Understanding how seasonality and shifts in species composition impact emission estimates in semi-arid ecosystems

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Introduction

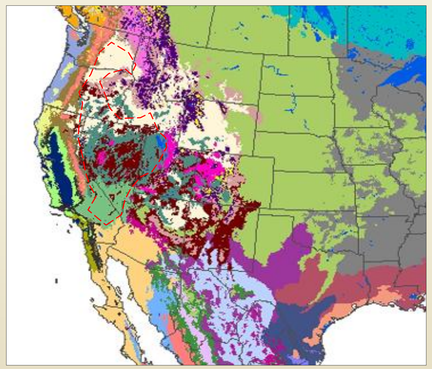
Biomass burning is a major source of trace gas emissions to the atmosphere (Sieler and Crutzen, 1980). Quantifying sources of uncertainty in the calculation of those emissions is crucial to understanding biogeochemical processes and how those processes are influenced by changing climate and species composition.

*Gas emissions = A * B * b * Efx*

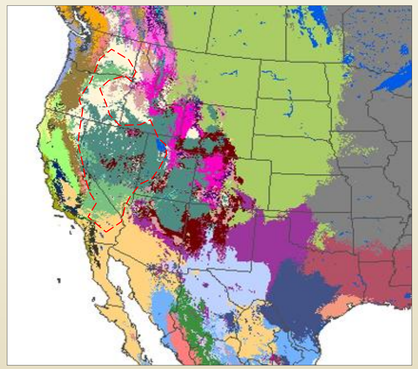
where A = area burned, B = fuel load, b = combustion completeness, Efx = emission factor (g gas / kg fuel combusted).

University of Idaho's Combustion Laboratory (IFire).

a



b



Predicted North American biome distribution shifts from, a) present day to, b) year2090 (Rehfeldt et al., 2012). Red outline is approximate boundary of Great Basin region. Great Basin region biomes: white = Great Basin shrub-grassland, dull purple = Rocky Mountain montane conifer forest, dark red = Great Basin conifer woodland, dark teal = Great Basin desert scrub, pink = Great Basin montane scrub, light teal = Mohave desert scrub, tan = Sonoran desert scrub.

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Objectives

(i) determine impacts of seasonality on emission factors of major carbonaceous and nitrogenous gas species

(ii) determine impacts of shifting vegetation species composition in the Great Basin (via replacement of native with invasive species) that can alter the fire regime (including gas emission seasonality and combustion efficiency)

Methods

In order to quantify influence of season and species shifts on gas emissions, dominant rangeland species will be collected at multiple points during the burning season (~April – October) and burned under controlled conditions at the University of Idaho's Combustion Laboratory (IFire).

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