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STATISTICAL ANALYSIS OF THE WEEKLY FIRE ALERTS COUNT IN GEORGIA AND ITS REGIONS IN 2012-2023

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Abstract: *Results of a statistical analysis of the weekly fire alerts count (FAC) in Georgia and its regions for 2012-2023 are presented. In particular, the following results were obtained. The highest average annual FAC value is recorded in Kakheti (858), the lowest – in Tbilisi (14). In Georgia as a whole, the average annual FAC value is 2739. The intra-annual distribution of weekly FAC values for Georgia and its regions was studied. The degree of linear correlation relationships between regions of Georgia on the weekly fire alerts count has been determined.*

Key Words: *Fire, fire alert.*

Introduction

The problem of fires, especially against the background of climate change, is relevant for many countries of the world, including Georgia [1, 2]. In Georgia, work on determining the Angstrom fire index was carried out for the cities of Tbilisi, Kutaisi and Telavi [3-6]. In work [7], a comparative analysis of the Angstrom fire index was carried out for Telavi and Nalchik, and in work [8] – for Tbilisi and Kislovodsk. In work [9], the results of a statistical analysis of daily and monthly values of the total number of fire alarms in Georgia for 2012-2020 are presented.

This study is a continuation of previous works. Results of a statistical analysis of the weekly fire alerts count in Georgia and its regions for 2012-2023 are presented below.

Study area, material and methods

Study area is Georgia and its regions. The following abbreviations are used below: Abkhazeti (Abkh); Adjara (Adj); Guria (Gur); Imereti (Im); Kakheti (Kakh); Kvemo Kartli (KK); Mtskheta-Mtianeti (M-M); Racha-Lechkhumi and Kvemo Svaneti (R-L KS); Samegrelo-Zemo Svaneti (S-ZS); Samtskhe-Javakheti (S-J); Shida Kartli (Sh K); Tbilisi (Tb); Georgia (Geo).

Data of the about the weekly fire alerts count (FAC) in period 2012-2023 are used [https://www.global-forestwatch.org/dashboards/country/GEO]. W1…W53 – numbers of week.

The standard statistical methods are used. The following designations will be used below: Min – minimal values; Max – maximal values; St Dev – standard deviation; St Err – standard error; R – coefficient of linear correlation; α – level of significance

The degree of correlation was determined in accordance with [10]: very high correlation ($0.9 \leq R \leq 1.0$); high correlation ($0.7 \leq R < 0.9$); moderate correlation ($0.5 \leq R < 0.7$); low correlation ($0.3 \leq R< 0.5$); negligible correlation ($0 \leq R < 0.3$).

Results and discussion

Results in Fig. 1-3 and Table 1-2 are presented.

In Fig.1-3 data on intra-annual variation of the weekly fire alerts count in Georgia and its regions in 2012-2023 are presented.

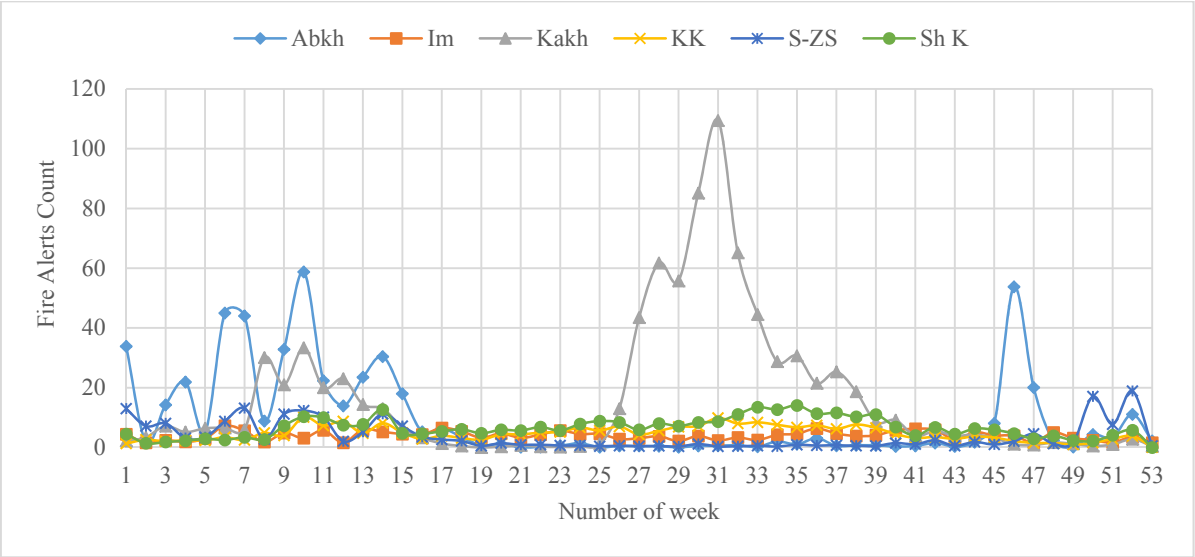

Fig. 1. Intra-annual variation of the weekly fire alerts count in 6 region of Georgia (Abkh, Im, Kakh, S-ZS, Sh K) in 2012-2023.

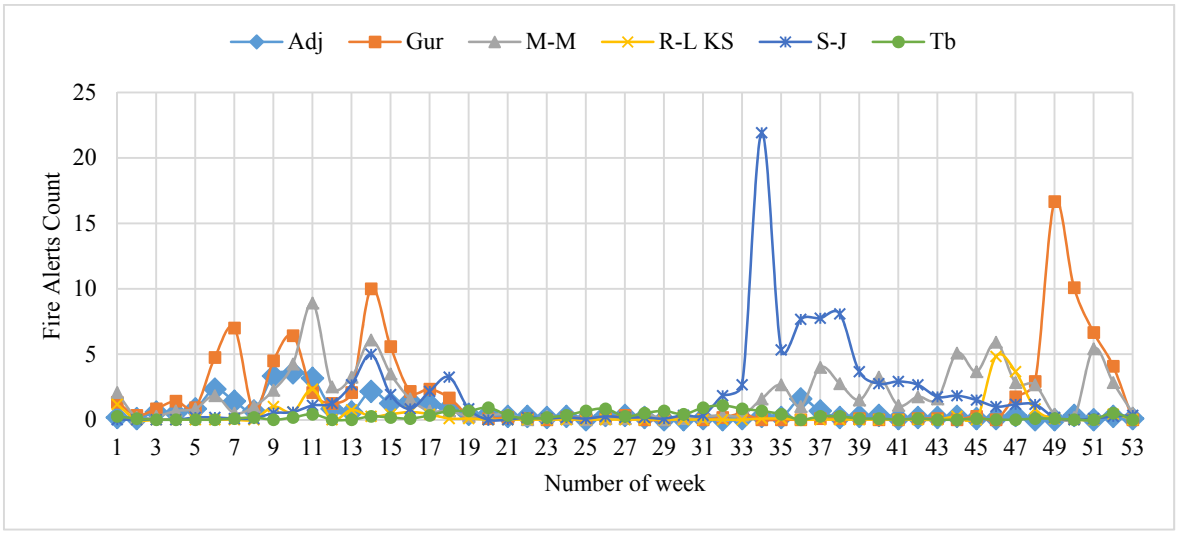

Fig. 2. Intra-annual variation of the weekly fire alerts count in 6 region of Georgia (Adj, Gur, M-M, R-L KS, S-J, Tb).

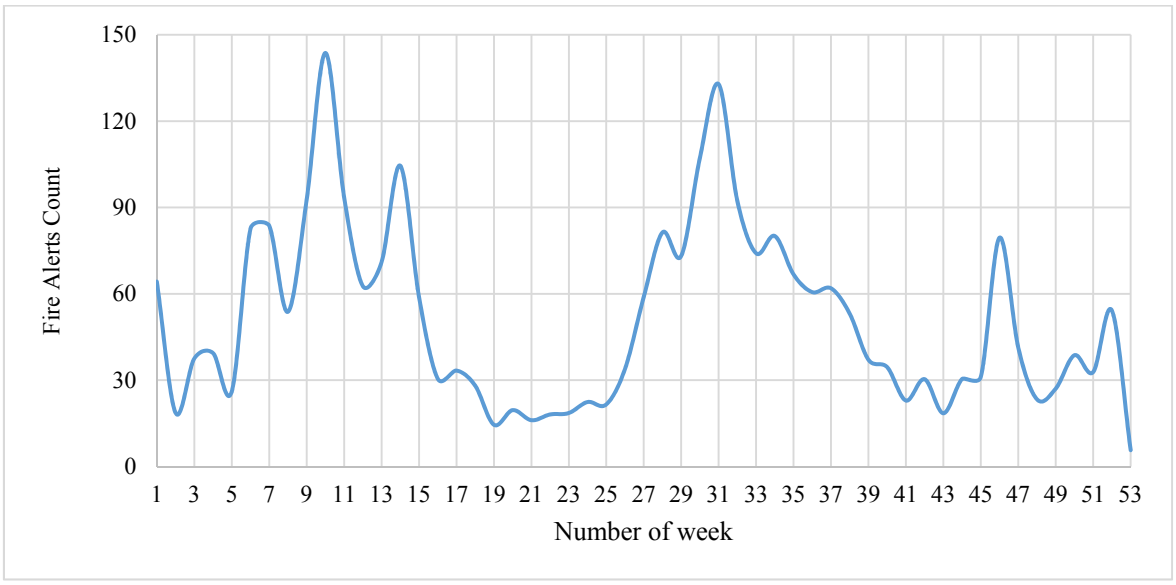

Fig. 3. Intra-annual variation of the weekly fire alerts count in Georgia.

As follows from these Figures, the peaks of the values of FAC in different regions of Georgia occur to the following weeks. Fig. 1: Abkh – 58.8 and 53.8 (W10 and W46), Im – 7.3 (W6), Kakh -109.4 (W31), KK – 10.2 and 9.9 (W10 and W31), S-ZS – 18.9 (W52), Sh K – 14.1 (W35); Fig. 2: Adj – 3.6 (W10), Gur – 16.7 (W49), M-M – 8.9 (W11), R-L KS – 4.8 (W46), S-J – 21.9 (W34), Tb – 1.1 (W32); Fig. 3: Geo – 143.7 and 132.8 (W10 and W31).

In Table 1 statistical characteristics of the weekly fire alerts count in Georgia and its regions are presented. In Table data about coefficients of linear correlarion between regions of Georgia on the weekly fire alerts count are presented.

Table 1. Statistical characteristics of the weekly fire alerts count in Georgia and its regions.

Variable	FAC in year	Min	Max	Average	St Dev	St Err
Abkh	516	0.1	58.8	9.7	14.9	2.1
Adj	33	0.0	3.6	0.6	0.9	0.1
Gur	100	0.0	16.7	1.9	3.3	0.5
Im	210	1.6	7.3	4.0	1.5	0.2
Kakh	858	0.0	109.4	16.2	23.2	3.2
KK	249	0.1	10.2	4.7	2.4	0.3
M-M	95	0.0	8.9	1.8	1.9	0.3
R-L KS	18	0.0	4.8	0.3	0.9	0.1
S-ZS	203	0.3	18.9	3.8	4.7	0.7
S-J	99	0.0	21.9	1.9	3.5	0.5
Sh K	346	0.0	14.1	6.5	3.4	0.5
Tb	14	0.0	1.1	0.3	0.3	0.0
Geo	2739	5.7	143.7	51.7	31.6	4.4

Table 2. Coefficients of linear correlarion between regions of Georgia on the weekly fire alerts count.

$R_{min} = \pm 0.27$, $\alpha = 0.05$.

	Abkh	Adj	Gur	Im	Kakh	KK	M-M	R-L KS	S-ZS	S-J	Sh K	Tb	Geo
Abkh	1												
Adj	0.64	1											
Gur	0.35	0.37	1										
Im	0.17	0.32	0.01	1									
Kakh	-0.13	-0.04	-0.20	-0.21	1								
KK	-0.05	0.22	-0.20	0.05	0.64	1							
M-M	0.45	0.46	0.19	0.22	-0.15	0.10	1						
R-L KS	0.53	0.16	0.01	0.01	-0.15	-0.20	0.52	1					
S-ZS	0.60	0.52	0.58	0.03	-0.22	-0.19	0.32	0.17	1				
S-J	-0.14	-0.02	-0.14	0.24	0.08	0.34	0.16	-0.07	-0.21	1			
Sh K	-0.11	0.14	-0.21	0.25	0.46	**0.84**	0.23	-0.10	-0.22	0.55	1		
Tb	-0.32	-0.20	-0.25	-0.08	0.50	0.50	-0.28	-0.18	-0.25	0.13	0.48	1	
Geo	0.54	0.49	0.17	0.06	0.71	0.62	0.31	0.19	0.31	0.16	0.50	0.24	1

As follows from Table 1 average annual values of FAC change from 14 (Tb) to 858 (Kakh). In Georgia average annual values of FAC is 2739.

Table 2 shows, that values of R change from 0.01 (negligible correlation) to 0.84 (pair KK÷Sh K, high correlation). Values of R for pairs Geo and regions of Georgia change from 0.16 (with S-J, negligible correlation) to 0.71 (with Kakh, high correlation).

Conclusion

In the future, we plan to continue similar studies for both Tbilisi and other regions of Georgia using more extensive information.

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