**NASA DEVELOP National Program**

Wise County Clerk of Court's Office

**Spring 2016**

**Short Title: Wise County Disasters**

**Subtitle:** Using NASA Earth Observations to Identify the Historic and Future Extent of Flooding Throughout Wise County, Virginia.

**VPS Title:** Wise Decisions: Remote Flood Monitoring in Wise County, Virginia

**Project Team & Partners**

**Project Team:**

Kimberly Berry (Project Lead), kimberly.m.berry@nasa.gov

Abhijeet Singh Baghel

Grant Bloomer

Zachary Tate

**Advisors & Mentors:**

Dr. Kenton Ross (NASA DEVELOP National Program)

Dr. DeWayne Cecil (Global Science & Technology [GST] National Centers for Environmental Information [NCEI])

Bob VanGundy (University of Virginia’s College at Wise)

**Partner Organizations:**

Wise County Board of Supervisors (End-user, Boundary Orginazation), POC: Bob Adkins

**Project Details**

**Applied Sciences National Applications Addressed:** Disasters

**Study Area**: Dickenson, Russel, Lee, Wise, and Scott Counties in Virginia (VA). Harlan and Letcher Counties in Kentucky (KY).

**Study Period:** May 2000 - November 2014

**Earth Observations & Parameters:**

Landsat 5, TM – Surface Reflectance

Landsat 8, OLI – Surface Reflectance

Terra, ASTER – Digital Elevation Model

SRTM, SIR-C/X-SAR – Digital Elevation Model

GPM, DPR – Precipitation data

TRMM, PR – Precipitation data

**Ancillary Datasets Utilized:**

* USGS National Land Cover Dataset (NLCD) – Soil properties

**Models Utilized:**

* CREST - The Coupled Routing and Excess Storage model by the University of Oklahoma and NASA SERVIR

**Software Utilized:**

ArcGIS - Raster manipulation/analysis, image enhancement & map creation

MATLAB - Runs the CREST Model

**Project Overview**

**80-100 Word Objectives Overview:**

Floods in Wise County, Virginia contributed to over $8 million in damages in 2015 alone. Factors that may contribute to destructive flooding in this area include the water runoff from high elevations, low capacity thresholds of the numerous stream networks, and high rainfall rates associated with strong storm systems. This project aims to assist the Wise County Board of Supervisors by providing a collection of comprehensive maps of the areas in and around Wise County. These maps will show areas that are prone to flooding, the impact of potentially devastating floods, and historical flood extents. This will better prepare the Board of Supervisors in managing these areas should a significant flood occur.

**Abstract:**

Wise County is located in the Appalachian Mountains of southwest Virginia. Mountainous terrain increases the amount of runoff into local drainage basins during strong storms, which can increase the frequency of flash floods. This project determined areas that are more susceptible to flooding using Esri ArcGIS and The Coupled Routing and Excess Storage (CREST) model to analyze data collected from Landsat 5 Thematic Mapper, Landsat 8 Operational Land Imager, and Shuttle Radar Topography Mission (SRTM). These sensors collected data on rainfall, elevation, and land use change from 2000-2015. The modeled flooding data was compared to estimated historical floods to increase the confidence of the CREST modeled flood predictions. Maps created from the flood models have been handed off to the Wise County Emergency Operations Center for use in planning for future flood events.

**Community Concerns:**

* Past floods in Wise County have damaged local ecosystems and property.
* FEMA declared major disasters due to storms and flooding in Wise County in March and May of 2002, with other major flooding events recorded in 1977, 2006, and 2015.

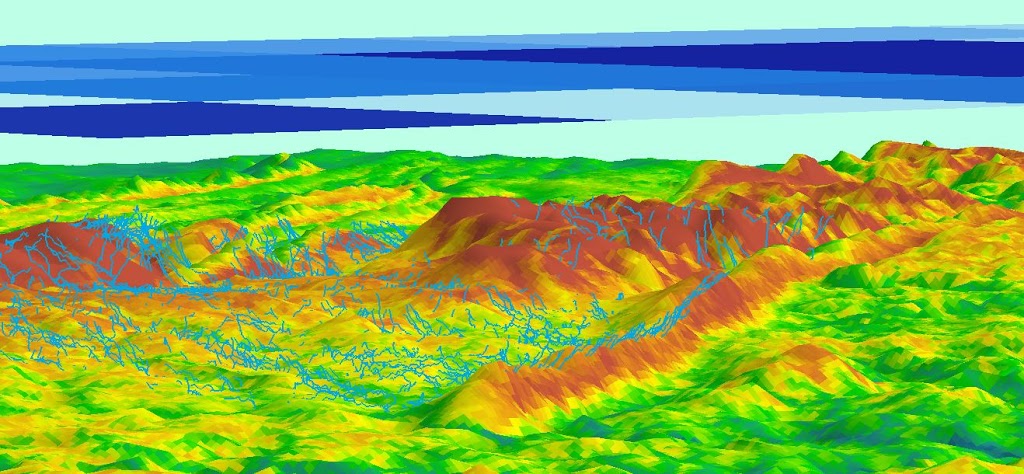
**Current Management Practices & Policies**:

Currently, the Wise County Board of Supervisors relies on notifications from the National Weather Service to warn of impending severe weather. Flood reports are submitted to the Wise County Office of Emergency Management by first responders and storm spotters. Additional flood products from the Integrated Flood Observing and Warning Systems (IFLOWS) are monitored by the Wise, VA Office of Emergency Management in near real time.

**Decision Support Tools & Benefits:**

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| --- | --- | --- |
| **End-Product** | **Earth Observations Used** | **Benefit & Impact** |
| Flood Hazard Map | TRMM, Landsat 5, 8, GPM | Improve Emergency Management Office distribution of first responders |
| Historical Flood Map | TRMM, Landsat 5, 8, SRTM | Display previous flood extent and locations of pooling water |
| Tutorial for CREST | TRMM | Complete tutorial of how to input NASA data into the flood model so the Emergency Management Office can improve the flood hazard map in the future |

**Project Imagery**



**Caption:** Wise in 3D. The inputs for the NASA DEVELOP National Program Wise Disasters Project analyzing flooding hazards in Wise, VA. Image Credit: Wise Disasters Team.

**Image:** File Name: 2016Spring\_WC\_WiseDisasters\_FinalImage

**Software Release Requirements**

No software development involved.