

HAIL STORMS IN GEORGIA IN 2016-2018

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Summary: *The analysis of the data of the Georgian Environment Agency on the incidents of hail in Georgia and damage from them in 2016-2018 is presented. The greatest number of days with hail for the indicated three years was recorded in Kakheti (32 days with hail, 90 locations subjected to hail), the smallest – in Samegrelo-Zemo Svaneti (one day with hail, 1 subjected to hail locations). A map of hail cases has been built.*

Key Words: *Hail storm, dangerous meteorological phenomena, geoinformation map*

Introduction

Among natural disasters, hail is a dangerous event for Georgia. It causes significant material damage, damages the roofs and walls of buildings, crops, orchards, vineyards and leads to the death of pets. Research on hail processes in Georgia has been the subject of many works, including over the past 15 years [1-12]. Therefore, the city has attracted the attention of local residents, historians and travelers from ancient times. In July 1877, the Iveria newspaper reported that on July 4, in fine weather, it got dark in the afternoon, a heavy thunderstorm, heavy rain fell, and then hail, the grain of which was the size of an egg of a dove, followed. Crops and vineyards were completely destroyed in Gurjaani, Vejni, Bakurtsikhe and nearby villages. On June 6, 1972, hail was noted in the regions of Lagodekhi, Gurjaani, Telavi and Dusheti, resulting in damage to hundreds of hectares of crops. On July 19, 2012, a midnight natural disaster struck the eastern part of Georgia, Telavi and neighboring villages in the Telavi and Gurjaani districts. A whirlwind storm was accompanied by a strong hail. Buildings were damaged, crops were completely destroyed, and at dawn not a single leaf was on the plants. The loss exceeded \$ 100 million [1].

This paper studies the occurrences of hailstorms in the territory of Georgia in 2016-2018 and analyzes the damage caused during this period. For the work were used materials National Environmental Agency observational data and literature on hail.

Results

Based on the materials available to us, on the hail and the damage it caused, which covers 2016–2018, a table was compiled (Table), which shows data on the damage caused by hail for the regions of Georgia. It also indicates the number of hail days, duration, damage, process and affected municipalities.

Analysis of Table 1. shows that hail processes in 2016-2018 were significantly more active in eastern Georgia than in western Georgia, especially in the Kakheti region (32 days) and Samtskhe-Javakheti region (16 days), where hail was observed in all municipalities these regions. It was also shown that hail is more common and more destructive during Western processes.

This trend of the hail is not new and was mentioned in a number of literary sources and scientific articles, including in our studies [2-6]. It should also be noted that the damage caused by hail in the east of Georgia over the past three years has reached tens of millions of GEL, which is a huge loss for the Georgian economy.

Table 1

Hail Damage in the Regions of Georgia (2016-2018)

Regions	Number of days	Damage	Duration	Process	Municipalities
Adjara	2	Hail damaged citrus and plants			Batumi Khelvachauri Khulo
Guria	1	Traffic was hampered by the hail	15 min.		Ozurgeti
Samegrelo-zemo Svaneti	1	The hail destroyed the crops			Tsalenjikha
Tbilisi	3	Cars damaged			Tbilisi
Kakheti	32	Agricultural fields have been destroyed, poultry have been killed, vineyards and orchards damaged. The diameter of the hail was in some cases 18 mm.	10-30 min.	Western process, Eastern process, Intramass process	All municipalities
Mtskheta-Mtianeti	2	Plants and vineyards were damaged. Vegetable crops, fruit trees were damaged.		Intramass process, Western process	Mtskheta, Dusheti
Samtskhe-Javakheti	16	Hail destroyed crops, damaged orchards and agricultural lands, hail diameter in Bakuriani was 18 m. The disaster damaged much of the national park in the Borjomi municipality, broke trees, broke lights.	10-20 min.	Western process	All municipalities
Kvemo Kartli	7	Agricultural crops were damaged. In Tsalka municipality the diameter of the hail was 24 mm.		Intramass process	Rustavi, Bolnisi, Dmanis, Tsalka
Shida Kartli	10	The disaster has destroyed much of the fruit trees, vineyards and crops in Shida Kartli. Yards and roads were flooded in the city of Gori and traffic has slowed.	20 min.	Western process, Eastern process, Intramass process	Gori, Kaspi, Kareli

According to Table and based on statistical data for 2016-2018, we have prepared a geoinformation map of the hail on the territory of Georgia. (Fig.).

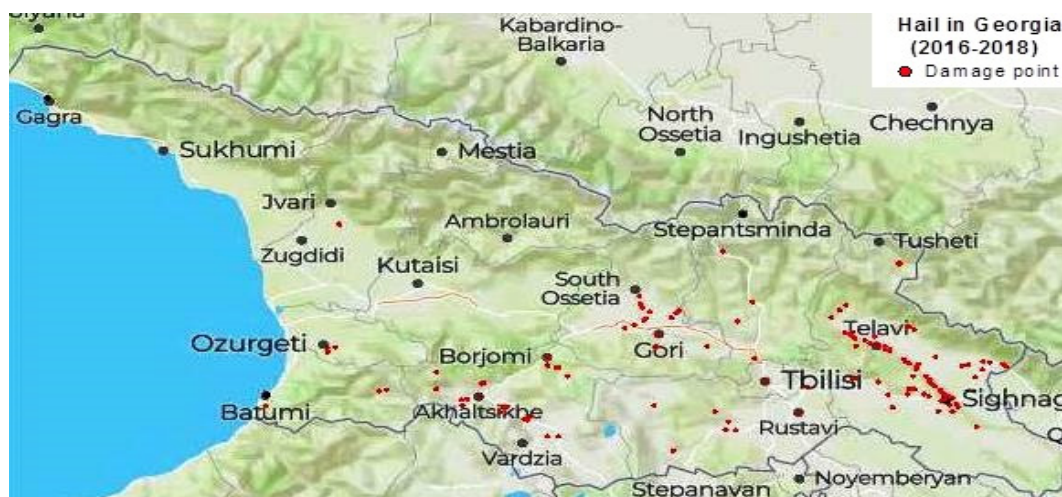


Fig. Hail According to 2016-2018 Data in Georgia

Fig. also shows that the hail especially damages the Kakheti region and also causes great damage to the regions of Samtskhe-Javakheti and Shida Kartli. The smallest hail is observed in the Samegrelo-Zemo Svaneti region.

Over the past three years, the number of hail days in Kakheti was 32, which was recorded in 90 locations in the region, this is the highest indicator hail in Georgia. The lowest indicator hail is in the Samegrelo-Zemo Svaneti region, where the number of hail days is 1 in 1 location.

Conclusion

Over the past three years, hail has been a frequent occurrence in Georgia. The hail in eastern Georgia is characterized by a duration (30 min) and the largest hail grain (24 mm), which is mainly due to western processes.

References

1. Elizbarashvili E., Amiranashvili A., Varazanashvili O., Tsereteli N., Elizbarashvili M., Elizbarashvili Sh., Pipia M., Hailstorms in the Territory of Georgia//European Geographical Studies, Vol. 2, No. 2, 2014.
2. Amiranashvili A., Varazanashvili O., Pipia M., Tsereteli N., Elizbarashvili M., Elizbarashvili E. Some Data About Hail Damages in Eastern Georgia and Economic Losses From Them. // Reports, presented on the Scientific Conference “80 Years of the M. Nodia Institute of Geophysics”, 2014, Tbilisi, pp. 145-150. (in Russian).
3. Amiranashvili A.G., Bliadze T.G., Jamrlishvili N.K., Khurodze T.V., Pipia M.G., Tavidashvili Kh. Z. Comparative Analysis of the Distribution of Number of Days with Hail Per Annum on the Territory of Kakheti According to the Data of the Meteorological Stations and State Insurance Service of Georgia. // Journal of the Georgian Geophysical Society, Issue A. Physics of Solid Earth, v.20A, 2017, Tbilisi, pp.44 -56.
4. Pipia M. Prospects for the development of anti-hail works in Kakheti region (Georgia) taking into account some climatic indices//Transactions of Mikheil Nodia Institute of Geophysics, vol. LXVI, 2016, Tbilisi, pp. 96-107. (in Georgia).
5. Pipia M. G., Beglarashvili N. G. Hail Hits in Eastern Georgia. //Journal of International Scientific Publications: Ecology and Safety, Volume 8,2014, Burgas, pp. 567-573.
6. Varazanashvili O., Tsereteli N., Amiranashvili A., Tsereteli E., Elizbarashvili E., Dolidze J., Qaldani L., Saluqvadze M., Adamia Sh., Arevadze N., Gventcadze A. Vulnerability, Hazards and Multiple Risk Assessment for Georgia. // Natural Hazards, Vol. 64, Number 3 (2012), 2021-2056, DOI: 10.1007/s11069-012-0374-3, <http://www.springerlink.com/content/9311p18582143662/fulltext.pdf>.
7. Amiranashvili A., Varazanashvili O., Nodia A., Tsereteli N., Khurodze T. Statistical Characteristics of the Number of Days with Hail Per Annum in Georgia. // Trans. of the Institute of Hydrometeorology, ISSN 1512-0902, vol. 115, Tb., 2008, pp. 427 – 433, (in Russian).
8. Amiranashvili A. Influence of the Anthropogenic Pollution of Atmosphere on the Changeability of Hail Processes Intensity. // Trans. of Mikheil Nodia Institute of Geophysics, ISSN 1512-1135, vol. 64, Tb., 2013, pp. 160 – 177, (in Russian).
9. Amiranashvili A., Dzodzuashvili U., Lomtadze J., Sauri I., Chikhladze V. Some Characteristics of Hail Processes in Kakheti. // Trans. of Mikheil Nodia Institute of Geophysics, ISSN 1512-1135, vol. 65, Tb., 2015, pp. 77 – 100, (in Russian).
10. Amiranashvili A.G., Nodia A.G., Toronjadze A.F., Khurodze T.V. The Changeability of the Number of Days with the Hail in Georgia in 1941-1990. // Trans. of Institute of Geophysics of Acad. of Sc. of Georgia, ISSN 1512-1135, v. 58, 2004, pp. 127-132, (in Russian).
11. Amiranashvili A.G., Nodia A.G., Toronjadze A.F., Khurodze T.V. Some Statistical Characteristics of the Number of Days with Hail into the Warm Half-Year in Georgia in 1974-1990. // Trans. of Institute of Geophysics of Acad. of Sc. of Georgia, ISSN 1512-1135, v. 58, 2004, pp. 133-141, (in Russian).
12. Amiranashvili A.G., Amiranashvili V.A., Nodia A.G., Khurodze T.V., Toronjadze A.F., Bibilashvili T.N. Spatial-Temporary Characteristics of Number of Days with a Hails in the Warm Period of Year in Georgia. // Proc. 14th International Conference on Clouds and Precipitation, Bologna, Italy, 18-July 2004, pp. 2_2_215. 1-2_2_215.2.