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Effect of physico-geographical conditions on snow structure

M.N. Petrushina, S.A. Sokratov, V.N. Golubev

Faculty of Geography, Moscow State University, Moscow, Russia (sokratov@geol.msu.ru)

The main goal of this research is to reveal the regularities of spatial and temporal variability of snow cover's characteristics (snow depth, density, and thermal characteristics) and factors of its formation at different hierarchic scales. The investigation is based on the large-scale fieldwork, physical and mathematic modeling, and analysis of data of meteorological observations. The snow structures at the regional level firstly depends on meteorological conditions of their formation, and than reflects the character of land surface, such as topography, vegetation, wetness of soils, etc. (landscapes). At local level, landscapes' characteristics are of particular importance. The common features of snowpack stratigraphy correlates to regional (zonal, longitude sector and altitude belt) characteristics of winter climatic conditions. The changes at this regional scale have been revealed for 1.) different physical-geographical countries—mountain and plain; 2.) different zonal and sub zonal types of landscapes—tundra, taiga, steppe and so on; 3.) different longitude sectors—oceanic, moderate continental, continental and so on; 4.) specific landscapes according to their intra-structure. Several types of snow structures were observed and than modeled based on meteorological conditions (temperature, wind, precipitation, duration of sunshine): complex columns of snow with high depth with clear distribution of different layers form in sectors with oceanic and moderate continental climate; less complex snowpack with increasing climate continentality; simplest snowpacks in extra continental areas, thick depth hoar layers are distinguished features for these areas. Especially complicated snowpack's structures correspond to mountain landscapes. The spatial and temporal variability of snow cover in mountain regions is closely connected to morphology of slopes. A model of snow structure allowing use of spatial variability in description of metamorphic processes in snow on slopes of different morphology was developed. The work is supported by INTAS 03–51–5296 and NATO ESP CLG 981842 grants.