DEVELOP

2014 Fall Projects

September 15 - November 21, 2014

NASA DEVELOP National Program
Spring 2014 - National Project Portfolio

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2. Virginia Agriculture (Wise County)

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Disasters

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Eco Forecasting

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12. Coastal Colombia Eco Forecasting II (Jet Propulsion Laboratory)
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Health & Air Quality

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Water Resources

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Cross-Cutting

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Project Summaries

1. Northwest US Agriculture: Analyzing the Impact of Climate Change on Growing Degree Days for Insect Pest Management
Partner: USDA Agricultural Research Service
Earth Observations: Aqua/Terra MODIS, Suomi NPP VIIRS
Study Location: US Northwest (Washington, Oregon)
Study Period: 2000-2015
Objective: The purpose of this project is to extend the data developed for future plant hardiness zones and growing season temperatures in the United States to create pest risk maps demonstrating ideal growing degree days for insect development. The maps would allow growers and produce processors to respond to climate change impacts and improve pest management.

2. Virginia Agriculture: Estimating Plated Area for Grapes for the Commonwealth of Virginia
Partners: Virginia Wine Board
Earth Observations: Landsat 8
Study Location: Virginia
Study Period: 2008 - 2013
Objective: The objective of this two term project is to produce a current mapped estimate of planted grape acreage in the Commonwealth of Virginia at Landsat scale leveraging the existing cropland cover mapping from the USDA NASS Cropland Data Layer (CDL) product available from the USDA CropScape portal.

3. California Climate II: Improving Methods of Predicting Extreme Weather Events or Drought Conditions for Water Resource Managers in Southern California
Partner: National Oceanic and Atmospheric Administration, National Climatic Data Center; Cooperative Institute for Climate and Satellites, North Carolina State University
Earth Observations: GOES-8, GOES-10, GMS-5, Metsat-6, Metsat-7-long wave infrared, TRMM
Study Location: The Sierra Nevada Mountains within California Climate Divisions 2 and 5
Study Period: October-April 1983-2009
Objective: This purpose of this project is to improve the utility of seasonal climate outlooks for water resource managers in southern California by assessing correlations and performing multivariate regressions between multiple atmospheric teleconnection indices and precipitation patterns documented by the National Climatic Data Center's Climate Data Records (CDRs).

4. Great Basin Climate II: Evaluating Current and Future Rangeland Ecosystem Health in the Great Basin ecoregion Using NASA Earth Observing Systems and a Long-Term Ground Monitoring Network
Partners: Bureau of Land Management, Great Basin Landscape Conservation Cooperative, University of California Davis, Desert Research Institute
Earth Observations: Aqua/Terra MODIS, Landsat 5, Landsat 7, Landsat 8
Study Location: The Great Basin of the United States (Nevada, California, Colorado, Idaho, Utah, and Arizona)
Study Period: 2005-2014, 2100

Objective: This project will utilize remotely-sensed imagery and *in situ* data to help land managers better address drought and land degradation concerns within the Great Basin ecoregion.

5. Great Lakes Climate: Monitoring the Impacts of Climate Change and Decreasing Water Levels on Wetlands in the Great Lakes Region of North America
Partner: Great Lakes and St. Lawrence Cities Initiative, Georgian Bay Forever
Earth Observations: Lansat 5, Landsat 7, Landsat 8, Aqua/Terra MODIS, Poseidon-3
Study Location: The Great Lakes
Objective: This project is partnered with the Great lakes and St. Lawrence Cities Initiative, and seeks to classify and monitor the change in wetlands surrounding the Georgian Bay, St. Lawrence River – Lac San Pierre, and Lake Michigan. A more accurate land cover classification will be created, and a time-series animation produced, showing the change in wetlands extent and health.

6. Andes Mountains Disasters II: Utilizing NASA Earth Observations to Develop a Monitoring Tool for the Copahue Volcano in the Andes Mountains
Partners: NASA SERVIR, Smithsonian Global Volcanism Program
Earth Observations: Aqua/Terra MODIS, Terra ASTER, AURA OMI, Landsat 8
Study Location: Copahue Volcano, Andes Mountains, Chile and Argentina
Study Period: 2012 - present
Objective: The objective of this project is to outline a monitoring tool for the Copahue Volcano where daily inputs of thermal anomalies and air quality data can be used to estimate volcanic activity for more timely evacuation warnings.

7. Idaho Disasters: Using NASA Earth Observations, Climate Model Outputs, and the RECOVER Decision Support System to Enhance Bureau of Land Management, Idaho Department of Lands, and US Forest Service Wildfire Management Capabilities
Partners: Bureau of Land Management, Idaho State Office and Cooperating District Offices; Idaho Department of Lands, Boise Field Office; RECOVER Project
Earth Observations: Aqua/Terra MODIS, Aqua AMSR-E, Landsat 8, SMAP, Suomi NPP VIIRS
Study Location: Idaho
Study Period: 2012 - 2015
Objective: This project will extend the data products and technical capabilities of the RECOVER system for application to pre-fire and active-fire decision processes and for use in forested ecosystem.

8. Pakistan Disasters: Application of Earth Observations to Assess Natural Hazards and their Potential Effect on Food Security in a Mountain Context
Partners: Karakorum International University
Earth Observations: Landsat 8, SRTM
Study Location: Mountainous areas of Gilgit-Baltistan, Pakistan
Study Period: present
Objective: Main objectives of this study are to assess, map and describe areas at risk of natural hazards (i.e. landslides) and describe the potential implications for food security (i.e. accessibility to markets and grains) of the local population. Case studies of disasters occurred in the past (e.g. Attabad lake disaster) may be part of this research.

9. Southeast Asia Disasters III: Utilizing NASA Earth Observations to Improve Flood Impact Mapping and Mitigation in Southeast Asia
Partners: Mekong River Commission, Committee on Earth Observation Satellites, MyCOE, SERVIR
Earth Observations: Terra/Aqua MODIS, Terra ASTER, Landsat 8, TRMM, GPM, ISS ISERV
Study Location: Lower Mekong Water Basin
Study Period: Near Real Time
Objective: This purpose of this project is to further assess, refine, and calibrate the near-real time product created in previous terms, and integrate newly available remotely sensed data, such as the Global Precipitation Measurement (GPM) and the ISERV camera aboard the ISS. Another objective is to demonstrate the utility of the product by making it available to new stakeholders. The team will also work to complete the dashboard, adding additional flood and precipitation data, refining the near-real time product as needed to maximize accuracy and application, and finalizing the web layout.

10. Southern U.S. Disasters: Assessing the Potential to Use VIIRS 375m Data for Detecting Forest Disturbances
Partners: USDA Forest Service, Oak Ridge National Laboratory, NASA Land Product Evaluation and Analysis Tool Element
Earth Observations: Suomi NPP VIIRS, Aqua/Terra MODIS, Landsat 5 TM, Landsat 7 ETM+, Landsat 8 OLI, USDA Aerial Photography NAIP
Study Location: Blackhills, SD mountain pine beetle-induced forest mortality; tornado damage in MS; hail storm damage in the eastern US
Study Period: March 2012 - present
Objective: Compute VIIRS forest disturbance detection products for at least one regional biotic forest disturbance (e.g., caterpillar-caused defoliation) and one broad-scale abiotic disturbance (e.g., fire or tornado). Evaluate these VIIRS-derived products against existing MODIS and Landsat data as a demonstration to Federal and State forest management agencies of VIIRS' capability to detect regionally evident biotic and abiotic forest disturbance.

11. Arizona Ecological Forecasting: Using Unmanned Aerial Vehicles and Landsat 8 for Enhanced Invasion Risk Assessment of Tamarisk in the Havasu National Wildlife Refuge
Partners: USGS Fort Collins Science Center; US Fish and Wildlife Service Havasu National Wildlife Refuge; Natural Resource Ecology Laboratory, Colorado State University
Earth Observations: Landsat 8 OLI/TIRS
Study Location: Havasu National Wildlife Refuge, Arizona
Study Period: April 2013 - April 2014
Objective: This project will utilize high resolution Unmanned Aerial Vehicle (UAV) data in concert with a time-series analysis of Landsat 8 imagery and species distribution modeling to map tamarisk across Havasu National Wildlife Refuge's Topock Marsh. Project outputs will provide a unique time- and cost-effective technique for enhanced detection of invasive tamarisk, and further facilitate existing plans for sensitive wetland habitat protection and mitigation of invasive species within the Refuge.

12. Coastal Colombia Ecological Forecasting II: Utilizing Spaceborne and Airborne Sensors to Monitor the Health of Coastal Wetlands in Colombia

Partners: Conservation International; Louisiana State University; MarVivà; Universidad Tecnológica del Chocó, Colombia
Earth Observations: Terra ASTER, Landsat 5 TM, Landsat 7 ETM+, Landsat 8 OLI, SRTM
Study Location: Coastal Colombia
Study Period: Mangrove Extent Mapping (1986 – 2014), Mangrove Forecasting (2014-?)
Objective: This project will use remote sensing to improve maps and monitor coastal wetlands with the goal of assessing the vulnerability of tidal wetlands to sea level rise and human activity along the coast of Colombia.

13. Columbia Ecological Forecasting: Utilizing NASA Earth Observations to Enhance the Conservation Efforts of Colombia's Most Endangered Primate, the Cotton-top Tamarin (Saginus oedipus)
Partners: Disney Animal Kingdom; Fundación Proyecto Tití; Proyecto Tití
Earth Observations: Aqua/Terra MODIS, Landsat 5 TM/MSS, Landsat 7 ETM+, Landsat 8 OLI/TIRS
Study Location: Northwestern Colombia within the historic distribution of the cotton-top tamarin
Study Period: 1991 - 2013
Objective: The overarching goal of this project is to strengthen and support Proyecto Tití by incorporating the use of NASA Earth observations into their conservation program. This study aims to use results from the previous term to compute landscape metrics and model Gross Primary Productivity, which in turn will help identify specific areas for reforestation and assess future bio-carbon and energy changes.

14. Cumberland Plateau Ecological Forecasting II: Predictive Spread Mapping of Invasive Shrubs in the Cumberland Plateau by Combining NASA Earth Observations and a Phenological Approach for Decision Support
Partners: U.S. Forest Service; Land Trust of North Alabama
Earth Observations: Terra/Aqua MODIS, Landsat 5 TM, Landsat 7 ETM+, Landsat 8 OLI
Study Location: Cumberland Plateau; Alabama, Kentucky, Tennessee
Study Period: 2001 - present
Objective: The objective of this project is to map the location, density, and probability of movement for invasive shrub group, Asiatic Bush Honeysuckle, throughout the Cumberland Plateau using the Landsat satellite series.

15. Appalachia Energy II: NASA Earth Observation Detection of Burned and Blighted Areas for Creation of an Unhealthy Forest Index to prioritize Harvest for Biofuel Production
Partners: Virginia Department of Forestry; EnviraCarbon Inc.; U.S. Forest Service, Four Threats
Earth Observations: Landsat 8 OLI, Aqua/Terra MODIS, Suomi NPP VIIRS
Study Location: Appalachian Region - parts of Virginia, North Carolina, West Virginia, Tennessee, and Kentucky
Study Period: Jan 2010 to present
Objective: This project will utilize NASA Earth observations to detect recently burned forests or those containing active blight to help prioritize harvest of timber stocks on public lands to decrease fuel load and fire risk. This will assist in assessing biofuel production and create biofuels to meet energy demand.

16. East Africa Health and Air Quality III: Using a Flood Forecasting Tool Built from NASA Earth Observations and Creating Inundation and Epidemiological Early Warning Systems to understand the relationship between Rainfall Extreme Events, Inundation, and Epidemic Dynamics in East Africa
Partner: Federal Ministry of Health and the University of Khartoum, Sudan; University of Maryland, Eastern Shore; Kenya Ministry of Health; Red Cross / Red Crescent Climate Centre; Regional Centre for Mapping of Resources for Development
Earth Observations: QuikSCAT SeaWinds, Aqua AMSR-E, Aqua/Terra MODIS, Landsat 7 ETM+, Landsat 8 OLI/TIRS, ALOS PALSAR, TRMM TMI
Study Location: Ethiopia, Sudan, Kenya, and Tanzania
Study Period: 1999 - 2013
Objective: The objective is to give a measurable evaluation for the potential of using water bodies and inundated areas to forecast outbreaks of vector-borne diseases. After the products are correlated to the epidemiological data, there is potential for developing an Early Warning System (EWS) tool in order to help the populations of East Africa better manage vector-borne disease outbreaks.

17. Zanzibar Health and Air Quality: Creating a Land Cover Map Using NASA Earth Observations to Identify Locations of Malaria Transmission in Zanzibar
Partners: RTI International
Earth Observations: Lansdat 7 ETM+, Landsat 8 OLI/TIRS, ISS ISERV
Study Location: Zanzibar
Study Period: 2002 - 2014
Objective: This project will explore the land cover in Zanzibar and its relationship with malaria transmission. The land cover map will be derived from sensors found on Landsat 8 and ISERV. The project will help the USAID-led President's Malaria Initiative (PMI) and the nonprofit organization formerly named Research Triangle Institute but now simply known as RTI International (RTI) in identifying the locations of malaria transmission with the objective of eradicating malaria in Zanzibar.

18. Coastal Mid-Atlantic Water Resources II: NASA Earth Observations and Unmanned Autonomous System Inputs for Estimating Water Balance in Coastal Virginia, Maryland and North Carolina
Partner: Virginia Department of Environmental Quality; Digital Harvest; Virginia Secretary of Technology, Virginia Secretary of Natural Resources; Virginia Secretary of Agriculture & Forestry
Earth Observations: Aqua/Terra MODIS, Terra ASTER, Landsat 8, Hyperion, GRACE
Study Location: Virginia, Maryland
Study Period: 2000 - present
Objective: Assess the feasibility of NASA and partner remote sensing observation inputs into the water balance of the coastal Mid-Atlantic region. Evapotranspiration will be derived through use of the Landsat-driven Mapping Evapotranspiration for high Resolution and Internalized Calibration (METRIC) model, and Gravity Recovery and Climate Experiment (GRACE) will be analyzed for groundwater storage estimates.

19. Georgia Water Resources II: Developing a Cyanobacteria Detection Tool for Georgia Inland Waters Using NASA Landsat-8 OLI Data for Water Quality Protection and Restoration
Partners: Georgia Power Company
Earth Observations: Landsat 8 OLI
Study Location: Southern Company reservoirs, GA: Lake Oconee, Lake Sinclair, Lake Juliette, Lake Jackson
Study Period: June 2014 to November 2014
Objective: The overall objective of this project is to develop an automated early detection tool to analyze the spatial distribution and temporal relationship between phytoplankton and toxic blue green algae (cyanobacteria) in Georgia waters using Landsat-8 data.

20. Mississippi Water Resources (MCHD): Mapping Extent and Modeling Land Use of Critical and Endangered Watersheds to Assist Restoration Efforts and Conservation Planning Using NASA Earth Observations
Partner: The Nature Conservancy; Pascagoula River Audubon Center
Earth Observations: Landsat 8 OLI, Terra ASTER, Aqua/Terra MODIS, Suomi NPP VIIRS, SRTM
Study Location: Turkey Creek Watershed (Harrison County) and Pascagoula River Watershed (Jackson County), Mississippi
Study Period: 2004 - 2014
Objective: This project will assist The Nature Conservancy and their partners with conservation planning by using remotely sensed NASA data and open source geographic information systems (GIS) to map land use and watershed extent for two of nine recently identified conservation priority areas in Mississippi. Habitat risk assessment and overlap analysis modeling will be conducted to indicate human and environmental significances under varying scenarios of conflicting coastal wetland use.

21. Mississippi Water Resources (SSC): Utilizing NASA Earth Observations to Assist the Pascagoula River Audubon Center's Migratory and Coastal Bird Habitat Monitoring and Restoration Planning Activities
Partners: The Nature Conservancy; Pascagoula River Audubon Center
Earth Observations: Landsat 8 OLI, Terra ASTER, Aqua/Terra MODIS, Suomi NPP VIIRS, ER-2 AVIRIS
Study Location: Coastal and nearshore Mississippi
Study Period: 2010-2014
Objective: This project will provide the Pascagoula River Audubon Center, the Nature Conservancy, and the National Fish and Wildlife Foundation with vital habitat classifications and water quality information to assist in monitoring and planning migratory and coastal bird habitat restoration activities.

22. Peru Water Resources II: Integrating NASA Earth Observations into Water Resource Planning and Management in Peru's La Libertad Region
Partners: Water for People; University of Idaho; Idaho Department of Water Resources
Earth Observations: Terra ASTER, Landsat 8
Study Location: Ochape Sub-Basin, Gran Chimú Province, La Libertad Region, Peru
Study Period: December 2013 to June 2014

Objective: This project will use NASA Earth observations to determine the evapotranspiration and precipitation levels in Peru and provide the information to Water For People for use in generating La Libertad's water budget.

23. Western US Water Resources: A New Way to Detect and Monitor Drought Conditions in the US from Atmospheric Conditions Detected with NASA's Atmospheric Infrared Sounder (AIRS)
Partners: California Department of Water Resources; U. S. Drought Portal, National Integrated Drought Information System; Scripps Institute of Oceanography
Earth Observations: Aqua AIRS/MODIS
Study Location: Southwestern United States and California
Study Period: 2011 - present
Objective: Develop methodologies to derive drought information using atmospheric condition data from AIRS. Analyze the results relative to the recent 2011 U. S. drought and the 2014 drought in California. Generate weekly drought maps for the CONUS by implementing algorithm developed during this project.

23. Tech Team: Enhancing Technological Tools and DEVELOP's Website Resources
Partners: NASA DEVELOP, IDEAM, GEO, NOAA
Study Location: Colombia
Objective: The Tech Team will focus on three tasks: 1) DEVELOPedia (DEVELOP's internal resource for participants), 2) GEO-AIP-7 II (partnering with NOAA and IDEAM to expand Colombia's 'Mi Pronostico' Application), and 3) DEVELOP's Website development (redesigning the DEVELOP website).