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# Database of in-situ field measurements for estimates of fuel consumption and fire emissions in Siberia

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Wildfires show great variability in the amount of fuel consumed and carbon emitted to the atmosphere. Various types of models are used to calculate global or large scale regional fire emissions. However, in the databases used to estimate fuel consumptions, 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 of regional ecosystem-specific data. For about 15 years we have been collecting field data on fuel loads and consumption in different ecosystem types of Siberia. We conducted a series of experimental burnings of varying fireline intensity in Scots pine and larch forests of central Siberia to obtain quantitative and qualitative data on fire behavior and carbon emissions. In addition, we examined wildfire behavior and effects in different vegetation types including Scots pine, Siberian pine, fir, birch, poplar, and larch-dominated forests; evergreen coniferous shrubs; grasslands, and peats. We investigated various ecosystem zones of Siberia (central and southern taiga, forest-steppe, steppe, mountains) in the different subjects of the Russian Federation (Krasnoyarsk Kray, Republic of Khakassia, Republic of Buryatia, Tuva Republic, Zabaikalsky Kray). To evaluate the impact of forest practices on fire emissions, burned and unburned logged sites and forest plantations were examined. 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. Changes in the climate system result in an increase in fire frequency, area burned, the number of extreme fires, fire season length, fire season severity, and the number of ignitions from lightning. This leads to an increase of fire-related emissions of carbon to the atmosphere. The field measurement database we compiled is required for improving 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.
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