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Influence of Logging on the Effects of Wildfire in Siberia

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The Russian boreal zone supports a huge terrestrial carbon pool. Changes in this pool and related changes in land cover have global significance in terms of climate change. Moreover, it is a tremendous and largely untapped reservoir of wood products. The main natural disturbance in these forests is wildfire, which modifies the carbon budget and has potentially important climate feedbacks. In addition both legal and illegal logging are increasing in many forest areas of Siberia. From 2009 to 2012, we investigated a number of logged and unlogged sites to evaluate the impact of logging on wildfire characteristics and subsequent effects of wildfires on the ecosystem. The research was conducted in 3 different ecoregions of Siberia: taiga forest (Angara region), forest-steppe (Shushenskoe region), and mountain forest (Chita region). We analyzed fire effects in different forest types as a function of both the presence of logging and harvest methods. Logged areas often had higher fuel loads due to logging debris, and typically experienced higher severity fires than unlogged forests. We found large variations among sites depending on forest types, type of logging activity, and weather conditions prior to and during burning. Illegal logging resulted in much higher fire hazard than legal logging. Fuel consumption was highest on repeatedly burned areas, where ground cover was often burned to the mineral layer. Estimated carbon emissions were up to 5 times higher on logged areas than on unlogged sites. Soil respiration was less on both burned and logged areas than in undisturbed forest. Changing patterns in the harvest of wood products can be expected to increase the emissions and ecosystem damage from wildfires, inhibit recovery of natural ecosystems, and exacerbate impacts of wildland fire on changing climate and air quality. The research was supported by NASA LCLUC Program, RFBR grant # 12-04-31258, and Russian Academy of Sciences.