ARSET Advanced Webinar on Using NASA Remote Sensing for Flood Monitoring and Management: Week 1

Extreme Rainfall Detection System (ERDS)

==========

Objective: Learn to use ERDS to monitor rainfall and flood warning

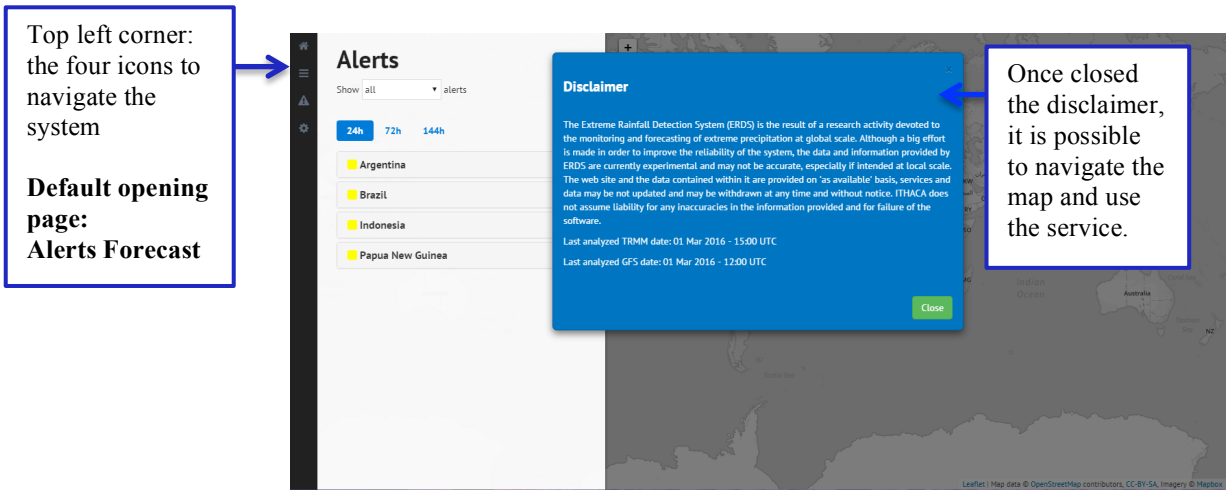
==========

There are four parts to this exercise:

1) Learn ERDS features: navigation, zoom, available pages, the forecast alerts page
2) Accumulated rainfall monitoring and forecasting
3) Analyze extreme rainfall alerts at pixel and district levels
4) Analyze the Texas and Oklahoma flooding using ERDS

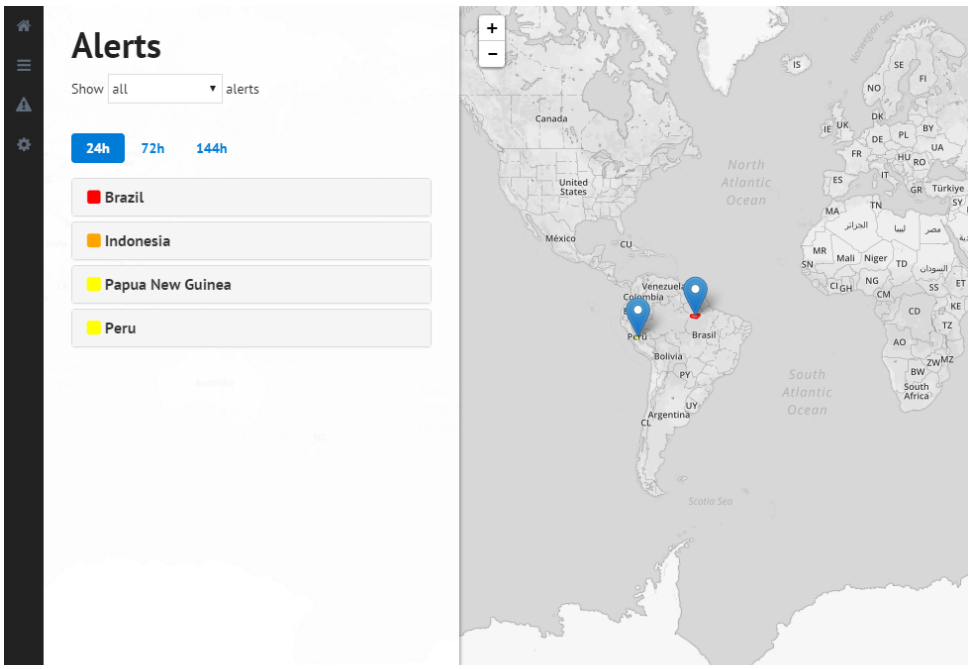
Part 1. Learn ERDS features: navigation, zoom, available pages, and the forecast alerts page

- Go to http://erds.ithacaweb.org/



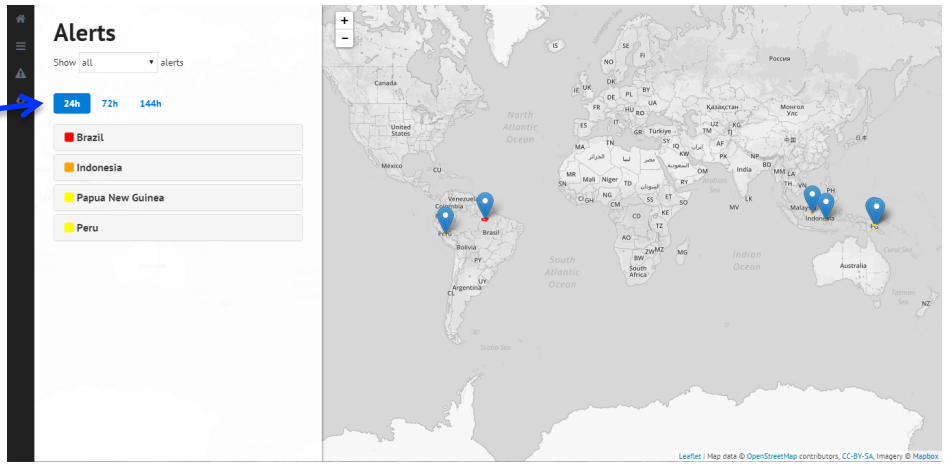
- The **default opening page** shows firstly a disclaimer specifying the last analyzed TRMM and GFS files
- **Black bar, in the top left corner**, note **four icons**:
  - *ERDS home page*, in this area it is possible to find information about the service ( );
  - *Layers page*, the analyzed data are organized in different layers ( );
  - *Alerts Forecast page*, in this section information about alerted countries are listed ( );
  - *Setting page*, the precipitation data and alert legends are shown ( ).

Default opening page:
Alerts Forecast

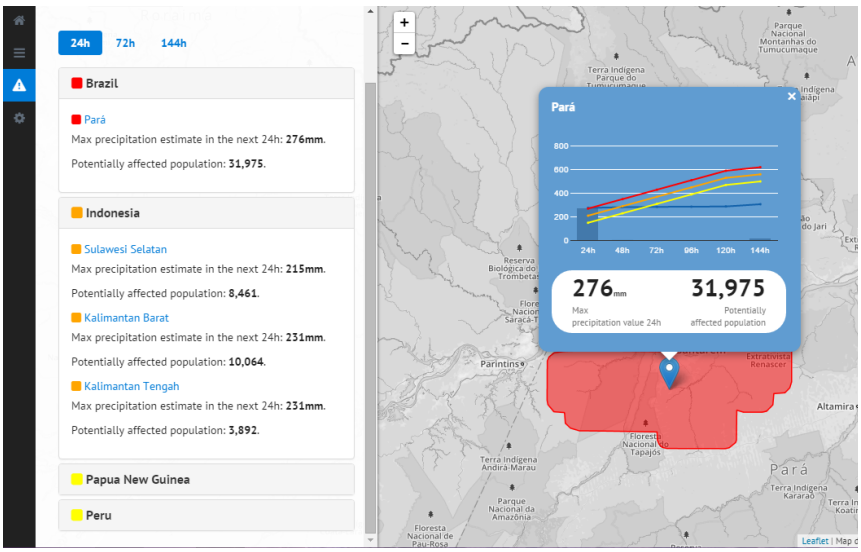


- Close the disclaimer and you can start navigate the system
- **Alerts Forecast page** ( ). Alerted countries are listed, ordered from the potentially most affected to the less affected in terms of population.
- **Three different alert levels** can be visualized (low→yellow, moderate→orange and severe→red), based on specific rainfall intensity thresholds, defined as the amount of precipitation for a given duration over a specific climatological area.
- Above the list of affected countries **three forecast events** are presented: short term events (**24 h**), and medium/long term events (**72h** and **144h**).
- **Click on the 24h, 72h, 144h** icons and note the list of affected countries for each specific forecasted event.

The three forecast events: short term events (24 h), and medium/long term events (72h and 144h).



- **Click on the name of an affected country** and note the list of affected districts/regions. Also values of Max precipitation estimate in the next 24h, 72h, 144h are presented as well as the potentially affected population.
- **Click on the name** of an alerted district, the map zooms over the envelope extent of the active pixels in the chosen area. Specific information about the potential impact of heavy rainfall, such as the visualization of the affected countries and the calculation of the potentially affected population, are displayed in a table. **Alternative method to visualize the table**: it is possible to click directly on the icons in the map.



- **The graphic in the table** shows the histograms of 24h precipitation values and the accumulation of precipitation over the selected period. So it is possible to identify when accumulated precipitation values overcome the extreme rainfall thresholds and therefore an alert is triggered.
- Using **zoom in** and **zoom out** buttons on the upper left corner in the map you can zoom over an area of interest. You can also use the '**pan**' option.

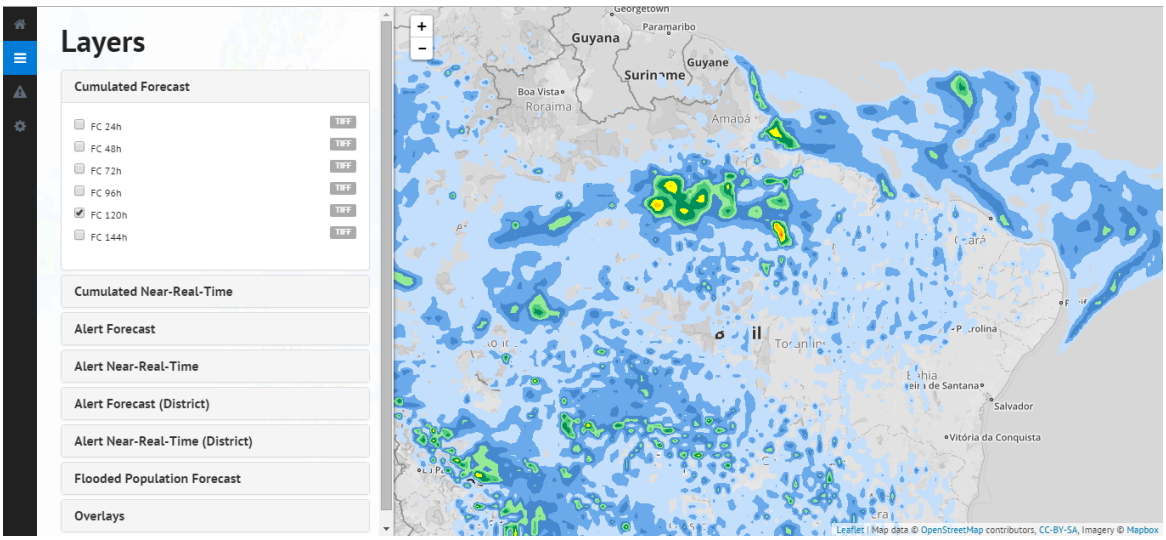
Part 2. Accumulated rainfall monitoring and forecasting

Perform a more in depth analysis of past rainfall and predicted rainfall at global and at local scale. The **Forecast data** are derived from GFS model, while the **Near-Real-Time** monitoring is derived from TRMM.

- **Click on** the icon of **Layers page** in the left black bar. ( )
- **To be able to select the option** of interest and to start visualizing the different layers, you have to click **on Flooded Population Forecast layer** and **uncheck** the selected tabs.
- **Note the selection of available layers:**
    - Cumulated Forecast
    - Cumulated Near-Real-Time
    - Alert Forecast

- Alert Near-Real-Time
- Alert Forecast (District)
- Alert Near-Real-Time (District)
- Flooded Population Forecast
- Overlays

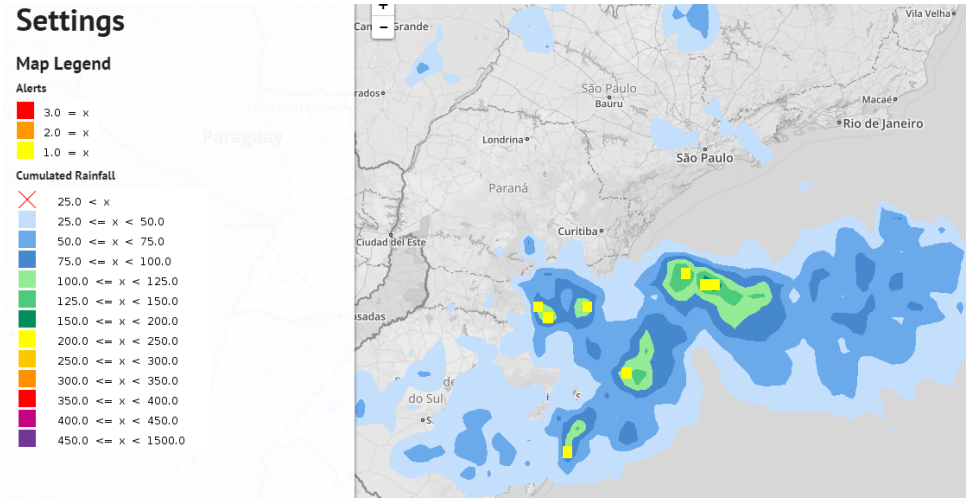
- Live analysis of accumulated precipitation (**zoom in** over an area suggested by the speaker)
- Click on the **Overlays** button at the end of the Layers list and check the **Admin Label** box to get the administrative boundaries overlaid to the precipitation layers
- **Click on Cumulated Forecast** and note the six available layers. Each Layer represents the prediction of accumulated precipitation starting from the next 24h and up to 144h lead-time.



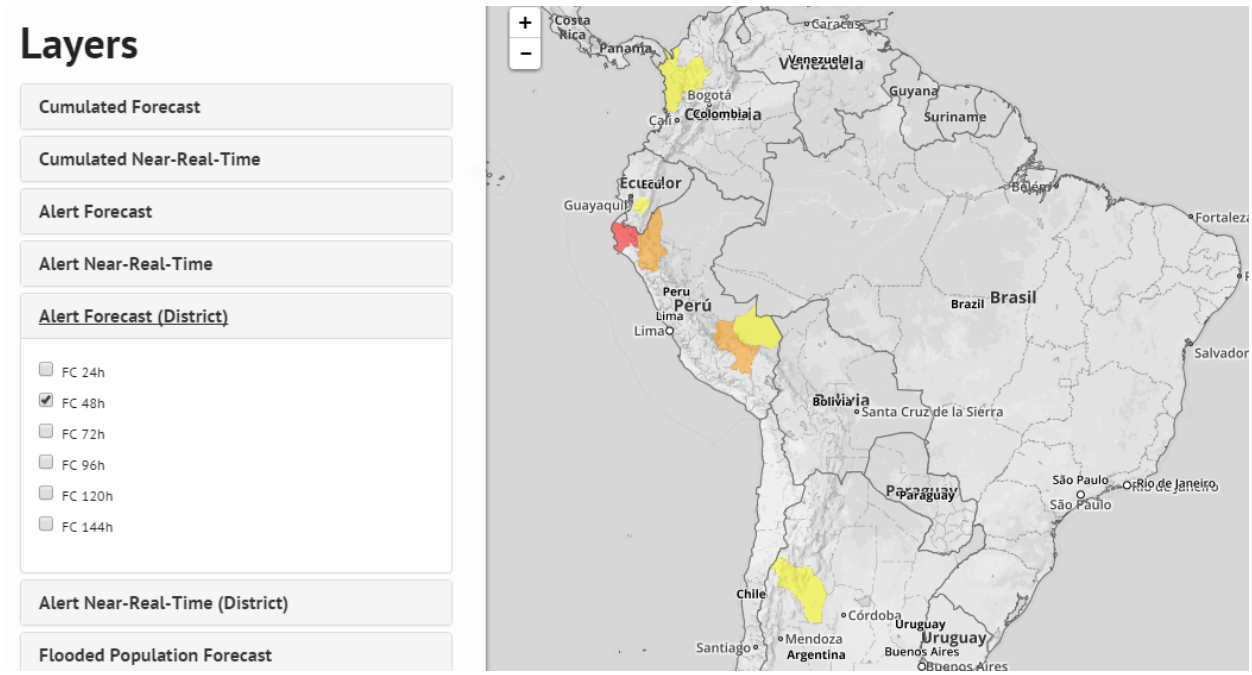
- **Select FC 24h**, then FC 48h, then FC 72h. Note the accumulation of precipitation over the area during the next three days.
- **Before checking another layer** (i.e. Cumulated Near-Real-Time) **uncheck** the selected layers.
- **Click on Cumulated Near-Real-Time** and note the seven available layers. Each Layer represents the accumulated rainfall starting from the past 24h and until the past 7 days.
- **Select NRT 24h**, then NRT 48h, then NRT 72h. Note the accumulation of precipitation over the area during the past three days.
- **Click on the Setting page icon** ( ) to access the precipitation legend.
- **Use zoom in and zoom out buttons** to have an overview of precipitation at global or at local scale.
- **Click on** the icon of **Layers page** in the left black bar. ( )
- **Click on "TIFF" tab** to download the gridded precipitation dataset for a specific event of interest as .tiff. The .tiff are available for all the Layers.

Part 3. Analyze extreme rainfall alerts at pixel and district levels

- **Click on Alert Forecast** and note the six available layers. These layers show the results of the calculation of extreme rainfall alerts at pixel level using GFS data
- **Click on FC 24h, FC 48h, etc…** to get information about extreme rainfall prediction up to 144h lead-time
- By **selecting both Cumulated Forecast and Alert Forecast** for the same time-frame it is possible to overlay the accumulated precipitation and the alerted pixels



- **Click on Alert Near-Real-Time** and note the seven available layers. These layers show the results of the calculation of extreme rainfall alerts at pixel level using TRMM data
- **Click on NRT 24h, NRT 48h etc…** to get information about extreme rainfall monitoring up to 7 days before the current date.
- By **selecting both Cumulated Near-Real-Time and Alert Near-Real-Time** for the same time-frame it is possible to overlay the accumulated precipitation and the alerted pixels
- Now **Click on Alert Forecast (District).** The system sows the prediction of alerted districts based on the analysis of alerted pixel within each district.
- **Click on FC24h or FC48h or FC72h** and zoom in and out to get an overview of major predicted extreme rainfall events at global scale



- **Click on Alert Near-Real-Time (District).** The system sows the monitoring of alerted districts based on the analysis of alerted pixel within each district.
- **Click on NRT24h or NRT72h** and zoom in and out to get an overview of major past extreme rainfall events at global scale
- **By overlaying the Alert District and the Alerts at pixel level** is possible to get information about the extreme rainfall event characteristics

Part 4. Analyze the Texas and Oklahoma flood event through ERDS demo

- **Go to** http://erds.ithacaweb.org/Texas and Oklahoma/#layers
- The system opens over Texas and Oklahoma area
- **Go to ERDS Home page** (top left corner). Information about last analyzed TRMM and GFS dates files are available.
- **Click on the Layers page** (≡)
- **Click on Overlays** (Last option of the page) and check the **Admin Label tab** to switch on the Administrative Layers

Extreme Precipitation **Forecast** Steps

- Now go to **Cumulated Forecast** and select each variable from 24h up to 144h to analyze the evolution of the predicted rainfall from 07/05/2015 to 12/05/2015
- The precipitation scale is available by clicking on the **setting button** ( ) in the left black bar
- The system shows heavy precipitation over south-east Texas and Oklahoma and Mozambique especially between May 10th and 11th (FC96h-FC120h)
- Now **uncheck the Cumulated Forecast tabs and go to Alert Forecast;** select each variable from 24h up to 144h to analyze the evolution of the predicted **extreme rainfall alerts at pixel level** from 07/05/2015 until 12/05/2015
- **Uncheck the Alert Forecast Tabs** and go to **Alert Forecast (District)**; select each variable from 24h up to 144h to analyze the evolution of the predicted **extreme rainfall alerts at district level** from 07/05/2015 until 12/05/2015
- Uncheck all the tabs
- *Comparison FC cumulated precipitation and FC alerts.* Go to **Cumulated Forecast** and check the **FC72h**. Then go to **Alert Forecast** and check the **FC 72h**. Alerts are superposed to the predicted accumulated rainfall

Extreme Precipitation **Monitoring** Steps

- Go to **Cumulated Near-Real-Time** and select each variable from 24h up to 168h to analyze the evolution of the accumulated rainfall from 09/05/2015 to 04/05/2015 (the accumulation of precipitation goes backwards in time)
- The precipitation scale is available by clicking on the **setting button** in the left black bar
- The system shows heavy precipitation over southeast Texas and Oklahoma and Mozambique especially between May 6th and 8th (NRT48h to NRT96h).
- Now **uncheck the Cumulated Near-Real-Time tabs and go to Alert Near-Real-Time;** select each variable from 24h up to 168h to analyze the evolution of the **extreme rainfall alerts at pixel level** from 09/05/2015 to 04/05/2015
- Uncheck the **Alert Near-Real-Time** Tabs and go to **Alert Near-Real-Time (District)**; select each variable from 24h up to 168h to analyze the evolution of the **extreme rainfall alerts at district level** from 09/05/2015 to 04/05/2015
- Uncheck all the tabs
- *Comparison NRT cumulated precipitation and NRT alerts.* Go to **Cumulated Near-Real-Time** and check the NRT 96h. Then go to Alert **Near-Real-Time** and check the NRT 96h. Alerts are superposed to the accumulated rainfall
- Uncheck all the tabs
- *Comparison forecast/monitoring.* **Check the NRT 96h in the Near-Real-Time (District) Layer** and the **FC 96h in the Alert Forecast (District) Layer.** They system allows to assess if extreme precipitation is going to affect Districts already affected by heavy precipitation during the past four days (NRT 96h).