Monitoring of Snow Cover at the Territory of Academic Vernadsky Polar Research Base

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During the 24-year (1997-2020) observation period, there is a clear tendency to shift the timing of beginning of the permanent snow cover formation to later, and its complete destruction – to earlier dates. If at the beginning of the studied period the formation of snow cover was observed in March, today it is stable in April. The average dates for the destruction of snow cover also shifted, although somewhat less – from the third decade of February to mid-February. As a result, we have a stable tendency to decrease of snow cover occurrence period in the study area.

The dates of the beginning of formation of the snow cover shifted most significantly. With a linear trend of 12.7 days over 10 years, a shift of 1 month occurred over a 24-year observation period. An analysis of dates of the maximum snow cover for the period under study also showed their shift to later dates. However, the dates of maximum snow depth as well as the dates snow thawing have shifted less significantly.

With the help of mathematical and statistical methods, we obtained the amplitudes and phases of harmonics of the intra-annual component of the snow depth, among which the next three were statistically significant – 57, 103 and 240 days. The first two harmonics are characterize the initial period of formation of the snow cover, and the third – the period of maximum increments of the snow mass (late July – early August). Analysis of the snow accumulation showed, that during the period from April to August are formed 6-8 stable layers (although in some unstable winters their number may be greater), the total height of which is about 250-260 cm. Because the layers are built by certain atmospheric processes, the dates of their formation from year to year are quite close. During the period of maximum snow growth (July-August) an avalanche-hazardous layer of insignificant vertical thickness is formed. The snow thawing time is characterized by 3-4 stable periods. All of the above mentioned us to make an assumption about the presence of significant changes in the very process of formation of the snow mass at area of Academic Vernadsky polar research base, which is manifested in changes in the height of the snow during 1997-2020.

The obtained results give a broad understanding of the properties of snow and the very process of snow accumulation in the study area.