A decline in tree growth in Arctic since 1970: Global warming or a New Little Ice Age?

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The results of analysis of dendrochronological series taken from four different regions located behind of the Polar Circle (Northern Siberia, Alaska, Kola Peninsula, Northern Lapland) are presented. These regions are located close to the northern timberline. It was shown that the most major warming and cooling trends observed are in agreement with other high-latitude temperature reconstructions based on tree-ring analysis with some regional differences in timing of cooling in the late XVIII century and warming in the late XIX century. The warm-season temperatures reconstructed from tree-ring growth correlate with global instrumental temperatures and indicate unusual warming in the first half of the XX century for the all four regions. However, there was a loss of the thermal response in ring widths of Northern Siberia, Kola Peninsula and Alaska since about 1970. Previously the warmer temperatures induced the wider rings. This thermal response has appeared only in Lapland series. A decline in tree growth in Arctic might be expected to arise from an increase in evaporation rates and moisture following the rise in seasurface temperatures which has accompanied global warming. Another possible reasons seem to be connected to regional climate features and solar activity. The role of cosmic rays as a link between solar activity and climate together with variation of solar irradiation rate are discussed.

Results of analysis of tree-ring series collected at Kola Peninsula (about 20 series) showed that the zone of anthropogenous influence of Monchegorsk nickel plant is extended. Using of tree-ring chronologies permits us to separate the influence of external natural and anthropogenous factors on ecosystem development.