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HAS THE CLIMATE CHANGED?

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Résumé: ***On peut parler sur un changement climatique en vérité?*** Cette interrogation analyse le point de vue qui regarde la circulation atmosphèrique comme le facteur climatique determinant. En même temps, cette question actualise des ouvrages de référence d'années 1950 qui s'occupent du problème de la fréquence des types de circulation atmosphérique au dessus de l'Europe, aspect integré dans les scénarios et dans les théories qui visent le réchauffement climatique et le changement climatique.

Mots-clés: réchauffement climatique, circulation atmosphèrique, champ de pression atmosphérique

Lately, mass-media has brought into everyone's attention a lot of apocalyptic scenarios concerning the climate. We hear more and more often terms like the global warming, the amplification of the greenhouse effect, the rapid melting of the glaciers and even dramatic climate changing.

But, have you ever wondered, how much truth is there, in these scenarios and how much credibility have hose who back them up in newspapers and on TV?

This question is as actual now days as it was about 110 years ago, when Stefan Hepites, the coordinator of the Central Meteorologic Institute founded in 1884, answered the question: "Is the climate changing?" After consulting different historic sources, he gave a negative response.

The climate cannot change unless one of its genetic components changes too:

- the solar radiation, through the changing of the angle of incidence or the intensity of the radiation;
- the underlying surface, through the changing of the land –sea level on a global scale or between the polar ice field and the planetary ocean;
- general circulation of the atmosphere, which is responsible for the transfer of energy between Equator and the two poles and which is caused by the natural tendency towards thermal and barometric balance and the compensation of the unequal warming of the Earth.

The first two factors have insignificant fluctuations and are quantifiable only on geological scale, so the dynamic "Air Ocean" is a lot more concrete and tangible. Further on, I will try to argue, at least partially, that the temperature oscillations, the rainfall or other weather phenomena's on a historic scale cannot be considered climate changes, only climate variations.

Yet, if there are certain researchers, authors and opinion leaders who can identify and argue the existence of thermic, barometric or pluviometric anomalies with global implications, in my opinion, they should deepen more the Milancovitch oscillations concerning the solar activity. According to the „astronomical theory", the cycles of climate changes correspond with the Earth's eccentricity periods; that means that they have a strong causal connection with the glaciations and the interglaciations periods.

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More exactly, on the official website of the National Administration of Meteorology, on the basis of a long substrings data gathered from 14 weather stations (1901-2000), is presented a heating average of 0.3 degrees for the whole country, a bit higher in the eastern half of Romania (about 0.8 degrees in Bucharest, Filaret, Constanta and Roman); in the intracarpathian regions the warming is insignificant. If we're thinking that between 1960 and 1975 the average global temperature has decreased by 1.5 degrees and life has followed its natural course, how could less than 1 degree more cause/bring the great Apocalypse?

If the athmospheric circulation is relatively uniform in the areas between the tropics and at the two poles, we cannot say the same thing about the temperate regions. Here, at temperate latitudes, where the west winds and the JET currents are found, the circulation of the air is much more intense and less predictable. Here, we can also find movable cyclones and anticyclones, which play an important part in the energy exchange between the equatorial cell of the general air circulation and the polar cell. The direct consequence is that on ground the wind can blow from all directions, but mostly from the western sector.

The wind's direction on ground is established by the barometric field, which consists of the spatial disposion of the main barometric elements found at this latitude. Since 1965, N. Topor and C. Stoica studied for 52 years (1899-1951) the 4 barometric systems typical for the European continent:

- the Azoric Anticyclone (warm) which persists throughout the year above the Atlantic Ocean between 20 and 40 degrees northern latitude;
- the North-Eastern European Anticylone (cold) typical for the cold season of the year;
- the Icelanding Cyclone persists the whole year above the northern part of the Atlantic Ocean, very strong in winter and weak in summer;
- the Mediteranean Cyclone, typical for the whole cold season, known as "the last member of the Icelander cyclone family".

The barometrical system specific for the two most representative months of the year has the following distribution:

1. In January, the Europe is influenced by the 4 barometric systems listed above, which are disposed as in picture nr.1. Under these circumstations, Romania is directly influenced by the North-Eastern European Anticylone and indirectly by the Mediteranean Cyclone. The direction of the air circulation in the lower troposphere is from north-east to south-west and in the upper troposphere is the other way around: from south-west to north-east. The weather is cold, with little rain in the extracarpatic regions and a bit warmer and with more snow in the intracarpatic areas and to the mountains.

2. In July, the hottest month of the year, the barometric field is dominated by the three main barometric systems (picture nr. 2): The Azoric Anticyclone, the most important and the most extensive, The Azoric Cyclone, smaller and the Depression from the south-west Asia, with thermal origins, with the centre in Iran. The barometric gradients are weak and the air circulation is slow. As the Atlantic air masses approach our country, they lose dampness and become more and drier. The lack of the barometric gradient is responsible for the missing of a dominant wind direction in this season. Meteorological phenomena are influenced by the properties of air masses, by the thermodynamic changes induced by the orography and by the barometric field of altitude. All these are local, not migratory; they last for a short while and occur mainly in the afternoon, because of the thermic convection.

Besides these two barometric average distributions in the cold and hot season, there is also a number of intermediate barometric systems and particular cases which involve different forms of air circulation above the european continent.

N. Topor and C. Stoica have identified seven barometric types which last longer and have a certain influence on the aspect of the local weather.

1. Type 1 (figure nr. 3) - west anticyclone which determines the north air masses advection. This way there are involved arctic masses from northern of Scandinavia to the eastern basin of the Mediterranean Sea. In winter, in Romania we confront with strong frost, wind and moderate snow. In spring and autumn occur late snowfalls and frosts, but also early snowfalls and frosts. In summer time this type determines a cold weather and temporary rain. This barometric type has a rather low frequency.

2. The 2nd type (figure nr .4) Anticyclon in the East: which leads to the advection of the air masses from the South, that means dry, tropical air advection from the North of Africa, sometimes from the South-East of Asia. The consequence is the droughty and warm weather in summer, heat waves in summer and autumn, warm and frog weather in winter. This type has a higher frequency in March and November and lower in July.

3. The 3rd type (figure nr. 5) Anticyclonic belt from the Atlantic Ocean to the North-East of the continent with the longitudinal axis situated in the North of Romania. This type determines an advection of the air from North-East-North. The pressure axis raised separates the Icelander cyclone from the Mediterranean one. The consequence is the cold weather in association with intensely wind and snow in the South of the country in winter and in summer and winter weak rains. In summer the weather is warm and the wind is strong. The highest frequency is in October and November.

4. The 4th type (figure nr.6) Anticyclonic belt in all South Europe, including the hollow of the Mediterranean Sea and the North of Africa. The Nordic half of the continent is under the effect of the Icelander Cyclone. The air advection from the South and South-East leads to great weather, dried and warm in all seasons. The frequency of this type is much higher than at other types, about 16% a year, with maximum values in October and minimum in June and July.

5. The 5th type (figure nr. 7) The Azoric anticyclone's wedge in the North-West. In this case, it lengthens from the North-East until the Baltic Sea, while in the North Atlantic and the South-Eastern Europe are dominated by a depression system. Above Romania the air advection comes from the North sector, with winds from the North-West in the subcarpatian regions and from the North and North-East in the South and East of the country. The weather is generally wet and warm in winter and wet and cold in summer. In the transition seasons, the weather is warm with rains when the anticyclone extents to the centre of Europe and dried when it goes back to the West. This type has a higher frequency, almost 20% from the cases, with the highest values in summer, in July and the lowest in October.

6. The 6th type (figure nr. 8) depressionary field in the East. It is characterized by the extension of the Greenlandic anticyclone over the North Atlantic until the North of Germany. In the half of the Eastern Romania there are two depressionary areas: one with the centre in the Mediterranean Sea extended to all the South-Eastern Europe, and another in the Norh-East of the Russian Federation, which forms a depressionary alley from the North of Scandinavia till the Mediterranean Sea hollow. In our country this type determines the advection of wet, polar air, from the North and North-West.

The consequence is the cold weather and the intensification of the wind, with abundant rainfalls and snows. The frequency of this type is about 10% (lower in winter and higher in summer).

7. The 7th type (figure nr. 9) depressionary alley in the West. The centre of the continent is dominated by barometric lap formed between the two cyclones (Icelandic and Mediterranean) and the two anticyclones (Azoric and North-Eastern European). In our country, the air advection comes from the Eastern sector and the weather is wet with abundant rainfalls in all the seasons and strong wind in spring and autumn. If the continental anticyclone extends, it creates favourable conditions for powerful blizzards in the extracarpatian regions. This type has a pretty high frequency, over 21%, with maximum values in April and minimum in July.

The frequency of each barometric type and its balance in the context of general circulation above Europe is synthetically represented in picture nr.10. The types that determine the air advection in the Western sector and its side sectors, meaning North-Western and South-Western are the 1st, 4th and 5th type, which altogether represent more than 50% of the cases. This confirms the ascendant eastern winds' theory from the temperate latitude. Namely, although theoretically the wind may blow from any direction depending on the disposal of the barometric forms which are very mobile, the Western circulation is the most common.

Taking into consideration the model and the barometric types proposed by N. Topor, my intention is to see if the frequency of the barometric types is similar in the latest years, an important fact from the reason that the general atmospheric circulation is climate's most dynamic factor.

Using the specified sources at the subchapter regarding the utilised methodology, I have analyzed, for now, only four years (from the ten proposed, by reason of accumulation and necessary time). In many summer days, the aerosinoptic situation, meaning the disposal of the barometric centres is identical with the reappearance of the atmospheric pressure at the sea level in July as N. Topor says (figure nr.2); these situations have been assimilated to the 5th type of atmospheric circulation.

Although the period of time is not a very long one, the results are important in terms of the fact that there are no significant differences between the air circulation at the beginning of the last century and the one from the beginning of this millennium. The results are represented in the chart from figure nr. 11.

In 1898, Stefan Hepites said that in the Middle East the climate is the same it was 3250 years ago on Moses time, and that in Romania is similar to the one from the beginning of our Age, during the pontic exile of poet Ovidiu. So, if during the latest years the atmosphere is moving as in Nicolae Topor's time, the followers of the climatic apocalyptic scenarios will have to wait for a long time.

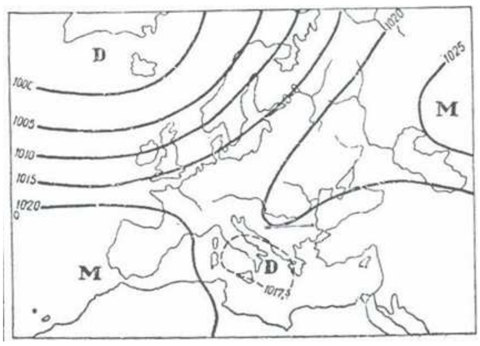

Fig. 1 The distribution of the average atmospheric pressure at sea level in January

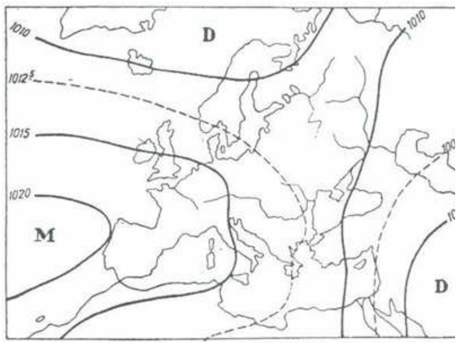

Fig. 2 The distribution of the average atmospheric pressure at sea level in July

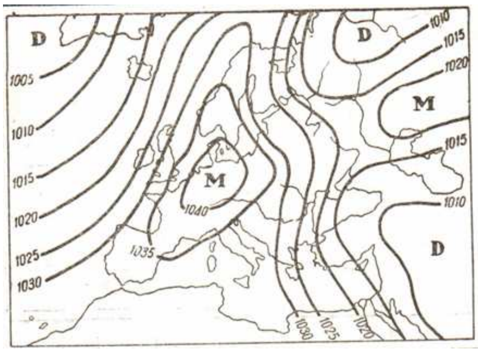

Fig. 3 Type 1 of the atmospheric circulation

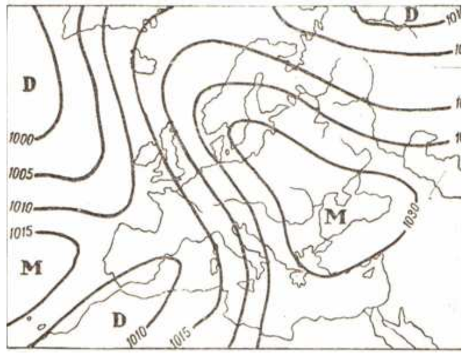

Fig. 4 Type 2 of the atmospheric circulation

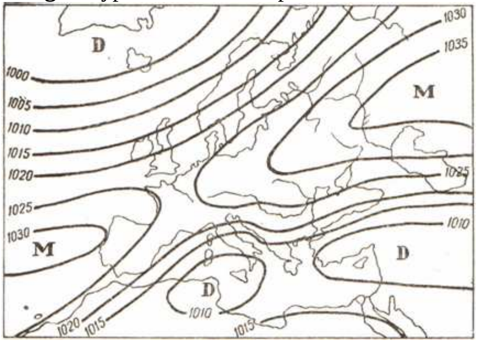

Fig. 5 Type 3 of the atmospheric circulation

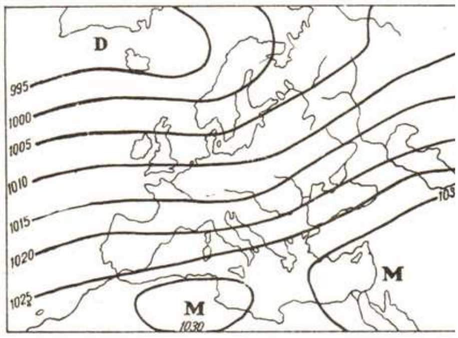

Fig. 6 Type 4 of the atmospheric circulation

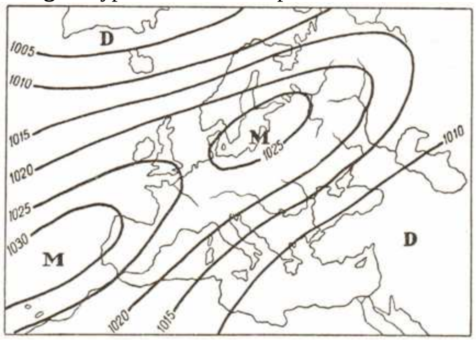

Fig. 7 Type 5 of the atmospheric circulation

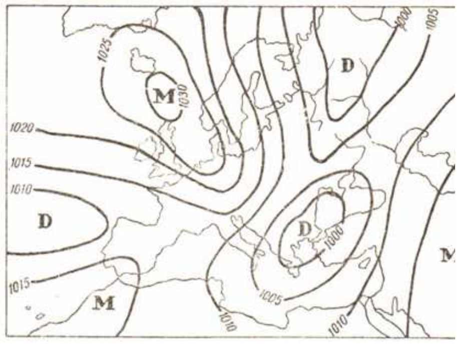

Fig. 8 Type 6 of the atmospheric circulation

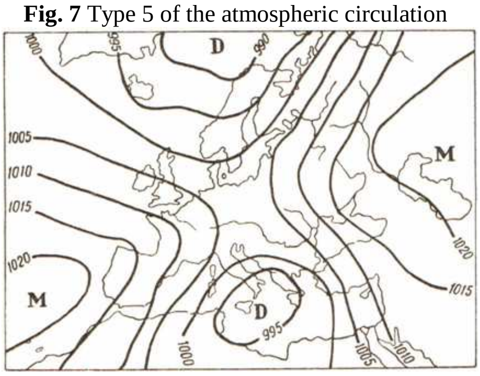

Fig. 9 Type 7 of the atmospheric circulation

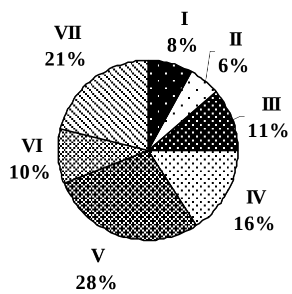

Fig. 10 The frequence of the barometric types 1899 -1951 (by N. Topor)

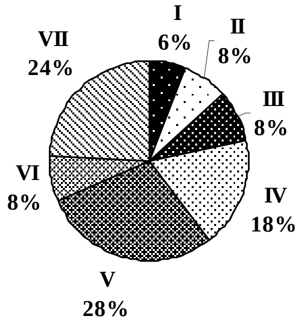

Fig. 11 The barometric types 2006-2002

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