

DEVELOP National Program

SPRING 2016 PROJECT PREVIEW



Spring 2016: By the Numbers



PROJECTS



PARTICIPANTS



PARTNERS



Project Metrics:





■ Eco ■ Water ■ H&AQ ■ Ag ■ Cli ■ Oceans ■ Energy ■ WX ■ Dis ■ Cross

Nodes (Spring 2016)





• Health & Air Quality

- Oceans
- Climate
- Agriculture
- Weather
- Disasters
- Cross-Cutting
- Ecological Forecasting
- Water Resources



Spring 2016



PUERTO RICO HEALTH

NASA Ames Research Center



Community Concern: The Dengue and Chikungunya viruses have been declared endemic in the Caribbean and Puerto Rico. They are transmitted by mosquitoes, primarily Aedes aegypti.

Partners:

End users

- Puerto Rico Department of Health
- U.S. Centers for Disease Control and Prevention (CDC) Dengue Branch Boundary Org
- Medical Sciences Campus of the University of Puerto Rico

Earth Observations:

- Terra (MODIS)
- Suomi NPP (VIIRS)
- Landsat 5&8 (TM&OLI)
- TRMM (PR, TMI, VIRS)
- GPM (DPR)







Gulf of Mexico Health & Air Quality

Goddard Space Flight Center



Community Concern: Bureau of Ocean Energy Management (BOEM) does not have the capacity to address scientific questions tasked with assessing the potential onshore air quality impacts from petroleum resources at the outer continental shelf of the Gulf of Mexico (GOM).

Partners:

Office of Environment (BOEM): End-User ARSET/USRA (NASA): Collaborator

Earth Observations:

- Aura (OMI)
- Auqa/Terra (MODIS)
- Terra (MOPITT)
- Suomi-NPP (ÓMPS)
- OCO-2 (Orbiting Carbon Observatory 2)
- CALIPSÒ (CALIŎP)



Impact: By studying aerosols in the GOM and creating new methodologies around NASA Earth observations, BOEM will be able to enhance activities related to monitoring air quality and supporting operator information models.



Arizona Health and Air Quality II

NASA Langley Research Center



Community Concern: Extreme heat exposure in Maricopa County, AZ is spatially variable. The network of cooling centers does not account for this variability, possibly missing places of greatest need.

Partners:

Arizona Department of Health Services, Environmental Remote Sensing and Informatics Lab at Arizona State University Center for Policy Informatics at Arizona State University Maricopa County Health Department

Earth Observations:

- Landsat 8, TIRS
- Aqua & Terra, MODIS



Impact: Automating the analyses performed during term I will allow the health department to continuously monitor the hottest areas in Maricopa County for heat related illness intervention.



CARIBBEAN OCEANS

NASA Ames Research Center



Community Concern: Sargassum is a floating brown macro alga that naturally occurs in shallow, tropical waters. However, in large quantities, Sargassum can pose a threat to beach habitats and local tourist economies. Last year (2015), coastal Caribbean communities observed mass influxes of this alga. Caribbean governments now hope to understand Sargassum's origin, monitor its movement, and predict its arrival.

Partners:

- Consorcio de Instituciones de Investigación Marina del Golfo de México y del Caribe (CiiMar-GoMC)
- Centro Interdisciplinario de Ciencias Marinas: Instituto Politécnico Nacional (CICIMAR-IPN)
- University of Puerto Rico

Earth Observations:

- Landsat 5-8 (TM, ETM+, OLI)
- Aqua (MODÍS)
- EnviSat (MERIS)

Impact: The first term of this project (Spring 2016) will investigate historical trends of *Sargassum* in the Caribbean, compare these trends to different environmental variables, and identify a successful detection algorithm to assess its origin and movement.





LOS ANGELES OCEANS II NASA JET PROPULSION LABORATORY



Community Concern: Contaminates in fresh water plumes caused by the maintenance of wastewater treatment plants such as Hyperion may impact the Los Angeles coastal ecosystem with nutrient-rich treated waters.

Partners:

City of Los Angeles Hyperion Treatment Plant

Earth Observations:

- Terra (ASTER)
- Aqua (MODIS)
- Landsat-8 (Optical, TIR)
- Sentinel-1, ALOS-2(SAR)



Impact: The overriding concern is to identify the wastewater plume, where the plume goes, and how the plume might impact water quality and public health, related to potential nutrient enrichment and beach bacterial contamination respectively.



PERU CLIMATE II University of Georgia



Community Concern: Shifting climatic conditions in the Peruvian Andes have meant a push of the native potato's geographic distribution into higher elevations and exposed crops to the risk of new pests and disease.

Partners:

International Potato Center (CIP) Parque de la Papa & ANDES

Earth Observations:

- Aqua (MODIS)
- GPM (DPR & GMI)
- Landsat 5 (TM)
- Landsat 7 (ETM+)
- Landsat 8 (OLI & TIRS)
- SRTM
- Suomi NPP (VIIRS)
- Terra (ASTER & MODIS)
- TRMM (PR)

Impact: By identifying characteristics for suitable potato crop locations throughout the Peruvian Andes, CIP will be able to help local communities sustain their traditional agriculture practices.





Levant & Central American Climate I

NOAA NCEI



Community Concern: Drought and heavy precipitation are major concerns for many areas within Central America and the Levant. Heavy precipitation causes flooding, water contamination, and landslides. Drought exacerbates water supply and agricultural insecurity and causes livestock mortality and the migration of people.

Earth Observations/NOAA CDRs:

- PERSIANN (GridSat-B1)
- CMORPH (IR Band)
- GPM
- NOAA NDVI
- GRACE Assimilated Data

Partners:

U.S. Air Force14th Weather Squadron





http://www.geographicguide.com

https://en.wikipedia.org/wiki

Impact: The goal of the first term is to **provide a drought and heavy precipitation monitoring tool** to the 14th Weather Squadron that they can use to determine areas and times that will be influenced by drought or heavy precipitation.



Uruguay Agriculture III



Community Concern: End-users and stakeholders have expressed interest in having the ability to visualize the various components within the DSI to see how exactly the driving factors in the drought affect different regions, crops, and livestock. The DSI (Rhee et al., 2010; Lessel et al., in press) is based on precipitation, land surface temperature (LST), and a vegetation index (VI). When computed, a map is created showing levels of drought severity. Due to the sensitivity of different crops and varieties of livestock, users currently are not able to customize the drought preparations and mitigation methods based on the given factors within the DSI. We have proposed the creation of a set of ternary diagrams (see figure 1), which can be displayed when clicking on a desired region of the map.

Partners:

End-User – Institutio Nacional de Investigacion Agropecuria (POC – Guadalupe Tiscornia)

Earth Observations:

- Aqua MODIS
- Terra MODIS
- DMSP 13, 14, & 15 SSM/I
- NOAA-15, 16, 17, &18 AMSU-B

Impact: This novel application would help illustrate how the various drivers of drought severity are received by NASA Earth observations and how those Earth observations can be used to make better decisions regarding the health of the country. This will therefore have the benefit of saving the end-user time as well as money. If they have the ability to better understand the nature of the drought severity, they can better prepare by taking different steps in the planning process.





GUNNISON NATIONAL FOREST AGRICULTURE

USGS at Colorado State University



Community Concern: A spruce beetle outbreak is actively occurring in Colorado. Nearly 1.4 million acres of forest have been affected by the beetle to date. Our partners are concerned that increased tree mortality will result in less favorable habitats for wildlife and that that dead and falling trees will pose a hazard to forest visitors engaging in recreational activities.

Partners:

- Bioenergy Alliance Network of the Rockies
- Spatial Sciences Center, Montana State University
- Natural Resource Ecology Laboratory (CSU)
- USFS, Gunnison District
- USFS Rocky Mountain Research Station

Earth Observations:

- Landsat 5 TM
- Landsat 7 ETM+
- Landsat 8 OLI
- Space Shuttle SRTM V2

Impact: Partners will use products to begin planning habitat improvements and to make management recommendations for spruce-dominated forests present in the district.





Indonesia Agriculture

Goddard Space Flight Center



Community Concern: Production of major agricultural commodities like palm oil are widely recognized as the leading driver of global deforestation, and in Indonesia, illegal deforestation fueled by palm oil production has become especially alarming.

Partners:

World Wildlife Fund (WWF): End-User

Earth Observations:

- Landsat 8 (OLI)
- Auqa/Terrà (MODIS)
- TRMM (TMI)
- GPM (ĠMI)
- SRTM



Impact: Geospatial mapping layers and automated scripts for the acquisition and processing of NASA satellite imagery, along with the methodology for generating a risk map of the area, will position WWF to help companies achieve their commitments to deforestation-free sourcing and to inform their supply chain development with ways to link evolving purchasing choices with companies' deforestation-free commitments.



Africa Great Lakes Weather II

Wise County Clark of Court's Office



Community Concern: Each year around 5,000 people are killed on the African Great Lakes with little warning from these storms. There is a need for methods to provide early warning to fisherman and citizens in nearby countries.

Partners:

Kenya Meteorological Department

Earth Observations:

- AQUA
- TRMM
- GPM
- Meteosat 8,9



Impact: To identify indicators which may predict powerful storms over the African Great Lakes in order to assist the Kenya Meteorological Department to prepare for and mitigate damage and casualties.



Wise Disasters

Wise County Clerk of Court's Office



Community Concern: Wise County, Virginia is susceptible to severe flooding due to a combination of high rainfall rates, low stream capacity, and compacted soils from widespread strip mines. Record flooding in February, 2015 caused over 8 million dollars in damage in Wise County alone.

Partners:

Wise County, Virginia Board of Supervisors

Earth Observations:

- Landsat 8 (OLI) / Landsat 5 (TM)
- Terra (ASTER)
- SRTM (SIR-C/X_SAR)
- Aqua/Terra (MODIS)



Impact: By examining the extent of historical floods, the Wise County Board of Supervisors will be better equipped to take measures to protect life and property during future flood events.



Southeast Idaho Disasters II

Pocatello



Community Concern: Juniper encroachment across the west has been a land management concern for decades, with wildfires perhaps one of the only natural processes to keep the populations in check.

Partners:

Bureau of Land Management Idaho Department of Lands Caribou-Targhee National Forest Idaho Fish and Game NASA RECOVER

Earth Observations:

- Landsat 5 (TM)
- Landsat 8 (OLI)
- SMAP
- Worldview
- NAIP Digital CIR Aerial Imagery

Fire Frequency in the Western United States (1950-2014)) based upon the comprehensive RECOVER Historic Fires Database.

Impact: Understanding how juniper invasions move across the landscape, and if juniper invasions can be predicted, will help land managers better distribute resources for pre-fire fuel load reduction management.





CALIPSO Cross-Cutting III

NASA Langley Research Center



Community Concern: Since it's launch in 2006, the CALIOP sensor has made over 5 billion observations. The tool scientists currently have to visualize these data is written in a proprietary language (IDL) which means the tool is difficult to update to provide functionalities specific to scientists needs.

Partners:

Dr. Charles Trepte and Dr. Amber Soja – CALIPSO Science team at Langley Research Center

Earth Observations:

• CALIPSO, CALIOP



Impact: Continuing to work with the science team to update the GUI (now written in python) to provide additional functionality as well as a server based database



BOLSA CHICA ECOLOGICAL FORECASTING



NASA JET PROPULSION LABORATORY

Community Concern: The planning process to restore 550 acres of the Bolsa Chica Ecological Reserve began in 2001. Since the start of the restoration process, very little analysis of its success have been gathered quantitatively to assess future changes in water level.

Partners:

Amigos de Bolsa Chica

Earth Observations:

- ER-2 (AVIRIS)
- Landsat (1-8) (OLI and TMI)
- Gulfstream III (UAVSAR)
- ALOS-1 and RADARSAT-1

• Sentinel-1



Impact: By developing an understanding of the restoration process, the Amigos can use the information to improve upon conducting *in situ* environmental measurements in order to understand how water level changes with different tides and environmental conditions.



LOUISIANA ECOLOGICAL FORECASTING II



NASA JET PROPULSION LABORATORY

Community Concern: While much of the Louisiana coast has undergone extensive degradation due to erosion, land subsidence and sea level rise, studies are limited in understanding the unusual rapid growth of the Wax Lake Delta.

Partners:

Naval Research Laboratory (End-User, Richard Crout, Supervisory Oceanographer) Louisiana Universities Marine Consortium (Alexander Kolker, Assistant Professor)

Earth Observations:

- NASA King Air B200 (AirSWOT)
- NASA Gulfstream III (UAVSAR)



Impact: This project aims to provide a synoptic view of the accretion process at Wax Lake in order to better model and understand the conditions necessary for land building in shallow deltas that evolve under the influence of both riverine sediment influx and tidal influx.



Great Lakes Ecological Forecasting

Goddard Space Flight Center



Community Concern: *Phragmites australis,* also known as the common reed, is an aggressive invasive freshwater or brackish-tidal wetland perennial grass. Phragmites displaces native marsh vegetation. The GLSLCI does not they have a strong understanding of the extent of *Phragmites australis* for this region, or the extent of this invasive species in the future.

Partners:

Great Lakes and St. Lawrence Cities Initiative (GLSLCI): End-User/Boundary Organization Michigan Tech Research Institute: Collaborator

Earth Observations:

- Landsat 5 (TM)
- Landsat 7 (ETM+)
- Landsat 8 (OLI)
- SRTM
- EO-1 (Hyperion)
- Sentinel-1 (SAR)



Impact: This project will allow communities to respond to and prevent further invasion of Phragmites by locating the current extent of this invasive species, forecast the future extent, and guide policy makers to implement best management practices to support an invasive Phragmites program.



El Salvador Ecological Forecasting II

NASA Langley Research Center

Community Concern: The pine oak forest of La Mancomunidad de la Montañona which recharges streams for downstream communities, is threatened by encroaching agriculture and unsustainable slash and burn methods.

Partners:

The Earth Institute La Mancomunidad de la Montañona Ministerio de Medio Ambiente y Recursos Naturales (MARN)

Earth Observations:

- Landsat 4, 5, 7, & 8
- RapidEye Constellation
- QuickBird
- WorldView-2
- Lidar

Impact: A model to calibrate Landsat from RapidEye will enable an analyses of land use/ land cover and woody biomass change in order to inform MARN's efforts to developing change trajectories and monitoring protocols required of REDD+





Southern Rockies Ecological Forecasting II

NASA Langley Research Center



Community Concern: Mule deer are a migratory wildlife species that require specific winter and summer habitat characteristics. There is a need for a landscape-scale solution that allows for the development of a predictive habitat model based on historic and recent mule deer migrations.

Partners:

Southern Rockies Landscape Conservation Cooperative Western Association of Fish and Wildlife Agencies (WAFWA) Mule Deer Working Group

Earth Observations:

- Aqua/Terra MODIS
- Landsat 5 & 8
- Terra ASTER







Mobile Bay Ecological Forecasting

Mobile County Health Department



Community Concern: Sea level rise and land-use practices are detrimentally affecting coastal marshes in the area by decreasing marsh extent and impacting marsh health.

Partners:

Alabama Coastal Foundation (ACF) Dauphin Island Sea Lab

Earth Observations:

- Landsat series
- MODIS



Impact: The forecasted marsh extent and health for 2030 will help the ACF focus and refine restoration and conservation efforts.



LARAMIE MOUNTAINS ECOLOGICAL FORECASTING

USGS at Colorado State University

Community Concern: Aspen stands provide critical habitat for wildlife. Mixed age stands of aspen are associated with a high diversity of herbaceous understory species, and are important for ungulate fawning, fawn rearing, forage, and cover from predators. However, sudden aspen decline is a growing concern, in addition to declining mule deer populations throughout the Western US.

Partners:

Wyoming Game and Fish Department Natural Resource Ecology Laboratory (CSU)

Earth Observations:

- Landsat 5 TM
- Landsat 7 ETM+
- Landsat 8 OLI
- MODIS Aqua/Terra
- Space Shuttle SRTM V2



Impact: "This project will help my agency in identifying critical parturition habitats for ungulates in the Laramie Range and improve our current estimates of habitat carrying capacity. These estimates are important in deciding how to manage wildlife numbers to alleviate competition among ungulates and mitigate habitat conservation" – Ryan Amundson, Wyoming Game and Fish Department



Alabama Ecological Forecasting

Marshall Space Flight Center



Community Concern: The Southern Pine Bark Beetle is an opportunistic species that typically attacks stressed pine trees that have been weakened by drought, storm damage, or fire. It is estimated that nearly 60,000 pine trees are lost to SPB every year. The costs associated with infestation management and the loss of pines is estimated around \$800,000 per year.

Partners:

United State Forest Service – Southern Research Station

Earth Observations:

- EO-1 (Hyperion)
- Aqua (MODIS, AMSR-E)
- Terra (MODIS, ASTER L1B)
- Landsat 5 (TM)
- Landsat 7 (ETM+)
- Landsat 8 (OLI)
- GPM (IMERGE)



Impact: The end products will increase the temporal and spatial coverage of the infected area which in turn could focus and expedite suppression efforts (e.g. tree removal or chemical control) and, thus, reduce research, economic, and environmental costs for the end-users.



ATLANTA WATER RESOURCES

University of Georgia



Community Concern: Rapid development in Atlanta and its suburbs is expanding areas of impervious surface that will continue to exacerbate stormwater management problems.

Partners:

The Nature Conservancy Atlanta Regional Commission Trees Atlanta

Earth Observations:

- GPM (DPR)
- GRACE
- Landsat 8 (OLI, TIRS)
- Terra (ASTER)
- TRMM (PR)



Impact: Protecting green infrastructure and strategically reforesting degraded areas will help reduce sediment and nutrient-laden stormwater runoff in the Chattahoochee River watershed.



Cascade & Sierra Nevada Mountains Water Resources

NOAA NCEI

Community Concern: Within the Western states, snowmelt from the mountains is responsible for the majority of the seasonal fresh water resources. However, *in situ* monitoring stations are spatially limited in the region. Due to this limitation, it is difficult to determine future water availability.

Partners:

- Western Regional Climate Center
- National Weather Service

Earth Observations/NOAA CDRs:

- PERSIANN (GridSat-B1)
- CMORPH (IR Band)
- GPM
- Suomi NPP

Impact: Anomaly maps generated from satellite data will help end-users **determine which areas received above or below normal precipitation**. Additionally, difference maps will be provided that show where the PERSIANN and CMORPH agree and disagree. The difference maps will **highlight areas that would benefit the most from these supplemental data**.





Texas Water Resources II

NASA Langley Research Center



Community Concern: Wildfires pose a constant risk for many regions across Texas, burning thousands of acres a year. Monitoring drought conditions is vital for forecasting wildfire risk.

Partners: Texas Forest Service

Earth Observations:

- SMAP
- Aqua & Terra MODIS



Impact: Monitoring drought conditions using NASA Earth observations will provide continuous spatial coverage and will provide end users with information regarding the allocation of wildfire mitigation resources.



Lake Victoria Water Resources II

Marshall Space Flight Center



Community Concern: The water hyacinth is an invasive species that has established itself in Africa and has spread prolifically due to the favorable growing conditions due to poor water quality in Lake Victoria. The hyacinth can have adverse impacts on the lake; outcompeting native plant species for space and nutrients, restricting boating access, and creating hypoxic zones, killing aquatic life.

Partners:

NASA SERVIR Coordination Office NASA SERVIR – Africa Team Regional Centre for Mapping of Resources for Development (RCMRD)

Earth Observations:

- Landsat 5 (TM)
- Landsat 7 (ETM+)
- Landsat 8 (OLI)
- Aqua & Terra (MODIS)
- Suomi NPP (VIIRS)
- EO_1 (Hyperion)

Impact: The methodologies and products created will benefit the end-users in validating and calibrating their data. The end products will inform water quality preservation efforts and help eliminate and prevent the spread of water hyacinth in Lake Victoria.



Useful Dates to Remember

Project Deliverable Deadlines

- Project Summary (RD 11 Feb, FD 10 Mar)
- o Tech Paper (RD − 18 Feb, FD − 31 Mar)
- Poster (RD 25 Feb, FD 31 Mar)
- ∘ Presentation (RD 3 Mar, FD 31 Mar)
- o VPS (Video & Transcript 22 Mar, Launch 7 Apr)
- Holidays
 - Presidents Day 15 February
- Others
 - Myers Briggs & 4D Color Types 29 January
 - o Spring Gear Order 2 February
 - Summer Application Window Closes 12 February





Have a great term!

