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THE CLIMATIC CONDITIONS OF THE COASTAL AREAS AT THESSALONIKI DURING THE HIGH TOURISTIC PERIOD

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Abstract: *We have used the daily meteorological data (maximum temperature, absolute humidity at 14:00 local time, sunshine duration and the precipitation's hours during sunlight time) of the station of Thessaloniki for a period of ten years (1966-1975).*

Based upon these data we have developed a methodology in order to classify the weather types that appear during the summer touristic period (June to September).

The weather types that result from the combination of the mentioned meteorological data are not a product of an automatic classification. On the contrary we have taken in account the human behavior and the reaction between environment and people in order to explain the ambient weather and climate, by means of bioclimatic criteria.

We have also estimated the frequences of the weather types for every year, month and decade of days. Thus all these periods above are expressed by means of a number of days of fine, pleasant, comfortable weather and so on.

These numbers of days are determined in combination with the bioclimatic indices which limit the sense of thermal comfort, of human comfort and so on.

INTRODUCTION

Weather and climate seem to be the main topics for discussion and the most important decision making factors concerning the large-scaled summer touristic movements. Climate is the basic element in advertising campaigns of private and state travel enterprises. We would like to point out, however, that any negative aspect of an area's climate will never be cited. Winds blowing from north or the south and causing extreme temperature fluctuations or even sea breezes, acting as factors increasing air pollution in coastal areas where industrial installations are usually numerous, are systematically ignored.

A deliberately exaggerated false picture of atmospheric environment is usually presented to people planning to visit a country. However, we have to admit that the efforts made so far for a really scientific description of touristic climatic conditions may not be quite satisfying. Could these descriptions give tourists a thorough picture of atmospheric enviroment? Furthermore, could they give the information needed by touristic services concerning establishing of large touristic installations? (e. g. frequency of sunny days, touristic period lengthening possibilities etc).

In most cases just one important aspect, different from one investigator to other, is usually stressed and the tendency is just to present certain mean values. Reports on complex indeses defined on the basis of certain meteorologic parameters, or even diagrams depicting water balance may be made. The tourists interest, however, seems to be oriented towards the real situations, the weather they do experience during a day. The knowledge that 80% of a summer month's days are sunny, or that 90% are rainless, or even that temperature is within tolerable boundaries in the 50% of them, seems to be uniportant compared to realistic information which would be to know the number of days possessing altogether the features mentioned above.

The main purpose of the present study is to offer not only an approach to the problem methodogically oriented towards a non automatic description of the most frequent combinations of the basic meteorologic phenomena (P. MAHERAS, 1982), but also, taking in account the bioclimatic criteria of people behavior and reactions, to proceed to a clear-cut description of weather and climate ie the way we feel and live them. Previous similar studies, those by J. BESANCENOT (1978) and I. ROUSSEL (1972) in particular, have been reviewed concerning this attempt for wearthe classification.

1. METHOD OF WEATHER TYPES CLASSIFICATION

Sunlight and blue sky function as tourists attracting factors. Instead of sunshine duration, sunshine fraction was used in our study, so that we could have comparable values in different months. Taking in account that sunshine fraction in Thessaloniki seldom exceeds 0.90 we consider as «sunny» any day with a ratio more than 0.60 (I>0.60). In cases I ranges from 0.60 to 0.30 weather is said to be «nice with partial clouding», while when I is less than 0.30, bad or cloudy.

Concerning rain (P) only rainfalls during the day-time (08.00-

20.00) were measured. Duration of rain in hours was used instead of height of rain. Ohviously, a dry day's rain equals zero (rain=0). Two grades were used: 1. Generally incident of rain 2. rain with duration of less than 3 hours.

Daily maximum air temperature (T) was used as a measure for temperature (T) since this temperature is most frequently felt, reaching its msaximum almost always around 15.00h. The temperature of 18° C, frequently used in bioclimatic touristic research (J. BESANCENOT, 1978) was taken as the lowest limit below which the feeling of comfortness does not exist. Below this temperature human body starts to defend against cold. The temperature of 33° C, roughly reflecting normal bare skin temperature was used as the upper limit. In temperatures higher than 33° C, people, on holidays will have to avoid long exposure to sun, while in temperatures lower than 18° C the same people dare not being exposed at the seashore unless they have a pullover on (J. BESANCENOT, 1978).

Winds (V) are an additional factor regulating the feeling of comfortness, acting in two ways: 1. the feeling of cold they cause 2. the disturbing feeling of movement and pressure on the body.

Cooling power is the best variable that could be used. In the present study, however, we used speed of wind (Km/h) at 14.00, hoping to use in the future a probably more formidable variable such as cooling power. Our experience is that winds blowing with a speed less than 25Km/h cause a rather pleasant refreshing feeling to people, not disturbing them at all. When, however, winds speed exceeds 25 Km/h not only a disturbing feeling of cold is experienced, but, furthermore, rather pronounced sea waving appears, acting against the feeling for sea bathing.

The last parameter used for weather types classifications and description, from a touristic viewpoint, is absolute humidity (c) at 14.00. Most investigators believe that 23.5 gr/m^3 are the upper limit of absolute air humidity a person can adjust himself with little effort. Beyond this value man experiences uncomfortness and in some cases, serious health problems arise in sensitive persons. The value of 18.9 gr/m^3 was used as the second absolute humidity grade.

2. WEATHER TYPES CLASSIFICATION AND DESCRIPTION

The data selected were combined using the above descrided classification method. Thus eight weather types were formed (I to VIII).

A computer-program was used for classification of each day to one of these types, some of which (type II in particular) are extremely rare, though others (type I) are very common, being typical ot summer period.

WEATHER TYPE I:
Very nice sunny weather.

$I \geq 0.60$
$25^0C \leq T \leq 33^0C$
$P = 0$
$V \leq 25Km/h$
$e \leq 18.9gr/m^3$

WEATHER TYPE II:
Nice weather

$I \geq 0.60$
$18^0C \leq T \leq 25^0C$
$P = 0$
$V \leq 25Km/h$
$e \leq 18.9gr/m^3$

WEATHER TYPE III:
Hot, Wet, Sunny, weather.

$I \geq 0.60$
$T > 33^0C$
$P = 0$
$V \leq 25Km/h$
$e < 23.5gr/m$

WEATHER TYPE IV:
Nice, partially cloudy weather.

$I \geq 0.60$
$T \leq 33$
$P = 0$
$V \leq 25Km/h$
$e \geq 18.9gr/m^3$

$0.30 \leq I < 0.60$
$18 < T \leq 33^0C$
$P = 0$
$V \leq 25Km/h$
$e \leq 18.9gr/m^3$

WEATHER TYPE V:
Nice weather with temporary rainfall

$I \geq 0.30$
$18 < T \leq 33^0C$
$P \leq 3hours$
$W \leq 25Km/h$
$e \leq 18.9gr/m^3$

WEATHER TYPE VI:
Nice windy weather

$I \geq 0.60$
$18 < T \leq 33^0C$
$P = 0$
$V > 25Km/h$
$e \leq 18.9gr/m^3$

WEATHER TYPE VII:
Rainy cloudy weather

$I \leq 0.30$
$18 \leq T \leq 33^0C$
$P > 0$
$V < 25Km/h$

WEATHER TYPE VIII:
All other types of weather not favoring touristic activities.

Type I, very nice weather, is obviously formed through combination of prolonged sunlight, temperatures leading to a feeling of excellent comfort, and lack of rainfalls or strong winds. Temperature is the basic point of difference between types I and II, the former leading to excellent climatic conditions attracting tourists to the seashore with a feeling of comfort.

Weather type III causes a feeling of uncomfortness due to high temperature or humidity or even the common action of these two variables, which in combination with prolonged sunlight and lack of winds, lead to burning heat. The results are well known: a massive outflow of people who leave towns seeking coolness by the sea.

Reduced length of sunlight and partially cloudy weather make tourists doubt as to whether being by the sea will be comfortable. Lack of rainfalls and winds however, seem to ultimately have a quite convincing effect. (Type IV).

Weather type V stands for relative worsening of meteorologic conditions due to the presence of rainfalls, which nevertheless last not so long to diminish radically touristic activities since they never exceed the limit of these hours.

The prominent feature of type VI is the blowing of strong winds causing an unpleasant feeling. Furthermore, in cases wind's blowing direction is from sea to land, waves appear making people leave the beaches. These meteorologic conditions however, should not be regarded unanimously disturbing since a windy day may be not so bad for closed, wind protected beaches or may be enen favorable for sea sports.

Weather type VII is unpleasant mainly due to reduced sunshine duration and rainfalls which may be long lasting. This cloudy and rainy weather during summer leads to empty beaches and makes tourists stay in.

Weather type VIII comprises all summer days not included in any of the above described types. Needless to say that the weather is bad and may forse tourists staying indoors. Sunshine is extremely reduced, rainfall's duration prolonged and winds strength increased, while temperature in some cases may be high. Since tourists have to stay in, within an artificial microclimate, we think that defining conditions of comfortness in relation to atmospheric conditions outdoors, is of no importance.

TABLE I

Relative frequencies of the weather types
(Summer period, per month, per ten days period)

		I	II	III	IV	V	VI	VII	VIII
JUNE	1	47.0%	5.0	1.0	10.0	17.0	1.0	16.0	3.0
	2	47.0	1.0	6.0	7.0	20.0	5.0	10.0	4.0
	3	53.0	1.0	11.0	7.0	12.0	7.0	5.0	4.0
TOTAL		49.0	2.3	6.0	8.0	16.3	4.3	10.3	3.7
JULE	1	50.0	0	13.0	2.0	17.0	6.0	7.0	5.0
	2	35.0	0	33.0	3.0	11.0	8.0	3.0	7.0
	3	54.5	0	17.3	4.5	13.6	2.7	4.5	2.7
TOTAL		46.8	0	21.0	3.2	13.9	5.5	4.8	4.8
AUGUST	1	42.0	0	33.0	3.0	8.0	5.0	5.0	4.0
	2	49.0	0	24.0	4.0	9.0	4.0	2.0	8.0
	3	60.0	0	10.0	8.2	7.3	1.8	10.9	1.8
TOTAL		50.6	0	22.0	5.2	8.1	3.5	6.1	4.5
PERIOD		48.8	0.8	16.4	5.4	12.7	4.5	7.1	4.3

3. WEATHER TYPES' FREQUENCY ANALYSIS

Based on the data selected, we estimated the mean absolute and relative frequency of summer weather types, the frequency per month and also per ten days period, for a total of nine subperiods.

As it is shown in table I and figure 1 weather's type I frequency, approaching 49%(48,8%), substantially exceeds those of weather, which gradually decrease. Thus weather type III follows with a frequency of 16.4%, type V 12,7%, type VII 7,1% and type II 0,8%, the last weather type appears only in June.

The first three most common (sunny weather) frequencies, taken as a whole, equal 66%, meaning that these weather types cover two of every three days of this period. Furthermore, if frequency of weather type VI, which though windy is in fact a sunny weather, is added to that number it approaches 70.5%, meaning seven in every 10 days. Similarly, by adding types' IV and V frequencies (weather only parti-

ally cloudy, combined or not with temporary rainfalls) the percentage comes to 88.6%, meaning that weather of nine in every 10 days is not bad.

Monthly frequency analysis shows that weather type I appears mostly in August and June (covering respectively 50.6 % and 49 % of the days) Type III presents its highest rate of appearance also in August (22%) with July coming just behind (21%).

On the other hand bad weather (types VII and VIII) shows its minimal rate in July (9,6%), while in August (10,6%) and June (14%) it presents a steady increase. Weather's type VI frequency shows its

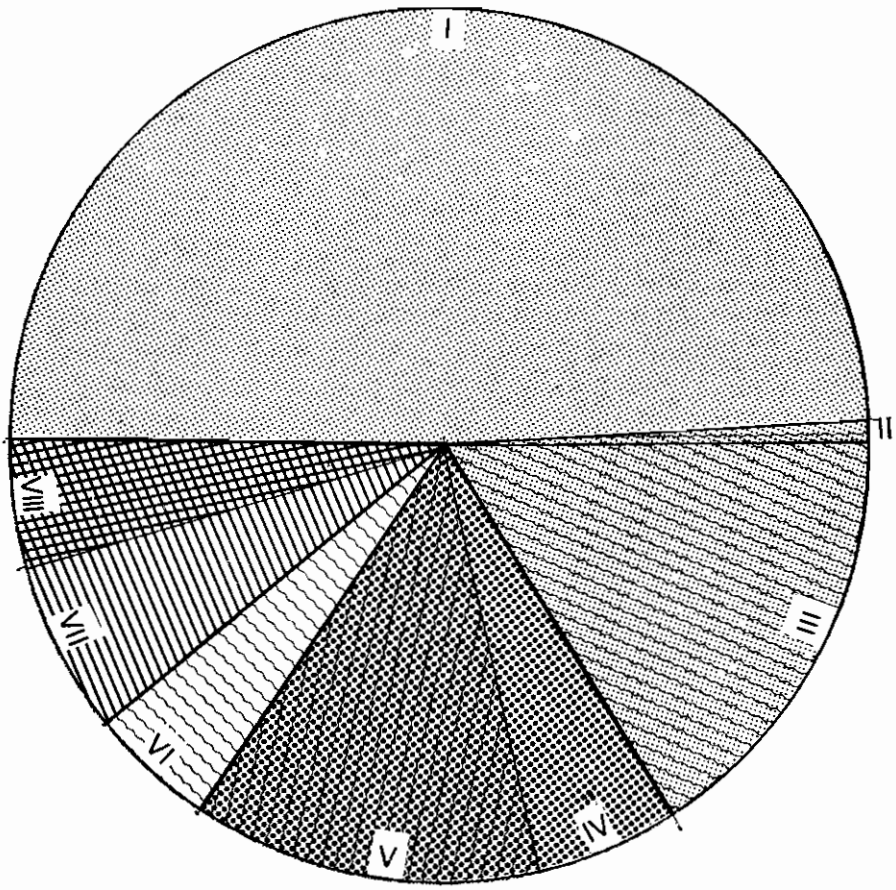

Fig. 1. Relative frequency of weather types for the summer period (June - August 1966-75)

maximum in July (5,5) %. The same holds for weather types IV and V (respective June rate 8.0% and 16,3%) which show their minimal rate in August (5.2% and 8.0% respectively).

As to the relative frequency for every period of ten days, highest value for sunny weather types appears (figure 2, curve a) during the first 10 August days (75%) and lowest in the first 10 of June (53%). A secondary minimum appears during the first 10 July days (63%) while the secondary maximum comes during the 10 preceding ones (last 10 days of June- 65%).

The highest frequency (27%) of weather types IV and V (weather sunny enough, combined some of the times with temporary rainfalls) appears during the first and second 10 days periods of June (curve b) while the lowest (11%) is reached the first 10 August days. A secondary maximum (18%) appears the last 10 July days and the respective secondary minimum (13%) the preceding 10 days of the same month.

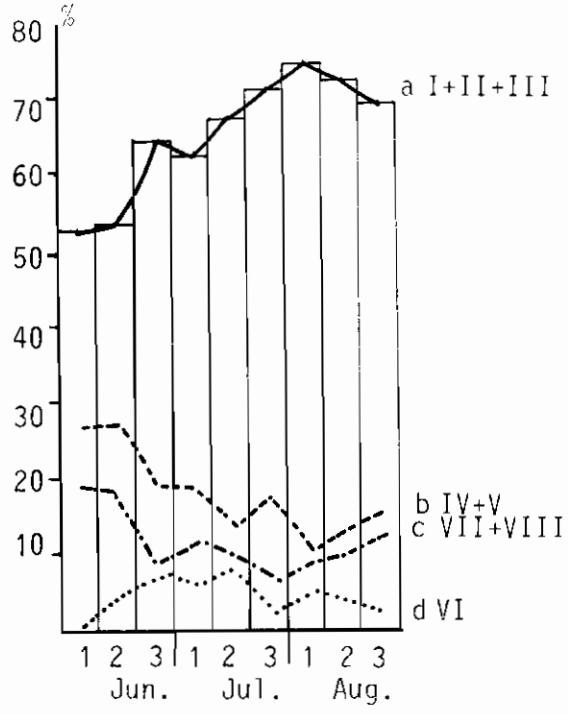

Fig. 2. Course of weather types frequency during the ten - days Summer period (1966-75)

Not surprisingly, bad weather types (VII and VIII, curve c) present their maximal frequency during the first 10 June days (19 %) and their minimal (7%) the last 10 days of July. A secondary maximum (12%) appears during the first 10 July days and a secondary minimum (9%) the last 10 days of June. Finally, days with sunny windy weather present their highest incidence (8%) during the second 10 days period of July and their lowest during the first of June.

CONCLUSIONS

The eight weather types defined and described for touristic purposes comprise the last decade's total of summer atmospheric conditions. If observation period is prolonged to five or six months of the year, new weather types will appear, mainly through temperature, functioning as a reinforced variable. This work consequently could not be viewed as intended to give an overall solution to the problem discussed above. On the contrary, its main purpose was to propose a classification method, open to future improvement, such as the use of complex parameters, (cooling power, air-enthalpy) of observation period and by using data from more than one stations.

The real character of summer weather for each month and 10 days periods was made in this study through weather types' frequency analysis. «Sunny weather» is by far the commonest weather type of this period. However we would like to point out, once more, that this weather types' frequency is lower at Thessaloniki area compared to other coastal areas in Greece, a point we would like to definitely confirm in a future study.

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