

# The model by Russian scientists predicts the impact of climate on forest growth

Researchers from Siberian Federal University have tested a universal tree growth model that will help manage forests effectively. According to the authors, experimental verification showed the high accuracy of the model in predicting changes of the forests of the Northern Hemisphere. The data were published in a highly rated journal [Frontiers in Plant Science](#).



Forest management is a set of measures that allows efficient and environmentally friendly regulation of commercial cutting and reforestation. The key element of effective forest management, as the SibFU experts explained, is simulation models of tree growth, which allow predicting their response to external influences.

The Vaganov-Shashkin model (VS-model) developed by the SibFU researchers connects the growth of woody plants with three climatic factors: air temperature, humidification and illumination. Today, the scientific community considers this model as the most promising as it helps predict with high accuracy the response of trees to past, current and prognosticated climatic changes on the planet.

In the new study, the VS-model was tested on unique data of the observations of the growth of black spruce (*Picea mariana*) provided by Canadian scientists. The observation archive, which has been formed for 15 years, is one of the best databases in the world regarding seasonal tree growth.

*“The analysis carried out on the new material has shown that we can predict many physiological processes of tree growth, taking into account climatic dynamics, even in cases where plants are not very sensitive to climatic factors, such as, for example, some species of conifers in the Northern America. This means that even for specific forest areas, our forecasts can be used for practical forest management,”* said **Vladimir Shishov**, professor of the Department of Mathematical Methods and Information Technologies of Siberian Federal University.



The test results showed that the Russian model perfectly describes a very specific relationship between the growth of black spruce and the climate of its natural habitat, the north of the province of Quebec. This confirms the applicability of the model to virtually any forest in the Northern Hemisphere.

The researchers emphasized, that the peculiarity of the model that distinguishes it from competitors is its simplicity and conciseness. In most cases, over long time intervals, it is the climate that determines how trees grow and develop in various ecosystems, which means that the influence of other factors can be neglected.

In the course of the study, the researchers used a VS-oscilloscope, which is an online version of the VS-model, as well as a high-performance computing cluster of SibFU. The project became possible thanks to close long-term cooperation with specialists from the Canadian University of Quebec and Chicoutimi.

The next stage of work will be the development of neural-network analogues of this model, which will

improve the calculations for modelling on a global scale.

[RIA Science](#) wrote about the model of the SibFU researchers.

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