



Parameterization of tree-ring growth in Siberia

Ivan Tychkov, Margarita Popkova, Vladimir Shishov, and Eugene Vaganov
Siberian Federal University, Krasnoyarsk, Russian Federation (ivan.tychkov@gmail.com)

No doubt, climate-tree growth relationship is an one of the useful and interesting subject of studying in dendrochronology. It provides an information of tree growth dependency on climatic environment, but also, gives information about growth conditions and whole tree-ring growth process for long-term periods. New parameterization approach of the Vaganov-Shashkin process-based model (VS-model) is developed to described critical process linking climate variables with tree-ring formation. The approach (co-called VS-Oscilloscope) is presented as a computer software with graphical interface. As most process-based tree-ring models, VS-model's initial purpose is to describe variability of tree-ring radial growth due to variability of climatic factors, but also to determinate principal factors limiting tree-ring growth. The principal factors affecting on the growth rate of cambial cells in the VS-model are temperature, day light and soil moisture. Detailed testing of VS-Oscilloscope was done for semi-arid area of southern Siberia (Khakassian region). Significant correlations between initial tree-ring chronologies and simulated tree-ring growth curves were obtained. Direct natural observations confirm obtained simulation results including unique growth characteristic for semi-arid habitats. New results concerning formation of wide and narrow rings under different climate conditions are considered. By itself the new parameterization approach (VS-oscilloscope) is an useful instrument for better understanding of various processes in tree-ring formation.

The work was supported by the Russian Science Foundation (RSF # 14-14-00219).