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# IMPACT OF FOREST FIRES ON TREE-RING $\delta$13C AND $\delta$18O OF GMELINII LARCH IN THE PERMAFROST ZONE

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Forest fire is one of the most important environmental factors which define forest ecosystem functioning in the continuous permafrost zone in the north of Siberia. Tree-ring width (TRW) and stable isotope (13C/12C and 18O/16O) chronologies from two Larix Gmelinii sites with initially different conditions (wet and dry) and characterized by different fire history (fires in 1852 at wet and 1896 at dry sites, respectively) were considered. It was found that the rate of tree radial growth is enlarged due to the increased depth of seasonally thawing soil layer after fire. This effect is well pronounced during the consequent 30-60 years after the fire event and the length of this period depends on the fire intensity and the type of post-fire ground vegetation. TRW and $\delta$18O are identified to be the most sensitive parameters to the changes of tree growth condition after fire. Correlations between these tree-ring parameters from the two sites shift from significantly positive ($r=0.40$; $p<0.05$ for TRW and $r=0.62$; $p<0.05$ for $\delta$18O) before to negative ($r=-0.52$; $p<0.05$ for TRW and $r=-0.38$; $p<0.05$ for $\delta$18O) after fire. In $\sim$30-40 years correlations return to be positive, and faster recovery for TRW than for $\delta$18O is observed. Values of $\delta$13C in tree-rings from the two sites are highly positively correlated ($r=0.56$; $p<0.05$) during all considered periods independently of the fire impact. This fact indicates that $\delta$13C chronologies should be more adequate for climatic reconstruction in the region because of the climate signal consistency. However, comparative analyses of prior and post-fire climatic response of the dendrochronological parameters indicate sufficient? significant changes in tree-ring growth and isotopic ratio response to climate due to the increased demand of water for trees during the post-fire period (deeper seasonal retreat of permafrost). The results obtained imply a higher impact of forest fires on the permafrost ecosystem under projected climate change because the frequency and intensity of fires is expected to increase.

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