



Assessment of natural hazard impacts on transport infrastructure in Russia

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Transport infrastructure is considered as a large and complex technological system including railway and automobile stations; subways; tunnels, overpasses, and bridges; seaports; ports on inland waterways; airports; sections of roads, railways and inland waterways, as well as other buildings, structures, devices, and equipment ensuring the functioning of the transport system. Almost all of the listed transport infrastructure objects are prone to undesirable impacts from adverse natural processes and phenomena, as well as natural hazards of different genesis. Such impacts create a certain threat to transport security, lead to transport accidents or disruption of normal transport operation, cause delays in flights, in delivery of passengers and goods, and to other negative consequences. Under conditions of observed and forecasted global climate changes, adverse and hazardous natural impacts on various objects of transport infrastructure, primarily from meteorological and hydrological hazards, as well as other natural events triggered by them, will increase. In this regard, the relevance and importance of the assessment of natural hazards on the basis of their continuous monitoring increases. The transport infrastructure of Russia is exposed to multiple impacts of various natural hazards and weather phenomena such as heavy rains and snowfalls, floods, earthquakes, volcanic eruptions, landslides, debris flows, snow avalanches, rock falls, fog and mist, icing conditions of roads, and others. The presentation considers impacts of different hazardous natural processes and phenomena on transport infrastructure in Russian regions. Using the information collected by the author in the database of technological and natural-technological accidents, the contribution of various natural factors to railway, road, air, and water transport accidents and delay of transportation is assessed. As the analysis of the database revealed, about 6.5% of all emergencies in the railway transportation were caused by various natural events. Road transport infrastructure facilities are also highly susceptible to adverse and hazardous natural processes and phenomena. The total risk of transport accidents and delay of rail, road, and air transportation caused by adverse and hazardous natural impacts was assessed for the area of Russia.