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CHANGEABILITY OF THE ATMOSPHERIC PRECIPITATIONS REGIME IN KAKHETI IN 1956-2015

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Summary: *The results of statistical analysis of data on monthly precipitation for five points of Kakheti – Telavi, Sagarejo, Kvareli, Gurjaani, Dedoplistskaro and Lagodekhi are presented. The study period from 1956 to 2015. In particular, it was found that during the indicated period of time in various months of the year in Kakheti at different points the variability of precipitation is quite heterogeneous. So, in 1986-2015, compared with 1956-1985, the regime of precipitation in Kvareli did not change; in Telavi, in the second period of time compared to the first, the monthly precipitation decreased in June and July, and increased in October; in Sagarejo – a decrease in precipitation from June to August and an increase in October; in Gurjaani and Dedoplstskaro – a decrease in rainfall in June; in Lagodekhi an increase in October and November. The results of the study may be useful for planning works on artificial precipitation.*

Key Words: *Regional climate change, atmospheric precipitations*

Introduction. In Georgia, as in other countries, to studies of atmospheric precipitations was always given important attention. So, study of the precipitation climatology, their statistical structure and distribution on the territory of Georgia were carried out in the works [1-4]. Analyses of statistical structure of spring-summer precipitation for 18 locations of Eastern Georgia was carried out in [5]. A study of lasting variations and expected changeability of atmospheric precipitations in the future, in particular, they are carried out in the works [6-9]. Information about influence of heavy rains on flash flood hazard in Georgia in [10, 11] are presented.

In this work, which presents the continuation of the foregoing studies, some results of the changeability of monthly sum of atmospheric precipitation in five location of Kakheti in 1956-2015 6 are represented.

Study area, material and methods. Study area is Kakheti region of Georgia. Data of the Hydrometeorological department of Georgia about monthly sum of precipitation in five locations of Kakheti (Telavi, Sagarejo, Kvareli, Gurjaani, Dedoplistskaro and Lagodekhi) in 1956-2015 are used.

The standard statistical methods are used. The following designations will be used below: Mean – average value of precipitations for 1956-2015; I – average value for 1956-1985 (first period of time); II – average value for 1986-2015 (second period of time); R^2 – coefficient of determination; α– the two-sided level of significance. Missing observational data using standard methods were recovered. Comparison of mean values of precipitations in two periods of time was produced with the use of Student's criterion with the level of significance not worse than 0.15

Results and discussion. Results in Fig. 1-4 and Table clearly are presented.

In Fig. 1-4 the graphs of linear trends of monthly sum of atmospheric precipitation in Telavi, Sagarejo, Dedoplistskaro and Lagodekhi in 1956-2015 are presented. In Kvareli the trend of precipitations is absent.

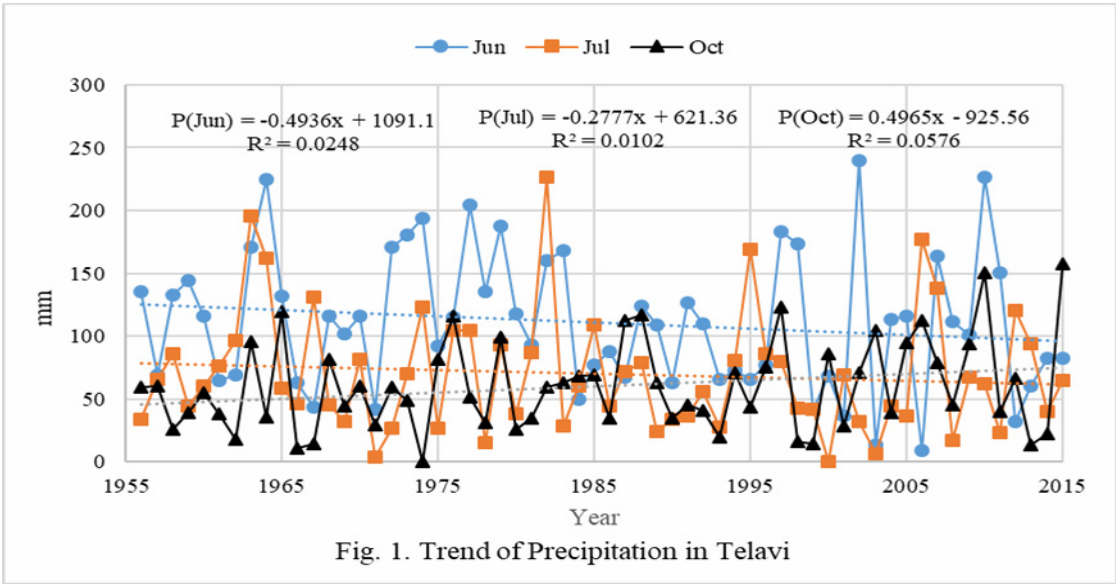

Fig. 1. Trend of Precipitation in Telavi

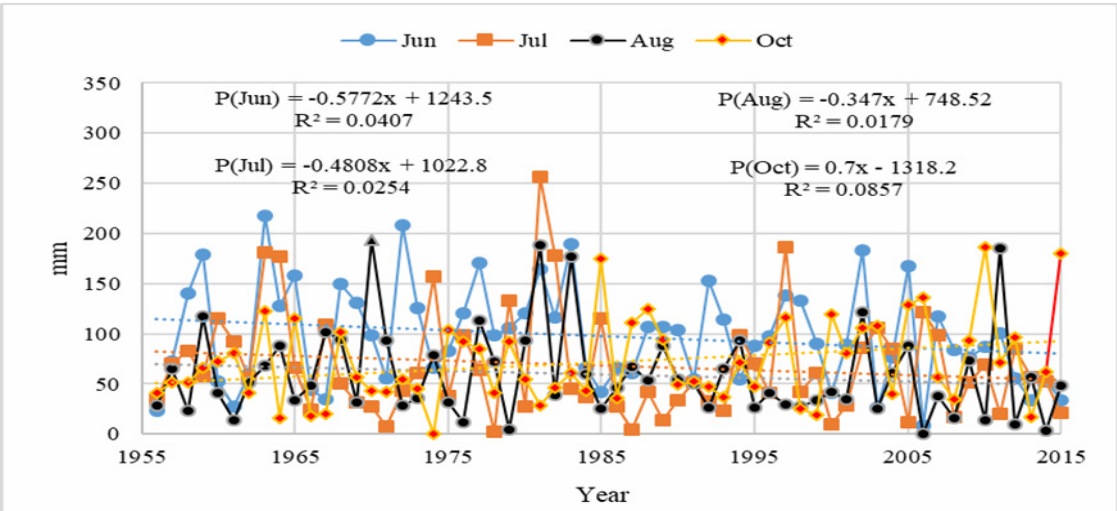

Fig. 2. Trend of Precipitation in Sagarejo

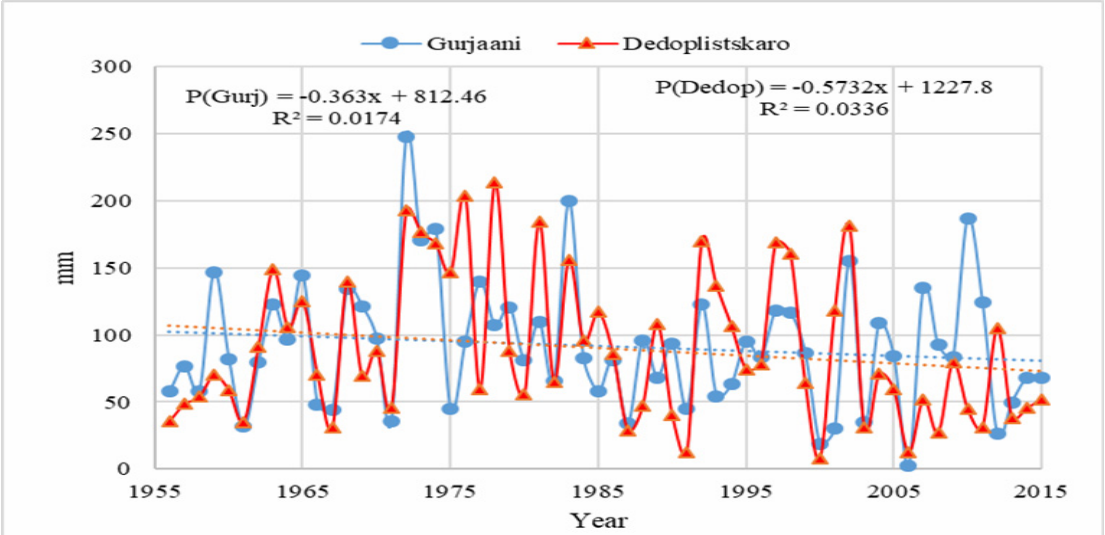

Fig. 3. Trend of Precipitation in Gurjaani and Dedoplistskaro in June

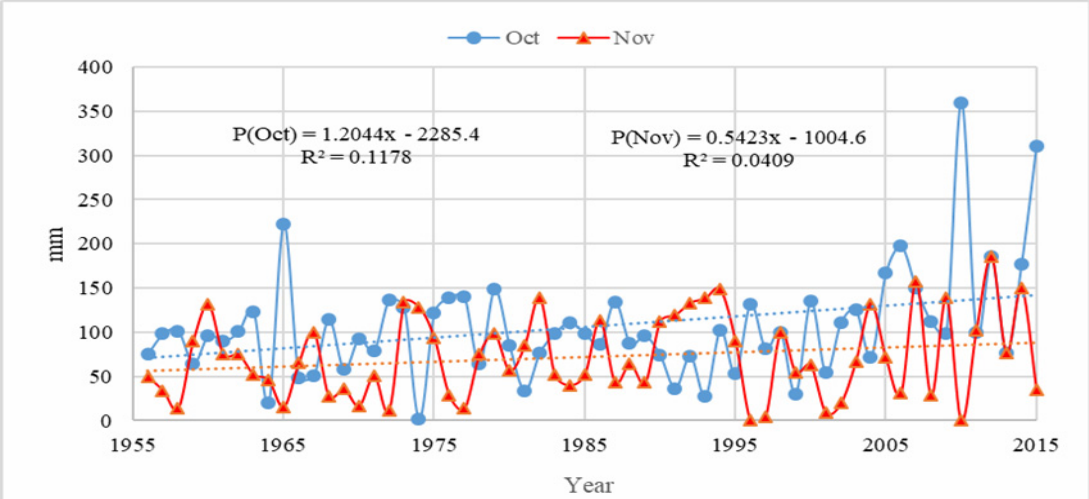

Fig. 4. Trend of Precipitation in Lagodekhi

In Table the difference between monthly sum of atmospheric precipitation in 1986-2015 and 1956-1985 for five locations of Kakheti is presented.

Table

Difference between Monthly Sum of Atmospheric Precipitation
in 1986-2015 and 1956-1985 for Five Locations of Kakheti (mm)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Loc.	**Telavi**											
Mean	27.1	34.9	50.4	83.3	116.3	111.0	69.9	71.3	66.9	60.2	43.6	29.7
(II-I)	0.6	-0.5	-0.3	9.1	9.8	-23.8	-15.6	-4.0	-1.6	14.0	6.8	2.4
α	No	No	No	No	No	0.10	0.2	No	No	0.15	No	No
Loc.	**Sagarejo**											
Mean	29.4	38.9	58.9	92.1	106.5	97.6	68.1	59.6	65.6	71.7	45.8	29.5
(II-I)	-5.7	-5.9	-9.1	3.0	-6.9	-21.6	-26.3	-18.0	-9.1	19.3	4.6	2.4
α	No	No	No	No	No	0.10	0.05	0.15	No	0.05	No	No
Loc.	**Kvareli**											
Mean	37.9	49.1	73.0	102.4	129.9	118.8	87.8	91.4	97.9	85.1	57.4	40.1
(II-I)	3.0	-1.7	-6.8	-3.6	15.8	-14.4	-17.6	5.6	-16.3	15.5	6.2	3.6
α	No	No	No	No	No	No	No	No	No	No	No	No
Loc.	**Gurjaani**											
Mean	31.0	40.7	61.7	88.4	114.4	91.7	73.0	67.9	71.0	71.0	47.6	30.7
(II-I)	4.4	0.0	-5.5	8.4	15.9	-21.8	-13.8	-11.0	-0.1	8.4	5.6	2.5
α	No	No	No	No	No	0.07	No	No	No	No	No	No
Loc.	**Dedoplistskaro**											
Mean	27.4	30.6	44.6	65.4	89.8	89.7	51.8	42.0	50.7	53.3	33.7	23.3
(II-I)	10.0	2.8	-1.6	4.3	7.8	-30.1	-4.3	-6.0	9.0	6.3	6.8	-0.6
α	No	No	No	No	No	0.05	No	No	No	No	No	No
Loc.	**Lagodekhi**											
Mean	42.6	53.4	81.9	110.6	132.6	121.9	103.0	100.1	111.7	106.0	72.1	42.5
(II-I)	7.9	10.2	8.7	18.4	11.7	-1.3	12.2	26.3	11.6	24.2	18.1	9.6
α	No	No	No	No	No	No	No	No	No	0.07	0.07	No

As follows from these Fig. and Table in 1986-2015, compared with 1956-1985, the regime of precipitation in Kvareli did not change (no trend); in Telavi, in the second period of time compared to the first, the monthly precipitation decreased in June and July (negative trends), and increased in October

(positive trend); in Sagarejo – a decrease in precipitation from June to August (negative trends) and an increase in October (positive trend); in Gurjaani and Dedoplstskaro – a decrease in rainfall in June (negative trends); in Lagodekhi an increase in October and November (positive trends).

Conclusion. In Kakheti in the summer months is noted the tendency of the decrease of precipitations that negative influences to the state of agricultural crops. In our view it is expedient to examine a question of an artificial increase of precipitations by active actions on the clouds with using anti-hail service potential [12].

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