STAT 511 Project, Fall 2017
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Recent years have seen an increased frequency of wildfire events in different parts of Arctic tundra ecosystems. Although contemporary studies illuminate on climate-wildfire linkage for regional and historic wildfire events (i.e., in Boral forests), a detailed understanding is lacking regarding the nature of relationship between climatic parameters and wildfire characteristics in the Arctic tundra ecosystems. This project aims to elucidate explicit climate associations of recent Tundra wildfires using two state-of-the-art datasets: i) satellite-derived wildfire records and their intensity from NASA MODIS dataset (2001-2015), and ii) climate variables extracted from MERRA-Land dataset (NASA's atmospheric reanalysis product).

This project aims at exploring following **key question**:

What is the nature of the relationship between intensity and climate variables over multiple temporal scales: 15-year period (2001-2015 average), seasonal (May-October average for each year) and monthly (individual months of wildfire occurrence: May to October)?

Data:

Response variable: Average wildfire intensity aggregated to 2/3° longitude by 1/2° latitude grids.

Explanatory variables: Climate variables aggregated to 2/3° longitude by 1/2° latitude grids.

> These climate variables are:
>
> i) Mean soil surface temperature (K)
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> ii) Total surface precipitation (kg m^{-2} s^{-1})
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> iii) Mean soil moisture content (kg m^{-2} s^{-1})
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> iv) Mean surface evaporation (kg m^{-2} s^{-1})
>
> v) Average soil surface temperature anomaly
>
> vi) Average surface precipitation anomaly

Methods:

To answer the aforementioned question, following statistical analyses will be carried out:

1) Correlation

- to examine potential associations between average monthly/yearly/seasonal wildfire characteristics (i.e., number of wildfire events and their intensity) and climate parameters.

2) Regression and Classification for explanatory and predictive modeling

Specific methods:

- Multiple Linear Regression
- Classification and Regression Trees