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The Effect of Fire Intensity on Soil Respiration in Siberia Boreal Forest

[Baker, S.](#); [Bogorodskaya, A. V.](#)

American Geophysical Union, Fall Meeting 2010, abstract #GC33A-0934

Russian boreal forests have an annual wildfire activity averaging 10 to 20 million ha, which has increased in recent years. This wildfire activity, in response to changing climate has the potential to significantly affect the carbon storage capacity of Siberian forests. A better understanding of the effect of fire on soil respiration rates in the boreal forest of Siberia is important. Fire can change the rate of soil respiration by reducing soil moisture and organic matter, increasing surface temperature, and reducing soil microbial populations to varying degrees, based on fire intensity. Experimental fires were conducted at three Scotch pine sites and two larch sites in central Siberia from 2000 to 2007. A range of fire intensities occurred on the plots at each site, primarily low and medium, with one high intensity fire. Adjacent control plots were established at each site. Soil respiration has been measured since 2002 on most of the burn plots and controls one year after burning, and annually thereafter through 2010. One year after burning the soil respiration rate was reduced on the burn plots by 30 to 70 percent vs. the control. Reduction in soil respiration had a significant linear correlation with fire severity measurements, including fire line intensity, duff consumption and depth of burn. We will report how the soil respiration rate increased over a one to seven year period after burning, on plots of different fire intensities. This study is part of the Russian FIREBEAR (Fire Effects in the Boreal Eurasia Region) Project, which quantifies the impacts of fire severity on ecosystem processes, emissions, and the carbon cycle.

Keywords: [0315] ATMOSPHERIC COMPOSITION AND STRUCTURE / Biosphere/atmosphere interactions, [0428] BIOGEOSCIENCES / Carbon cycling, [0486] BIOGEOSCIENCES / Soils/pedology



The ADS is Operated by the [Smithsonian Astrophysical Observatory](#) under [NASA](#) Grant NNX09AB39G