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SOME EXAMPLES OF THE CLOUDINESS MONITORING WITH MODERN METEOROLOGICAL RADAR “WRM200” IN WESTERN GEORGIA

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Summary: *Some examples of the cloudiness monitoring with modern meteorological radar “WRM200” in Western Georgia are presented. In particular, the radar data for September 2-3, 2021, when intense precipitation and tornado were observed on the Black Sea coast of Georgia (the city Kobuleti) are given.*

Key Words: *meteorological radar, radar observation, cloudiness.*

Introduction

As is known, since 2015, the anti-hail service working has been resumed in Eastern Georgia (Kakheti). This service is equipped with a modern radar station "Meteor 735CDP 10" [1]. In recent years, a number of works have presented the results of studies of some atmospheric phenomena in Eastern Georgia and neighboring countries (Azerbaijan, Armenia) using this radar: hail processes [2-5], precipitation [6-8], dust migration [9] and others [10].

Since 2021 in Kutaisi (Western Georgia) to monitor atmospheric processes in this region, National Environmental Agency of Georgia installed a modern radar “WRM200” [11].

Some examples of the cloudiness monitoring with this radar in Western Georgia are presented below.

Study area, data description

Study area: Western Georgia. Data on radar reflectivity (dBz) of clouds of radar “WRM200” installed in Kutaisi are used (product – Live Max). A description of the technical characteristics of this radar is presented in [11,12]. Data from an VAISALA automatic weather station for September 2-3, 2021 installed in Kobuleti were also used.

Results and discussion

Results in fig. 1-5 are presented.

On September 1, 2021, the National Environmental Agency of Georgia issued a warning about deteriorating weather in Western Georgia. In particular, it said that heavy rainfall with a thunderstorm, as well as a strong westerly wind, were expected on September 2-3. According to the synoptic description, the weather in Western Georgia was caused by the interaction of masses of cold and humid air coming from the north-west of the Black Sea and masses of warm air acting from the south. Further, based on the data received from the "WRM200" meteorological radar, a short-term warning was issued about the deterioration of the weather in this region of Georgia.

These data are clearly visible in the images taken from the radar screen (fig. 1, 2). Areas of heavy precipitation are clearly visible, the reflectivity of clouds is about 40-45 dBz, which is also clearly visible on the vertical sections of the clouds. Simultaneously with the noted intensity of the development of processes, the height of the clouds also grows. So, for example, on September 2, the height of the clouds was about 8 km (fig. 1), and on September 3, it exceeded 9 km (fig. 2).

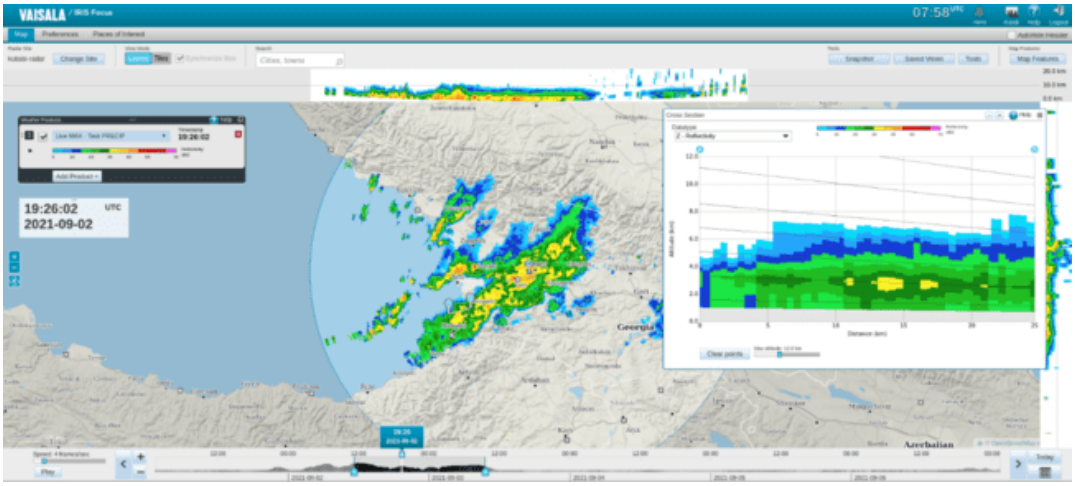

Fig. 1. The picture of radar reflectivity of clouds on September 02, 2021 in 19:26:02 UTC.

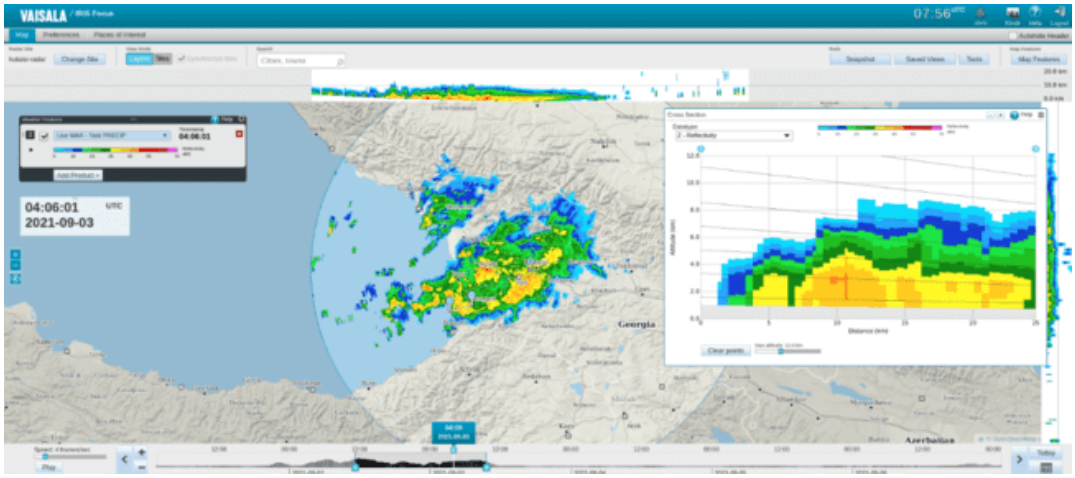

Fig. 2. The picture of radar reflectivity of clouds on September 03, 2021 in 04:06:01 UTC.

The active process in Kobuleti began on the night of September 2. The automatic weather station VAISALA recorded the following data on the amount of precipitation over the past time: on September 2, 46 mm of precipitation fell at night, rain was also noted on September 3. During the day, 76 mm of precipitation fell, and at night - 25 mm, for a total of 101 mm. In the afternoon of September 4, 175 mm of precipitation fell, after which a significant decrease in their intensity began. The maximum wind speed for the specified period is 16 m/s.

The aforementioned heavy rainfall caused the paralysis of the central streets of Kobuleti, which was also facilitated by the flood on the Avchala River. The disaster also caused flooding of residential buildings and courtyards. It is noteworthy that along with the heavy rainfall, there was also a tornado, which originated over the sea and came ashore. As a result, several roofs were ripped from houses and several trees were uprooted. The village of Chakva was also badly damaged.

In fig. 3-5 show three other examples of cloudiness distribution over the territory of Western Georgia.

In particular, as follows from these figures, the radar reflectivity of clouds on September 11, 2021 reached up to 45-50 dBz, maximum cloud height - above 10 km (fig. 3), on September 22 - up to 50-55 dBz, maximum cloud height - above 10 km (fig. 4), and on November 10 - up to 40-45 dBz, maximum cloud height – up to 8 km (fig 5). In all cases, cloud cover spread significant areas over the territory of Western Georgia.

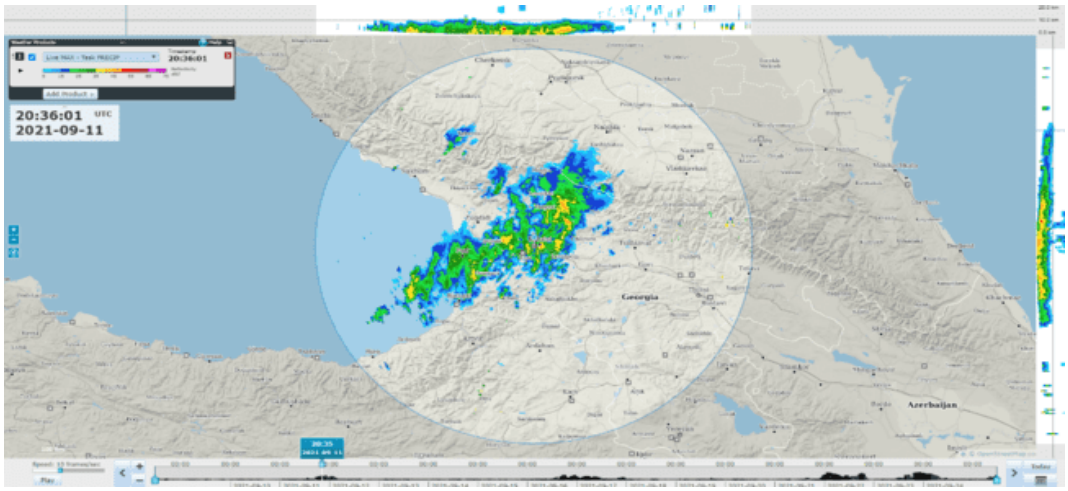

Fig. 3. The picture of radar reflectivity of clouds on September 11, 2021 in 20:36:01 UTC.

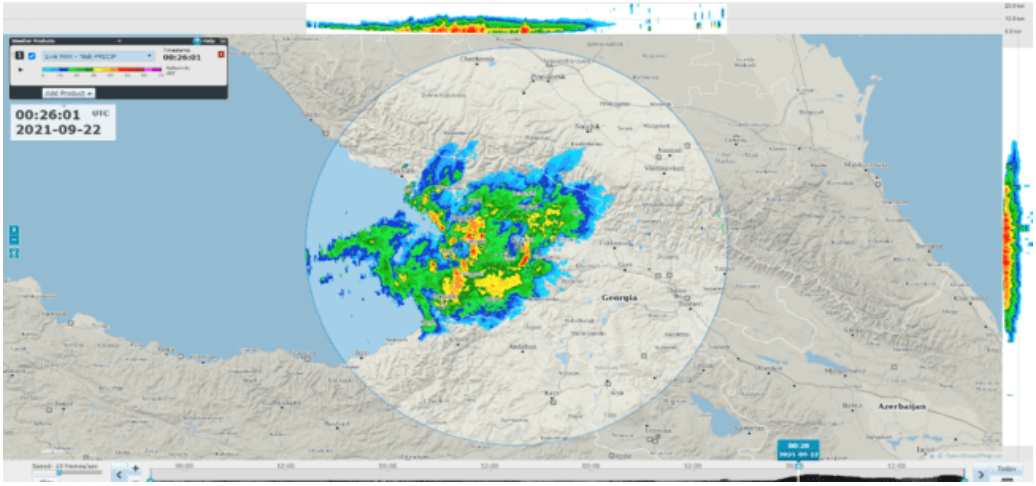

Fig. 4. The picture of radar reflectivity of clouds on September 22, 2021 in 00:26:01 UTC.

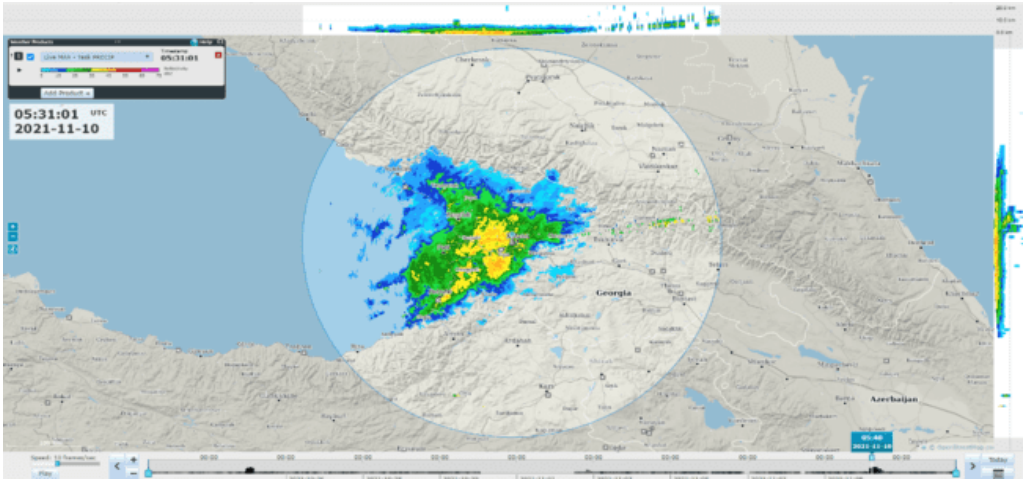

Fig. 5. The picture of radar reflectivity of clouds on November 10, 2021 in 05:31:01 UTC.

Conclusion

This is the first work on the preliminary scientific analysis of data from the meteorological radar "WRM200". In the future, we will continue similar studies, in particular, in the aspect of studying of hydrometeorological disasters in Western Georgia.

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