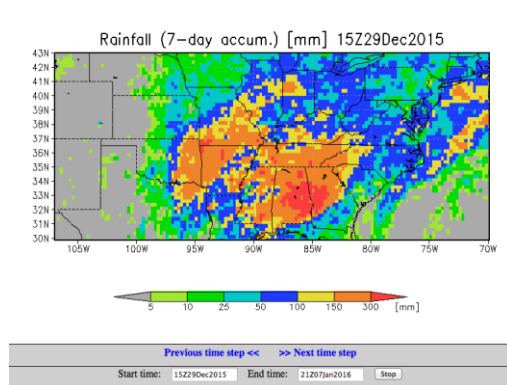


ARSET Advanced Webinar on Using NASA Remote Sensing for Flood Monitoring and Management:  
Week 4

Exercise: Mississippi River Flood December 2015 - January 2016

**Part 1a: Monitor Rainfall and Flooding Intensity Using GFMS**

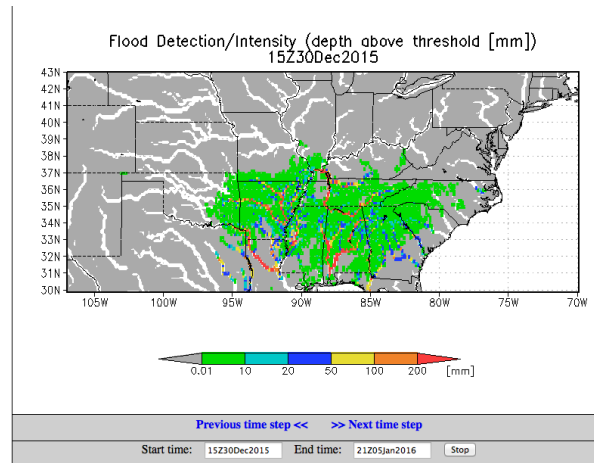
- Go to <http://flood.umd.edu/>
- Scroll down to **Rainfall (7 – day accum) [mm]**
- Using ‘**Pan the map**’ and ‘**Zoom in**’ and ‘**Zoom out**’ arrow zoom in on the St. Louis region
- Under the map enter ‘**Start time:**’ 00Z28Dec2015 and ‘**End time:**’ 21Z05Jan2016
- Click on **Animate** and observe how the rainfall changes
- Note the maximum amount of 7-day accumulated rain observed during 28 December 2015 - 05 January, 2016
- Note the approximate area (in latitude and longitude) where heavy rainfall is observed



- From the rainfall maps from GFMS which river(s) are likely to be flooded?



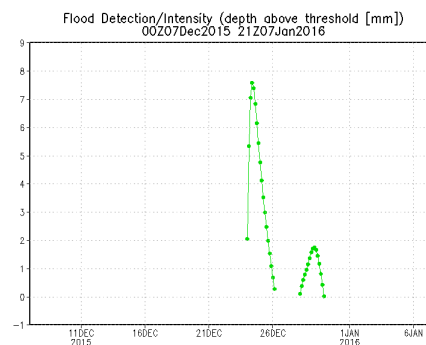
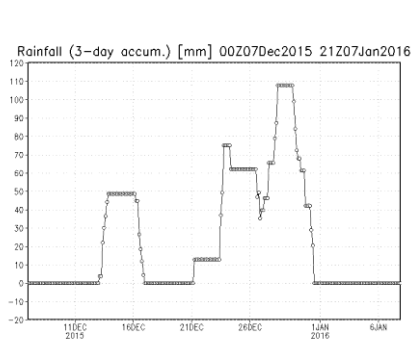
- Now from the ‘**Plot different variables:**’ on the right side of the map select ‘**Flood Detection (Depth)**’ from the drop-down menu and click on ‘**plot**’
- Repeat map animation steps for the ‘**Flood Detection (Depth)**’. That is enter ‘**Start time:**’ 00Z28Dec2015 and ‘**End time:**’ 21Z05Jan2016 and click on **Animate** and observe how the flood intensity is changing



- Do the rivers you think would be flooded based on the rainfall animation show high **flood detection depth**?
- Which river had maximum intensity flooding? Note the date, time and maximum flood depth observed.

### Part 1b: Rainfall Time Series as Flood Indicator

- From the ‘Plot different variable’ select ‘Rainfall (3-day)’ from the drop-down menu
- In the ‘Plot time series for an individual point (lat, lon):’ section and enter  
**T1: 00Z07Dec2015**  
**T2: 21Z07Jan2016**
- In the map zoom in enough to individual pixels
- Enter lat -lon 38.5 and -90.4 (This is close the city of St. Louis which was heavily flooded)
- Click on ‘See time Series’
- Save the time series on your computer (by dragging or right clicking the image with your mouse)
- Repeat the same time series for ‘Flood detection (Depth)’
- Examine both the time series and note the period when accumulated rainfall is rising; also examine the flooding detection depth and see if flood episodes can be deduced from the rainfall time series.

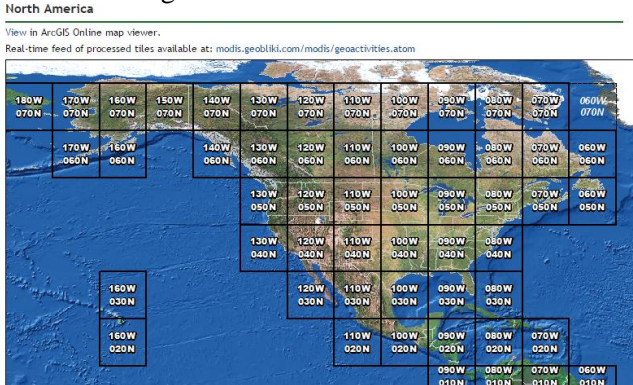



## Part 2: Examine Surface Inundation for the November-December 2015 from MODIS NRT

- Go to the MODIS Near Real-Time (NRT) Global Flood Mapping Portal:

<http://oas.gsfc.nasa.gov/floodmap/>

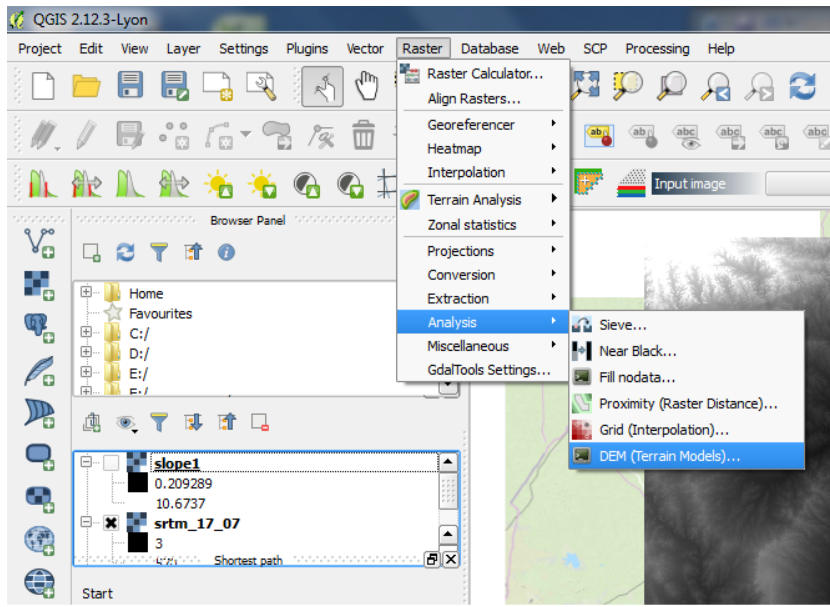
- Click on the **plus icon** next in the **Data Viewer** (left hand menu)
- Click on **North America**
- Click on the grid 100E and 040N



- From the top bar select **'14 Day Composite'**
- Using the calendar in the top upper left, select **7 January, 2016**
- Do you see any inundation where GFMS shows high rainfall?
- Also use the direction  arrows to explore surrounding grids to see if there is surface inundation present
- Next, for **"14 Day Composite"** examine how the inundation maps change from 28 December, 2015- 10 January 2016 in the 100W 040N grid
- Click on the maps to zoom-in and see the surface inundation
- Download the MODIS Flood Water** shapefile for the 100W, 040N grid using the 14 day composite of 7 January, 2016.

## Part 3: Use the Shuttle Radar Topography Mission (SRTM) Terrain and Slope in the Flooded Area

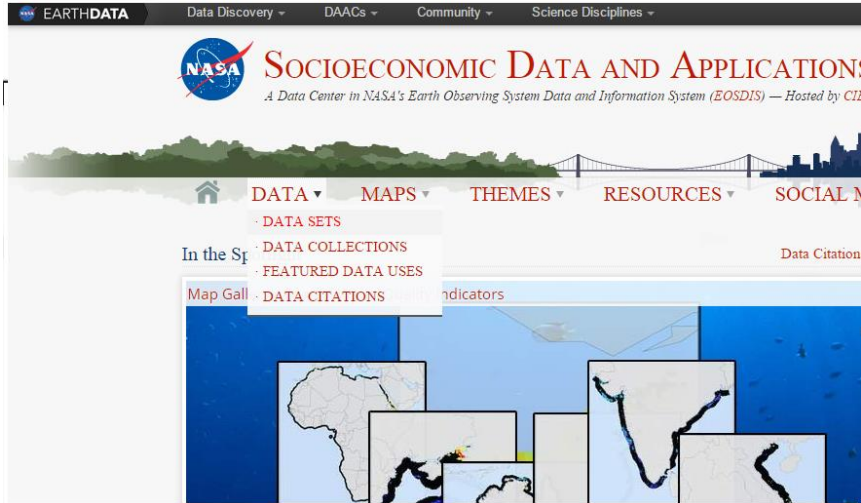
- Go to the SRTM download portal:  
<http://srtm.csi.cgiar.org/SELECTION/inputCoord.asp>
- Download SRTM elevation using the following input coordinates:
  - Latitude min:** 35N **max:** 40N
  - Longitude min:** 95W **max:** 90W
- Open QGIS Desktop**
- Load a basemap of your choice
- Import the SRTM data previously downloaded
- Using the DEM (Terrain Models) tool create a slope layer



- Set the input file to the SRTM Digital Elevation Model (DEM)
- Select an output file location and name
- Change the Mode to Slope
- Check the box next to Slope expressed as percent
- Set the Scale to 111120.00 to convert to meters
- Import the MODIS Flood Water shapefile
- Visually inspect the slope layer and how it intersects with the MODIS Flood Water data
- Note how areas of lower slope and elevation have flooded and where areas of potential flooding may occur
- This can help decision makers determine areas most at risk and where to focus disaster response.

**Part 4: Examine SEDAC Population Density, Roads, and Landmarks in the Flooded Area**

- Go to the SEDAC website:  
<http://sedac.ciesin.columbia.edu/>
- **Login** using your previously created SEDAC username and password
- Click on the **Data** tab and select **Data Sets**



- Type **'population density'** in the **All Fields** search box
- Download the **'Population Density Grid, v3'** dataset for the United States
- Go back to the Data Sets tab and type in **'roads'** in the **All Fields** search box
- Download **'Global Roads Open Access Data Set (gROADS) v1'** for the Americas
- Import both of these products into QGIS Desktop
- Import the MODIS Flood Water dataset downloaded previously
- Visually inspect the areas near and around the flood water
- Are there any highly populated areas experiencing flooding?
- Are there any roads that may be under water?
- Where should your relief efforts be focused and why?