Conclusion

All clouds, which are located above the territory of Kakheti, were subjected to action by anti-hail rockets. The analysis of the dynamics of development and decay of the subjected and not subjected to action hail clouds (territory of Kakheti, Armenia and Azerbaijan, respectively) will be represented in the subsequent works.

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STORM WIND IN TBILISI AND RUSTAVI CITIES ON 21 SEPTEMBER 2019. ANALYSIS OF DATA OF RADAR, AEROLOGICAL AND GROUND-BASED MEASUREMENTS

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Summary: Results of analysis of the data of radar, aerological and ground-based measurements of the storm wind in Tbilisi and Rustavi cities, which was observed on September 21, 2019, are represented. In particular, it is obtained that the data of radar observation about wind speed at the level 2.0 km above Tbilisi are in the satisfactory agreement with the data of ground-based measurements. Data of radiosonde for the same height show the substantially decreased values of wind speed.

Key words: Dangerous meteorological processes, wind, radar monitoring.

Introduction

In recent years in a number of works were represented the results of radar studies of some atmospheric phenomena in Eastern Georgia and its neighboring countries (Azerbaijan, Armenia): hail processes [1-5], rainfall [6-8], dust formation migration [9, 10], etc. [11]. This work is the continuation of the indicated series of the experiments. Some results of analysis of the data of radar, aerological and ground-based measurements of the storm wind in Tbilisi and Rustavi cities, which was observed on September 21, 2019, are represented below.

Study area, data description

The Anti-hail service is equipped with contemporary C-band, dual polarized Doppler meteorological radar "METEOR 735 CDP 10 - Doppler Weather Radar", which is installed in the village Chotori (1090 m height from sea level) of the Signagi municipality of the Kakheti region of Georgia [12]. In this work two radar products are presented, HWIND(V) and MAX(V) [13, 14].

For determination the wind regime in the free atmosphere above the investigating territory the resources of http://ready.arl.noaa.gov/READYcmet.php were used. For determining the wind regime on the earth's surface in Tbilisi city and Tbilisi airport resources of rp5.ru and http://www.pogodaiklimat.ru/archive.php?id=ru&region=07 were used.

Study area: Tbilisi and Rustavi cities. Date and time of the study: September 21, 2019 (01 hour 00 min) to September 23, 2019 (01 hour 00 min). Below - 17:30 [hour: min].

Results and discussion

Results in the fig. 1-5 are presented.

In fig. 1 data about mean and max values of wind speed in Tbilisi airport and Tbilisi city from 21.09.2019_01:00 to 23.09.2019_01:00 are presented.

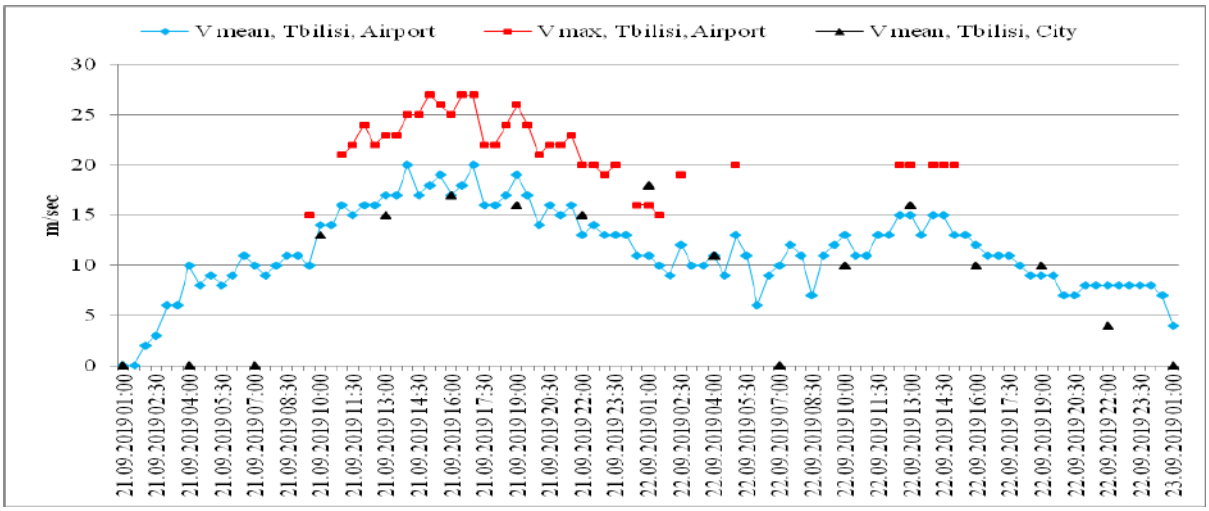

Fig.1. Mean and max values of wind speed in Tbilisi airport and Tbilisi city from 21.09.2019_01:00 to 23.09.2019_01:00.

As follows from this figure the greatest values of the mean and max wind speeds on 21 September from 14:00 to 19:30 were observed. Thus, mean wind speed in the airport changed from 16 to 20 m/sec, max - from 22 to 27 m/sec (according to the data of the measurements of every 30 minutes). In Tbilisi city mean wind speed changed in the limits of 16-17 m/sec (according to three-hour data).

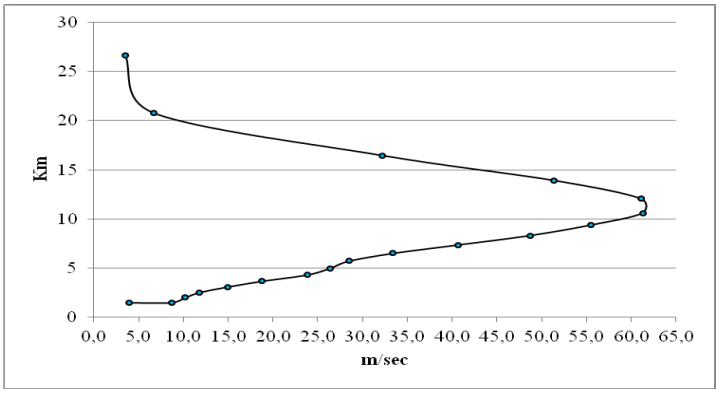

Fig.2. Vertical distribution of wind speed in free atmosphere over Tbilisi on 21.09.2019 in 19:00.

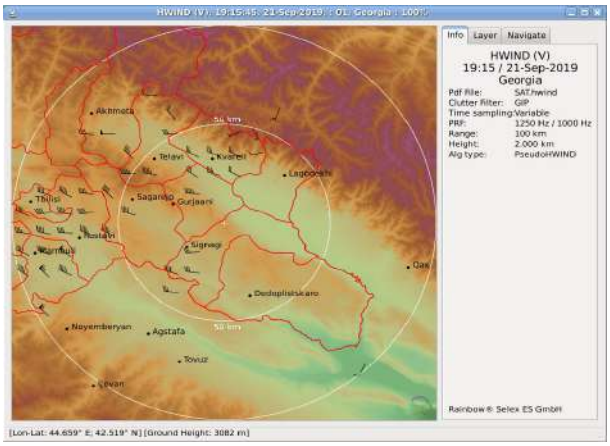

Fig.3. Radar picture of the wind speed at the level 2.0 km above Eastern Georgia [Radar product HWIND(V)].

As follows from fig. 3, wind speed above Tbilisi at the level 2.0 km - to 21 m/sec. Average wind speed on the earth's surface - 16-19 m/sec, maximum - to 26 m/sec (fig. 1). According to the data of radiosonde (fig. 2) at this height wind speed is equal to 10 m/sec.

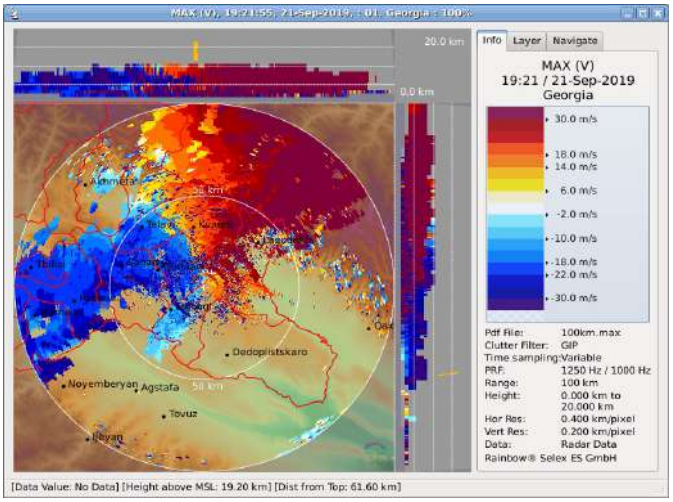

Fig.4. Radar picture of vertical distribution of wind speed in the layer 2.0-10.0 km above Eastern Georgia [Radar product MAX(V)].

In the layer of the atmosphere from 2.0 to 10 km average wind speed according to radar surveillance is 18-26 m/sec (fig. 4). According to the data of aerological radio sounding in the same layer of the atmosphere average wind speed is approximately 27 m/sec (fig. 2).

Fig.5. Results of storm wind in Tbilisi on 21 September 2019.
[https://ria-m.tv/news/165803/v_tbilisi_uragan_sorval_kryishi_s_desyatkov_domov.html]

Storm wind came in flocks trees, tore away roofs from the houses, damaged electric power line in Tbilisi and in Rustavi city. The public television of Georgia reported that two people suffered. In Rustavi city the wind tore away roofs from 15 houses, the pulled out with the root long-standing trees damaged electric power line, automobiles, while in several places they overlapped the motion of transport. Photos about some negative results of storm wind in Tbilisi in fig. 5 are presented.

Conclusion

The data of radar observation about wind speed at the level 2.0 km above Tbilisi are in the satisfactory agreement with the data of ground-based measurements. Data of radiosonde for the same height show the substantially decreased values of wind speed. Subsequently we are intended to continue the given above studies for the purpose of the development of the representativeness of radar data for evaluating the storm wind on the earth's surface.

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