

Giovanni – The Bridge Between Data & Science

Pawan Gupta, Melanie Follette-Cook, and Bryan Duncan

NASA Remote Sensing for Air Quality Applications, March 20-23, 2018, Jakarta, Indonesia

GIOVANNI - The Bridge Between Data and Science

<https://giovanni.gsfc.nasa.gov/giovanni/>

The screenshot displays the GIOVANNI web interface. At the top, there are navigation links for "EARTHDATA", "Data Discovery", "DAACs", "Community", and "Science Disciplines". The main header includes the "GIOVANNI" logo, the tagline "The Bridge Between Data and Science v 4.24", and links for "Release Notes", "Browser Compatibility", "Known Issues", and "Earthdata Login". A yellow banner indicates that "Time series area statistics temporarily unavailable" with a "Read More" link.

The "Select Plot" section offers several options: "Maps: Time Averaged Map" (selected), "Comparisons: Select...", "Vertical: Select...", "Time Series: Select...", and "Miscellaneous: Select...".

The "Select Date Range (UTC)" section includes input fields for "YYYY-MM-DD" and "HH:mm", with a "Valid Range: 1948-01-01 to 2018-02-18" note. The "Select Region (Bounding Box or Shape)" section has a text input field and a "Format: West, South, East, North" label.

The "Select Variables" section is divided into "Disciplines" and "Measurements". Under "Disciplines", there are checkboxes for Aerosols (187), Atmospheric Chemistry (92), Atmospheric Dynamics (416), Cryosphere (13), Hydrology (1083), Ocean Biology (72), Oceanography (75), and Water and Energy Cycle (1157). Under "Measurements", there are checkboxes for Aerosol Index (5), Aerosol Optical Depth (87), Air Pressure Anomaly (1), Air Pressure (53), Air Temperature Anomaly (2), Air Temperature (96), Albedo (24), Altitude (8), Angstrom Exponent (20), Atmospheric Moisture (117), Black Carbon (5), Buoyancy (2), CH4 (17), CO (30), and CO2 (2).

At the bottom right, there are buttons for "Help", "Reset", "Feedback", and a prominent green "Plot Data" button.



Aerosol Data Analysis: Step 1

- Under **Select Plot**, set **Maps** to **Time Averaged Map**
- Select your date range.
 - Set the range to **2015-09-15 to 2015-09-30**
- Select your region either by typing in coordinates or by clicking the button and drawing a box around your area of interest
 - For this exercise, use the coordinates: **(13.3S, 90.7E, 14.7N, 146.9E)** or draw a box that covers Indonesia and the surrounding region.

The screenshot shows a web interface for data analysis. It is divided into three main sections:

- Select Plot:** A dropdown menu is set to "Maps: Time Averaged Map". Other options include "Comparisons: Select...", "Vertical: Select...", and "Time Series: Select...".
- Select Date Range (UTC):** The date range is set to "2015 -09 -15 00 :00" to "2015 -09 -30 23 :59". A note below indicates a "Valid Range: 1948-01-01 to 2018-02-19".
- Select Region (Bounding Box or Shape):** The region is defined by coordinates "90.7031,-13.3594,146.9531,14.76E". A note below indicates the "Format: West, South, East, North".



Aerosol Data Analysis: Step 2

- Select **Variables**

- For this exercise, under Disciplines select **Aerosols**
- Then select Combined Dark Target and Deep Blue AOD at 0.55 micron for land and ocean: Mean (MOD08_D3 v6) - Daily

Select Variables

Number of matching Variables: 8 of 1897 Total Variable(s) included in Plot: 1

Keyword : Search Clear

	Variable	Source	Temp.Res.	Spat.Res.	Begin Date	End Date	Units
<input type="checkbox"/>	Aerosol Optical Thickness at 0.55 microns for both Ocean (best) and Land (corrected): Mean of Daily Mean (MYD08_M3 v6)	MODIS-Aqua	Monthly	1 °	2002-07-04	2018-01-31	-
<input type="checkbox"/>	Aerosol Optical Depth 550 nm (Deep Blue, Land-only) (MYD08_M3 v6)	MODIS-Aqua	Monthly	1 °	2002-07-04	2018-01-31	-
<input type="checkbox"/>	Aerosol Optical Depth 550 nm (Dark Target) (MYD08_D3 v6)	MODIS-Aqua	Daily	1 °	2002-07-04	2018-02-13	-
<input checked="" type="checkbox"/>	Combined Dark Target and Deep Blue AOD at 0.55 micron for land and ocean: Mean (MYD08_D3 v6)	MODIS-Aqua	Daily	1 °	2002-07-04	2018-02-13	-
<input type="checkbox"/>	Aerosol Optical Depth 550 nm (Deep Blue, Land-only) (MYD08_D3 v6)	MODIS-Aqua	Daily	1 °	2002-07-04	2018-02-13	-
<input type="checkbox"/>	Combined Dark Target and Deep Blue AOD at 0.55 micron for land and ocean: Mean of Daily Mean (MYD08_M3 v6)	MODIS-Aqua	Monthly	1 °	2002-07-04	2018-01-31	-
<input type="checkbox"/>	Aerosol angstrom exponent (MODISA_L3m_RRS_8d_4km v2014)	MODIS-Aqua	8-Daily	4 km	2002-07-04	2017-11-24	-
<input type="checkbox"/>	Aerosol optical thickness at 869 nm (MODISA_L3m_RRS_8d_4km v2014)	MODIS-Aqua	8-Daily	4 km	2002-07-04	2017-11-24	-

▼ Disciplines

- Aerosols (8)
- Atmospheric Chemistry (5)
- Atmospheric Dynamics (2)
- Ocean Biology (2)
- Oceanography (2)

▼ Measurements

- Aerosol Index (2)
- Aerosol Optical Depth (8)
- Angstrom Exponent (4)
- Scattering Angle (2)
- Total Aerosol Optical Depth (2)

▼ Platform / Instrument

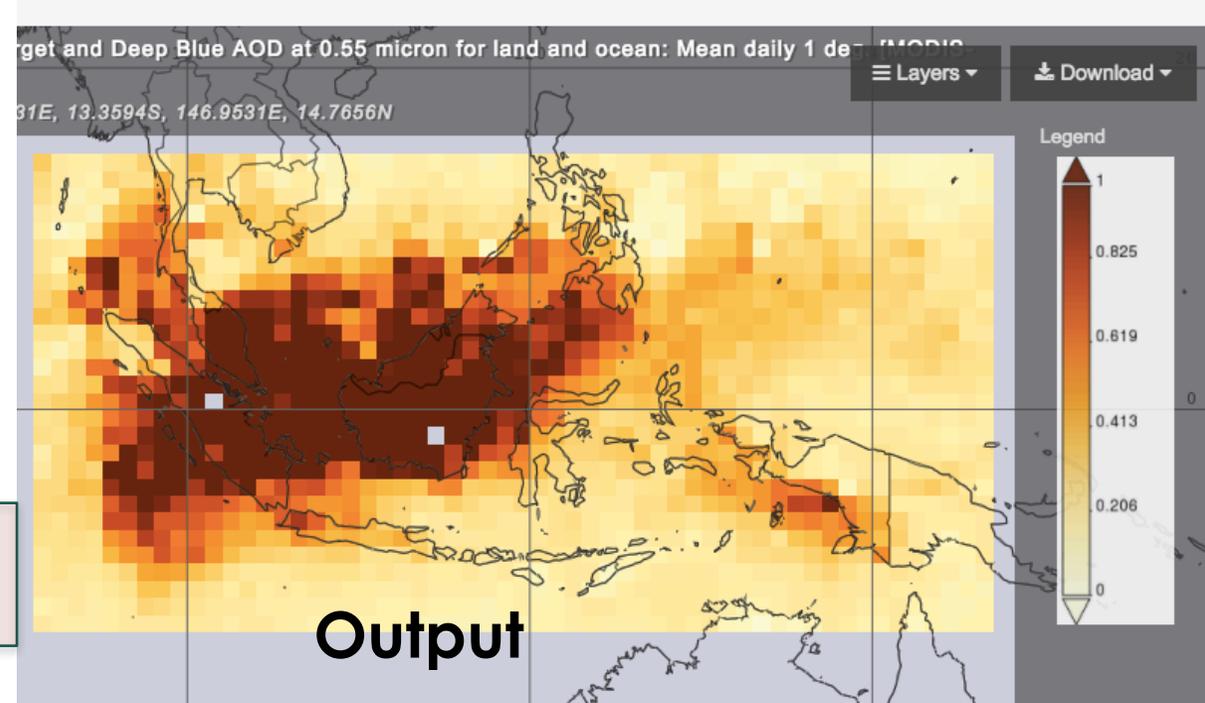
- AMSR-E (4)
- MERRA-2 Model (19)
- MISR (2)
- MODIS-Aqua (8)
- MODIS-Terra (6)
- OMI (8)
- SeaWiFS (38)

Aerosol Data Analysis: Step 3

- Plot the data

8-Daily	4 km	2002-07-04	2017-11-24	-
8-Daily	4 km	2002-07-04	2017-11-24	-

Help Reset Feedback **Plot Data**



Aerosol Data Analysis: Step 4

Modify the Output

The screenshot displays the GIOVANNI web interface. At the top, the header includes the logo and navigation links: "GIOVANNI The Bridge Between Data and Science v 4.24", "Release Notes", "Browser Compatibility", "Known Issues", and "Earthdata Login". A yellow notification bar states "Time series area statistics temporarily unavailable ... [1 of 1 messages] Read More".

The main interface is divided into several sections:

- Left Panel:** "Browse History" and "1. Time Averaged Map" with sub-options: "User Input", "Plots", "Lineage", and "Downloads".
- Layers Panel:** "Layers" dropdown menu with "Options" (gear icon), "Decorations" (checkboxes for Title, Sub-title, Caption, Legend), and "Supporting Overlays" (checkboxes for Coastlines, Countries, Grid).
- Map Options Dialog:** A central dialog box titled "Map Options" for "Combined Dark Target and Deep Blue AOD at 0.55 micron for land and ocean: Mean daily 1 deg. [MODIS-Aqua MYD08_D3 v6]". It includes:
 - Data Range:** Input fields for "0" (Minimum) and "1" (Maximum).
 - Palette:** Two color palette options: "Cyan-Red-Yellow (Seq), 65" and "Yellow-Orange-Brown (Seq), 65".
 - Smoothing:** Radio buttons for "On" and "Off" (selected).
 - Projection:** A dropdown menu set to "Equidistant Cylindrical".
 - Scaling:** Radio buttons for "Linear" (selected) and "Log".
 - Buttons for "View All Palettes", "Restore Defaults", and "Re-Plot".
- Download Panel:** A "Download" dropdown menu with options: "GeoTIFF", "KMZ", and "PNG".

A vertical color scale legend on the right side of the map shows values: 0.819, 0.413, 0.206, and 0.

Analysis details

Modify the plot

Adjust the scale

Pick the colors

Download map

Aerosol Data Analysis: Step 5

Download the data

Earth Data Login is required to download the data

Time series area statistics temporarily unavailable ... [1 of 1 messages] [Read More](#)

[-] Browse History

[-] 1. Time Averaged Map

- ... User Input
- ... Plots
- ... Lineage

Downloads

Click on file links to download. Files contain data portrayed in the plot images.

NetCDF:

[g4.timeAvgMap.MYD08_D3_6_AOD_550_Dark_Target_Deep_Blue_Combined_Mean.20150915-20150930.90E_13S_146E_14N.nc](#)

PNG:

[MYD08_D3_6_AOD_550_Dark_Target_Deep_Blue_Combined_Mean.20150915-20150930.90E_13S_146E_14N.png](#)

GEOTIFF:

[MYD08_D3_6_AOD_550_Dark_Target_Deep_Blue_Combined_Mean.20150915-20150930.90E_13S_146E_14N.geotif](#)

KMZ:

[MYD08_D3_6_AOD_550_Dark_Target_Deep_Blue_Combined_Mean.20150915-20150930.90E_13S_146E_14N.kmz](#)



Aerosol Data Analysis: Step 6

Create Another Plot

Time series area statistics temporarily unavailable ... [1 of 1 messages] [Read More](#)

[-] Browse History

[-] 1. Time Averaged Map

... User Input

... Plots

... Lineage

Downloads

Click on file links to download. Files contain data portrayed in the plot images.

NetCDF:

[g4.timeAvgMap.MYD08_D3_6_AOD_550_Dark_Target_Deep_Blue_Combined_Mean.20150915-20150930.90E_13S_146E_14N.nc](#)

PNG:

[MYD08_D3_6_AOD_550_Dark_Target_Deep_Blue_Combined_Mean.20150915-20150930.90E_13S_146E_14N.png](#)

GEOTIFF:

[MYD08_D3_6_AOD_550_Dark_Target_Deep_Blue_Combined_Mean.20150915-20150930.90E_13S_146E_14N.geotif](#)

KMZ:

[MYD08_D3_6_AOD_550_Dark_Target_Deep_Blue_Combined_Mean.20150915-20150930.90E_13S_146E_14N.kmz](#)



Aerosol Data Analysis: Step 7

Create Animation

Time series area statistics temporarily unavailable ... [1 of 1 messages] [Read More](#)

Select Plot

Maps: Animation *
 Comparisons: Select...
 Vertical: Select...
 Time Series: Select...
 Miscellaneous: Select...

Select Date Range (UTC)

YYYY-MM-DD HH:mm
 2015 -09 -15 00 :00 to 2015 -09 -30 23 :59

Select Region (Bounding Box or Shape)

Format: West, South, East, North
 90.7031,-13.3594,146.9531,14.76

Valid Range: 2002-07-04 to 2018-02-13

Select Variables

▼ Disciplines

- Aerosols (187)
- Atmospheric Chemistry (92)
- Atmospheric Dynamics (416)
- Cryosphere (13)
- Hydrology (1083)
- Ocean Biology (72)
- Oceanography (75)
- Water and Energy Cycle (1157)

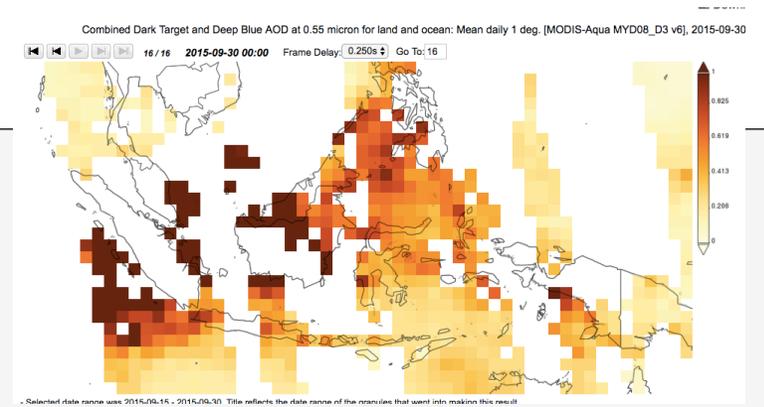
▼ Measurements

- Aerosol Index (5)
- Aerosol Optical Depth (87)
- Air Pressure Anomaly (1)
- Air Pressure (53)
- Air Temperature Anomaly (2)

Number of matching Variables: 0 of 1897 Total Variable(s) included in Plot: 1

Keyword :

	Variable	Source	Temp.Res.	Spat.Res.	Begin Date	End Date	Units
<input checked="" type="checkbox"/>	Combined Dark Target and Deep Blue AOD at 0.55 micron for land and ocean: Mean (MYD08_D3 v6)	MODIS-Aqua	Daily	1°	2002-07-04	2018-02-13	-



Aerosol Data Analysis: Step 8

Create Time Series

Time series area statistics temporarily unavailable ... [1 of 1 messages] [Read More](#)

Select Plot

Maps: *Select...*
 Comparisons: *Select...*
 Vertical: *Select...*
 Time Series: *Area-Averaged*
 Miscellaneous: *Select...*

Select Date Range (UTC)

YYYY-MM-DD HH:mm
 2015 -09 -15 00 :00 to 2015 -09 -30 23 :59

Valid Range: 2002-07-04 to 2018-02-13

Select Region (Bounding Box or Shape)

Format: West, South, East, North
 90.7031,-13.3594,146.9531,14.76

Select Variables

▼ Disciplines

- Aerosols (187)
- Atmospheric Chemistry (92)
- Atmospheric Dynamics (416)
- Cryosphere (13)
- Hydrology (1083)
- Ocean Biology (72)
- Oceanography (75)
- Water and Energy Cycle (1157)

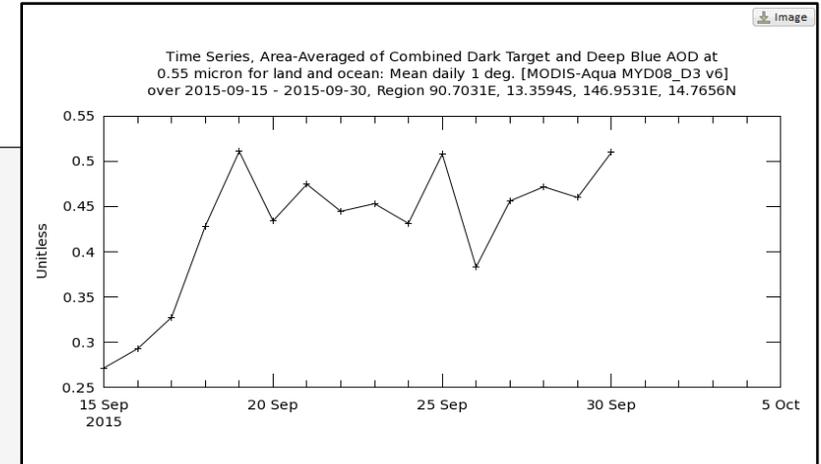
▼ Measurements

- Aerosol Index (5)
- Aerosol Optical Depth (87)
- Air Pressure Anomaly (1)
- Air Pressure (53)
- Air Temperature Anomaly (2)
- Air Temperature (96)
- Albedo (24)
- Altitude (8)
- Angstrom Exponent (20)
- Atmospheric Moisture (117)
- Black Carbon (5)
- Buoyancy (2)
- CH4 (17)
- CO (30)
- CO2 (2)

Number of matching Variables: 0 of 1897 Total Variable(s) included in Plot: 1

Keyword :

	Variable	Source	Temp.Res.	Spat.Res.	Begin Date	End Date	Units
<input checked="" type="checkbox"/>	Combined Dark Target and Deep Blue AOD at 0.55 micron for land and ocean: Mean (MYD08_D3 v6)	MODIS-Aqua	Daily	1 °	2002-07-04	2018-02-13	-



Questions for Discussion

- Describe the aerosol maps created using the Giovanni exercise.
- What is the maximum Aerosol Optical Depth reported on the map?
- What is the observed trend in aerosols over your location? Explain.
- Do you have any prior knowledge about the observed trends in aerosols in your region? How can you verify them using an independent data set?
- What is the seasonal variability (if it exists) in the observed trend?

