SOME RESULTS OF LONG-TERM VARIABILITY OF AVALANCHE ACTIVITY OF CIS MOUNTAINS

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The problem of studying the long-term variations of hydrometeorological characteristics, e.g. precipitation, river flow, and avalanche activity, is of great scientific and practical importance. Druzhinin (1970) determined that sudden change in the sun's activity is the cause of the turning point of the long-term trend of numerous natural processes, including atmospheric circulation and relevant meteorological elements.The long-term variations in avalanching in former USSR attracted the attention of scientists such as Turmanina (1970), Oleinikov (1983), Kakurina (1987), Okolov (1986), and Sezin (1982).

This paper presents an analysis of the long-term variation of avalanche activity in the mountains of former USSR (CIS) by using the data from regular observations. Periods of activisation and reduction of avalanche formation with different synchronisation of separate groups of regions were determined. With the aim of synchronous analysis, the 30-year period of observation, from 1960 to 1990, was taken as the most representative (with the most comprehensive observational data). Fourty-three stations were selected from which 17 are in the European territory of CIS and the Caucasus, 13 in Kazakhstan and Central Asia, and 13 in Siberia and the Far East. In the study of the long-term variations of different elements, the running averages were used. To determine the general regularities of cyclic variations, three principal gradations were used namely the phases of increased, moderate and decreased avalanche activity. These phases were detected on differential integral curves by the principal turning points. The common territorial time curves of avalanche activity derived for 11 of the 13 mountains areas of CIS were analyzed. For the Tian Shan and Caucasus, the generel tendencies of long-term variation of avalanche formation were differentiated in more detail. For some regions, the

relationship is established between the avalanche formation and climatic factors (air temperature, winter precipitation).

The diagram (Fig.1) was constructed for a clearer idea of the spatial distribution of long-term variations in avalanche activity. Considerable similarity is observed in the change of phase of cyclic variation in avalanche activity, practically in all regions except Tian Shan and Zabaikalje. Up to the mid 70s, a phase of weak avalanche activity is observed everywhere, which was followed by an increase in the activity.

The sampled cycles of the long-term variations in avalanche activity for the Tian Shan and Pamirs were tested on independent observational data. The data of observations from different snow-avalanche stations were used for 1990 to 94. The decreasing tendency of avalanche activity in the Tian Shan subregions and the tendency to increase in the Pamirs was confirmed; besides, from 1990 to 92 a change of the increase in avalanche activity was recorded on the Pamirs, and in 1992 and after that the decrease in avalanche activity was recorded as it can be expected following the choozen phase of definite duration.

Despite the obtained practical effect, it is rather untimely to draw the conclusion · that every new cycle of avalanche activity variation is a repetition of the preceeding one. That is why the forecast of avalanche activity intensity on the basis of the derived tendencies needs to be studied further.

Nevertheless, the determined regularities are not only presented as a basis for independent testing but they also serve as the definite experimental corroboration of possible long-term variations in climate as an argument determining avalanche activity.

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* MGI - Data of Glaciological Studies

Figure1. Diagram of cyclic variations in avalanche activity in the mountain regions of the CIS

1 - low activity, 2 - high activity, 3 - moderate activity, 4 - data is absent.

The numbers of regions (Y-axis) correspond to 1. Khibins, 2. Carpathians, 3. Northern Caucasus, 4. Caucasus type 1, 5. Caucasus type 2, 6. Zailiyskiy Alatau, 7. Tian Shan 1 type, 8. Tian Shan type 2, 9. Tian Shan type 3, 10. Pamir, 11. Altai, 12. Kuznetskiy Alatau, 13. Baikal region, 14. Zabaikalje, 15. North East, and 16. Sakhalin