

Impact of climate changes over the extratropical land on permafrost dynamics under RCP scenarios in the 21st century as simulated by the IAP RAS climate model

Arzhanov M., Eliseev A., Mokhov I.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

Estimates of possible climate changes and cryolithozone dynamics in the 21st century over the Northern Hemisphere land are obtained using the IAP RAS global climate model under the RCP scenarios. Annual mean warming over the northern extratropical land during the 21st century amounts to 1.2-5.3°C depending on the scenario. The area of the snow cover in February amounting currently to 46 million km² decreases to 33-42 million km² in the late 21st century. According to model estimates, the near-surface permafrost in the late 21st century persists in northern regions of West Siberia, in Transbaikalia, and Tibet even under the most aggressive RCP 8.5 scenario; under more moderate scenarios (RCP 6.0, RCP 4.5, and RCP 2.6), it remains in East Siberia and in some high-latitude regions of North America. The total near-surface permafrost area in the Northern Hemisphere in the current century decreases by 5.3-12.8 million km² depending on the scenario. The soil subsidence due to permafrost thawing in Central Siberia, Cisbaikalia, and North America can reach 0.5-0.8 m by the late 21st century. © 2013 Allerton Press, Inc.

<http://dx.doi.org/10.3103/S1068373913070030>
