Flood Monitoring
Case Study: Argentina, Brazil, and Paraguay Floods
January 2016

Objective:
This exercise is designed to provide experience in using the Global Flood Monitoring System and MODIS Inundation Mapping Tool for flood monitoring and for planning flood warning and post-flood relief operations.

There are two parts to this exercise
1. Rainfall and Flooding
    a. Monitor Rainfall and Flooding Intensity Using GFMS
    b. Rainfall Time Series as a Flood Indicator
2. Examine Surface Inundation from MODIS NRT for 12-17 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 the **Zoom in** and **Zoom out** arrows, zoom in on the region of southern Brazil, Argentina, and Paraguay
- Under the map, enter
    o **Start time:** 00Z12Jan2016
    o **End time:** 21Z17Jan2016
- Click on **Animate** and observe how the rainfall changes
- Write down the maximum amount of 7-day accumulated rain observed during 12-17 January 2016
- Note the approximate area (in latitude and longitude) where heavy rainfall is observed.

Question:
From the rainfall maps, which river(s) are likely to be flooded?

- In **Plot different variables** on the right-hand side of the map, select **Flood Detection (Depth)** from the drop-down menu and click **plot**
- Repeat the map animation steps for **Flood Detection (Depth)**. Enter:
    o **Start time:** 00Z01Jan2016
    o **End time:** 21Z31Jan2016

Questions:

Did the rivers you thought would be flooded based on the rainfall animation show high **flood detection depth**?

Which river has the maximum intensity of flooding? Write down the date, time, and the maximum flood depth observed.

Part 1b: Rainfall Time Series as a 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, enter:
  - **T1:** 00Z01Jan2016
  - **T2:** 21Z31Jan2016
- Zoom in on the map enough to see individual pixels
- Enter lat-lon: -22.62 and -52.56 (close to a heavily flooded area)
- Click on **See time series**
- Save the time series on your computer by dragging 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.

Questions:

At this location, how many flooding episodes do you see in the time series?

What is the highest value of **Flood Detection (Depth)** and on what date/time?

Can the 3-day composite rainfall time series be used for flood detection at this location?

Part 2: Examine Surface Inundation from MODIS NRT for 12-17 January 2016

- Go to the MODIS Near Real-Time (NRT) Global Flood Mapping Portal: http://oas.gsfc.nasa.gov/floodmap/
- Click on the **plus icon** next to the **Data Viewer** in the left hand menu
- Click on **South America**
- Click on the grid at 60W and 20S
- From the top bar, select **3 Day Composite**
- Using the calendar in the top upper left, select **January 17, 2016**. You will get a map showing inundation (shaded red).
- Click on the maps to zoom in and see the surface inundation
- Above the map, click **Check slide show for the last 10 days**. Note how the inundation changes between 12-17 January.
- Also use the direction arrows to explore surrounding grids to see if there is surface inundation present
- Next, select **14 Day Composite** and examine how the inundation maps change from 12-17 January

Discussion:

Do you see inundation where GFMS shows high rainfall and flooding? If not, what may be the reason?

Does the MODIS inundation map show the same information as GFMS **Flood Detection (Depth)**?

What information is shown in **14 Day Composite** maps? How does it differ from the **3 Day Composite** maps?

How can GFMS and MODIS NRT be used together for flood management?