**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

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**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), POC: Bob Adkins; Boundary Organization

**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 2015

**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

Aqua/Terra, MODIS- Surface Reflectance

GPM – Precipitation data

TRMM – Precipitation data

**Ancillary Datasets Utilized:**

* USGS National Land Cover Database (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 of Landsat ETM+, NPP VIIRS, Aqua/Terra MODIS

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 high volume of strip mining which increases runoff due to hardened soil, low capacity thresholds of the many stream networks, and high rainfall rates associated with strong storm systems. This project aims to assist the Wise County Board of Supervisors in better preparing for floods and to provide a better understanding of the watershed in which Wise County is located.

**Abstract:**

Wise County, located in the Appalachian Mountains of Southwest Virginia, was once a very large contributor to the coal industry. Mountainous terrain and strip mines increase the amount of runoff in local drainage basins. This project determined areas that are more susceptible to flooding using ArcGIS and The Coupled Routing and Excess Storage (CREST) model to analyze data collected from Landsat 5 TM, Landsat 8 OLI, Aqua and Terra MODIS, and Shuttle Radar Topography Mission (SRTM). These sensors collected data on rainfall, elevation, and land use change from 2000-2014. Comparison of the modeled flooding data to historical floods yielded XX% confidence in our 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 2015, 2006, and 1977.

**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, Aqua/Terra MODIS, 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, PRISM | 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**

**[Insert image here]**

**Caption:** [Insert Caption Here. Max of 25 words.] Image Credit: [Insert project short title] Team.

**Image:** File Name (Please submit your image as a separate .jpeg as well as inserting it in this document)

**Software Release Requirements**

No software development involved.