data-featured-page-new-air-quality-and-atmospheric-composition-theme-page/>



Jun 21, 2012 ... Monthly Average Precipitation for March, See **Air Quality** MND Lesson "How Much Water is Available in the Atmosphere for Precipitation?" ...

[New Online: Cruising the Chesapeake for Water and Air Quality](https://mydasdata.larc.nasa.gov/.../new-online-cruising-the-chesapeake-for-water-and-air-quality/)

mydasdata.larc.nasa.gov/.../new-online-cruising-the-chesapeake-for-water-and-air-quality/

New Online: Cruising the Chesapeake for Water and **Air Quality**. September 8, 2011. A

<http://mynasadata.larc.nasa.gov/air-quality-and-composition/>

Air Quality and Atmospheric Composition



Welcome to the **Air Quality and Composition** page on MY NASA DATA. This page links you to a powerful data viewer that will allow you to examine all of the air quality and composition parameters that are available on the MY NASA DATA website. You will be able to view sample images here and create data visualizations on the Live Access Server (LAS) that we've configured for you to view global and local data pertaining to these key areas of interest.

Lesson Plans & Activities

Aerosol Lesson Plans:

- ☐ Tropical Atlantic Aerosols (Middle School)
- ☐ Using MND to Determine Volcanic Activity (High School)

Air Quality Lesson Plan:

- ☐ Carbon Monoxide and Population Density (High School)
- ☐ Investigating Seasonal Variability in NO₂ Concentrations (High School)

Atmospheric Water Vapor Lesson Plan:

- ☐ How much Water is Available for Precipitation (High School)
- ☐ Seasons (Elementary)

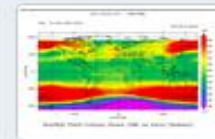
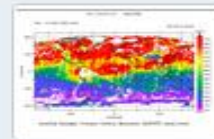
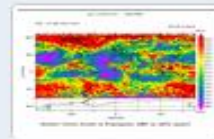
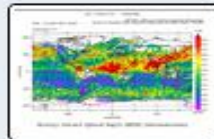
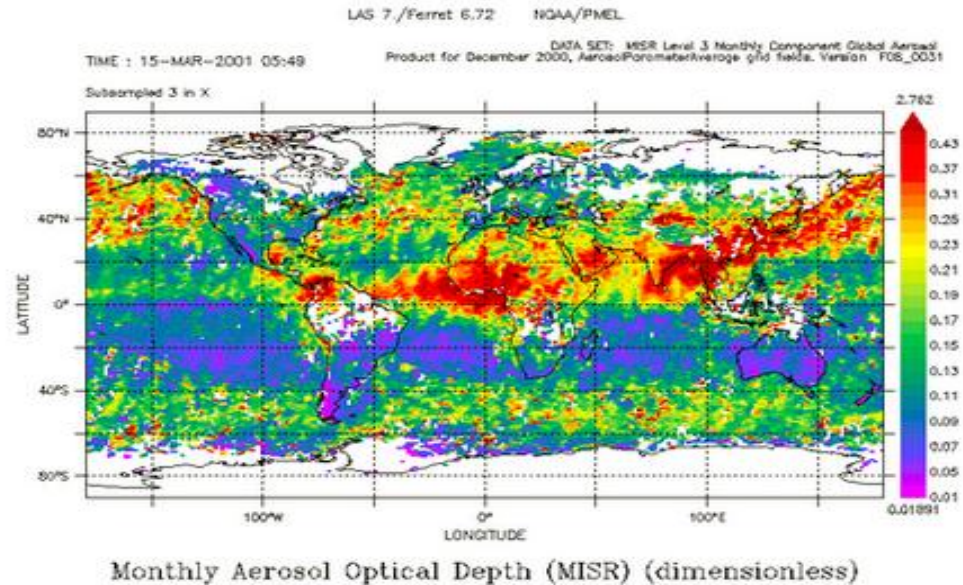
Activities

- ☐ Sky Color for Kids (Elementary)

Sample Plots from MY NASA DATA's Live Access Server

Lessons

Data Plots & Access



Click on the thumbnails above or the right arrow to navigate to line and Hovmoller plots.

Explore data in the Live Access Server

For all of the parameters below, after clicking on their respective links, please click on "Choose Dataset" button on the upper left hand side of the LAS page and then click on the cross directly to the left of the indicator that you'd like to view. For some browsers, the Choose Dataset dialogue box will automatically appear. We've provided a description of each parameter that is currently available. If you have any questions or issues with the LAS please email the MY NASA DATA support team.

- Monthly Average Cloud-free Aerosol Optical Depth 2007-2011 (CALIPSO)
- Monthly Average All-Sky Aerosol Optical Depth 2007-2011 (CALIPSO)
- Monthly Average All-sky Dust 2007-2011 (CALIPSO)
- Monthly Cloud Coverage (CALIPSO)
- Monthly Average Cloud-free Aerosol Optical Depth (MISR)

Looking at *Seasonal Variability in NO2*

Air Quality and Atmospheric Composition



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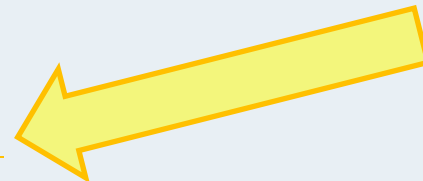
Lesson Plans & Activities

Aerosol Lesson Plans:

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Air Quality Lesson Plan:

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- ☐ Investigating Seasonal Variability in NO2 Concentrations (High School)



Atmospheric Water Vapor Lesson Plan:

- ☐ How much Water is Available for Precipitation (High School)
- ☐ Seasons (Elementary)

Activities

- ☐ Sky Color for Kids (Elementary)

Sample Plots from MY NASA DATA's Live Access Server

http://mynasadata.larc.nasa.gov/?page_id=474?&passid=59

Investigating Seasonal Variability in NO₂ Concentrations

Purpose: Students will examine data in several formats in order to determine the presence or absence of seasonal variability in tropospheric nitrogen dioxide (NO₂) concentrations

Grade Level: 8 – 10

Estimated Time for Completing Activity: 50 minutes

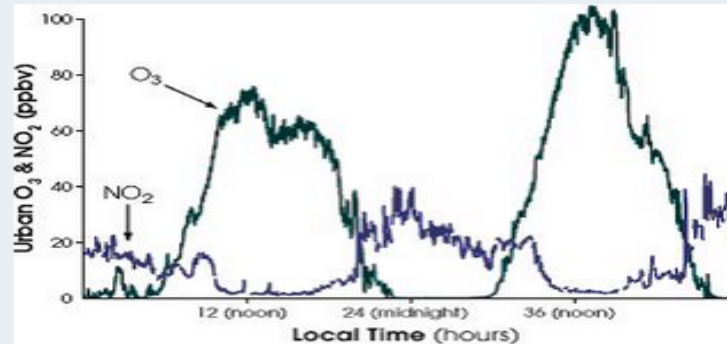


Image courtesy William Brune, Penn State Earth Systems Science Center

National Standards:

- Math:** Representation
- Science Content:** A Science as Inquiry
- Science Content:** D Earth and Space Science
- Science Content:** F Science in Personal and Social Perspectives

AP Environmental Science Topics

- Atmospheric circulation
- Atmospheric structure
- Formation of ozone
- Measurement units
- Seasons

Virginia Standards of Learning:

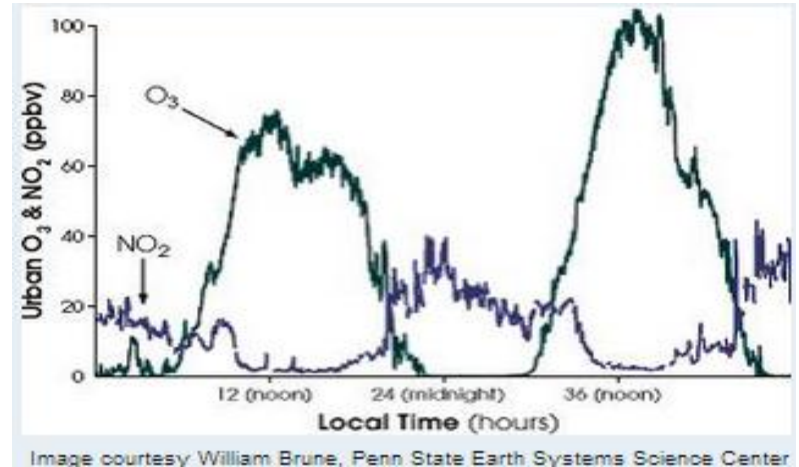
- ES.1c:** The student will plan and conduct investigations in which scales, diagrams, maps, charts, graphs, tables, and profiles are constructed and interpreted.
- ES.12:** The student will investigate and understand the origin and evolution of the atmosphere and the interrelationship of geologic processes, biologic processes, and human activities on its composition and dynamics.

Vocabulary:

- air quality
- atmospheric column

Lesson Background

Background:



The dataset used in this lesson is monthly averages of NO₂ as measured from NASA's EOS Aura spacecraft. NO₂ is measured using the Ozone Monitoring Instrument (OMI). OMI is a nadir-pointing instrument that measures trace gases in a column of air directly below the spacecraft. NO₂ concentrations are measured in number densities, or the amount of NO₂ molecules found in a cubic centimeter of air. Alternately, units of parts per billion can be used, as in the graph at the top of the page. This tells how many NO₂ molecules would be found in a sample containing a billion molecules of air. The OMI instrument measures the amount of NO₂ in the entire vertical column of air below it, thus the units for OMI measurements are molecules per square centimeter (of the surface). See the units page for more explanation of this.

Measurements of nitrogen dioxide (NO₂) [in blue on graph] and ozone (O₃) [in green] indicate rise and fall over a 48-hour period. Nitrogen dioxide participates in ozone formation, so after its concentrations peak, so do concentrations of ozone. Ozone concentrations peak during hours of maximum sunlight, around the middle of the day. (Graph courtesy William Brune, Penn State Earth Systems Science Center)

Part 1: Examine NO₂ for a Region

- *Step 1* – Access “Live Access Server” from Lesson Links or left toolbar
- *Step 2*- Select “Advanced Edition”

Lesson Links:

- ❑ EPA Web site about NO₂
- ❑ Graph of NO₂ vs. Ozone
- ❑ EPA NO_x website
- ❑ NPS Article on nitrogen deposition
- ❑ Population Density
- ❑ Live Access Server
- ❑ Understanding Scientific Units – Air Quality
- ❑ Convert this Lesson into a PDF

MY NASA DATA

Home

Live Access Server

Lesson Plans

Data Sources

Select NO2 DataSet

MY NASA DATA Home Advanced Intermediate Basic Climate Change Model Data

MY NASA DATA Live Access Server - Advanced

Close

Datasets

- Atmosphere
 - Aerosols
 - Air Quality
 - Monthly Carbon Dioxide in Troposphere (AIRS on AQUA)
 - Monthly Daylight Column Carbon Monoxide (MOPITT)
 - Monthly Total Column Ozone (ISCCP)
 - Monthly Total Column Ozone (OMI on Aura)
 - Monthly Tropospheric Ozone Residual Climatology (TOR)
 - Monthly Tropospheric Ozone Residual (TOR)
 - Monthly Tropospheric Total Column NO2 (OMI)
 - Atmospheric Pressure
 - Atmospheric Temperature

Choose

?

n.

?

?

Enter Region & Select Date

Choose dataset Update Plot Set plot options Animate Compare Google Earth Show Values Export to Desktop Application Save As ... Link To ... Print

Atmosphere / Air Quality

+ Monthly Tropospheric Total Column NO2 (OMI)



41 N
90 W 82 W
36 N

MAPS

Latitude-Longitude

HOVMOLLER PLOTS

Longitude-Time

Latitude-Time

LINE PLOTS

Time Series

Longitude

Latitude

SCATTER PLOTS

Property-Property

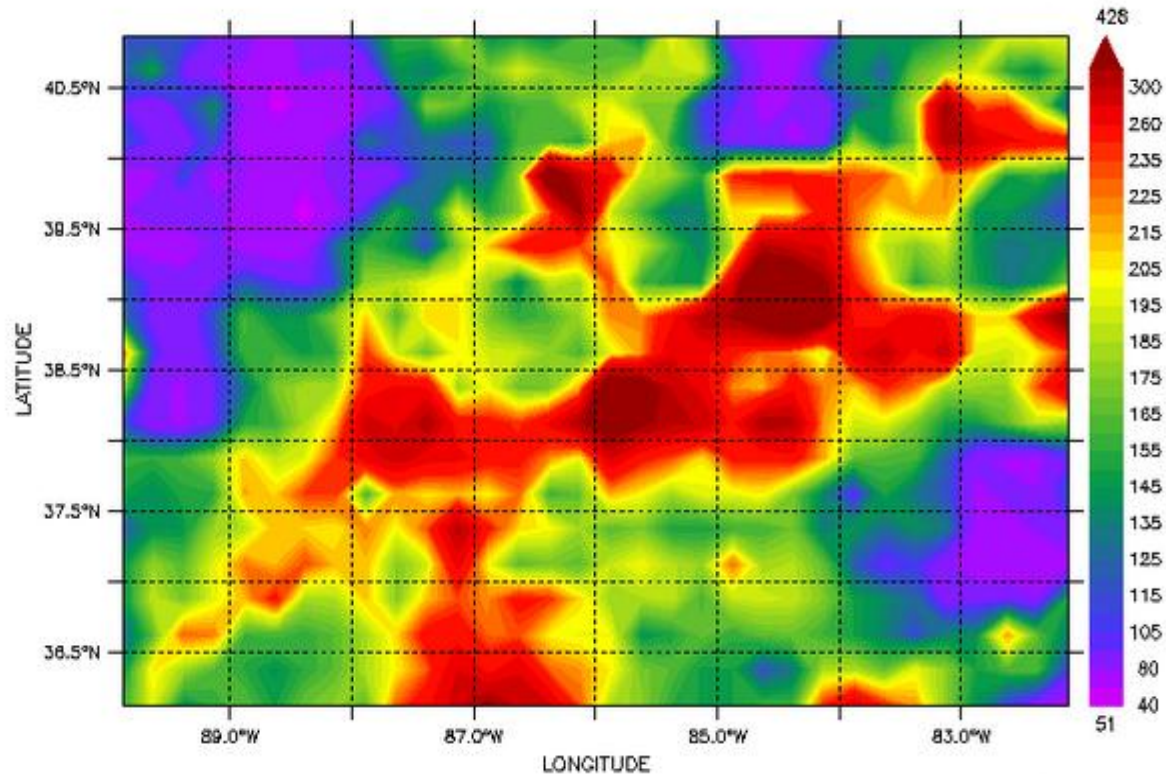
Date:

Jan 2007

LAS 7./Ferret 6.72 NOAA/PMEL

TIME : 15-JAN-2007 00:00

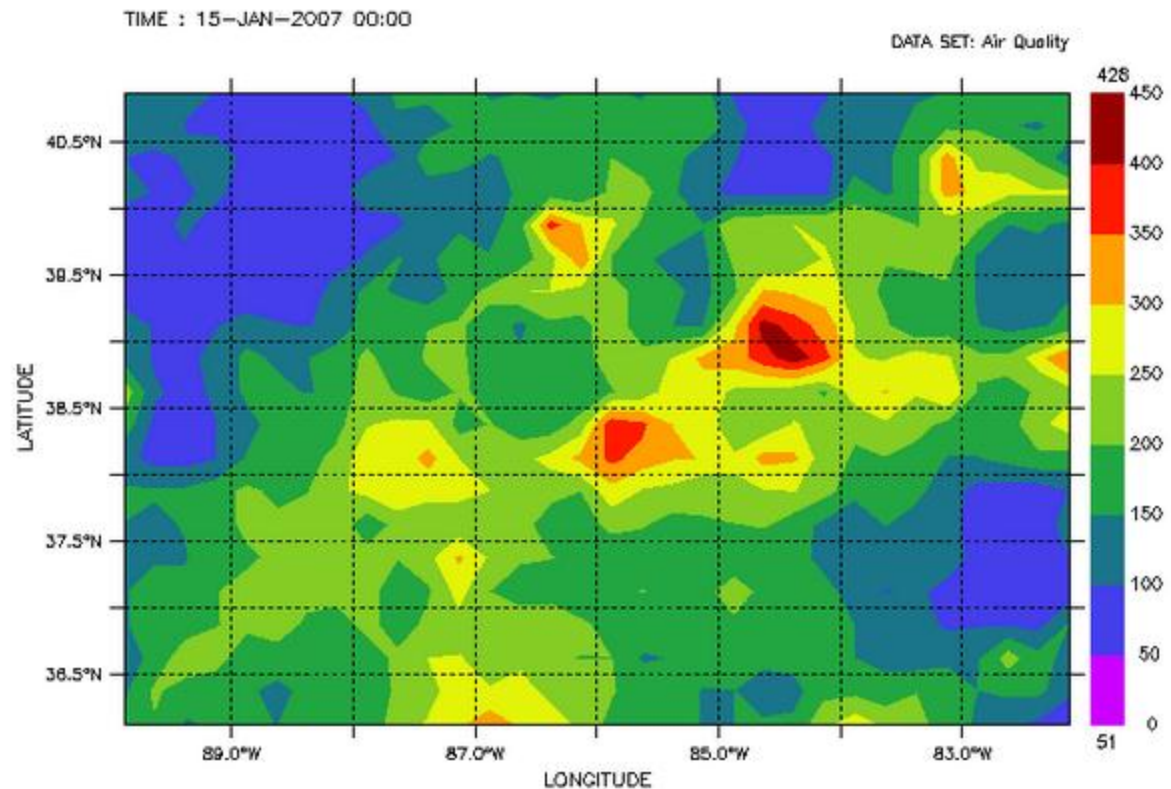
DATA SET: Air Quality



Monthly Tropospheric Total Column NO2 (OMI) ($10^{-1} \sim 5$ molecules/cm $^{-2}$)

Set Scale for Comparison

1. Click “Set Plot Options” Button
2. In “Contour Fill” type: ***(0,450,50)***
3. Click “Ok”
4. Click “Update Plot” Button

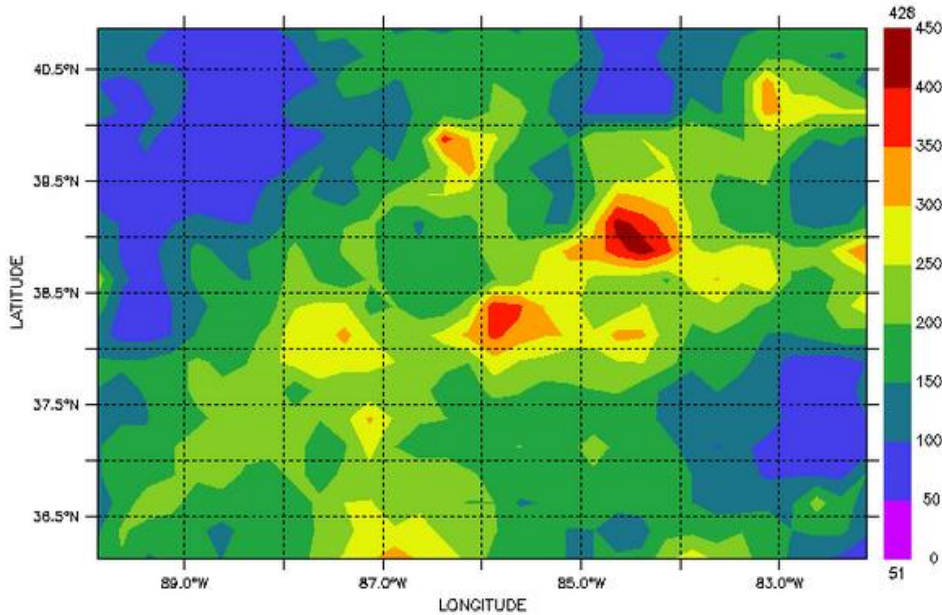


Monthly Tropospheric Total Column NO₂ (OMI) (10⁻¹~5molecules/cm⁻²)

Now, select June 2007 and Compare Plots

TIME : 15-JAN-2007 00:00

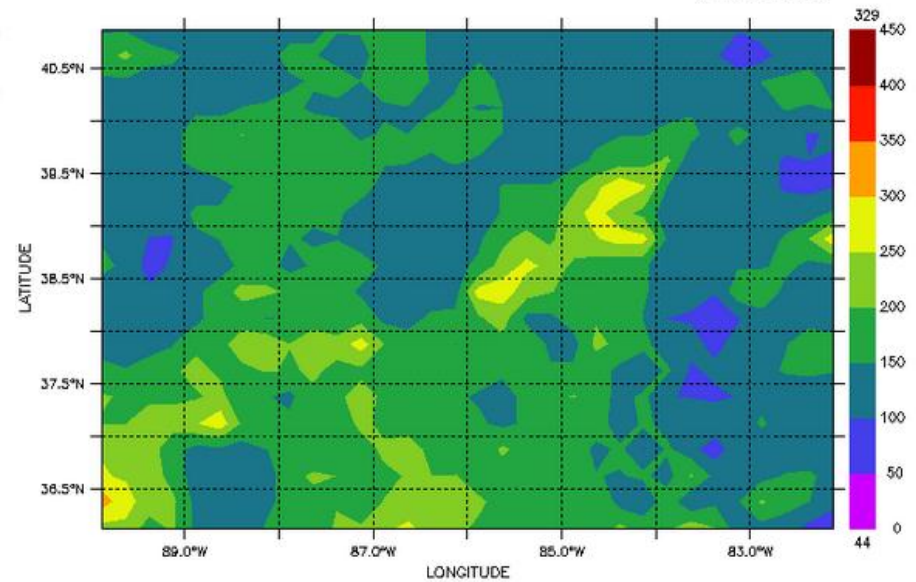
DATA SET: Air Quality



Monthly Tropospheric Total Column NO₂ (OMI) (10~1~5molecules/cm~2)

TIME : 15-JUN-2007 00:00

DATA SET: Air Quality



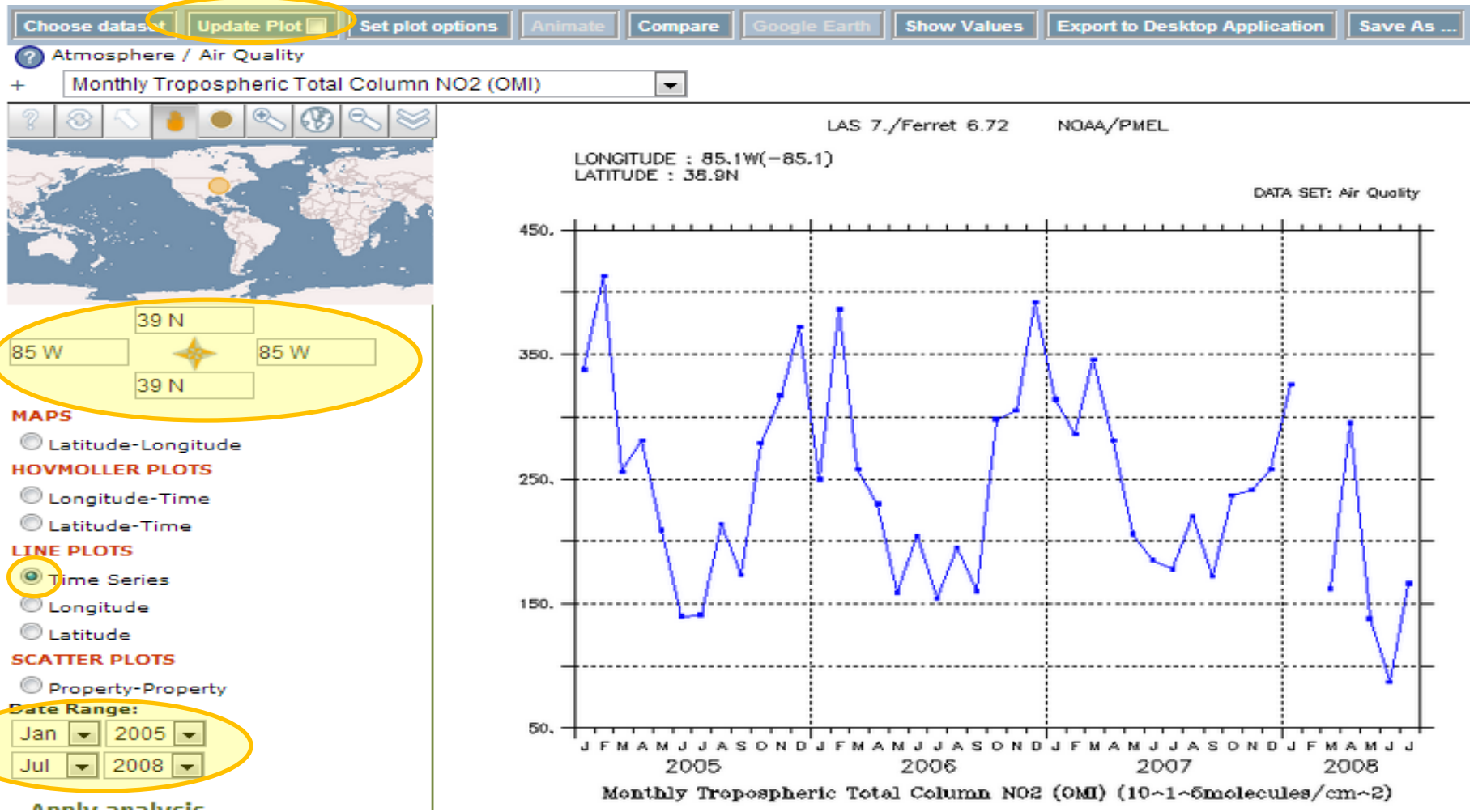
Monthly Tropospheric Total Column NO₂ (OMI) (10~1~5molecules/cm~2)

Questions

- What seasonal differences do you observe?
 - Are NO₂ values in January higher or lower than June?
 - Why?
- If you graphed the data for a given location, what sort of graph would you expect?

Part 2: Create TimeSeries of a Location

1. Select "TimeSeries"
2. Select Date Range
3. Enter Location Lat/Lon
4. Click "Update Plot"



Answer Key & Teacher Feedback

Lesson plan contributed by Brooke Carter, Greenbelt, Maryland

[Click here for Teachers Notes](#)

[View lesson without Standards](#)

Teacher
Feedback



Teacher's Notes

Teachers Notes: Investigating Seasonal Variability in NO₂ Concentrations

1) To create a free PDF of this lesson, see the [Convert this Lesson into a PDF link](#) and choose from a list of online hosts.

[Click here for this lesson's Answer Key](#)