

Activity 3: Extreme Rain Event over Oklahoma

NASA Remote Sensing Training
Norman, OK June 19-20, 2012

Objective: To conduct visual analysis of an extreme rain event in June 2007 that resulted in flooding of Oklahoma City and surrounding region.

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There are three parts to this exercise.

- 1) Identify the day of extreme rain event
- 2) Analyze 3-hourly rainfall associated with this event
- 3) Analyze winds and moisture characteristics associated with this event

Part 1: Identify Extreme Rain Event

Part 1a: Time Series of Rainfall for June 2007

Go to the home page for Giovanni:

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

Go to Hydrology Portal:

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

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

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

Spatial:

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

Parameters:

Select Display 'Units'

Select 'Precipitation'

Temporal:

Begin Year: 2007 Month: June Day: 1

End Year: 2007 Month: June Day: 30

Select Visualization:

Select 'Time Series'

‘Generate Visualization’

Study the time series plot and **note down the day of highest rainfall in June 2007**. We will use this date in Part 1b.

Part 1b: Rainfall Map

Click on ‘Home’ tab at the top

This will take you back [‘Daily TRMM and Other Rainfall Estimate \(3B42 V6 derived\)’](#)

Spatial:

Same as in 1a

Parameters:

Select Display ‘Units’

Check ‘Precipitation’

Temporal :

Begin Year: 2007 Month: June Day: the day with the maximum rainfall found in Part 1a

End Year: 2007 Month: June Day: the day with the maximum rainfall found in Part 1a

Select Visualization:

Select ‘Lat-Lon map, Time-averaged’

Select **‘Generate Visualization’**

Answer the following:

1) Note down the extreme rain rate value and approximate latitude-longitude box where the rainfall is maximum. Would you have known this information from the time series plot in Part 1a?

Part 2: Evolution of Extreme Rain Event

Part 2a: 3-hourly maps of rainfall on 20 June 2007

With your browser’s back arrow or by clicking ‘Home’ tab (upper left) go back to [‘TRMM Online Visualization and Analysis System \(TOVAS\)’](#)

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

Select [‘3-hourly product \(3B42 V6\)’](#)

Spatial:

Same as in 1a

Parameters:

Select Display 'Units'

Check 'Accumulated_Precipitation'

Temporal :

Begin Year: 2007 Month: June Day: 20 Hour: 00

End Year: 2007 Month: June Day: 20 Hour: 21

Select Visualization:

Select 'Animation'

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

Go to 'Color Bar'

Select Mode 'Custom'

Input 'Min Value' to 0 and 'Max Value' to 60

Select '**Generate Visualization**'

Answer the following:

Describe the movement of the rain system observed between 00 to 21 UTC on 20th of June.
When was the rainfall maximum and covered most of the state of Oklahoma?

Part 2b: 3-hourly time series of rainfall on 20 June 2007

Click the 'Home' tab and go back to ['3-hourly product \(3B42 V6\)'](#)

Spatial:

Same as in 2a

Parameters:

Same as in 2a

Temporal :

Same as in 2a

Select Visualization:

Select 'Time series'

Select 'Generate Visualization'

Drag the image to save on your computer

Answer the following:

When was the rainfall maximum? Does your answer match the answer in 2a?

PART 3: Winds, Humidity, and Extreme Rain

Part 3a: Upper Atmospheric Level East-West wind on 20th June 2007

Go to the home page for Giovanni:

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

Go to Meteorological Portal:

Select '[MERRA Hourly 3D](#)'

Parameters:

Select 'Eastward wind component'

Spatial

Enter West: -104 North: 38 South: 33 East: -94

Vertical Profile:

Upper Level: 200 hPa

Lower Level: 200 hPa

Temporal:

Begin Year: 2007 Month: June Day: 20 Hour: 00

End Year: 2007 Month: June Day: 20 Hour: 21

Visualization/Plot Type:

Select 'Time series'

Click 'Generate Visualization'

Part 3b: Lower Atmospheric Level North-South Wind on 20th June 2007

Go back to [‘MERRA Hourly 3D’](#)

Parameters:

Select ‘Northward wind component’

Spatial:

Same as in 3a

Vertical Profile:

Upper Level: 850 hPa

Lower Level: 850 hPa

Temporal:

Same as in 3a

Visualization/Plot Type:

Select ‘Time series’

Click ‘**Generate Visualization**’

Part 3c: Atmospheric Humidity on 20th June 2007

Go back to [‘MERRA Hourly 3D’](#)

Parameters:

Select ‘Specific Humidity’

Spatial:

Same as in 3a

Vertical Profile:

Upper Level: 500 hPa

Lower Level: 500 hPa

Temporal:

Same as in 3a

Visualization:

Select ‘Time series’

Select ‘**Generate Visualization**’

Inspect the time series in Parts 3a, 3b, and 3c along with the rainfall time series you saved in Part 2b. We will discuss the nature and inter-relationship among these parameters.

