Sci. Annals, Fac. Phys. & Mathem., Uuiv. Thessaloniki, **18**, 107 (1973)

ATMOSPHERIC - PRESSURE IN THESSALONIKI - GREECE

by

GEORGE C. LIVADAS and TIMOLEON J. MAKROYANNIS

(From the Institute of Meteorology and Climatology, Aristotelian University of Thessaloniki)

(Received 25.6.1973)

Summary: *Atmospheric pressure in Thessaloniki is examined for the period between the years 1931-1970. Mean and extreme annual, monthly, and daily values are tabulated, and manthly values are compared with those cited by previous research workers.*

Explanations are given for:

a) Maxima and minima in connection with the prevailing weather patterns, and the case of October 26, 1939 is fully analyzed.

b) The seasonal variation of atmospheric pressure as a function of the prevailing pressure patterns over the Atlantic (Azores high), and over Asia.

Introduction

The subject of atmospheric pressure in Thessaloniki - Greece has occupied in the past quite a few researchers, i.e. Eredia [1], Kuhlbrodt [2,3] and the greeks Mariolopoulos [4] and Kyriazopoulos [5]; Alexandrou, however, was the one who examined the matter more thoroughly, studying the climate of Thessaloniki [6,7]. All the above mentioned research workers studied values of atmospheric pressure for short intervals of 5 to 10 years, using data of various meteorological stations that have been operating at times in Thessaloniki, between the years 1891 - 1937.

In the present work we examine atmospheric pressure in Thessaloniki for the period between 1931 - 1970, excluding the 1940 - 1946 war period, and using data only from the meteorological station of the Institute of Meteorology and Climatology of the Aristotelian University of Thessaloniki.

Material

Measurements of atmospheric pressure were started in the above

station on September 1, 1930. Mean and extreme daily values*, as well as monthly mean values have been published in the series «Annuaire de l'Institut Météorologique et Climatologique» by MARIOLOPOULOS [8] for the years 1930 - 1937, KYRIAZOPOULOS [9] for the years 1938 - 1958, and by the former of us [10] for the years 1959 - 1970. All measurements have been effected with mercury barometers, while hourly and extreme values have been taken from barograph recordings (all the instruments for measurements and recording of atmospheric pressure have always been and are still those manufactured by R. Fuess - W. Berlin).

As already mentioned, in the present work we have not included the interval of the years 1940 - 46, although there are today published data from the Meteorological station of the University for the war period (KYRIAZOPOULOS [9] issues No. 11 - 13, for the years 1940, 1943 - 45, 1946) as well as the observations from the weather station of the german occupation army, covering the period between November 1, 1941 to July 31, 1944 (LIVADAS - ARSENI [12]). We came to this decision because we deemed better to employ data of barograph recordings of full calendar years only. We have been thus limited to the periods between the years 1931 - 1939 and 1947 - 1970, that is 33 years in all. All hourly values, as well as extreme ones found from barograph record ings have been reduced to mean sea level (M.S.L.) and to normal gravity of 45°; this has been effected by a special program for processing these data in the electronic computer of the University (IBM 1620/ II) (MAKROYANNIS - ARSENI - PAPADIMITRIOU [13]).

Mean and extreme values of atmospheric pressure.

The mean and extreme annual values of atmospheric pressure in Thessaloniki for the 33 - year period are given in Table I.

TABLE I

Mean and extreme annual values of atmospheric pressure in Thessaloniki for the period between the years 1931 - 1939 and 1947 - 1970 (M.S.L.).

Maximum	763.41 mm Hg (1932)
Mean	761.85 ± 0.79
Minimum	760.38 mm Hg (1937)

* reduced to temperature of 0° C, and the barometer elevation (Hz) (1930 - 1958 Hz = 46.35 m; 1959 - 1970 Hz = 31.78 m (LIVADAS [11]).

The frequency of annual values is given in Table II.

TABLE II

Frequency of annual values

763.9 - 763.0	762.9 - 762.0	761.9 - 761.0	760.9 - 760.0
6 years	7 years	18 years	2 years

The mean and extreme monthly values of atmospheric pressure are given in Table III.

TABLE III

Mean monthly and also the highest and lowest monthly mean values of atmospheric pressure in Thessaloniki for 396 months (in mm Hg).

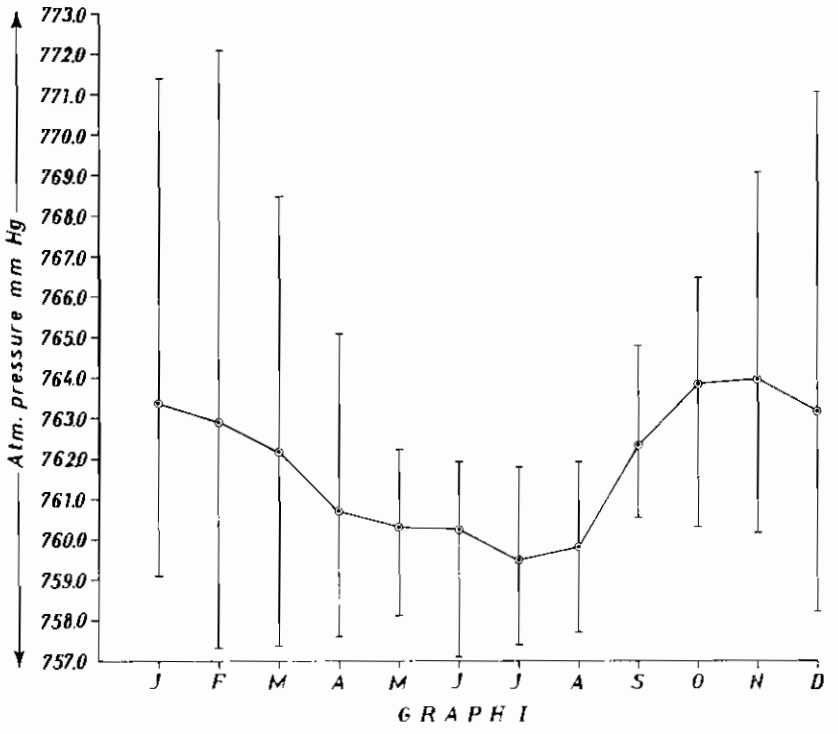
	max mean monthly (1)	mean	$+\sigma$	coef of variation	min mean monthly (2)	D (1-2)
J	771.47 (1964)	763.36	2.93	0.38%	759.08 (1968)	12.39
F	72.04 (1959)	62.94	3.59	0.47	57.32 (1937)	14.72
M	68.49 (1953)	62.14	2.57	0.34	57.33 (1939)	11.16
A	65.11 (1947)	60.64	1.63	0.21	57.65 (1937)	7.46
M	62.14 (1966)	60.33	1.20	0.16	58.07 (1936)	4.07
J	61.81 (1950)	60.23	1.21	0.16	57.16 (1933)	4.65
J	61.74 (1969)	59.49	1.01	0.13	57.48 (1934)	4.26
A	61.94 (1949)	59.80	0.95	0.13	57.70 (1937)	4.24
S	64.81 (1949)	62.39	1.04	0.14	60.53 (1931)	4.28
O	66.49 (1949)	63.88	1.69	0.22	60.35 (1939)	6.14
N	69.24 (1953)	63.98	1.95	0.26	60.17 (1952)	9.07
D	71.13 (1948)	63.11	3.33	0.44	58.17 (1969)	12.96
E		761.85				

From the adjoined Tables III, IV and Graph I, we find that during the cold season we have the greatest variation of monthly mean values of atmospheric pressure in the area examined. Thus the difference between the highest and lowest monthly mean values is :

$>$ 10.0 mm Hg from December to March,

— between 5 - 10 mm Hg during the transitive months of April, October, November, and

— $<$ 5,0 mm Hg during the summer months from May to September.



GRAPH I

TABLE IV

Distribution of frequencies of monthly mean atmospheric pressure values in Thessaloniki for 396 months

	J	F	M	A	M	J	J	A	S	O	N	D	S1	S2
774.00 - 772.00		1											1	
71.99 - 70.00	2											3	5	
69.99 - 68.00		1	1								1		3	9
67.99 - 66.00	4	5	1							4	4	5	23	
65.99 - 64.00	5	3	6	2					3	15	11	2	47	
63.99 - 62.00	8	7	10	4	4			1	18	9	13	8	82	152
61.99 - 60.00	12	4	10	16	17	20	14	14	12	5	4	11	139	
59.99 - 58.00	2	10	2	10	12	11	16	17				4	84	
57.99 - 56.00		2	3	1		2	3	1					12	235
Total	33	33	33	33	33	33	33	33	33	33	33	33	396	396

Moreover, the main summer months June, July, August have the smallest monthly mean values, all of them assembled in the lowest grades of the frequency scale. On the other hand, the main three winter months, December, January and February, hold with a few cases, the highest grades of the frequency scale, but have also greater dispersal of cases.

If we take also into account the extreme values of atmospheric pressure (absolute maximum, absolute minimum) recorded during the period examined in the meteorological station of the Institute of Meteorology and Climatology (Table V), variations of atmospheric pressure within the same month become considerable (see last column of Table V).

TABLE V

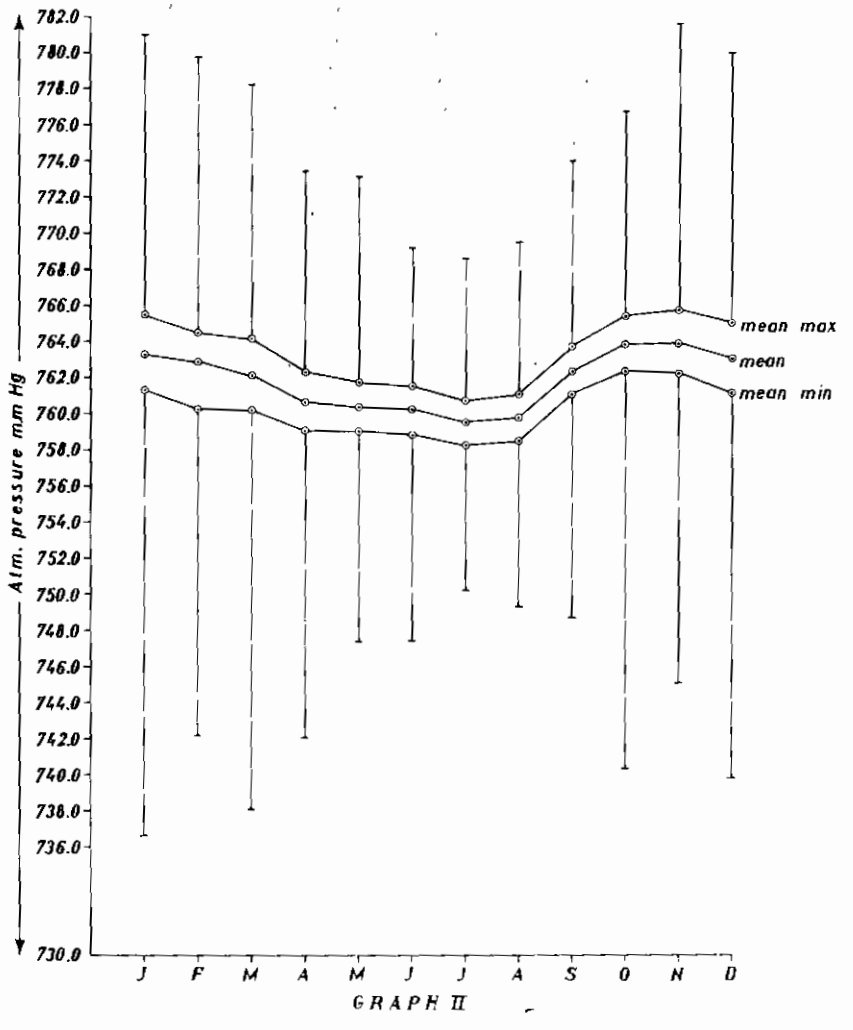
Mean monthly, mean maximum, and mean minimum, as well as absolute maxima and minima recorded during the years 1931-39 and 1947-70 (*in mm Hg M.S.L.*)

	Absol. maximum		mean monthly			Absol. minimum		1-2
	d./year (1)		maximum	mean	minimum	d/years (2)		
J	780.83	18/1964	765.47	763.36	761.35	736.52	20/1965	44.31
F	79.54	28/1948	64.47	62.92	60.24	42.01	13/1956	37.53
M	79.04	1/1948	64.16	62.14	60.19	37.92	2/1937	41.12
A	73.25	8/1955	62.37	60.64	59.03	42.01	6/1956	31.24
M	72.95	6/1935	61.71	60.33	59.00	47.30	8/1957	25.65
J	69.06	5/1950	61.52	60.23	58.93	47.30	1/1953	21.76
J	68.46	17/1969	60.74	59.49	58.22	50.10	18/1961	18.36
A	69.36	29/1949	61.08	59.80	58.49	49.20	24/1956	20.16
S	73.85	20/1936	63.72	62.39	61.05	48.60	2/1934	25.25
O	76.54	13/1956	65.41	63.88	62.43	40.22	26/1939	36.32
N	81.43	21/1958	65.75	63.98	62.32	45.01	8/1952	36.42
D	79.84	4/1933	65.14	63.11	61.18	39.72	17/1962	40.12
E			763.46	761.85	760.20			

During the six months from October to March, the mercury column may run a course of > 35 mm Hg; this, however, is limited to < 25 mm Hg during the warm summer months from June to August. The summer season in Greece is characterized by a uniformity of weather conditions (it could be also termed as monotony); one clear and warm day is succeeded by another similar, especially during the months of July and August.

On the contrary, mean monthly maxima and mean monthly mi-

nima derived from hourly maxima and minima of 24 hours, for each month, show little change.



GRAPH II

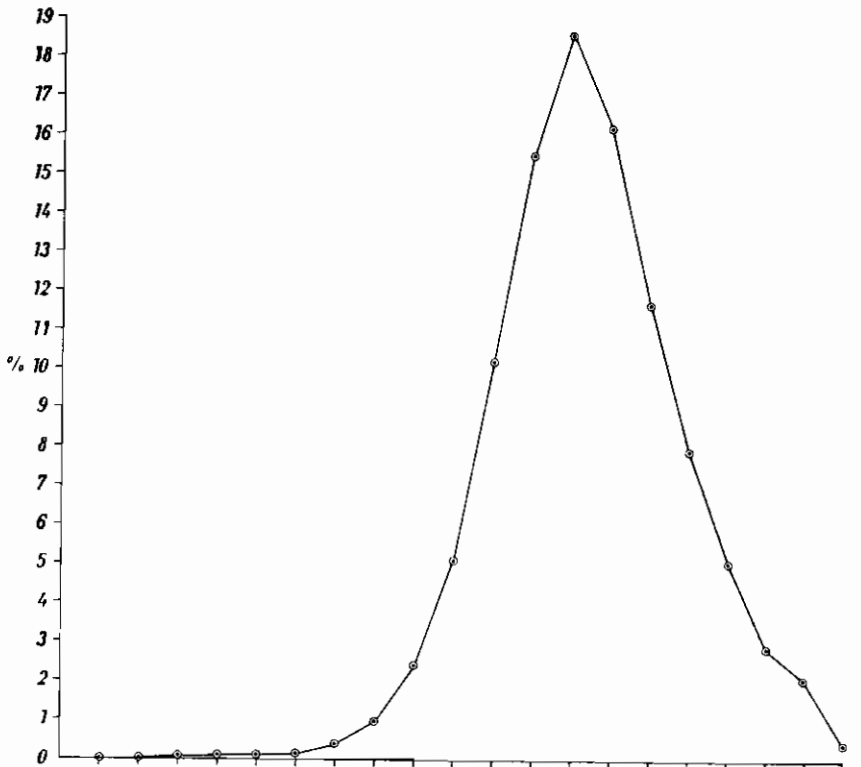
The absolute maximum range of the mercury column in Thessaloniki is 781.43 (21.11.1958) - 736.52 (20.1.1965) = 44.91 mm Hg. This figure slightly differs from the corresponding range of January

TABLE VI

Distribution of frequency of daily values (24 hours) in Thessaloniki Greece for the years 1931-1939, 1947-1970 (12053 days)

	J	F	M	A	M	J	J	A	S	O	N	D	S	
>775.0	27	22	5						12			28	94	0.77%
75.0 - 72.0	58	47	32			2			33	9		69	250	2.07
72.0 - 70.0	62	41	51	6	4	13			57	44		69	347	2.87
70.0 - 68.0	104	67	70	34	2	33		2	99	101	3	93	608	5.04
68.0 - 66.0	114	94	104	58	29	106	6	15	144	167	25	90	952	7.89
66.0 - 64.0	128	99	137	126	99	169	31	47	167	222	72	110	1407	11.67
64.0 - 62.0	122	112	139	172	205	229	151	169	155	192	182	123	1951	16.18
62.0 - 60.0	114	126	147	206	246	223	280	269	139	126	261	106	2243	18.60
60.0 - 58.0	95	95	116	145	210	136	289	277	77	85	240	104	1869	15.50
58.0 - 56.0	76	83	95	97	135	51	175	158	62	56	151	90	1229	10.19
56.0 - 54.0	45	60	60	78	70	19	71	63	24	15	44	66	615	5.10
54.0 - 52.0	40	45	36	46	17	6	20	21	11	4	9	35	290	2.40
52.0 - 50.0	22	22	9	13	6	3		2	7	2	2	26	114	0.94
50.0 - 48.0	8	11	11	5					2		1	7	45	0.37
48.0 - 46.0	4	4	4	3					1			5	21	0.17
46.0 - 44.0	2	2	4	1								2	11	0.09
44.0 - 42.0	1		3										4	0.03
42.0 - 40.0	1	1											2	0.01
40.0 - 38.0		1											1	0.00
38.0 - 36.0														0.00
36.0 - 34.0														0.00
34.0 - 32.0														0.00
32.0 - 30.0														0.00
Total	1023	932	1023	990	1023	990	1023	1023	990	1023	990	1023	12053	99.89

From Table VI it appears that very low atmospheric pressure values are extremely rare : 84 cases (daily mean values) out of a total of 12053, that is 0.67%, have been recorded below 750 mm Hg or 1000.0 mb, while 93 51% have been recorded between 750 - 770 mm Hg. It is worth noting that 691 cases, or 5.71%, have been recorded above 770 mm Hg.



GRAPH III

The area of Thessaloniki is situated on the northern coast of the Aegean Sea, meaning that this is the southern end of the largest peninsula of the Mediterranean Sea, the Balkans. This being also the coldest of the three large peninsulas (Iberia and Italia being the other two), stands nearer to the Siberian high; during the cold season and especially the four months from December to March, it is possible for migratory

highs to advance towards the central Balkans and remain quasi - stationary, producing a weather pattern which is termed as weather type II in the classification of weather types of the area of Greece (the anticyclone is centered over the Balkans and south of parallel 45° N (LIVADAS [14]). This type of high is extremely rare during the main summer season from July to August.

TABLE VII

Number of cases with extremely high and extremely low daily values (24 hours mean) per month during the (12053 days) 1931 - 1970 period.

	J	F	M	A	M	J	J	A	S	O	N	D	TOTAL
> 770.0	147	110	88	6	4	15	0	0	102	53	0	166	691
< 750.0	16	19	22	9	0	0	0	0	3	0	1	14	84

Extremely low values are recorded mainly during the cold fourmoth from December to March (71 cases out of the total 81), when the frequency of lows in the Mediterranean is also great ([15'16'17]). It should be noted, however, that very few low pressure centers ever come near Thessaloniki. It can be sustained that the area of Thessaloniki is rarely visited by low pressure centers; usually it is under the northern edges of lows whose trajectory is the Ionian Sea - Aegean - Propontis - Black Sea and even less in the case of lows which follow the trajectory Ionion Sea - Central Aegean - Cyprus - Middle East. This is the reason for values < 750.0 mm Hg being so rare. Anyway the subject should undergo further investigation, which, however, is out of the scope of the present research.

In studying the diurnal variation of atmospheric pressure, that is the differences between the maximum and minimum of the same 24 hours, we observe that these amplitudes are comparatively small : More than 1/4 of the total of days examined had differences ≤2.0 mm Hg.

9/10 of the total of days had differences ≤6.0 mm Hg; another 904 days (or 7.499%) had differences between 60 - 80 mm Hg; and a percentage of 1.358% (that is 164 days out of the total of 12053) had differences between 10.1 - 20.2 mm Hg.

An examination of the distribution per month of values of diurnal variation, indicates that during the warm 5 - months from May to September, the differences recorded belong to the lowest grades of the scale : In 73 days out of 4158, the max - min differences have been 6.1 -

TABLE VIII

Distributionof frequencies of diurnal range of Atmospheric pressure D(max-min) in Thessaloniki-Greece for the years 1931 - 1939 and 1947 - 1970

	J	F	M	A	M	J	J	A	S	O	N	D	S1	%
0.0 - 2.0	211	169	185	252	351	345	345	335	322	336	313	220	3384	28.075
2.1 - 4.0	393	371	469	489	537	546	598	597	545	494	377	432	5848	48.519
4.1 - 6.0	220	202	207	154	107	90	72	84	102	140	175	200	1753	14.544
6.1 - 8.0	116	109	93	70	24	9	6	6	20	39	77	94	663	5.500
8.1 - 10.0	48	47	43	15	4		2	1	1	7	32	41	241	1.999
10.1 - 12.0	25	16	18	8						4	14	23	108	0.896
12.1 - 14.0	8	13	3	2						2		10	38	0.315
14.1 - 16.0	1	2	4								1	2	10	0.082
16.1 - 18.0	1	2	1								1	1	6	0.049
18.1 - 20.0		1											1	0.008
20.1 - 22.0										1			1	0.008
total	1023	932	1023	990	1023	990	1023	1023	990	1023	990	1023	12053	99.995

10.0 mm Hg; all the remaining days recorded differences between 0.0 - 6.0 mm Hg, while more than half of these figures are between 2.1 - 4.0 mm Hg.

The main two summer months, July and August, hold the largest percentage of small figures of diurnal variation, in the first two grades of the scale with 943 cases (July) and 932 cases (August) out of a total 1023 The two transitive months, April and October, have larger max - min differences.

Notice : On October 26, 1939 the absolute maximum difference has been recorded (20.2 mm Hg in 24 hours). This, however, is due to an exceptional case and as a matter of fact this difference was recorded within 16 hours (see barograph chart of 26.10.39, Fig. I) and Weather Maps of 14 : 00 and 20 : 00 hours of same datl).

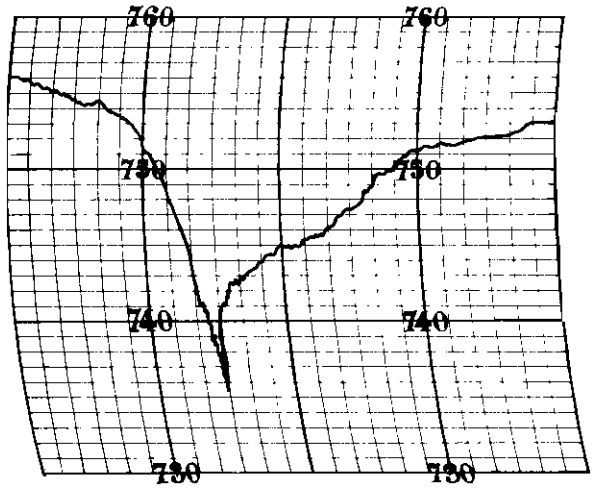


Fig. 1 (Barograph chart of 26.10.1939)

From the examination of the recording on the barograph chart, and from the adjoined weather maps we find that this deep depression advanced very quickly during the six hours from 14 : 00 to 20 : 00 hours of the 26.10.39, and the low - pressure center passed above the area of Thessaloniki. It should be noted that this case produced short but heavy rains ≧10.0 mm within the 24 - hours of 26.10.1939 in all the northern region of Greece (north of parallel 39° N), from Epirus to Thrace.

Nevertheless, the highest grades in the scale of max - min ampli-

tudes are encountered during the period when the number of lows increases (BIEL [15], MET. OFFICE [16]), that is in the cold season.

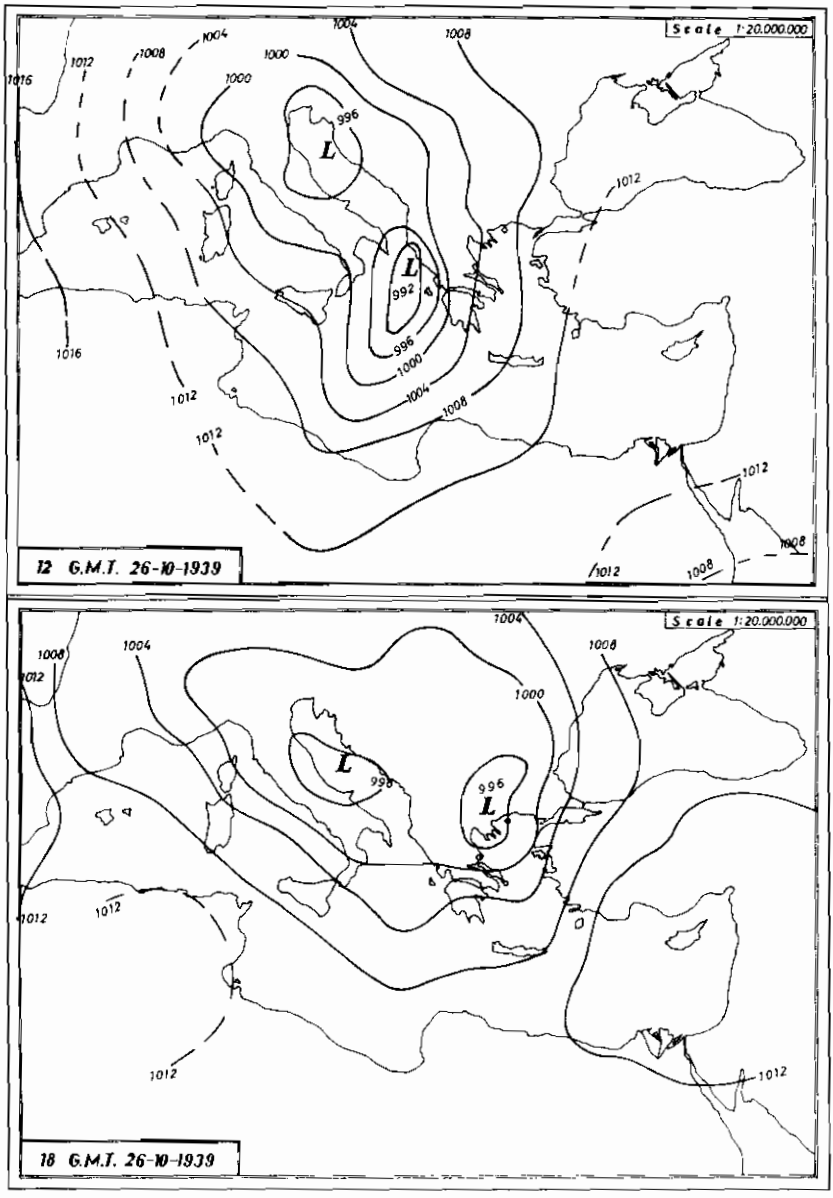


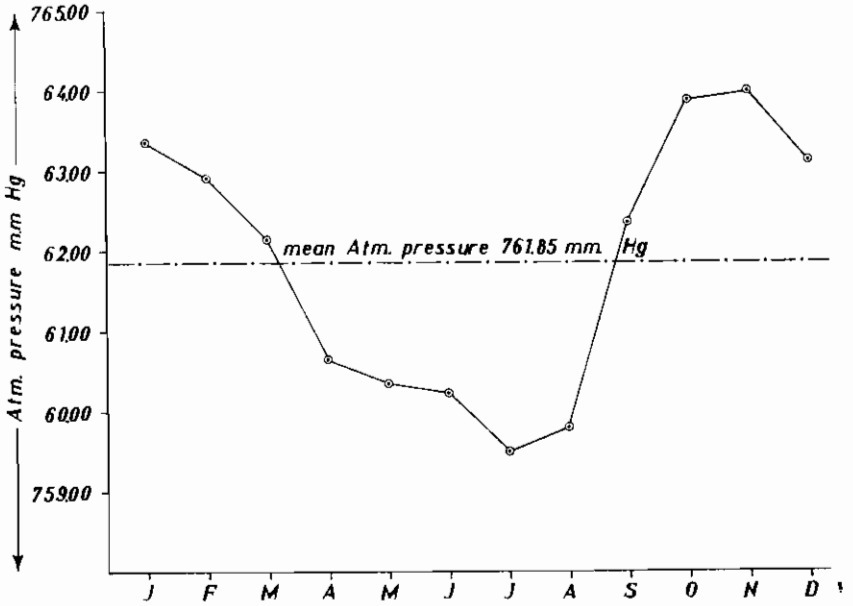
Fig. 2 Weather Maps of 26.10.1939 *14:00L.T.20:00.LT.*

Discussion

From the examination of all the above mentioned data on atmospheric pressure in the city of Thessaloniki for the 1939 - 1970 period. we draw the following conclusions :

a. From Tables I and II we find that the mean annual variation is rather small (3.03 mm Hg), while standart deviation (S.D.) is very small and the log of coef. around zero.

b. The annual range of atmospheric pressure, reduced to M.S.L. and normal gravity of 45°, shows a bouble fluctuation, with a primary maximum in November and primary minimun in July, and a secondary



GRAPH IV

minimum in December and secondary maximum in January.

c. Comparing the monthly mean values of the present research with those found by previous researchers([2'4'5'6'7]), we notice that:

All series with a sufficient number of observational years, have one maximum in October or November; those with a lesser number of years have this maximum in October [4'6], and as the number of years increases the maximum is transfered to November.

The second maximum appears in January, except in the series

TABLE IX

Monthly mean values of Atmospheric pressure in Thessaloniki according to various research workers.

Bulgarian Gymn. 1899-1908 (a) Greek Gymn. Alexandrou (b), Mariolopoulos (c), Thessaloniki Alexandrou 16 years (d), A.U.T. Kyriazopoulos (e), Livadas - Makroyannis (f)

	a	b	c	d	e	f
J	764.8	765.1	765.80	765.02	762.20	763.36
F	761.3	764.0	763.68	762.56	760.10	762.92
M	761.0	762.8	762.69	762.17	761.00	762.14
A	759.3	760.0	760.09	759.65	758.85	760.64
M	759.8	759.1	759.10	759.37	759.58	760.33
I	758.9	760.0	760.13	759.81	758.98	760.23
J	758.5	759.3	759.04	758.91	758.09	759.49
A	759.3	759.9	759.84	759.60	759.11	759.80
S	762.1	762.0	761.97	761.80	761.24	762.39
O	762.8	763.0	763.30	762.72	761.49	763.88
N	763.5	762.9	762.53	763.49	763.84	763.98
D	762.6	762.7	763.12	763.32	763.57	763.11
E	761.2	761.7	761.77	761.53	760.82	761.85

of the University of Thessaloniki (KYRIAZOPOULOS [5]), for the observations of the years 1931 - 1937.

Pressure values for January in the first four series of Table IX, are all extremely high, but have no sequence. Thus figures jump from December to January by >2.0 mm Hg and then fall by >2.5 mm Hg from January to February. It should be mentioned, however, that, while the series of the Greek Gymnasium and the American Farm School have many gaps, leading to erroneous conclusions, the series of the Bulgarian Gymnasium, as mentioned by KUHLBRODT [2], have been taken from the readings of an aneroid barometer.

ALEXANDROU [6] comparing this last series with those of the Greek Gymnasium, finds the figures extremely high, for the elevation of 39 m, where the met. station of the Bulgarian Gymnasium had been functioning; this fact shakes our confidence in these figures.

For similar to the above reasons, we have to reject the maxima of May or June of previous series.

As for the minima, we have to note that in all series the primary minimum appears in July, the hottest month of the year. In our series, which is the longest, August, an equally hot month, comes next.

This primary summer minimum is due to the distribution of atmospheric pressure in the Eastern Mediterranean during the summer, when we have the considerable effect of the South Asia trough.

The appearance of the two maxima within the cold season (November, January), with the primary minimum in the hot two - months of July and August, denote an annual variation of the «continental» type in Thessaloniki. To this conclusion agree all previous research workers [4'5'6'7].

d. As for the recorded extreme daily values of pressure (Table V), they exceed all values mentioned by previous researchers. The maxima occured, as should be expected, with anticyclonic pressure systems having their center to the north or west of Thessaloniki, that is with weather types I, II, XI (LIVADAS [14]).

TABLE X

Weather types and extreme daily values of atmospheric pressure.

Weather Type	Maxima	Minima
I	7	—
II	4	—
XI	1	—
VI	—	2
VII	—	5
VIII	—	2
Xa	—	1
Xb	—	1

The minima have been recorded either with low pressure systems, with the depression centers to the south of the area of Thessaloniki (W.T. VI and VII, Xb), or with the depression centers over the Balkans (W.T. VIII, Xa).

e. The succession of pressure systems within the same 24 hours, results in abrupt changes of atmospheric pressure within a few hours. As we have already mentioned, in analyzing Table VIII, cases with pressure - change $\geq$10.0 mm within the same 24 - hours, hold a percentage of 1.36% of the total of cases examined in this paper (164 cases out of a total 12,055 days). An analytical and detailed study of these 164 cases, might prove extremely interesting from the viewpoint of «synoptic meteorology» but, is however outside of the scopes of the research in hand.

REFERENCES

1. Eredia, F., 1916 : Sul clima di Salonico. Bollet. della R. Stà Geografica Italiana, Fasc. XII, pp. 986 - 1006.
2. Kuhlbrodt, E., 1920 : Klimatologie und Meteorologic von Mazedonien. Archiv der Deutschen Secwarten, XXXVII, No. 5, s.7. Hamburg.
3. Kuhlbrodt, E., 1921 : Klimatologie und Meteorologie von Mazedonien. Met. Zeit., Bd. 38, s. 344.
4. Mariolopoulos, E. G., 1938 : Τὸ Κλῖμα τῆς Ἑλλάδος (Ἀτμ. Πίεσις σελ. 253 - 260). Ἀθῆναι.
   The Climate of Greece (Atm. pressure pp. 253 -260). Athens.
5. Kyriazopoulos, B. D., 1939 : Τὸ Κλῖμα τῆς Ἑλληνικῆς Κεντρικῆς Μακεδονίας (Ἀτμ. Πέεσις σελ. 304 - 308). Ἀθῆναι.
   The Climate of Central Greek Macedonia. (Atm. pressure pp. 304 - 308). Athens.
6. Alexandrou, L., 1933 : Τὸ Κλῖμα τῆς Θεσσαλονίκης (Ἀτμ. Πίεσις σελ. 43 - 46. Διατριβὴ ἐπὶ Διδακτορίᾳ. Ἐπετ. Φυσικομαθηματικῆς Σχολῆς Παν/μίου Θεσσαλονίκης. Τομ. I.
   The Climate of Thessaloniki (Atm. pressure pp. 43 - 46). Doctoral Thesis. Sci. Ann. Fac. of Phys. & Mathem., Univ. ofThessaloniki, Vol. I.
7. Alexandrou, L., 1940 : Ἡ Ἀτμοσφαιρικὴ Πίεσις ἐν Θεσσαλονίκῃ. Ἐπιστ. Ἐπετ. Φυσικομαθηματικῆς Σχολῆς Παν)μίου Θεσ)νίκης, Τομ. VI, σελ. 185 - 196.
   Atmospheric Pressure in Thessaloniki. Sci. Ann. Fac. of Phys. & Mathem., Univ. of Thessaloniki, Vol. VI, pp. 185-196.
8. Mariolopoulos, E. G., 1933 - 38 : Ohservations Météorologiques de Thessaloniki. Annuaire de l'Institut Météorologique et Climatologique No. 1 (1930) - No. 8 (1937).
9. Kyriazopoulos, B. D., 1949 - 64 : Observations Météorologiques de Thessaloniki. Annuaire de l'Institut Météorologique et Climatologique No. 9 (1938) - No. 25 (1958).
10. Livadas, G. C., 1970 - 73 : Observations Météorologiques de Thessaloniki. Annuaire de l'Institut Météorologique et Climatologique No. 26 (1959), No. 28 (1960) - No. 38 (1970).
11. Livadas, G. C., 1973 : Observations Météorologiques de Thessaloniki. Annuaire de l'Institut Météorologique et Climatologique No. 27 (Spécial).
12. Livadas, G. C. and Arseni - Papadimitriou, A., 1972 : Meteorological Observations of the German Weather Station in Thessaloniki, 1941 - 1944. «Climatologika» Publ. of the Met. Clim. Institute, Univ of Thessaloniki, No. 1.
13. Makroyannis, T. J. and Arseni - Papadimitriou, A., 1972 : Programs for the Processing of Meteorological Data by Computers. «Climatologika» Publ. of the Met. Clim. Institute, Univ. of Thessaloniki, No. 2.
14. Livadas, G. C., 1962 : Ὁ Καιρὸς τῆς Πάχνης ἐν Ἑλλάδι. Ἐπιστ. Ἐπετ.Φυσικομαθηματικῆς Σχολῆς Παν)μίου Θεσ)νίκης, Πυράρτημα Ἀρ. 12.

Hoar - Frost Weather in Greece. Sci. Ann. Fac. of Phys & Mathem., Univ. of Thessaloniki. Appendix No. 12.

15. Biel, E. R., 1944 : Climatology of the Mediterranean Area. Publ. of the Inst of Meteorology of the University of Chicago, Misc. Rep. No. 13.
16. Air Ministry, Met. Office, 1962 : Weather in the Mediterranean. Vol. I (Second Edition). London.
17. Béranger, M., 1955 : Essai d'Etude Météorologique du Bassin Méditerranéen. Mémorial de la Météo. Nationale No. 40. Paris.

ΑΤΜΟΣΦΑΙΡΙΚΗ ΠΙΕΣΙΣ ΕΝ ΘΕΣΣΑΛΟΝΙΚΗ

Ὑπὸ

Γ. Κ. ΛΙΒΑΔΑ καὶ Τ. Ι. ΜΑΚΡΟΓΙΑΝΝΗ

('Εργαστήριον Μετεωρολογίας - Κλιματολογίας 'Αριστοτελείου Πανεπιστημίου Θεσσαλονίκης)

ΠΕΡΙΛΗΨΙΣ

Μελετᾶται ἡ ἀτμοσφαιρικὴ πίεσις ἐν Θεσσαλονίκῃ διὰ τὴν χρονικὴν περίοδον μεταξὺ τῶν ἐτῶν 1931-1970. Δίδονται μέσαι καὶ ἄκραι ἐτήσιαι, μηνιαῖαι καὶ ἡμερήσιαι τιμαί, συγκρίνονται δὲ αἱ μηνιαῖαι τιμαὶ μὲ τὰς ἀναφερομένας ὑπὸ προηγουμένων ἐρευνητῶν.

Δίδονται αἰτιολογίαι:

α) Τῶν μεγίστων καὶ ἐλαχίστων τιμῶν, ἐν συνδυασμῷ μὲ τοὺς ἐπικρατήσαντας τύπους καιροῦ, ὡς ἐπίσης ἀναλύεται ἡ περίπτωσις τῆς 26ης 'Οκτωβρίου 1939.

β) Τῆς ἐποχικῆς μεταβολῆς τῆς ἀτμοσφαιρικῆς πιέσεως, συναρτήσει τῶν ἐπικρατούντων βαρομετρικῶν συστημάτων, εἰς τὸν 'Ατλαντικὸν ('Αντικυκλὼν τῶν 'Αζορῶν), καὶ εἰς τὴν 'Ασίαν.