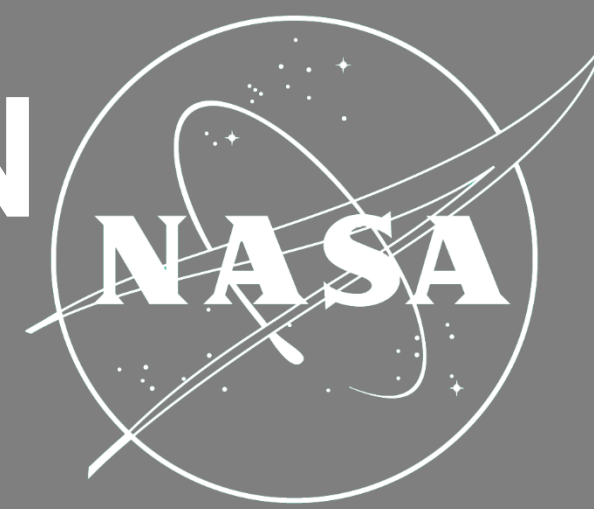




# COLOMBIA MI PRONÓSTICO FLOOD APPLICATION

Updating and Improving the Mi Pronóstico Flood Web Application to Include an Assessment of Flood Risk



Stephanie Rushley (North Carolina State University), Matthew Carter (United States Air Force), Charles Chiou (Old Dominion University), Kevin Haywood (United States Air Force), Rick Farmer (Mathews High School), Anthony Pototzky (Old Dominion University), and Adam White (Christopher Newport University), Daniel Winker (University of Virginia)

NASA Langley Research Center

## Abstract

Colombia is a country with highly variable terrain, from the Andes Mountains to plains and coastal areas; therefore, some areas are prone to flooding disasters. To identify these risk areas NASA's Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) was used to construct a digital elevation model (DEM) for the study region. The preliminary risk assessment was applied to a pilot study area of the La Mosca River basin. Precipitation data from the National Aeronautics and Space Administration (NASA) Tropical Rainfall Measuring Mission (TRMM)'s near-real-time rainfall products as well as precipitation data from the Instituto de Hidrologia, Meteorología y Estudios Ambientales (the Institute of Hydrology, Meteorology and Environmental Studies, IDEAM) and stations in the La Mosca River Basin were used to create rainfall distribution maps for the region. Using the precipitation data and the ASTER DEM, the web application, Mi Pronostico, run by IDEAM, was updated to include an interactive map which allows users to search for a location and view the vulnerability and current conditions in rainfall and flood warnings. The geospatial information was linked to an early warning system in Mi Pronostico that can alert the public of flood warnings and identify locations of nearby shelters.

## Objectives

- ▶ Perform statistical analysis of precipitation gauge data and streamflow for flood risk assessment
- ▶ Create a flood risk map for La Mosca River Basin in Colombia
- ▶ Update the existing Mi Pronostico web application to include an interactive flood risk map.
- ▶ Develop a user interface for calculating flood indices

## Methodology

### Data

- Slope developed using the ASTER DEM
- Precipitation and Streamflow from in situ data

### Analysis

- Calculate watershed indices
- Calculate flow duration curve and index of variability

### Application

- Flood Risk Map
- Update Mi Pronostico web application
- Visualization of flood indices for users

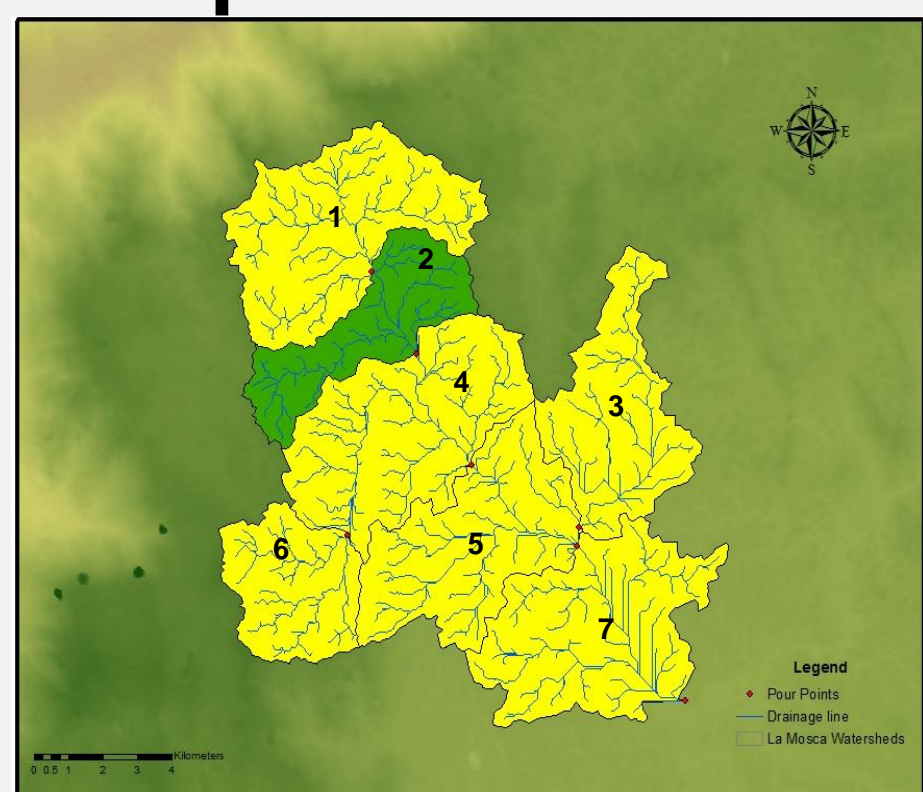
## Study Area

La Mosca River Basin



## Results

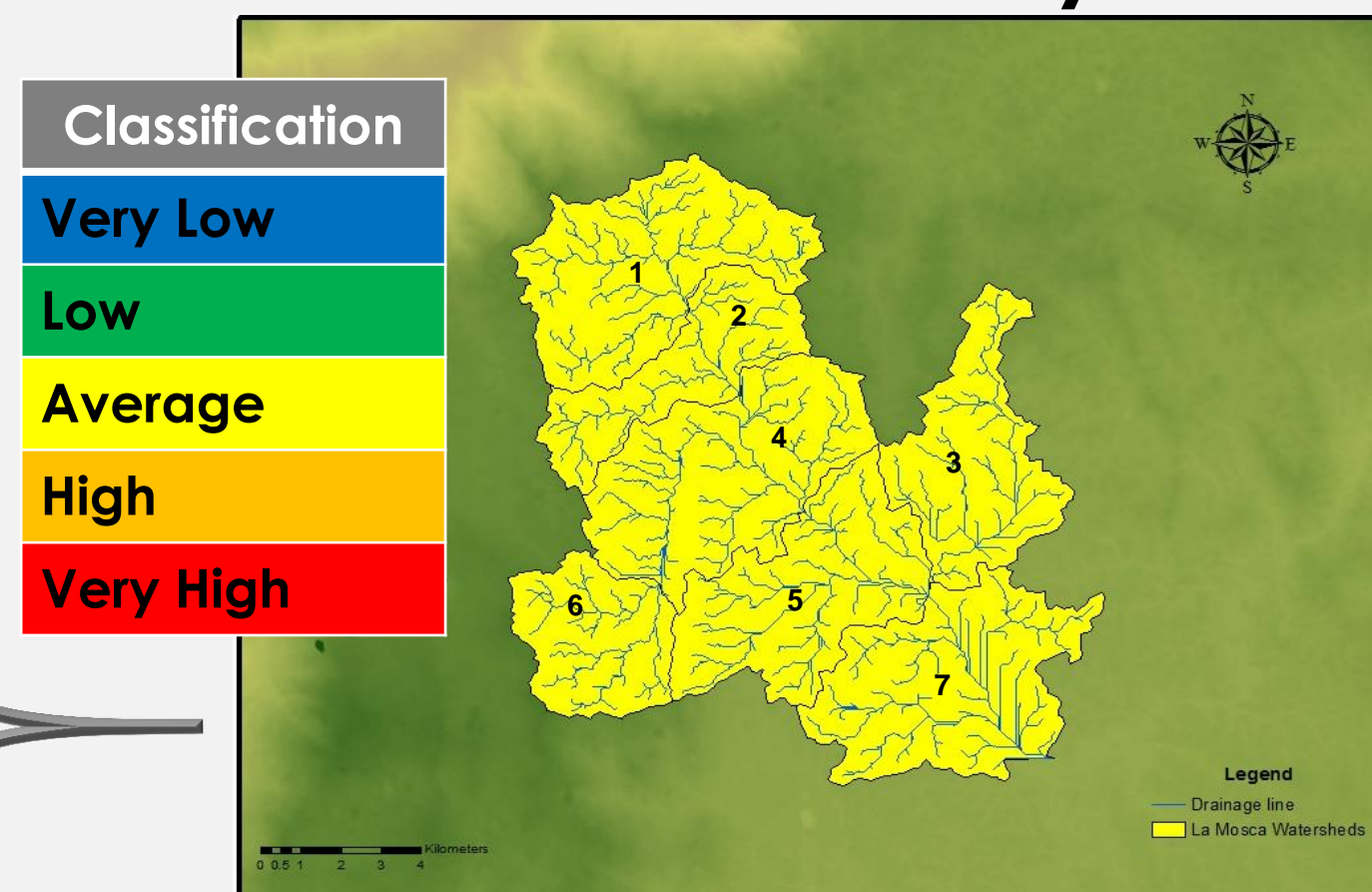
### Morphometric Index



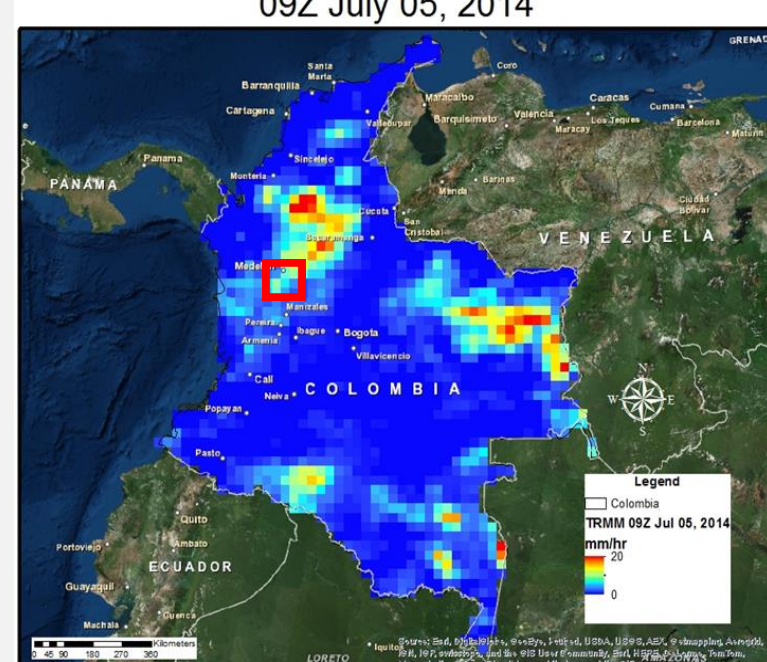
### Index of Variability

Variability Index	Station 23087670	Station 23087860	Station 23087170	Station 23087030
40%-60%	30.2022	38.9326	30.4553	38.2458
30%-70%	31.7183	35.2720	29.2970	38.0296
20%-80%	32.0733	32.8636	27.3563	36.2351
10%-90%	31.5347	31.0470	26.5651	34.7007

### Vulnerability



TRMM Near-Real-Time Precipitation 09Z July 05, 2014

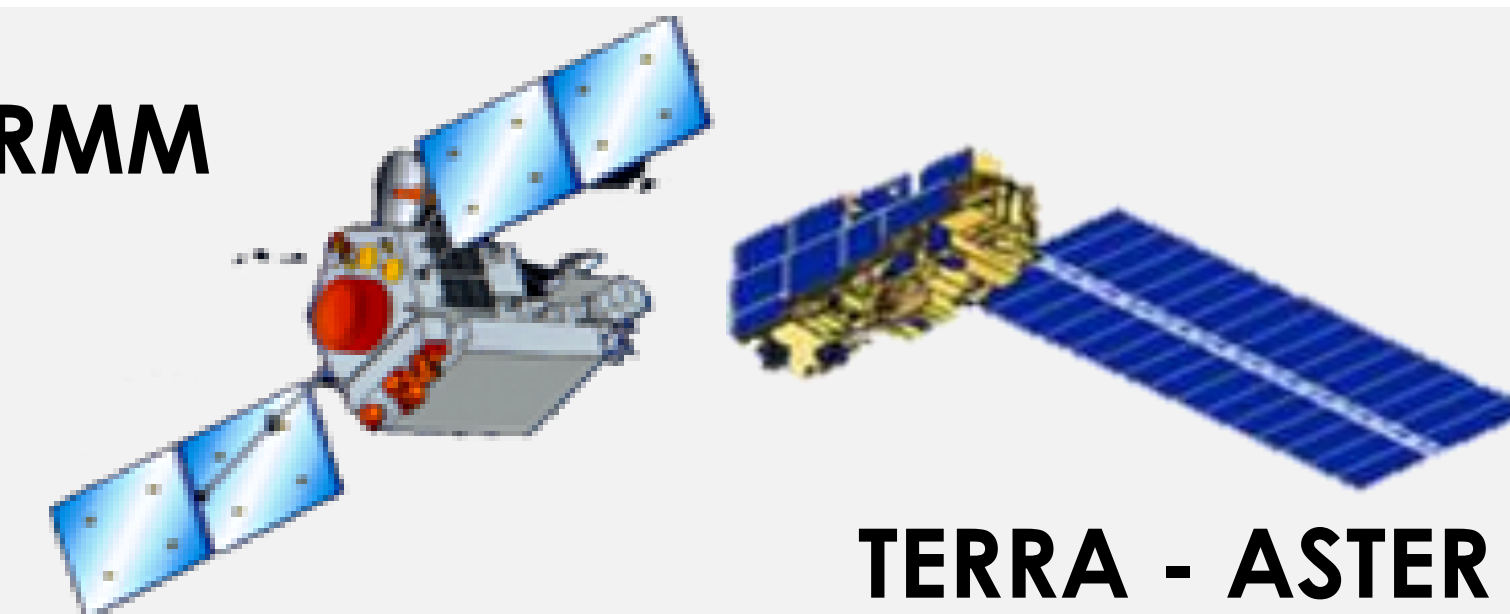


DRIVE model: 09Z July 05, 2014



## Earth Observations

### TRMM

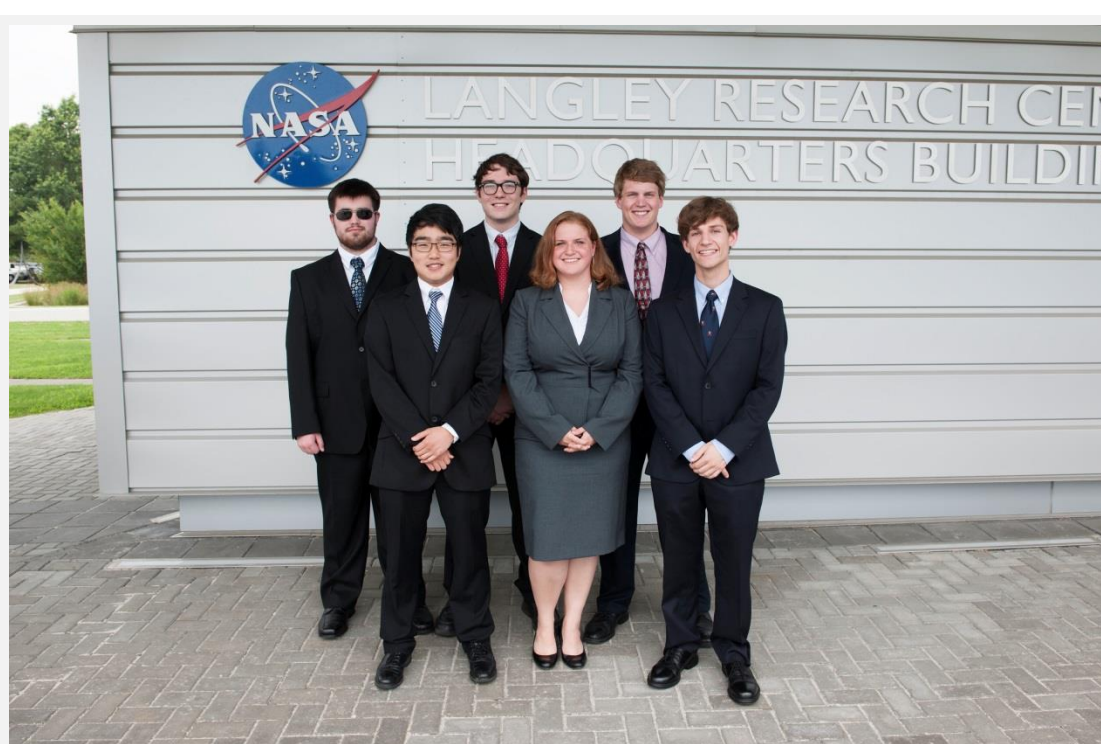


### TERRA - ASTER

## Conclusions

- ▶ Six of the seven sub basins have a moderate morphometric index
- ▶ The Index of Variability averages out into the Low category for all sub basins
- ▶ During high precipitation events there is a medium risk for flooding in the La Mosca Watershed.
- ▶ Overlaying TRMM and the DRIVE model creates a dynamic flood risk map.

## Team Members



From Left to Right:  
Rick Farmer  
Charles Chiou  
Anthony Pototzky  
Stephanie Rushley  
Adam White  
Daniel Winker

Not Pictured:  
Matthew Carter  
Kevin Haywood

## Project Partners

Institute of Hydrology,  
Meteorology, and  
Environmental Studies  
(IDEAM)

## Acknowledgements

Dr. Angelica Gutierrez  
NOAA

Pilar Galindo  
IDEAM

Ricardo Quiroga  
IDEAM

Lauren Childs-Gleason  
DEVELOP Operations Lead