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Changes of Snow Cover in North Eurasia: Tendencies and Consequences (*Invited*)

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Observed changes of the snow cover in regions of North Eurasia are analyzed and demonstrated in a series of maps. During the last decades, snow amount is increasing over most of North Eurasia. In the west of the sub-continent, the amount of snow is decreasing due to warmer winters and (in some areas) lower precipitation. The changes are caused mostly by atmospheric circulation, in particular larger cyclonic activity in North Eurasia during the last decades. The latter results in increased solid precipitation over most regions and its decrease in the west of the sub-continent. The snow changes are quite different by regions and result in a number of consequences for both natural and socio-economic systems. In some of the large-scale river basins, greater snow amount leads to a distinct runoff increase. Changes of snow cover in certain regions result in increase or decrease of expenses for snow removal from roads. In Moscow region, the expenses are increasing due to development of the road network, while near Pacific coast they grow due to heavier snowfalls. The latter parameter is evaluated taking into account the road density. Shifts in snow seasonality and solid precipitation cause somewhat different vertical structure of the snow cover, which in turn may affect many aspects of agriculture, avalanche activity, etc.
A local model of seasonal snow cover evolution, taking into account its vertical structure and crystal metamorphism, is developed and tested against data obtained in different geographical regions. The model reproduces the seasonal evolution of the snow cover and time of its melting with good accuracy for different locations and different weather conditions. The vertical structure of snow cover is evaluated too, in many cases with good quality. The model allows revealing the role of certain atmospheric processes in the snow cover formation, evolution and melting. In particular, sharp and gradual changes of weather regime during the cold season can be evaluated using the model experiments.
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