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SNOWPACK IN NORTHERN KAZAKHSTAN IN CONDITIONS OF REGIONAL CLIMATE CHANGE

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Recently the interest in research of snowpack has grown due to the regional climate changes that have been occurring in the last few years. The snowpack is one of the most important climate forcing factors. The territory of Northern Kazakhstan is located in such a latitude zone for which a long duration of a steady occurrence of a snowpack is distinctive for up to 4-5 months without a break in time and the snow in this area plays a big role on the climate there.

The global warming that was observed in the 20th and at the beginning of the 21st century also shows its occurrence in other regions of Kazakhstan too. Thus, in Northern Kazakhstan the highest increase in air temperature for the period of time 1941-2012 is typical for autumn (0.3 °C/10 years), winter (0.28–0.34 °C/10 years) and, especially, spring (0.35–0.37 °C/10 years), but as for the summer, then, the tempo of increase is a bit lower (0.20–0.25 °C/10 years). All tendencies of increase in air temperature are statistically significant.

A steady snowpack forms in Northern Kazakhstan in November-December and, in what, its formation occurs from north to south of the reviewed territory. In North-Kazakhstan and Akmola regions it is being formed from the 5th till the 12th of November, in Kostanay region there is a delay for up to 8-10 days (i.e. 14th-21st of November). The earliest formation of a steady snowpack in the north of the Republic was recorded on the 3rd-9th of October and the latest one - on the 18th-24th of December. Thus, an amplitude of the set dates when the steady occurrence of snowpack at the reviewed area has been recorded was about 70 days, and the mean-square deviation varies from 10 to 15 days.

The destruction of a steady snowpack lasts for two months - March and April. The earliest destruction of a steady snowpack in the north of the country was seen on the 20th of February - 5th of March and the latest - on the 25th-28th of April. Steady snowpack slides down from the 1st till the 10th of April almost on the whole territory of Northern Kazakhstan. The values of the mean square deviations of the dates for the steady snowpack slide-down are about 7-12 days. Amplitude of fluctuation of these dates does not exceed 60 days.

The duration of the snowpack stratification in Northern Kazakhstan is one of its most important characteristics, - the information on which is being used as on the operational practice as well as when resolving scientifically applied tasks. The average duration of the snowpack stratification is 145 days and it is changing from north to south from 162 to 115 days. The minimal number of days with a snow at the reviewed territory is 77 days and the maximal is 187 days.

For duration of the snowpack stratification the trends of -1.2 day/10 years and -3.8 day/10 years were calculated which indicated the tendency of decreasing the duration of the snowpack stratification and that was quite visible in the period of time of 1971-2008. The duration of the stratification is decreasing due to a later formation and earlier destruction of the steady snowpack.

The calculated trends indicate to more serious tendency of much later terms of formation of the steady snowpack (0.20 – 0.28 days/year). At the researched territory the weak tendency in

deviation of the time for the snowpack slide to earlier dates (0.10-0.17 day/year) has been seen, but these trends are not statistically significant.

The coefficient of correlation between the date of the snowpack formation and the air temperature of October-November was 0.54, and between the date of the snowpack slide and the air temperature of March-April this coefficient of correlation was 0.55.

In the last decades during the conditions of regional climate warming the distinct tendency towards the decrease in duration in steady snowpack stratification was recorded due to later formation and earlier destruction of the steady snowpack.