

Fire impact on forest formation in the light-coniferous forests of the southern Siberia

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Wildfire is the main disturbance factor in the boreal forests of Siberia. The majority of fires occur in the south of Siberia where the highest anthropogenic pressure is observed. We have examined in situ fire effects at 570 sample plots for the last 15 years. Forest formation process in the light-coniferous forests of the southern Siberia was found to depend significantly on zonal and geographic particularities of the forest lands. Different forest regions are characterized by specific factors of forest formation, which impact on fire behavior and its consequences. Fire tolerance of the tree species and stands depends on the ecological demands of the trees, terrain, and forest conditions. Postfire tree mortality depends greatly on the fire characteristics and periodicity. The biggest stand damage after surface fires in the southern Siberia was found in the forests of Angara region and Altai-Sayan mountain region. Tree mortality in the similar forest conditions after fires of identical type and severity could differ 2-4 times depending on the region. High-severity steady fires in all forest regions of Siberia result in nearly all or total tree mortality. Anthropogenic factors often increase negative fire consequences. Climate warming causes droughts intensification and change of fire regimes thus leading to the steppification and desertification of the forested lands and extension of the rocky areas. These processes mainly happen in the southern latitudinal forest border (forest-steppe zone in the southern Siberia and southern regions of the Zabaikalsky krai), as well as in the lowest and highest altitudes (more often -in the southern slopes). Wildfires accelerate transformation of the forests and shift of the borders zones and subzones. Based on our field data, with a use of satellite images and forest inventory datasets, we were able to develop methodology to forecast postfire forest ecosystem state and estimate natural fire danger dynamics. This research was supported by the Russian Foundation for Basic Research (grant # 15-04-06567) and NASA Land Cover and Land Use Change Program.

Keywords: fire type and severity, tree mortality, zonal and geographic particularities