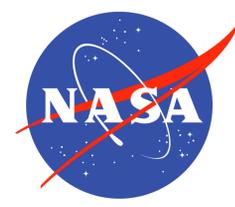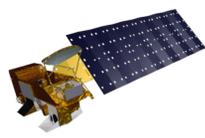# Utilizing NASA Earth Observations and NOAA Data Records to Produce Climate Indicators for Wildland Fire

Abstract

Grasslands in the Missouri River Basin (MRB) cover the majority of the landscape and are essential for agriculture. However, they are susceptible to wildland fires, with each year averaging approximately 6.6 million acres (2000-2010 average - National Interagency Fire Center) burned in this region. Due to sparse data sources, fire managers in the MRB are unable to quickly discern spatial differences in the wildland fire potential. The region is in need of a robust, communicable, and easily distributable method of analyzing fire potential. This project combined fuel moisture content derived from NASA's MODIS sensor aboard the Terra and Aqua satellites; wind speeds, temperature, and relative humidity from NOAA's Real-Time Mesoscale Analysis (RTMA); and precipitation estimates from Global Precipitation Measurement Mission (GPM) to train and construct a wildland fire potential matrix of the MRB. The NASA DEVELOP team used this data to create and distribute an updateable script for generating fire potential maps. This interface allows fire managers to quickly discern the potential for complex wildland fires throughout the MRB.

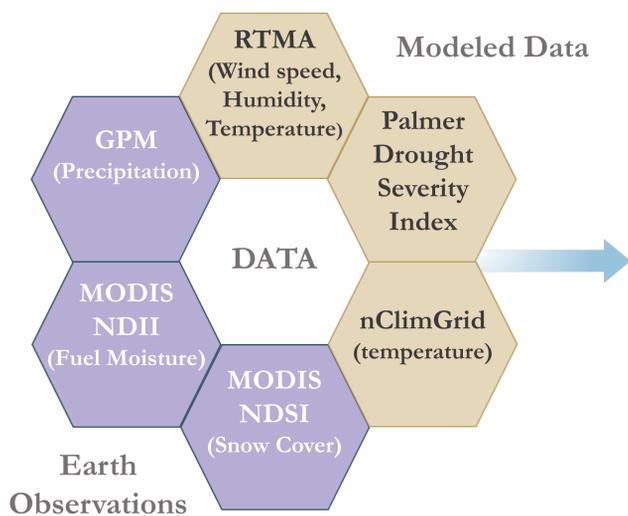## Earth Observations

Aqua - MODIS

Terra - MODIS

Global Precipitation Measurement (GPM)

Methodology

Modeled Data

RTMA (Wind speed, Humidity, Temperature)

GPM (Precipitation)

Palmer Drought Severity Index

DATA

MODIS NDII (Fuel Moisture)

nClimGrid (temperature)

MODIS NDSI (Snow Cover)

Earth Observations

Validate Indicators Against Historical Fires

Criteria for Large Fire Potential

Indicator	Threshold*
Wind Speeds	> 30 mph
Temperature	> 40 °F
Relative Humidity	< 30%
Drought	< -1 PSDI
Precipitation	>1/10 in
Precipitation	< 7 days

*Thresholds provided by project partners based on their analysis of severe fires in the study area

Conclusions

▸ The fire potential map will allow partners to identify areas with heightened fire potential.

▸ The user-friendly interface will enable fire managers with limited GIS experience to easily access and spread fire potential data.

▸ The open-source nature of the project will enable future users to update data sources and indicator thresholds as new data and research become publicly available.

Project Partners

Bureau of Indian Affairs

NOAA NCEI Regional Climate Services Director, Central Region

South Dakota School of Mines and Technology

Great Plains Tribal Water Alliance

US Army Corps of Engineers, Missouri River Basin Water Management

Team Members

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Objectives

▸ **Combine** several climatic variables influencing wildland fire potential, including drought conditions, wind speeds, precipitation, humidity, and cured fuels, to estimate wildland fire potential

▸ **Create** fire potential maps to help identify spatial differences in fire potential

▸ **Develop** transferrable open-source code for partners to build-upon and improve near-real time wildland fire potential maps

Study Area
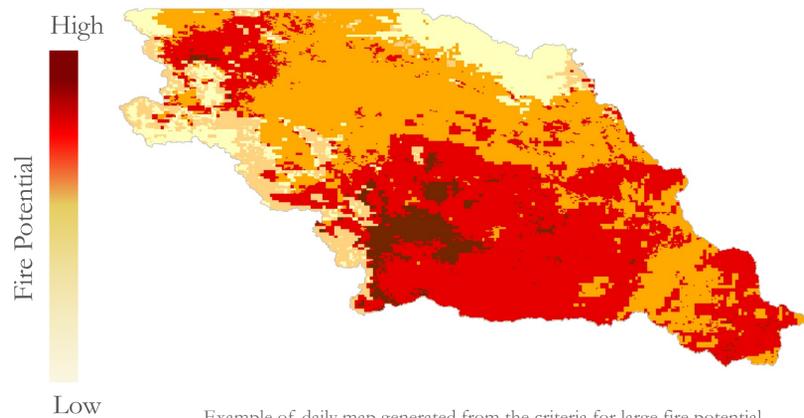
Missouri River Basin

0   250   500   1,000 Miles

Results

High

Fire Potential

Low

Example of daily map generated from the criteria for large fire potential.

Missouri River Climate II

Acknowledgements