Geophysical Research Abstracts
Vol. 21, EGU2019-7552, 2019
EGU General Assembly 2019


# Improving Estimates of Fuel Consumption and Fire Emissions in Siberia

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Wildfires are one of the main disturbances that impact structure, sustainability, and carbon budget of Russian forests. Warmer and drier climate leads to higher fire frequency and larger annual area burned in Russia. This results in increased fire-related carbon emissions to the atmosphere. Wildfires in Siberia account for up to 80% of all fires in Russia. Various types of models are used to calculate global or large scale regional fire emissions. However, in the databases used to estimate global fire emissions, data for Russia are typically under-represented. Meanwhile, the differences in vegetation and fire regimes in the boreal forests in North America and Eurasia argue strongly for the need for regional ecosystem-specific data. To improve and validate fire emissions models, accurate data on fuel loads and fuel consumption for the major vegetation types of Siberia are critical. We have compiled field database of fuel loads and consumption that contains more than 100 sites including experimental burns and wildfires in the forests, evergreen coniferous shrubs, steppe, grassland, and peat ecosystems. The study sites are located in the various ecosystem zones of Siberia (central and southern taiga, forest-steppe, steppe, and mountain forests) and include different vegetation types (Scots pine, Siberian pine, fir, birch and larch-dominated forests) with respect to the previous disturbances (logging, repeated fires). We found large variations of fuel consumption and fire emission rates among different vegetation types depending on growing conditions, fire behavior characteristics and anthropogenic factors. The correlations between fuel consumption and weather conditions (Russian fire danger index and Canadian Forest Fire Weather Index System components) were established. The database we have compiled is necessary for improving the accuracy of existing biomass burning models and for use by air quality agencies in developing regional strategies to mitigate negative smoke impacts on human health and environment.