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WINTER AND SUMMER INDICES IN ATHENS

by
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Abstract: *In this paper, seasonal weather indices (winter, summer) are determined for the city of Athens during the period* 1898-1973.

Winter indiex (I_w)*is determined through the context of the two meteorological parameters of air temperature* (T) *and sunshine duration* (S) *with the number of days with snow* (N_s), *while the summer index* (I_s) *is defined through the context of the same two as above meteorological parameters with the amount of rainfall; these two indices are expressed respectively as follows:*

$$I_w = 10T + \frac{S}{5.9} - 4.7\,N_s$$

$$I_s = 10T + \frac{S}{9.4} - \frac{R}{3.3}$$

Further more, winters are classified in five categories (severe, cold, normal, mild, very mild) and summers are well (very poor, poor, normal, good, very good).

Acording to this classification, five winters of the period examined have been characterized as "severe" and two as "very mild", while four summers were "very poor" and two "very good".

Finally is given the probability for the occurence of each class of winter and summer.

Introduction

The classification of winters (December - February) and summers (June - August) and the determination of their degree of coldness or warmth, is a sugject of particular interest, since the thermal anomalies of a certain area, influence immensely the national economy of the land and every human activity in general.

Till the present day, research scientists in Greece undertook mainly the classification of winters and the definition of their degree of coldness, mostly based on air temperature data. Of these we mention *Livathinos*[12] *Aeginitis*[1], *Karapiperis Ph*[7]., *Kyriazopoulos*[9,10], *Flocas*[5] e.t.c.

Recently, a great number of scientists studied weather indices in various areas of Great Britain. Most of these scientitists propose various empirical formulas for seasonal weather indices (summer and winter) through a combination of the principal three meteorological elements, that is temperature, rainfall and bright sunshine.

Among these, *Poulter*[17] for the city of London and *Rackliff*[18] for Armagh observatory (Ireland) proposed respectively the following two formulas for the summer weather index (I_s):

$$I_s = 10T + \frac{S}{6} - \frac{R}{5}$$

$$I_s = 4T + \frac{S}{13} - 2R$$

where: : T = mean temperature (June, July, August) in °F

S = total sunshine in hours over three months.
R = total rainfall over three months in mm.

To the same, *Fergusson*[4] and *Hugles*[6] proposed respectively the following two expressions for the summer weather index:

$$I_s = 10T_x + \frac{S}{3} - \frac{R}{5}$$

$$I_s = T_x + \frac{S}{22} - \frac{RD}{5}$$

where T_x = mean daily max temperature of the three months (June - August)

S = total sunshine over three months, in hours.
R = total rainfall over three months, in inches.
RD = total number of rain-days over three months with rainfall > 0.01 inches.

Another summer index expression was proposed by *Murray*[15].

Rackliff[18] has used an index of winter based on mean temperature,

total sunshine duration and total number of days with sleet or snow. The formula he proposed for Armagh has as follows:

$$I_w = 3.4T + \frac{S}{3.4} - N_s$$

where T = mean temperature (°F) of the three months (December - February).

S = total sunshine (in hours) over three months.

N_s = total number of days with snow or sleet over three months.

LYALL[13] in his study of winters in England since 1950, gives a relative formula for winter index.

In the present study we undertake the determination of seasonal weather indices (winter and summer) for the city of Athens, and the classification of each winter as to the degree of coldness and each summer as to the degree of warmth.

MATERIAL

In drawing up this work we have used basically the time-series of monthly air temperature values in the city of Athens (*Arseni*[2], 1858-1972) and that of monthly sunshine duration values for the period 1897 - 1973 (*Livadas - Karacostas*[11]).

Besides, data on rainfall and days with snow, have been taken from the "Annales de l'Observatoire National d'Athènes, (1897 - 1930)[16] and the Climatological Bulletin series of the same National Observatory[8,14] for the years 1931 - 1973.

From these data have been calculated the seasonal (winter, summer) values of air temperature, the total sunshine duration of the December - February three - month for winter, and the June - August quarter for summer, and for each year separately.

Also the total number of days with snow for the three winter months (Dec., Jan., Febr.) and the total rainfall for the three summer months (June, July, Aug.) have been calculated.

TABLE I has been based on the above data. Winters are allocated to the year in which the months of January and February fell (i.e. Dec. 1927 Jan. - Febr. 1928 = winter 1928).

The period examined for the city of Athens begins from the winter

TABLE I

Summer and Winter Extreme Values for Athens, 1898 - 1973

	SUMMER (*June, July and August*)		*WINTER* (*December, January and February*)	
AIR TEMPERATURE				
	Year	°C	Year	°C
Warmest	1946	28.1	1936	12.4
Coldest	1913	24.3	1929	7.7
TOTAL BRIGHT SUNSHINE				
Sunniest	1954	1223.7 hours	1910	558.1 hours
Dullest	1939	850.9 hours	1940	279.2 hours
TOTAL RAINFALL				
Driest Summer	1945	0.1 mm		
Wettest Summer	1901	134.6 mm		

SNOW	No of days
Least number of snow days	0
Highest number of snow days	10

of 1897 - 1898, since the complete series of recorded sunshine duration values, also begins from 1.1.1897 *(Livadas - Karacostas*[11]).

DETERMINATION OF WINTER AND SUMMER INDICES

The method followed for the determination of seasonal weather indices for the city of Athens, is that of *Poulter*[17], *Rackliff*[18] and *Davis*[3].

During a winter season, the total number of days on which snow is recorded is more important for the determination of the degree of severity of the winter season, than the total rainfall over the three winter months (December - January - February). The element of air temperature alone, is not enough for the determination of the degree of coldness of a winter season in a certain area. Moreover the psychological impact of bright sunshine upon human activity during a winter season, is considerable.

That is why in computing the winter index, we should have a com-

TABLE II

Winter Weather Index for Athens, 1898 - 1973

Decade Commencing	Individual Year 0	1	2	3	4	5	6	7	8	9	Decadal mean
1890									143	173	
1900	169	161	177	133	179	129	168	131	150	113	151
1910	196	128	147	158	162	178	173	185	147	178	165
1920	156	137	151	151	137	178	175	143	127	83	144
1930	145	147	110	153	121	164	180	131	135	171	146
1940	134	160	109	160	166	118	124	140	171	101	138
1950	159	190	177	169	142	191	166	177	161	146	168
1960	173	174	169	158	145	150	182	158	165	134	161
1970	194	157	151	146							

bination of the three meteorological parameters: air temperature, sunshine duration, and days of snow falling in the city of Athens.

According to *Rackliff*[18], the winter index is defined as:

$$I_w = W_1T + W_2S - W_3N_s$$

where : T = mean air temperature over the three months (Dec., Jan., Feb.).

S = total bright sunshine for the three months.

N_s = total number of days of snow falling in the three months, and W_1, W_2, W_3 = the weighting factors of the three elements T, S, and N_s respectively.

The weighted value of N_s is negative, since N_s is negatively correlated with T and S.

The correlation coefficients for the city of Athens during the period 1898 - 1973, have as follows:

$$r_{TS} = 0.20 \ , \qquad r_{TN_S} = -0.59 \qquad \text{and} \qquad r_{SN_S} = -0.01$$

From TABLE I we find that the range of extreme values for elements T, S, and N_S for the winter season (December, January, February) is 4.7, 278.9 and 10.0 respectively.

An arbitrary value of $W_1 = 10$ applied to the temperature range gives a span of 47 units; then weights W_2 and W_3 would be

$$W_2 = \frac{1}{5.9} \qquad \text{and} \quad W_3 = 4.7$$

Based on the values of the above three weights W_1, W_2 and W_3, we have the following expression for the winter weather index:

$$I_w = 10T + \frac{S}{5.9} - 4.7\ N_S$$

From this formula we have calculated the corresponding values of I_w separately for each year of tbe 1898 - 1973 period, and then we constructed TABLE II.

The classification of summers, in various types, through the determination of their degree of warm or cool, dry or wet, and sunny or dull,

should be based on the combination of a number of meteorological parameters. Recently a number of scientists, such as *Poulter*[17], *Rackliff*[18] *Hugles*[6] and others have calculated the summer weather index I_S for a number of areas in Great Britain through a combination of the meteorological parameters of air temperature, bright sunshine and rainfall or number of rain days.

Combining these three basic meteorological elements, we give the following expression of I_S for the city of Athens.

$$I_S = W_1'T + W_2'S - W_3'R$$

where T = mean temperature (°C) for June, July, and August.

S = total bright sunshine (hours) for June, July and August.

R = total rainfall (mm) for June, July and August.

and W_1', W_2', W_3', the weighted factors so that T, S, and R would be equally weighted.

In calculating the weights W_1', W_2', and W_3', *Poulter*[17], *Rackliff*[18], have chosen their values so that the weighted range of each element should be nearly equal.

For the determination of I_S, *Davis*[3] has found the following relations between W_1', W_2', W_3', and the standard deviations σ_T, σ_S, σ_R, of T, S, and R respectively

$$W_1'\sigma_T = W_2'\sigma_S = W_3'\sigma_R$$

The weighted value of R is negative, as R is negatively correlated with T and S.

Values of correlation coefficients in the city of Athens during the period 1898 - 1973, are:

$$r_{TS} = 0.18 \qquad r_{TR} = -0.42 \qquad \text{and} \qquad r_{SR} = -0.15$$

If we assume the weight W_1' as arbitrary, and since the temperature T, is expressed in degrees and their tenths, we have $W_1' = 10$.

From our calculations, we have found:

$$\sigma_T = 0.81\ , \qquad \sigma_S = 75.83\ , \qquad \text{and} \qquad \sigma_R = 26.61$$

and since $W_2' = \dfrac{10\sigma_T}{\sigma_S}$ and $W_3' = \dfrac{10\sigma_T}{\sigma_R}$

TABLE III

Summer Weather Index for Athens, 1898 - 1973

Decade Commencing	Individual year										Decadal mean
	0	1	2	3	4	5	6	7	8	9	
1890									358	353	
1900	349	314	363	341	360	365	326	350	375	374	352
1910	370	372	352	334	348	367	381	372	351	350	360
1920	364	341	382	351	358	344	358	385	390	375	365
1930	356	366	372	327	360	374	339	368	383	341	359
1940	355	367	352	368	338	378	390	368	367	346	363
1950	391	365	396	383	403	375	391	392	386	366	385
1960	376	380	392	388	359	370	373	364	347	370	372
1970	379	371	360	361							

we have $W'_2 = \frac{1}{9.3}$ and $W'_3 = \frac{1}{3.3}$

Consequently, the summer Index (I_S) for the city of Athens is expressed as:

$$I_S = 10T + \frac{S}{9.4} - \frac{R}{3.3}$$

On the grounds of the above formula we have calculated the I_S separately for each year of the period 1898 - 1973, and drawn TABLE III.

For the determination of weights W'_1, W'_2, W'_3, following *Poulter's*[17] and *Racliff's*[18] method, we find almost the same value as above.

CLASSIFICATION OF WINTERS AND SUMMERS.

In the area of Greece *Karapiperis*[8] and *Flocas*[5] have effected a classification of winters, based mostly on data of air temperature. At present, by the determination of seasonal iudices I_w and I_S, we attempt a new classification of winters and summers for the city of Athens during the period 1898 - 1973.

On the basis of data contained in TABLES I and we have calculated the mean values of I_w and I_s, and their standard deviations σ_w and σ_s, and we obtained:

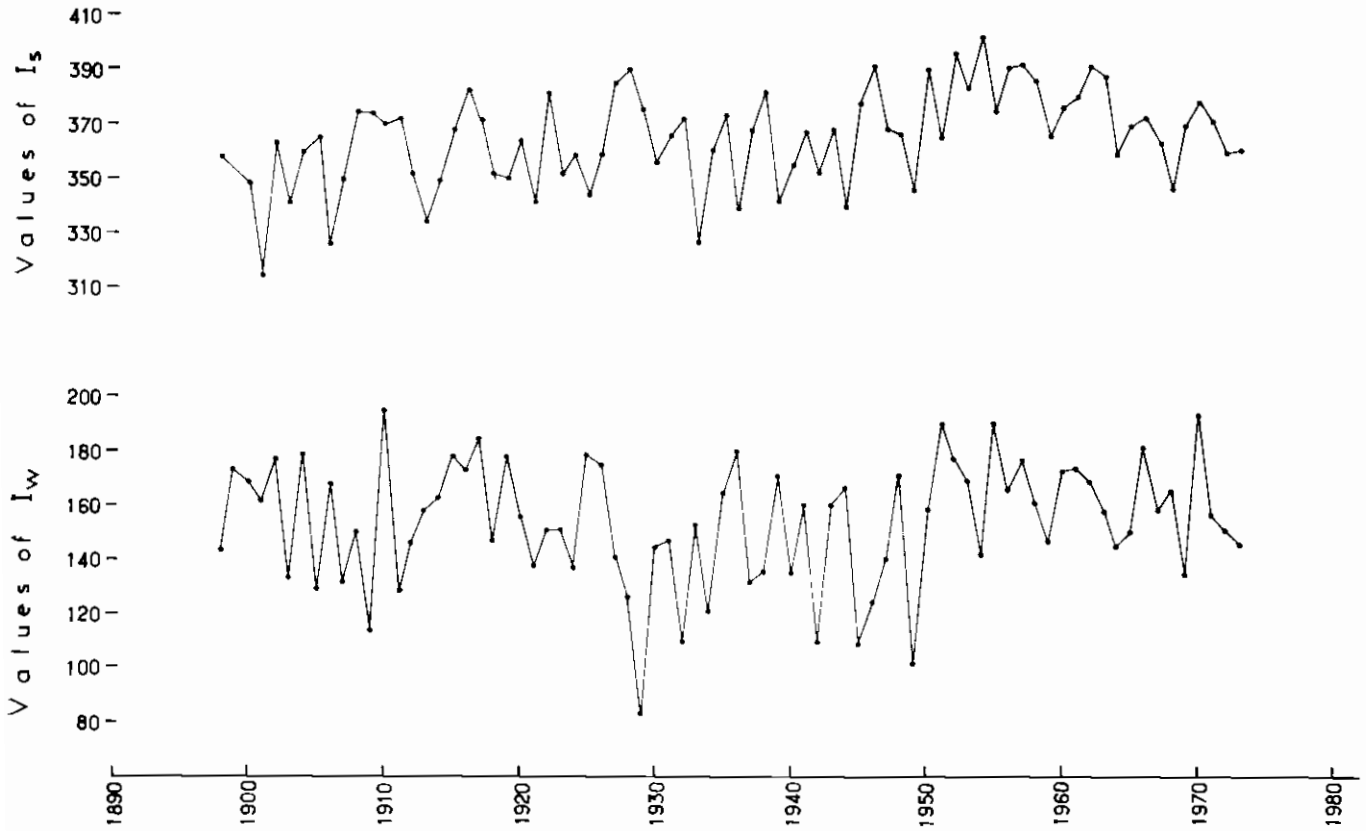
$$I_w = 154 \qquad \sigma_w = 22.86$$
$$I_s = 365 \qquad \sigma_s = 17.62$$

According to the values of I_w and I_s, we distinguish winters and summers in five main categories, (see TABLE A):

Based ou the above classification, TABLES IV and V, and GRAPH I have been drawn; this last illustrates the variation of I_w and I_s from year to year, during the period 1898 - 1973.

TABLE A

WINTER		SUMMER	
	Below the Normal value		
SEVERE	$I_w < \bar{I}_w - 1\frac{2}{3}\sigma_w$	VERY POOR	$I_s < \bar{I}_s - 1\frac{2}{3}\sigma_s$
COLD	$\bar{I}_w - 1\frac{2}{3}\sigma_w \leqslant I_w < \bar{I}_w - \frac{1}{2}\sigma_w$	POOR	$\bar{I}_s - 1\frac{2}{3}\sigma_s \leqslant I_s < \bar{I}_s - \frac{1}{2}\sigma_w$
NORMAL	$\bar{I}_w - \frac{1}{2}\sigma_w \leqslant I_w \leqslant \bar{I}_w + \frac{1}{2}\sigma_w$	NORMAL	$\bar{I}_s - \frac{1}{2}\sigma_s \leqslant I_s \leqslant \bar{I}_s + \frac{1}{2}\sigma_s$
	Above the Normal value		
MILD	$\bar{I}_w + \frac{1}{2}\sigma_w < I_w \leqslant \bar{I}_w + 1\frac{2}{3}\sigma_w$	GOOD	$\bar{I}_s + \frac{1}{2}\sigma_s < I_s \leqslant \bar{I}_s + 1\frac{2}{3}\sigma_s$
VERY MILD	$\bar{I}_w + 1\frac{2}{3}\sigma_w < I_w$	VERY GOOD	$\bar{I}_s + 1\frac{2}{3}\sigma_s < I_s$



GRAPH 1. Year by year varation of winter and Summer Indices in Athens 1898-1973.

TABLE IV

Classification of Winters in Athens, 1898 - 1973

Cold and Severe Winters				Mild and Very Mild Winters			
Winters	I_w	Order	Classif.	Winters	I_w	Order	Classif.
1903	133	13th	Cold	1899	173	13th	Mild
1905	129	11th	"	1900	169	15th	"
1907	131	12th	"	1902	177	10th	"
1909	113	5th	Severe	1904	179	8th	"
1911	128	10th	Cold	1906	168	16th	"
1921	137	16th	"	1910	196	1st	Very Mild
1924	137	16th	"	1915	178	9th	Mild
1928	127	9th	"	1916	173	13th	"
1929	83	1st	Severe	1917	185	5th	"
1932	110	4th	"	1919	178	9th	"
1934	121	7th	Cold	1925	178	9th	"
1937	131	12th	"	1926	175	11th	"
1938	135	15th	"	1936	180	7th	"
1940	140	17th	"	1939	171	14th	"
1942	109	3rd	Severe	1944	166	18th	"
1945	118	6th	Cold	1948	171	14th	"
1946	124	8th	"	1951	190	4th	"
1947	140	17th	"	1952	177	10th	"
1949	101	2nd	Severe	1953	169	15th	"
1954	142	18th	Cold	1955	191	3rd	"
1969	134	14th	"	1956	166	18th	"
				1957	167	17th	"
				1960	173	13th	"
				1961	174	12th	"
				1962	169	15th	"
				1966	182	6th	"
				1970	194	2nd	Very Mild

TABLE V

Classification of Summers in Athens, 1898 - 1973

Poor and Very Poor Summers				Good and Very Good Summers			
Summers	I_S	Order	Classif.	Summers	I_S	Order	Classif.
1899	353	16th	Poor	1908	375	16th	Good
1900	349	12th	"	1909	374	17th	"
1901	314	1st	Very poor	1916	381	11th	"
1903	341	7th	Poor	1922	382	10th	"
1906	326	2nd	Very Poor	1927	385	8th	"
1907	350	13th	Poor	1928	390	5th	"
1912	352	15th	"	1929	375	16th	"
1913	334	4th	Very Poor	1935	374	17th	"
1914	348	11th	Poor	1938	383	9th	"
1918	351	14th	"	1945	378	14th	"
1919	350	10th	"	1946	390	5th	"
1921	341	7th	"	1950	391	4th	"
1923	351	14th	"	1952	396	2nd	Very Good
1925	344	8th	"	1953	383	9th	Good
1930	356	18th	"	1954	403	1st	Very Good
1933	327	3rd	Very Poor	1955	375	16th	Good
1936	339	6th	Poor	1956	391	4th	"
1939	341	7th	"	1957	392	3rd	"
1940	355	17th	"	1958	386	7th	"
1942	352	15th	"	1960	376	15th	"
1944	338	5th	"	1961	380	12th	"
1949	346	9th	"	1962	392	3rd	"
1968	347	10th	"	1963	388	6th	"
				1970	379	13th	"

CONCLUSIONS

1. During the 1898 - 1973 period examined we observe five cases of severe winters in Athens, namely those of 1908 - 09, 1928 - 29, 1931 - 32, 1941 - 42, and 1948 - 49 (Table IV). The first place in severity belongs to the 1928 - 29 winter; the same winter holds second place in Thessaloniki and Larissa (*Flocas*[5]).

The same 1928 - 29 winter is characterized by *Rackliff*[18] as "severe" at Armagh, while *Karapiperis*[8] gives it sixth place among the winters of the period 1859 - 1949, and classifies this as a "cold" winter.

It should be noted in addition that while the winters of 1908 - 09

and 1941 - 42 started early in November, those of 1928 - 29, 1931 - 32 and 1948 - 49 were prolongated till the month of March, as it is also mentioned by *Karapiperis*[8] and *Flocas*[5] for the areas examined by each.

To the same, we observe two cases of very mild winters, those of 1909 - 10 and 1969 - 70. It should also be noted that in the 1909 - 10 winter has been recorded the longest sunshine duration (558.1 hours), while during the 1969 - 70 winter no snowfall has been recorded and the sunshine amounts to 460.1 hours (from December to February). These two winters have been characterized as mild in Thessaloniki and Larissa (*Flocas*[5]).

2. During the same 1898 - 1973 period, four summers have been classified as "very poor" in Athens (very cool, wet, dull) namely those of 1901, 1906, 1913, and 1933 (TABLE V).

It should be noted that the summers of 1901 and 1906 are characterized as the wettest of the period with a total rainfall (June - August) of 134.6 mm and 105.6 mm respectively and a mean temperature 1.8°C below the summer normal (26.1°C).

Besides, the summers of 1936, 1939, and 1944, characterized as "poor", but very near the range of "very poor" summers; their total sunshine duration being by 63.0 - 192.0 hours shorter than the normal (1043.0 hours), and their total rainfall above normal (24.7 mm) by 17.4 to 62.0 mm.

On the other hand the summers of 1952 and 1954 are characterized as "very good" (very warm, dry, sunny); their mean temperature is about 10°C above normal, total sunshine duration $>$ 1200 hours, and total rainfall $<$ 5.1 mm.

It is noteworthy that the summers of 1946, 1950, 1957, and 1962, characterized as good (warm, dry, sunny) are actually very near the "very good" range. Their mean temperature is by 1.0° - 2.0°C above normal, their total sunshine duration is between 1038.1 - 1144.7 hours, and their total rainfall between 0.4 - 2.4 mm.

3. The frequency of severe winters is highest during the period 1929-1949, while that of very poor summers during the first thirty years of this century.

4. In the interval between 1950 till the present day, no severe winter has been recorded; on the contrary there has been a great number of very mild winters.

Such mild or very mild winters also occured between 1898 - 1926; this same interval includes the 1909 - 10 winter, which is the sunniest of the whole period.

The greatest frequency of "good" or "very good" summers has been observed between the years 1950 - 1973, with the only "poor" summer being that of 1968.

5. In all the 1898 - 1973 period examined, the most "severe" winter is that of 1928 - 1929 ($I_w = 83$), and the most "mild" that of 1909 - 1910 ($I_w = 196$).

Accordiug to the winter classification in Athens, a winter is characterized as "severe", when $I_w \leqslant 115$, "cold" when $I_w \leqslant 143$, "very mild" when $I_w \geqslant 193$, and "mild" when $I_w \geqslant 166$.

6. This new process for the classification of winters, agrees with the one used by *Karapiperis*[8] for the city of Athens. As a matter of fact, during the 1898 - 1949 period, which is common in both studies, all the winters characterized as severe or cold, get similar characterizations by us. We, however designate in addition the following "cold" winters: 1902 - 03, 1920 - 21, 1923 - 24, 1927 - 28, 1933 - 34, 1936 - 37, 1937 - 38, 1939 - 40, 1944 - 45, 1945 - 46, and 1946 - 47; among these winters, those of 1933 -34, 1937 - 38 and 1939 - 40 are also encountered either in Larissa or Thessaloniki (*Flocas*[5]).

The same applies for all mild or very mild winters except for those of 1930 - 31 and 1940 - 41 which we classify as normal. Moreover we classify as very mild the winters of 1898 - 99, 1905 - 06, 1924 - 25, and 1943 - 44; the first of these winters (1898 - 99) is also mentioned as such in Thessaloniki (*Flocas*[5]).

7. A "very good" summer, during the period examined, has been that of 1954 ($I_s = 503$), and "very poor" that of 1901 ($I_s = 314$).

A summer is classified as "very good", when $I_s \geqslant 395$ as "good" when $I_s \geqslant 374$ as "very poor" when $I_s \leqslant 335$, and as "poor" when $I_s \leqslant 356$.

8. The incidence probability of a "severe" winter in Athens is 7%, "cold" 21%, "very mild" 3%, "mild" 33%, and "normal" 36%.

To the same, the incidence probabilities for summers have as follows: "very poor" 5.3%, "poor" 25.0%, very good" 2.6%, "good" 28.9%, and "normal" 38.1%.

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ΠΕΡΙΛΗΨΙΣ

ΧΕΙΜΕΡΙΝΟΙ ΚΑΙ ΘΕΡΙΝΟΙ ΚΑΙΡΙΚΟΙ ΔΕΙΚΤΑΙ ΕΙΣ ΑΘΗΝΑΣ

Ὑπὸ

ΑΠΟΣΤΟΛΟΥ Α. ΦΛΟΚΑ

(Ἐργαστήριον Μετεωρολογίας - Κλιματολογίας)

Εἰς τὴν παροῦσαν ἐργασίαν ἀσχολούμεθα μὲ τὸν προσδιορισμὸν ἐποχιακῶν καιρικῶν δεικτῶν (χειμῶνος, θέρους) εἰς τὴν πόλιν τῶν Ἀθηνῶν κατὰ τὴν διάρκειαν τῆς μελετωμένης περιόδου 1898 - 1973.

Διὰ συνδυασμοῦ τῶν τριῶν βασικῶν μετεωρολογικῶν παραμέτρων τῆς θερμοκρασίας ἀέρος (T), τῆς διαρκείας ἡλιοφανείας (S) καὶ τοῦ ἀριθμοῦ ἡμερῶν πτώσεως χιόνος (N_s) εἰς τὴν πόλιν τῶν Ἀθηνῶν, προσδιορίζεται ὁ καιρικὸς δείκτης χειμῶνος (I_w), ὁ ὁποῖος δίδεται ὑπὸ τοῦ τύπου

$$I_w = 10T + \frac{S}{5.9} - 4.7\,N_s$$

Ὁμοίως, διὰ συνδυασμοῦ τῶν S, T καὶ τοῦ ὕψους βροχῆς (R) προσδιορίζεται ὁ καιρικὸς δείκτης θέρους (I_s), ἐκφραζόμενος ὑπὸ τοῦ τύπου

$$I_s = 10T + \frac{S}{9.4} - \frac{R}{3.3}$$

Ἀκολούθως, ὑπολογίζονται αἱ τιμαὶ τῶν I_w καὶ I_s δι' ἕκαστον ἔτος τῆς μελετωμένης περιόδου εἰς τὴν πόλιν τῶν Ἀθηνῶν.

Περαιτέρω, γίνεται χαρακτηρισμὸς εἰς πέντε κατηγορίας τῶν χειμώνων (severe - δριμύς, cold - ψυχρός, normal - κανονικός, mild - ἤπιος, very mild - γλυκὺς) καὶ τῶν θερῶν (very poor - πολὺ ψυχρό, ὑγρὸ καὶ ἀνήλιο, poor - ψυχρό, ὑγρὸ καὶ ἀνήλιο, normal - κανονικό, good - θερμό, ξηρὸ καὶ ἡλιοφεγγές, very good - πολὺ θερμό, ξηρὸ καὶ ἡλιοφεγγές).

Μὲ βάσιν τὴν ταξινόμησιν ταύτην εἰς Ἀθήνας ἐπεκράτησαν κατὰ τὴν μελετωμένην περίοδον:

— πέντε περιπτώσεις δριμέων χειμώνων (1908 - 09, 1928 - 29, 1931 - 32, 1941 - 42, 1948 - 49) ὡς καὶ δύο γλυκέων (1909 - 10, 1969 - 70) καὶ
— τέσσαρα θέρη (περιόδων 1901, 1906, 1913, 1933) ὡς πολὺ ψυχρά, ὑγρὰ καὶ ἀνήλια καθὼς καὶ δύο θέρη (περιόδων 1952, 1954) ὡς πολὺ θερμά, ξηρὰ καὶ ἡλιοφεγγῆ.

Τέλος, ἡ πιθανότης ἐπικρατήσεως δι' ἑκάστην κατηγορίαν χειμῶνος ὡς δριμέος εἶναι 7%, ψυχροῦ 21%, γλυκέος 3%, ἠπίου 33% καὶ κανονικοῦ 36%, ἐνῶ διὰ τὴν κατηγορίαν θέρους ὡς πολὺ ψυχρό, ὑγρὸ καὶ ἀνήλιο εἶναι 5.3% ὡς ψυχρό, ὑγρὸ καὶ ἀνήλιο 25%, πολὺ θερμό, ξηρὸ καὶ ἡλιοφεγγὲς 2.6%, θερμό, ξηρὸ καὶ ἡλιοφεγγὲς 28.9% καὶ ὡς κανονικὸ 38.1%.