# Carbon Fluxes in Boreal Forests

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## Introduction:

With climate changing across our entire world it is important to understand how it will affect different ecosystems.The Boreal forests make up 30% of the Earth's forests; so in the research the focus was on the carbon fluxes within Boreal forests. And how climate change has affected carbon fluxes and how prominently disturbance events changed the results.

## Methods:

-Meteorological towers in two sites Old Aspen(OA) and Old Black Spruce (OBS) in Saskatchewan, Canada
-Eddy Covariance methodology
-Analyzed and plotted on R Studio

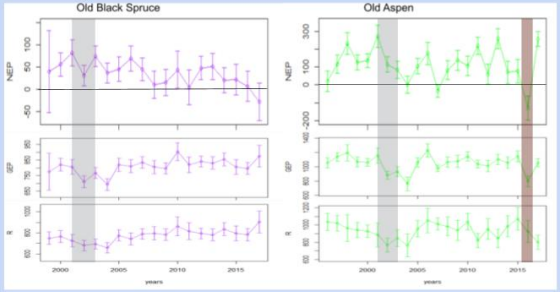
$$NEP = GEP - R_e$$

Net Ecosystem Productivity (NEP), Gross Ecosystem Productivity(GEP), Respiration (R). The instrumentation for the Eddy covariance method to the rights.

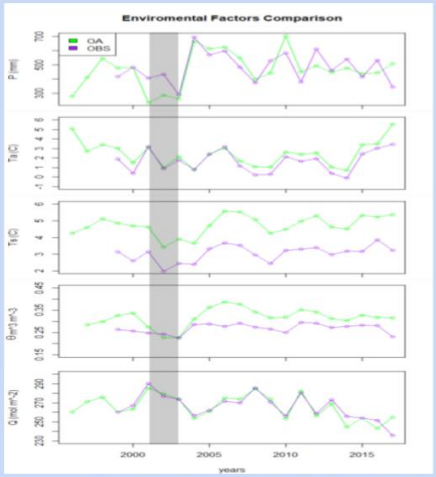
## Results:

-In 2001- 2003, there was a drought as represented in the Soil Water Content and the precipitation.
    -After the drought the mean precipitation increased by ~47 mm annually.
-Average temperature has increased since the drought.

-There has been increased Respiration and resulting in a decreased NEP.




Net Ecosystem Productivity (NEP). Gross Ecosystem Photosynthesis (GEP). Respiration (R)




Precipitation (P), Atmospheric Temperature (Ta), Soil Temperature (Ts), Soil Water Content (θ), Photosynthetic Active Radiation (Q)

-In 2016 at the Old Aspen site there was a tent caterpillar infestation leading to a significant drop in NEP.
    -This made the forest become a carbon sources instead of a sink

## Discussion:

**Some of the limitations include;**
- Annual data is broad so we weren't able to look at seasonal trends.
- Only looking at 2 sites in Canada, Boreal forests are across the world and different forests could have varying results.
- NEP is nuanced all of the environmental variables are interrelated There isn't a clear 1:1 relationship between any variable and NEP.
-The two sites are also slightly different geologically and localized weather could affect one without affecting the other.

**Future work**
-Data could be collected from other sites on different continents to compare
-Data on a smaller scale could be analyzed, looking at seasonal patterns

## Conclusions:

-The data indicates that the soil type is a factor in the differences in how the two sites react. OA has sandy soil whereas OBS has a more clay soil.This also leads to different kinds of trees with differing photosynthesis styles.
-Boreal forests are usually a carbon sink and this is beneficial for climate change, but when the forest is too distressed it can instead become a source.

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