

Activity 1: TRMM Rainfall Analysis **Introductory Exercise to Learn Giovanni**

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Giovanni is a web-based application that allows easy and quick exploration of NASA products (<http://giovanni.gsfc.nasa.gov>)

General Information:

The following steps will guide you through selection of Portal, product, analysis and visualization options. In the steps below, 'go to' or 'select' means use your mouse and click to select the link or option specified in the direction.

On the Giovanni home page you will see a Table in the middle of the page that lists all of the available Giovanni Portals. For each product there are following options:

Spatial:	Allows you to select the geographical region of interest
Vertical Profiles:	Allows you to select pressure levels for a profile display for 3-dimensional data (N/A to 2-dimensional data such as surface rain rate)
Parameters:	Allows you to select desired data parameter.
Display	Provides information about the 'Data product Info', 'Units', 'Dimensions' when you click on those options
Analysis Options:	Available for selected products when additional information about the data parameter is available (such as 'climatology' – defined as time-mean values)
Temporal:	Allows you to select time period of your interest
Select Visualization:	Allows you to select multiple ways of displaying the data parameter
Generate visualization:	Generates plots in image format which can subsequently be downloaded on you computer

Objective: Learn data selection, analysis, and visual display options by using NASA's Giovanni application

There are three parts to this exercise:

Learn to make --

- 1) map of rain rates over Oklahoma
- 2) animation of rain rate maps for selected time period,
- 3) time series of area-averaged rain rates

Go to the home page for Giovanni: <http://giovanni.gsfc.nasa.gov>

Part 1a: Time-Mean Rain Maps

In the Portal Table select 'hydrology portal'

Select ['TRMM Online Visualization and Analysis System \(TOVAS\)'](#)

You will see several options for rainfall products

Go to the section 'TOVAS New Release (2008/09/12)':

Select ['Monthly products \(3B43 V6, 3A12 V7, and 3A25 V7\)'](#)

Spatial:

You will see a map in this section. Below the map you will see 'Area of interest' followed by four boxes containing 'west longitude', 'north latitude', 'south latitude', and 'east longitude' of the map. Use these boxes to specify spatial region of your interest. Enter the following latitude-longitude values in the boxes to focus on Oklahoma.

Area of Interest (Oklahoma): Enter West: -104 North: 38 East: -94 South: 33 (click on 'Update Map')

Alternately,

- Select the hand icon to the left of the map then click and drag the map so that it is *centered over north America*
- Select the + icon then click on the map to zoom in.
- Select the box icon to the left of the map and then drag and draw a box that extends over Oklahoma

Parameters:

Display: Select 'Units'

Analysis Options: Select 'Parameter'

Select 'TRMM 3B43 V7(1998/01/01 - 2012/03/31)'

Select 'Rain Rate'

Temporal:

Begin Date : Year 1998 Month 'Jan' for January

End Date: Year 2012 Month 'Mar' for March

Select Visualization:

Select 'Lat-Lon map, Time-averaged'

Select **'Generate Visualization'** (will take a few minutes to get the plot)

Part 1b: Downloading Data

You are now at the 'Visualization Results' from Part 1a and have a map of mean rain rate
You can click in the image and drag it to your computer to save

Click the tab 'Download Data'

You will see a list of files you can download in HDF or netCDF formats (see the column 'Download Files') by clicking on desired option

Display on Google Maps [You need Google Earth on your computer]

Click on the multi-colored icon in the bottom row labeled 'KMZ' (You will be taken to another page)

Click on the link given and open it (This will open the image in Google Maps)

Now you may see the data with overlays borders and major cities or landmarks. You are able to Zoom in and out, add labels, and further customize your image with layers.

To save images:

Go to 'File', Open the 'Save' tab, then click 'Save Image'

Study the map and answer the following questions:

- 1) What is the unit of rain rate? Note the minimum and maximum values of time-mean rain rate.
- 2) Note down approximate latitude-longitude where the rain rate is maximum in the map.
- 3) Describe how the rain rate changes as you go from west to east in the map at 35° N.

Part 2: Animation

Click 'Home' tab to go back to ['Monthly products \(3B43 V6, 3A12 V7, and 3A25 V7\)'](#)

Spatial:

Area of Interest: Enter West: -104 North: 38 East: -94 South: 33

Parameters:

Display: Select 'Units'

Analysis Options: Select 'Parameter'

Select 'TRMM 3B43 V7(1998/01/01 - 2012/03/31)'

Select 'Rain Rate'

Temporal:

Begin Date : Year 2011 Month 'Jan' for January

End Date: Year 2011 Month 'Mar' for March

Select Visualization:

Select 'Animation'

Customization of Your Plot

Customizing will allow the data you are using to maintain the same parameter values and intervals. This is helpful when you want to compare multiple maps.

Click on 'Edit Preferences' (next to the tab where you selected 'Animation')

Go to 'Color Bar'

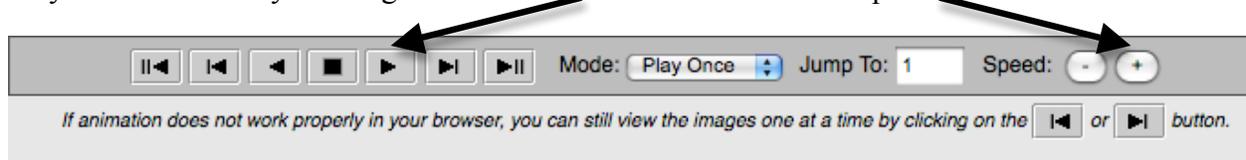
Select Mode 'Custom'

Input 'Min Value' and 'Max Value'

(These can vary based on parameters, however, for this exercise input Min Value: 0.02 and Max Value: 0.2)

Click '**Generate Visualization**'

Play the animation by clicking the middle arrow. You can control speed



Watch the animation and study the month-by-month rain pattern over Oklahoma.

Answer the following questions:

1) List the months when most of the state is void of rain in 2011

2) Oklahoma City is located at 35.5° N and 97.5° W. Which months had higher rain rate (greater than 0.164 mm/hr)? Do you think this will be the case every year? **If you wish you can repeat the animation for another year and check the rain rate around Oklahoma City.**

Part 3: Time Series of Area-averaged Rain Rates

You will be comparing daily rainfall averaged over selected domain centered on Oklahoma, for two summer seasons (May to August, 2010 and 2011)

Click 'Home' tab to go back and click 'Home' again or use back arrow of your browser to go back to the ['TRMM Online Visualization and Analysis System \(TOVAS\)'](#)

Go down to the section 'TOVAS New Release (2008/09/12)':

Select ['Daily TRMM and Other Rainfall Estimate \(3B42 V6 derived\)'](#)

Spatial:

Area of Interest (Oklahoma): Enter West: -104 North: 38 East: -94 South: 33 [Click on 'Update Map']

Parameters:

Display: select 'Units'

Temporal:

Begin year : 2010 Month: May Day: 1

End Year: 2010 Month: August Day: 31

Select Visualization:

Select 'Time Series'

Select 'Edit Preference'

Enter Y-Axis Minimum: 0 and Y-Axis Maximum: 20

Select **'Generate Visualization'**

Click on the 'Home' tab at the top

Now change the **Begin and End year to 2010 in Temporal :**

Begin year : 2011 Month: May Day: 1

End Year: 2011 Month: August Day: 31

Select '**Generate Visualization**'

You can view the two time series by selecting tabs on the top 'Result #1' and 'Result #2'

You can also drag the two time series on your computer and compare.

Answer the Following Questions:

1) Which summer season had more rain? Is this the season with more rainy days? Would you agree, if you live in Oklahoma, that the TRMM daily rainfall data confirms your experience that this season was the wetter season of the two?

2) Which year/month/day had the maximum daily rainfall? How much?