CLiMMATE

CLoud Microwave Measurements of ATmospheric Events

Precipitation Study using Radar and Rain Gauges during Hurricane Jeanne and a main Rain Event in May 2004 over Puerto Rico

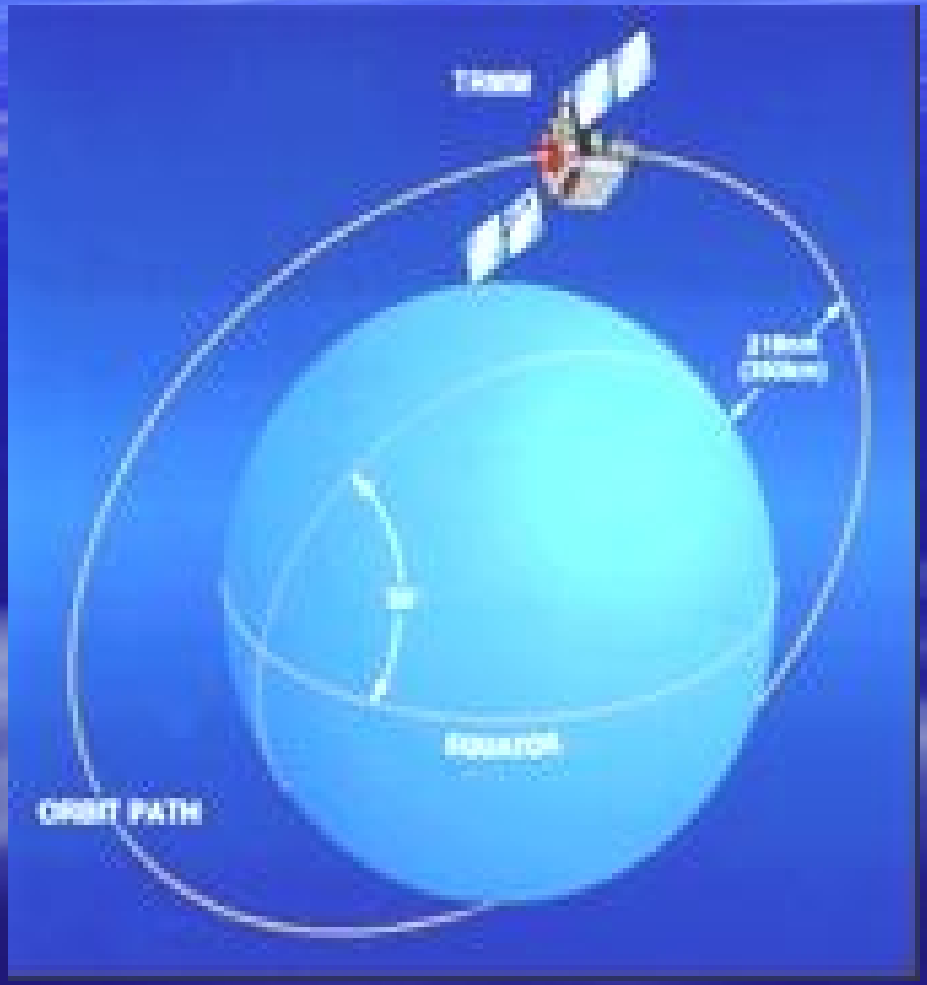
Roger Saltares, Soralis Pimentel, Luis D. Pérez, Sonymar Pérez, Carlos Rodríguez, Nesmary Hernández and Ricardo Ríos

Under supervision of Dr. Sandra Cruz Pol

Comparing Two Data Sets

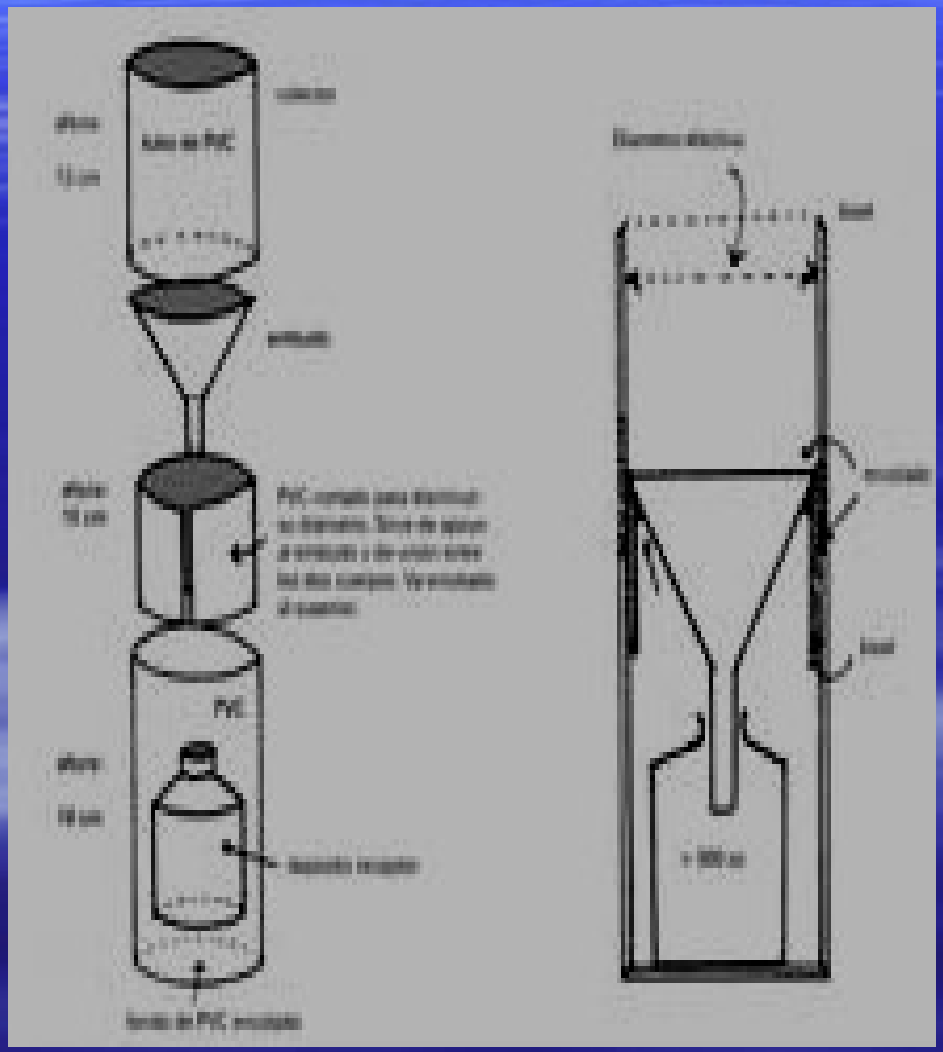
- NASA TRMM Precipitation Radar
- USGS Rain Gauges

NASA Tropical Rainfall Measuring Mission (TRMM) Radar



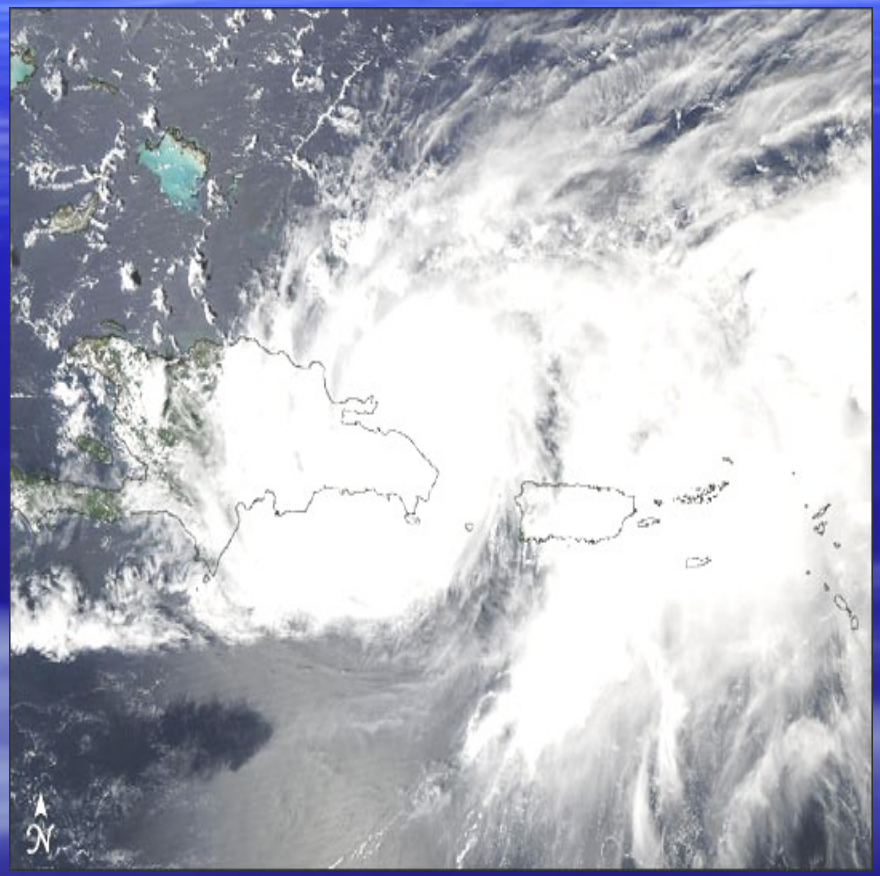
- *Launched*: November 28,1997
- Has an orbit at 35 degrees from the equator.
- *Orbit Duration:* 91 minutes (16 Orbit a day)
- *Time Spent over P.R. during each orbit*: 1.14 minutes
- *Total Time spent over P.R. per day:* 18.2 minutes

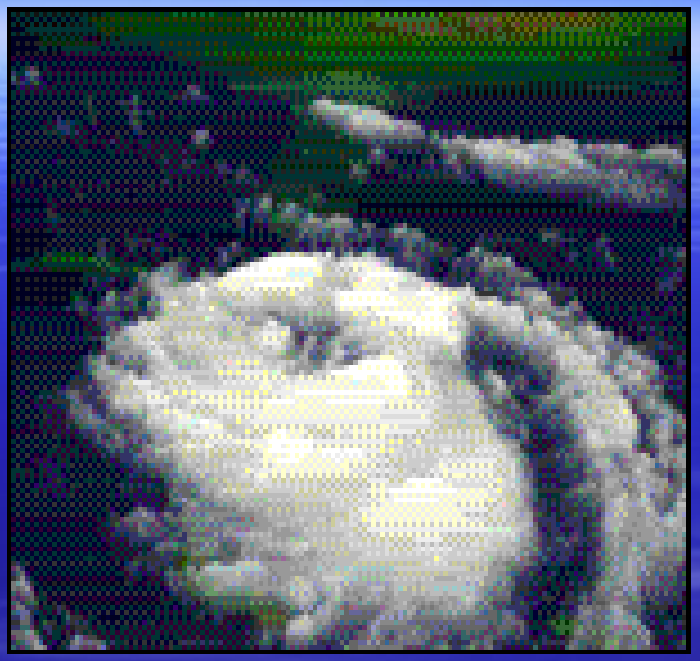
United States Geological Survey (USGS) Rain Gauges



- Around 100 rain gauges in P.R.
- Real-time data typically are recorded at 15-60 minute intervals.
- Recording and transmission times may be more frequent during critical events.

Hurricane Jeanne, May 12 and May 23



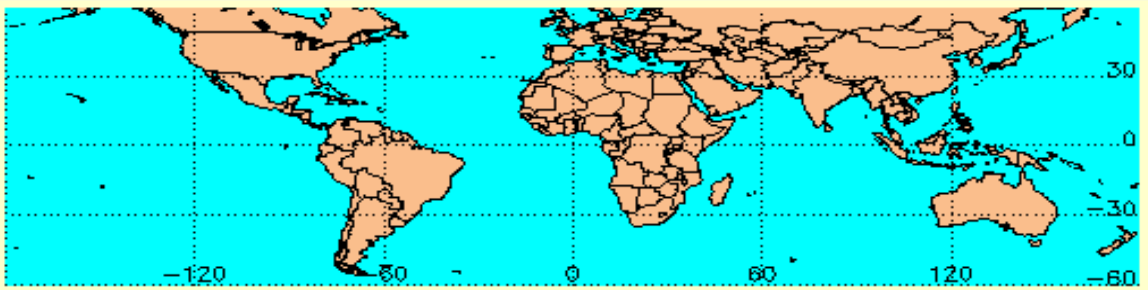


Methodology

- Selection of the day with highest precipitation during each event
- Evaluation of the overall data to identify region of the island to study
- Obtaining the data
  - Selection of rain gauges in the region
  - Selection of coordinates to obtain data from TRMM
- Work with the data to make them comparable
  - Accumulated rainfall instead of hourly measurements
  - Information at TRMM presented in regions vs USGS data are points of information in the map
- Percent of difference calculation
- Conclusion

Obtaining data from Rain Gauges and TRMM Satellite

http://**lake.nascom.nasa.gov/tovas/3B42RT/index2.shtml**



West Longitude: -67.4 **North Latitude:** 18.6

East Longitude: -65.5 **South Latitude:** 17.9

Parameter:

Accumulated Rainfall
Hourly Rain Rate (mm/hr)

Color Level Option:

- ○ Pre-defined
- ◉ Dynamic
- ○ Customize: Min Max

Plot type: Area Plot

Begin date: 2004 May 23 00Z *(Data Begin: 2002/01/29 00Z)*

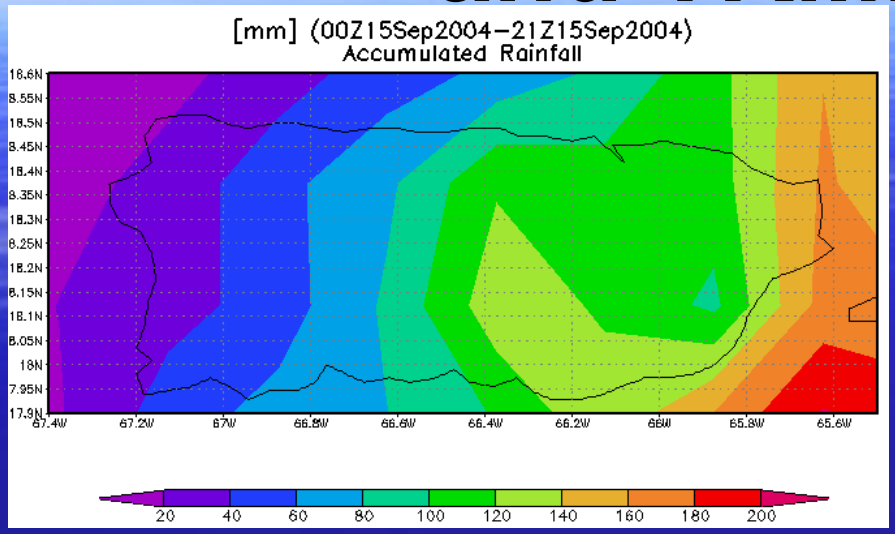
End date 2004 May 23 21Z *(Data End: 2005/03/07 03Z)*

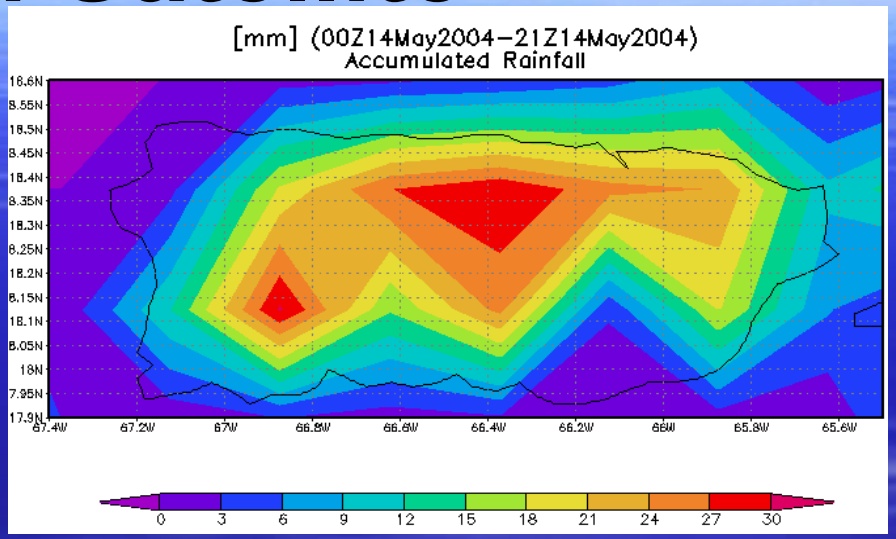
Generate Plot | ASCII Output | Reset Form

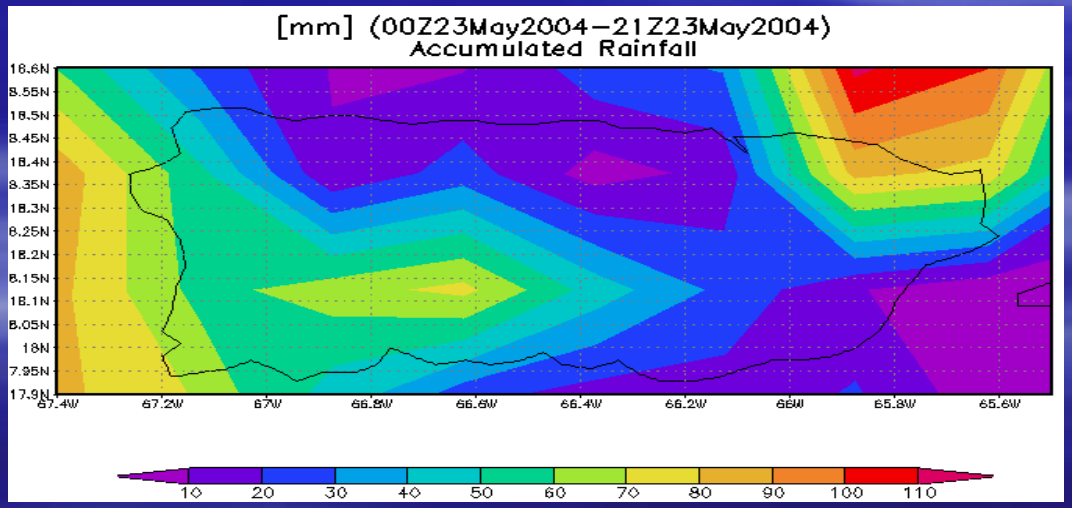
Alert: *A new window will be opened when "Generate Plot" or "ASCII Output" is selected.*

NASA - TRMM

Obtaining data from Rain Gauges and TRMM Satellite







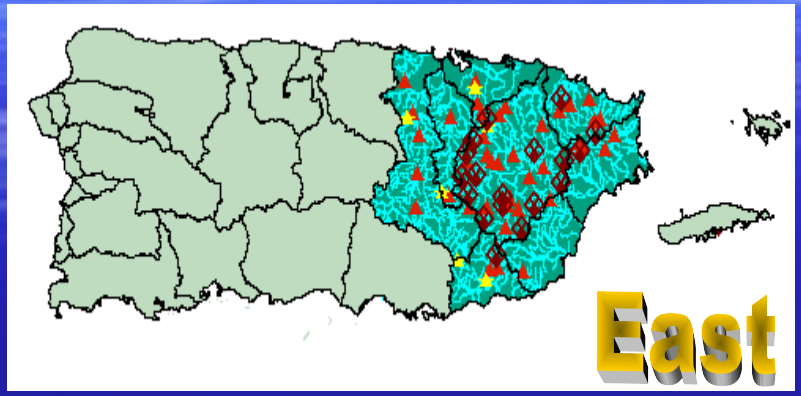
Sept 15, 2005

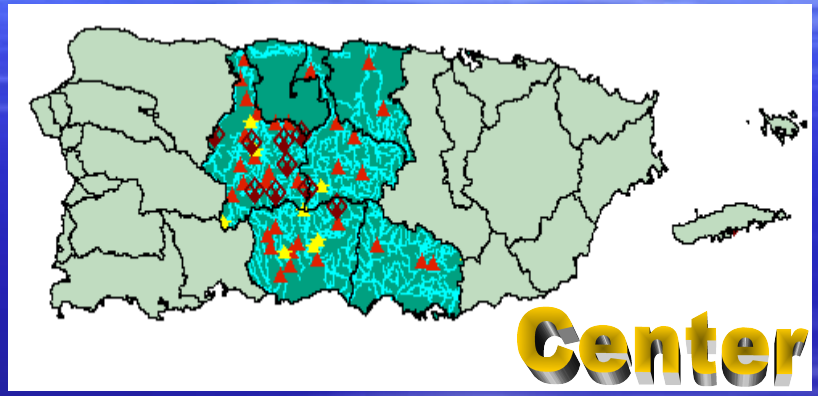
During T.S. Jeanne pass over PR

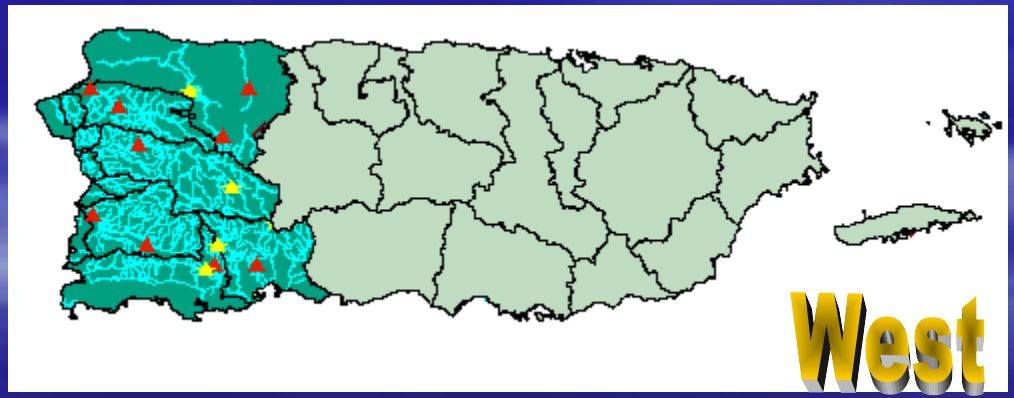
NASA - TRMM

Obtaining data from Rain Gauges and TRMM Satellite

http://**pr.water.usgs.gov/public/rt/pr/index.html**

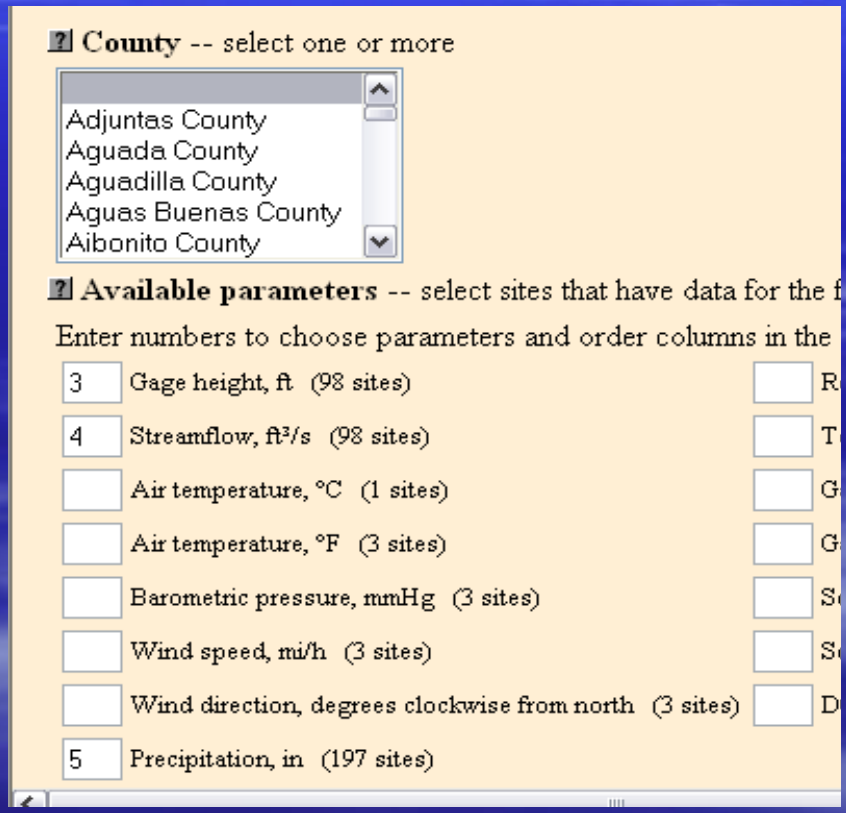






USGS

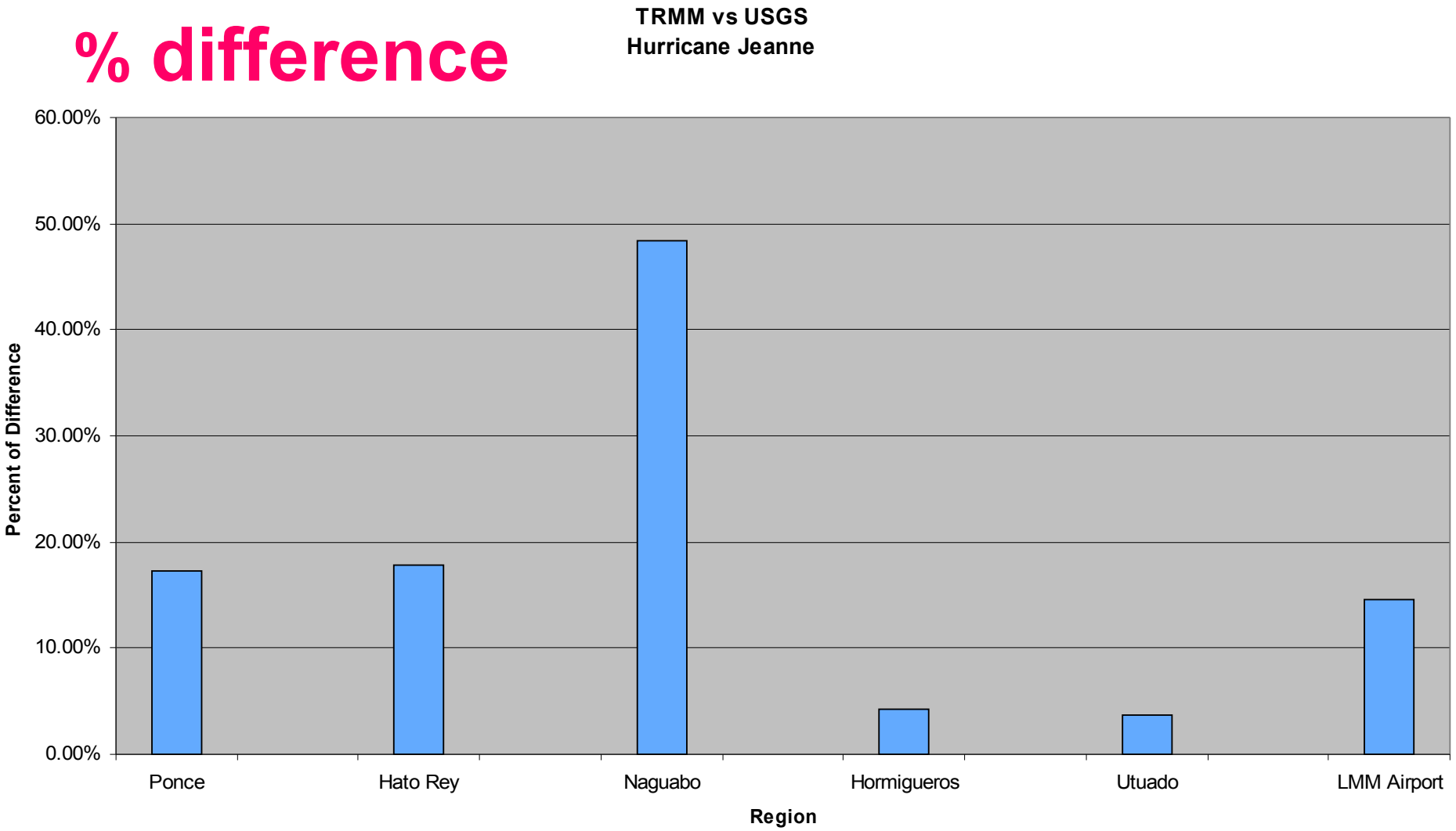
Obtaining data from Rain Gauges and TRMM Satellite



USGS

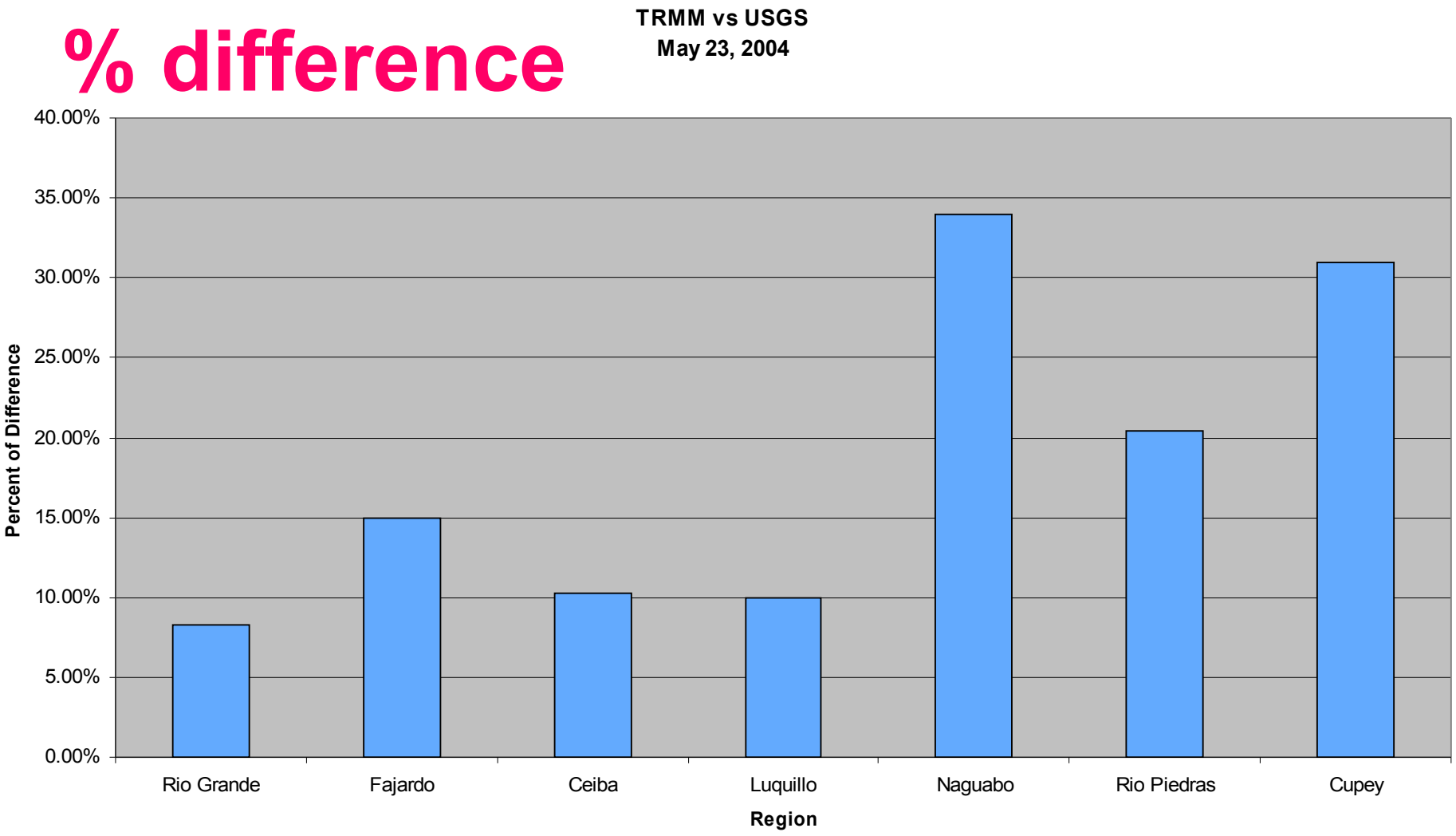
Results: Hurricane Jeanne

% difference



Results: May 23, 2004

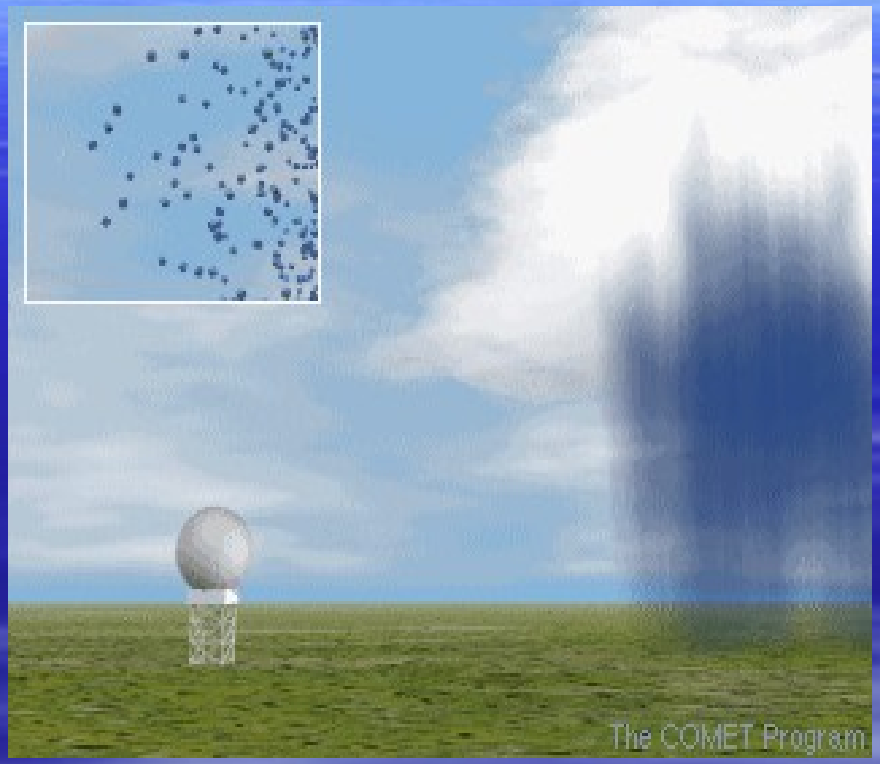
% difference



Conclusions

- USGS rain gauges could be considered more accurate in this case because they are in-situ measurements, whereas the radar provides a spatial average over a large area.
- The satellite radar is good for pinpointing location of heavy rains and tracking the storm movement.
- USGS rain gauges are well distributed around the island, yet some of them are not operational all the time.
- The accuracy of the information from the radars can be affected by retrieval algorithms and other factors.
- The resolution of the radar can also affect the % difference significantly because we are looking at different points in space and time.
- Ground-based radars can provide the advantages of both sensors mentioned above.

NEXRAD (local NWS radar)



Future Work

Questions