**NASA DEVELOP National Program**

**Summer 2016 Project Proposal**

**NASA Langley Research Center**

**Southeastern United States Agriculture**

Incorporating NASA Earth Observations into the USDA Southeast Regional Climate Hub Lately Identified Geospecific Heightened Threat System (SERCH LIGHTS) to Assist Farmers in Making Informed Decisions on Water and Crop Management

**Project Overview**

***Objective:*** To incorporate the NLDAS and newly available SMAP data into the USDA Southeast Regional Climate Hub (SERCH) Lately Identified Geospecific Heightened Threat System (LIGHTS) in order to increase the accuracy and range of the tool.

***Community Concern:*** Regional climate variability in the southeast United States is a concern for agricultural and forestry management. This variability is causing droughts, heat stress, and flooding events while also expanding the growing season and changing pest phenologies. Drought induced water-stress directly affects the agricultural and forestry sectors’ ability to manage their water resources through more effective use of irrigation and better distribution of forestland fire-management resources. As a result, the USDA Southeast Regional Climate Hub (SERCH) developed a tool called Lately Identified Geospecific Heightened Threat System (LIGHTS) to identify and alert users to changes in drought, temperature, and precipitation patterns. While this tool allows users to address water management more efficiently it lacks information regarding soil moisture, which also affects drought patterns.

***National Application Areas Addressed:*** Agriculture, Climate, Water Resources

***Study Location:*** Southeastern, United States (AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, VA)

***Study Period:*** April 2015to May 2016

***Advisor:*** Dr. Kenton Ross, NASA DEVELOP National Program

***Source of Project Idea:*** This project resulted from conversations between the DEVELOP Langley Center Lead, Emily Adams, and Dr. Ross regarding different ideas for summer projects. After formulating an outline of a project, we contacted the USDA SERCH to see if they would be interested in partnering with DEVELOP for the project, where the discussion evolved into incorporating NASA data into their existing tool.

**Partner Overview**

***Partner Organization:***

|  |  |  |  |
| --- | --- | --- | --- |
| **Organization** | **POC (Name, Position/Title)** | **Partner Type** | **Boundary Org?** |
| USDA Southeast Regional Climate Hub (SERCH) | Sarah Wiener, Program Coordinator and Steven McNulty, Program Director | End-User | Yes |

***End-User Overview***

***End-User’s Current Decision Making Process:***

The SERCH LIGHTS system is currently driven by NOAA’s Climate Prediction Center’s Monthly Drought Outlook, Monthly Temperature and Precipitation Outlook, and Risk of Seasonal Climate Extremes in the US Related to ENSO. Subscribers, who are typically in the sectors of forestry or agriculture, receive a notification when their location is predicted to experience changing conditions related to drought. This system allows users to address drought and water management issues efficiently and directly.

***End-User’s NASA Earth Observations Capacity:***

The USDA SERCH does not currently use NASA Earth observations for their LIGHTS tool. They are aware of NASA Earth observations and their ability to be incorporated into this tool but are unaware of the methodology involved. Integrating the NLDAS and SMAP data into SERCH LIGHTS will increase the resolution and relevance of the tool, thereby increasing the end-user’s water management capabilities in response to drought conditions.

***Collaborator & Boundary Organization Overview***

***Boundary Organization Dissemination:***

USDA Southeast Regional Climate Hub – The SERCH LIGHTS tool is currently an email based subscription service; the infrastructure of which already exists on the USDA SERCH website. Dissemination of the alerts derived from the tool will continue through these subscriptions. The community that subscribes to the tool includes farmers and foresters.

***Project Communication & Transition Overview***

***In-Term Communication Plan:***

The team will communicate biweekly via videoconference or telecon with project partners to discuss project progress. The main points of contact are Sarah Wiener and Steven McNulty.

***Transition Approach:***

The team will demonstrate the success of the tool during a project hand off at the end of the term. Given the proximity of the project partners to Langley, Raleigh, NC, an in person demonstration will be explored. The updated tool will be available for the end-users after the software release process has been completed. The partners will also be invited to the Annual Earth Applications Showcase at NASA Headquarters.

**Letters of Support:** USDA Southeast Regional Climate Hub, Steven McNulty, Program Director

**Earth Observations Overview**

***Earth Observations:***

|  |  |  |
| --- | --- | --- |
| **Platform & Sensor** | **Parameter(s)** | **Use** |
| **SMAP** | Soil Moisture | Soil moisture data will be incorporated into the SERCH LIGHTS tool to increase the relevance of the tool for water management purposes and better drought prediction. |
| **Aqua MODIS** | Land Surface Temperature | Incorporation of land surface temperature into SERCH LIGHTS will be explored |

***Ancillary Datasets:***

NASA – North American Land Data Assimilation System (NLDAS) - Soil moisture data will be incorporated into the SERCH LIGHTS tool to increase the relevance of the tool for water management purposes and better drought prediction.

**Decision Support Tool & End-Product Overview**

***End Products:***

|  |  |  |  |
| --- | --- | --- | --- |
| **End Product** | **Partner Use** | **Datasets & Analyses** | **Software Release Category** |
| SERCH LIGHTS update | The updates to this tool will provide the end-users with the most accurate, relevant information about drought conditions in their region | SMAP and NLDAS will be incorporated into the LIGHTS tool | 3 |

***End-User Benefit:***

“I believe that synergizing the preexisting products of NLDAS, SMAP, and SERCH LIGHTS will capitalize on resources and maximize the use and benefit of each of these projects. Ultimately, this will help farmers, foresters, extension, consultants, and field staff make timely, informed decisions based on the best available and most current climate observations.” – Steven McNulty, Program Director, Southeast Regional Climate Hub

**Project Timeline & Previous Related Work**

***Project Timeline:*** 1 Terms: 2016 Summer

**Project Needs/Requests**

***Participants Requested:*** 4

***Software & Scripting:***

Python 2.7 – Core backend language of the software

**Jamie’s Comments**:

Awesome project with a great partnership (great quote!). Is this feasible for one term? Will this be a code you had over to them to incorporate into their system? If some of the tools can be created early in the term and handed off for them to start using before the end of the term – I realize this is a huge stretch – they would be a great partner to consider highlighting at AESAS partner panel.

**Lauren’s Comments:**

I agree with Jamie! My one thought is perhaps we should try to send this to another node (Wise maybe) to lighten the load at Langley this summer? Would that be feasible?

**Michael’s Comments:**

I have the same thoughts as Jamie as well. We have a call scheduled with the POC, Sarah Weiner, to start getting a better handle on what they want.