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Flora of the forests as the indicator of climate change of Baikal Region (South Siberia)

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The problem of global climate warming and its consequences for nature and civilization has been actively discussed in scientific and political publications during last 15 years. Although quantitative estimations of the rate of warming can be rather differ by results of different authors. A relevant component of such assessment is the prognosis of vegetation development under conditions of climate warming.
Our study was carried out on the western macroslope of the Ikatskii Ridge in the northern Baikal region (South Siberia). This area is located on the territory where permafrost may have a continuous, discontinuous, or insular distribution.
The plant cover of study area is characterized by dominance of larch (Larix gmelinii (Rupr.) Rupr.) and pine (Pinus sylvestris L.) forests that form a forest belt. In this belt, two parts can be distinguished: the lower, forest–steppe part (550–900 m a.s.l.), which is limited by steppe at the lower part and the upper, mountain-taiga part (800–1600 m a.s.l.) with mountain tundra on the top. Pine forests by Braun-Blanquet approach include to hemiboreal forests Rhytidio rugosi-Laricetea sibiricae K. Korotkov et Ermakov 1999. Larch forests presented by boreal forests Vaccinio-Piceetea Br.-Bl. in Br.-Bl., Siss. et Vlieger 1939.
Floristic compositions of these classes were analyzed as cenofloras. Floristic complexes of cenofloras included the species of dark coniferous, light coniferous, preboreal, forest–steppe, mountain steppe, true steppe, montane, and meadow zonal groups.
The cenoflora of class Rhytidio-Laricetea is presented by 222 species of vascular plants. This cenoflora mostly has the steppe and forest floristic complexes, respectively 54.4 and 35.5%. The cenoflora of class Vaccinio-Piceetea include 153 species and the light coniferous group of the forest floristic complex prevailed. The total share of forest species in the cenoflora reaches 70.6%. Other floristic complexes (meadow, steppe, and mountain) has the similar proportions 8.5, 10.4, and 7.8%, respectively.
Relationships between the ranks of activity and species richness of zonal groups in the cenofloras were analyzed. In each cenoflora, parameters of activity (R) for constituent zonal groups were calculated. Zonal groups class intervals using the resultant R values and data on species richness were calculated too.
In the cenoflora of class Rhytidio-Laricetea, these ranks coincided in the dark coniferous, preboreal, light coniferous, and forest–steppe groups, while in the mountain steppe and true steppe groups, the rank of species richness exceeded the rank of activity. We consider that certain conditions unfavorable for the last groups developed in the ecotopes of this cenoflora in the near past, and this was the result of decreasing the activity of mountain steppe and true steppe species in light coniferous forests. The observed tendencies of changes in the composition of cenofloras indicate that climate in the lower band of mountain slopes is becoming more humid, which may be explained by an increase in the amount of precipitation. In addition, moisture supply to habitats increases due to increasing degradation (thawing) of permafrost.
In the cenoflora of class Vaccinio-Piceetea, the ranks of activity and species richness coincided in all zonal groups. This may be regarded as evidence that this cenoflora has existed for a long time under relatively stable climatic conditions. Such favorable conditions lead to absence of displacement of any species groups.
Our study showed that current climate change has now the influence on the vegetation of lower parts of forest belt of South Siberia.