**NASA DEVELOP National Program**

****NASA John C. Stennis Space Center

**Summer 2015**

**Short Title: Texas Disasters**

**Subtitle:** Mapping and Analyzing Fuel Loads and Phenology in the Texas Grasslands

**VPS Title:** Is Texas Burning? Using NASA Earth Observations to Estimate Wildfire Fuel Loads

**Project Team & Partners**

**Project Team:**

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**Advisors & Mentors:**

Joseph Spruce (NASA Stennis Space Center [SSC])

James “Doc” Smoot (NASA SSC)

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**Past or Other Contributors:**

**Partner Organizations**

Texas Forest Service, End-User, POC: Tom Spencer

Texas Forest Service, End-User, POC: Curt Stripling

USDA Forest Service ForWarn, Partner, POC: William “Bill” Hargrove

USDA Forest Service Eastern Forest Environmental Threat Assessment Center (EFETAC), End-User, POC: Dr. Steve Norman

**Project Details**

**Applied Sciences National Applications Addressed:**

Disasters, Ecological Forecasting, Agriculture, Water Resources

**Study Area:** Texas (TX)

**Study Period:** 2010 - present

**Earth Observations & Parameters**

Landsat 8, OLI – Surface Reflectance, Land Cover Classification

Terra, MODIS – MOD13 (Normalized Differential Vegetation Index)

**Ancillary Datasets Utilized**

* USGS National Land Cover Dataset (NLCD) - land cover
* US Forest Service ForWarn – phenology data, NDVI products

**Models Utilized**

* TerrSet Geospatial Monitoring and Modeling Software

**Software Utilized**

ERDAS Imagine – land classification of Landsat imagery and processing of MODIS data

ArcGIS – Raster Manipulation/Analysis, & Map Creation of Landsat OLM, Terra MODIS

QGIS – Raster Manipulation/Analysis, Image Enhancement & Map Creation of Landsat OLI,Terra MODIS

TerrSet Geospatial Monitoring and Modeling Software – Modeling and map creation of fuel load and fuel types

Time Series Product Tool – MODIS data is already preprocessed with this software.

ENVI – Ancillary software for land classification of Landsat imagery and processing of MODIS data

**Project Overview**

**80-100 Word Objectives Overview**

This project will use and produce regional geospatial mapping products from MODIS and Landsat 8 OLI data to depict locations of potential wildfire fuel types, and fuel loads, for Texas’ vegetation types vulnerable to wildfire, especially during drought years.

**Abstract**

In recent years, the risk of severe wildfires has been increasing due to weather phenomena (e.g., sequences of wet and drought years) and recent urban expansion into wildland areas that are vulnerable to wildfire. The Texas Forest Service is tasked with estimating and evaluating potential fire risk in order to manage and allocate resources for the prevention and containment of possible wildfires across the varied and dynamic Texas landscape. Some of the main components for assessing fire risk is understanding vegetative fuel types and fuel loads. NASA Earth observations provide a platform for evaluating wildfire fuel across a large temporal and spatial scales. MODIS and Landsat OLI were used to calculate vegetation indices such as NDVI and EVI and produce fuel type and fuel load maps. The Texas Forest Service will utilize these products in order to better understand and evaluate wildfire risks throughout the state.

**Community Concerns**

* Texas’ vegetation types (grasslands, shrublands, and forests) can be highly susceptible to seasonal wildfires, especially during severe droughts.
* In recent years, the risk of severe wildfires has been increasing due to variable climate conditions and recent urban expansion into wildland areas.
* Grassland vegetation growth during wet years can increase fuel loads that, in turn, increase wildfire risk and can lead to more frequent, intense fires during dry years.

**Current Management Practices & Policies**

The Texas Forest Service currently relies on costly and time-consuming field surveys, aerial imagery, and products from the LANDFIRE Program and the National Predictive Services Unit to assess and estimate vegetation types and fuel loads in their effort to manage and allocate resources for wildfire management. LANDFIRE fuel type and fuel load data relies largely on modeling with remote sensing inputs derived from Landsat data and existing USGS datasets. Although these are useful tools, they have limitations based on the availability of recent data. Many of these products are created using the USGS National Land Cover Database which is only released every five years. Due to the fluctuations in weather and other disturbances these fuel loads can experience changes on much shorter timescales.

**Decision Support Tools & Benefits**

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| **End-Product** | **Earth Observations Used** | **Benefit & Impact** |
| Fuel Type Map | Landsat 8 OLI, MODIS | Provide current location of potential wildfire fuel types |
| Fuel Load Map | Landsat 8 OLI, MODIS | Provide current quantity of wildfire fuel load |
| Fuel Load Calculator | Landsat 8 OLI, MODIS | Provide a tool to calculate wildfire fuel load directly from MODIS data |

**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)