

The Mechanism of Formation of Cumulus Clouds and Methods of Influencing them Using (on the Example of the Kakheti Region)

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Since the middle of the last century, a tendency towards an increase in the intensity of various types of natural processes has been observed on Earth. Climate change is considered its main provoking factor.

Due to the complex physical-geographical and climatic conditions of the territory of Georgia, an aggravation of general circulation processes of the atmosphere, the formation of various types of natural hydrometeorological processes is often observed.

It has been established that the majority of natural phenomena on Earth belong to the category of hydrometeorological phenomena. Of the hydrometeorological processes, hail and its active impact are of particular note, which are very important from a practical point of view. In this regard, the Kakheti region stands out, where hail often damaged the region. The damage caused by hail amounted to tens of millions of GEL annually.

It is necessary to develop methods of impact on the cloud that produces hail. Therefore, radar research of cloud parameters is important. The management and operation of anti-hail systems is based on the methodology based on the “methods developed by the High-Mountain Geophysical Institute” and private research. The Military-Scientific Technical Center “Delta” has a fully automated missile system that has no analogues in the world. We receive meteorological information using a modern German-made high-tech meteorological radar (METEOR 735 CDP 10-Doppler WeatherRadar), which provides comprehensive and detailed information about cloud parameters.

The paper discusses and establishes a specific aerosynoptic situation that caused hail in the Kakheti region, namely the process of August 23-24, 2024. During the active impact, two foci with a total area of 39,700 ha were treated. As a result of such an impact, the greatest damage was avoided.

Observations are being made of cumulonimbus clouds, which are formed in the final stages of cumulonimbus cloud development. Rain falls from these clouds, and is quite heavy, torrential, which is why it is accompanied by thunderstorms and hail. These clouds often occupy all three layers. The upper part is rich in ice crystals, and the lower part is mixed. They are characterized by large and sharply pronounced ridges that resemble mountains and towers.

A significant part of the territory of Georgia is occupied by agricultural lands and recreational zones, their development significantly depends on atmospheric processes. In particular, on the frequency of extreme events (meteorological forecast of heavy rains, hail and thunderstorms, weather modification, climate change assessment, etc.).