



Climatic response of the *Larix sibirica* annual growth in the upper basin of Irtysh

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The research is aimed at assessment of the climatic response of the annual growth of Siberian larch (*Larix sibirica* Ledeb.) growing in the upper basin of the Irtysh river. Trees' cores sampling was carried out on the northern macroslopes of the Sarymsakty, Tarbagatai and Southern Altai ranges in Kazakhstan, as well as on the southern macroslope of the Southern Altai ranges in Kazakhstan and China from three sites on the upper tree line (2300 m) and from four on the lower tree line (1200 m). According to the results of the dendrochronological analysis, two generalized tree-ring chronologies IRT_v and IRT_n were obtained, reflecting the variability of the radial growth of Siberian larch in the study region on the upper and lower tree lines respectively. On the upper tree line, the radial growth of Siberian larch is dependent on the thermal regime of the beginning of the growing season (June - July). The analysis of the tree-ring growth dynamics showed that during 1850–1873, 1881–1900, 1906–1939, 1957–1965, 1982–1990 with minimums at 1851, 1854, 1859, 1861, 1869, 1871, 1882, 1884, 1907, 1912, 1914, 1917, 1919, 1927, 1929, 1933, 1938, 1947, 1949, 1958, 1961, 1985, 2009 and 2014-ys tree-ring growth at the upper tree line was characterized by lower values. Since 1850 there is a positive trend in the tree-ring growth variability (0.013/10ys) that indicates better thermal conditions since the end of the Little Ice Age. The sufficiently strong climatic signal ($r < 0.7$) allows using the IRT_v chronology for June-July air temperature reconstruction. On the lower tree line the variability of the radial tree-ring growth is determined by precipitation dynamics in the winter-spring-summer period (December – July, $r = 0.3 \dots 0.6$). The most significant, along with that, is the moisturization during the completion of snowmelt and the beginning of the growing season (May – June, $r < 0.4$). Analysis of the trees' growth dynamics showed that over the past 150 years the moisture regime didn't change significantly. The reduced values of the tree-ring growth correspond to 1850–1859, 1877–1907, 1916–1936, 1944–1951, 1962–1968, 1973–1992 periods. Minimums of growth occurred at 1855, 1863, 1865, 1881, 1885, 1893–94, 1896, 1900, 1923–24, 1934, 1945, 1949, 1963, 1965, 1967, 1977, 1983, 1990–91 and 2012–13.

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