CLIMATE EVOLUTION IN ROMANIA IN THE GLOBAL CLIMATE CHANGE USING DATEABASES

EVOLUȚIA CLIMEI DIN ROMÂNIA ÎN CONTEXTUL SCHIMBĂRILOR CLIMATICE GLOBALE UTILIZÂND BAZE DE DATE

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Abstract *Present brings several environmental problems for people. Many of these are closely related, but by far the most important problem is the climate change. In the course of Earth evolution, climate has changed many times, sometimes dramatically. Warmer eras always replaced and were in turn replaced by glacial ones. However, the climate of the past almost ten thousand years has been very stable. During this period human civilization has also developed. In the past nearly 100 years - since the beginning of industrialization - the global average temperature has increased by approx. 0.6° C (after IPCC (Intergovernmental Panel on Climate Change), faster than at any time in the last 1000 years.*
Key words*: basin, confluence, decay, wastes, pollution, environment*

Rezumat. *Prezentul aduce in fața oamenilor multiple probleme privind mediul. Multe dintre acestea fiind strâns corelate între ele, însă de departe cea mai importantă problemă este, aşa cum au arătat-o rezultatele sondajelor din anii anteriori, al cărui subiecți au fost experți în domeniu, schimbarea climei. În cursul evoluției Pământului, clima s-a schimbat de multe ori, uneori chiar în mod dramatic. Erele mai calde au înlocuit şi au fost înlocuite mereu de ere glaciare. Totuşi, clima din ultimii aproximativ zece mii de ani a fost deosebit de stabilă. În această perioadă s-a dezvoltat şi civilizația umană. În ultimii circa 100 de ani – de la începutul industrializării – temperatura medie la nivel global a crescut cu cca. 0,6°C (după IPCC (Intergovernmental Panel on Climate Change), mai repede decât oricând în ultimii 1 000 de ani.*
Cuvinte cheie: *climate, environment, climate change, temperature*

INTRODUCTION

Global warming affects our country, the most pronounced effects being hot and dry winters. In Romania there is a significant increase in the frequency of rare and extreme weather events: hot summers, tornadoes, floods. Weather records for more than 100 years show a clear trend of desertification in an area of 3 million hectares in the eastern part of the country (Dobrogea), East Muntenia and southern Moldova, of which 2.8 million ha of arable land (20% of Romania's agricultural background).

For the past century it has been highlighted up to an average temperature increase of 0.3 ° C, with an increase reported after 1960. The increase is more

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pronounced and differentiated in the southeast regions with values of 0.8 ° C at stations as Bucharest, Constanta and Filaret. Increases are lower in the central and northern part of the country except Baia Mare depression where values of 0.7 ° C were highlighted.(Sandoiu, 2005).

Data recorded at the main meteorological stations in the country and weather stations in Western Carpathians, located at altitudes between 1090 and 2504 m for the period 1961 to 2000 reveal the following:

- An increasing trend in global average air temperature at the earth's surface, accelerated in the last 25 years;
- A slight increase in mean annual temperature and decreased rainfall mountainous areas;
- A slight increase in annual mean temperature stations Omu Peak (2504 m) and a clear increase in Stana de Vale for the period 1979-2000;
- Melting glaciers Scărişoara and reducing it to 2.0 m in the last 100 years, of which the largest reduction was reported in the past 25 years;
- Increasing the water level in different sections located on the Black Sea coast with up to 45 cm in a period of 130 years;
- occurrence of extreme temperatures, such as those recorded on 5 July 2000 data station Giurgiu 43.5 º C and 42.4 C in Bucharest since 1984 (Sandoiu, 2005).

Examples of changes in climate. 2000 was the year characterized by widespread drought and excessive heat. The summer of 2000 was the driest in the last 100 years, preceded by the spring which was also very dry. In terms of precipitation, significant regional differences indicate a slight increase in the south, west and east and the rest of annual quantities decline.

It is obvious stress the torrential rainfall which is manifested by loss of large amounts of rainfall in short periods followed by long periods of drought. Even in dry years rainfall produced extensive flooding during the spring when combined with snowmelt and summer heat (Dima and Stefan, 2008).

Rapid alternation of rainy periods with dry periods were frequent and a significant example in this respect was 2000 when after a spring in which there were major floods, a very dry period in June and July followed.

MATERIAL AND METHOD

Climate reference period is the period during which the time series are formed, according to continuous and homogeneous meteorological observations, which are found in the databases. This period length was fixed by WMO (World Meteorological Organization) at 30 years. Currently the reference period used is during 1951 - 1980, but the following statistics will be based on the period 1961 - 1990. In this article there were used databases from 1971 to 2000 for drawing the maps.(Dima 2008)

Characteristics of the main climatic elements in Romania

The average air temperature ranges in our country between 11 °C and 8 °C from South to North. Isothermal annual average is 11 ° C and this delimits a wide strip of 20-30 km along the Danube valley. On coastline and Delta average temperatures are exceeding this value. Most of the North Dobrogea and Tisza Plain

have average annual temperatures from 10^0 C to 11 ° C. From 10 ° C isotherm to the highlands, average annual temperatures decrease with the altitude, reaching the 0 °C isotherm at 2000 m altitude. The annual average values are lower in the north and north-exposed slopes while along the large river valleys, average temperatures are higher than in the corresponding high (Figure 1).

Extreme temperatures (maximum and minimum) also highlights continental climate in our country. The highest levels (above 40 °C) were recorded in Baragan, and the lower (below 0 °C) in the region Gheorghieni –Ciuc, Braşov.

Rainfall. Climatological database analysis led to the determination of the 637 mm average annual rainfall which occurs in our country. If we analyze the geographical distribution of rainfall, significant differences are to be noticed: thus, there are differences between western regions subject to invasions of moist air, and the eastern, drier, between the highlands, with high rainfall (1000 - 1400 mm), and bass poorer rainfall between slopes with different orientations. Signals are different in the case of depressions sheltered from Western currents (Gheorghieni, Ciuc, Braşov) where quantities fall below 600 mm. In the Getic Plateau quantities fall below 600 mm, and in Northern and Central Moldavian Plateau they are between 500 and 600 mm. In the south of the Plateau, in Baragan and Dobrogea the fall is below 500 mm, and in the Danube Delta and the coastal region it is below 400 mm. The annual fall in Tisa Plain is about 600 mm, and in the Western Hills it is between 700 and 800 mm.

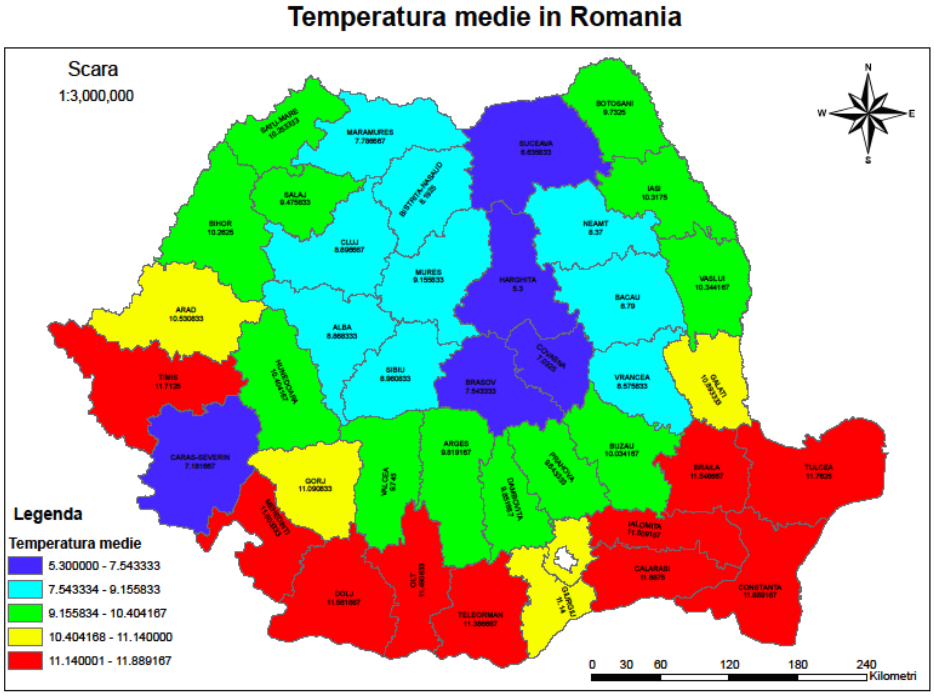

Fig. 1 - Average temperatures in Romania

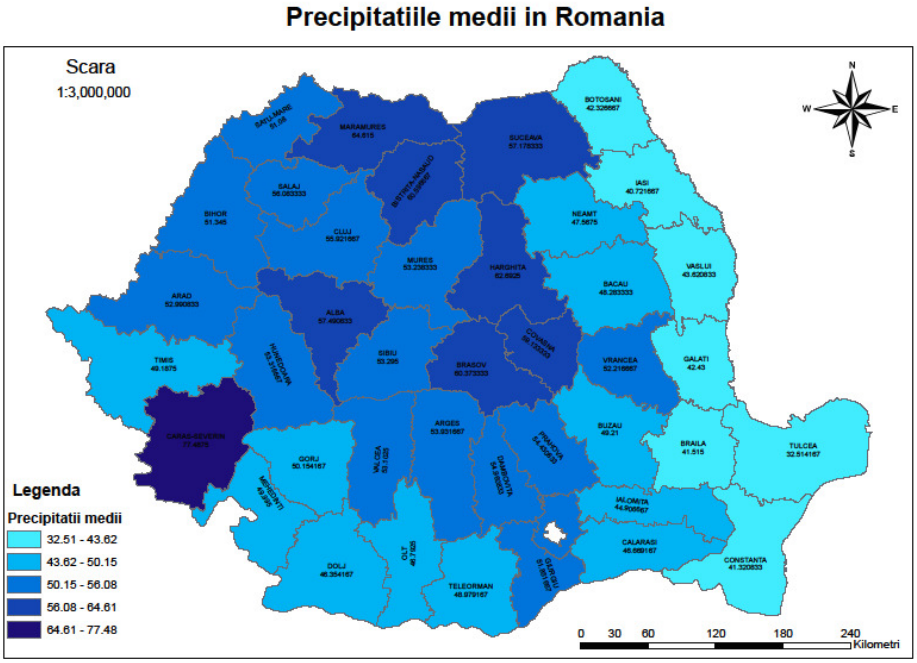

Fig. 2 - Average annual rainfall

Rainfall is the parameter with the greatest variability in time and space and this is supported by the special amounts to multiannual average recorded in some years. Thus, in regions characterized by moderate amounts of precipitation, such as the Romanian Plain, it has values of 1160 mm (otter), 1048 mm (Mărculeşti), 1014 mm Rm Sarat, etc.. In dry years rainfall quantities in the Romanian Plain summed up only 120 mm (Drăgăneşti-Vlaşca, Tămădău). (Figure 2)

Another problem, already mentioned, is the heavy rains, common especially during the summer, giving exceptional amounts of water and producing enhance thermal convection. One can remember the exceptional values recorded on June 26, 1925 Ciuperceni Dolj (349 mm), on August 17, 1900 at Negru Voda, Constanta (320 mm) and on days 29th to 30th of August 1924, when there were recorded 690 mm within 24 hours.

The analysis database was created and cloud maps (Figure 3) or sunshine duration maps (Figure 4) are shown in the figures below.

Nebulozitatea in Romania

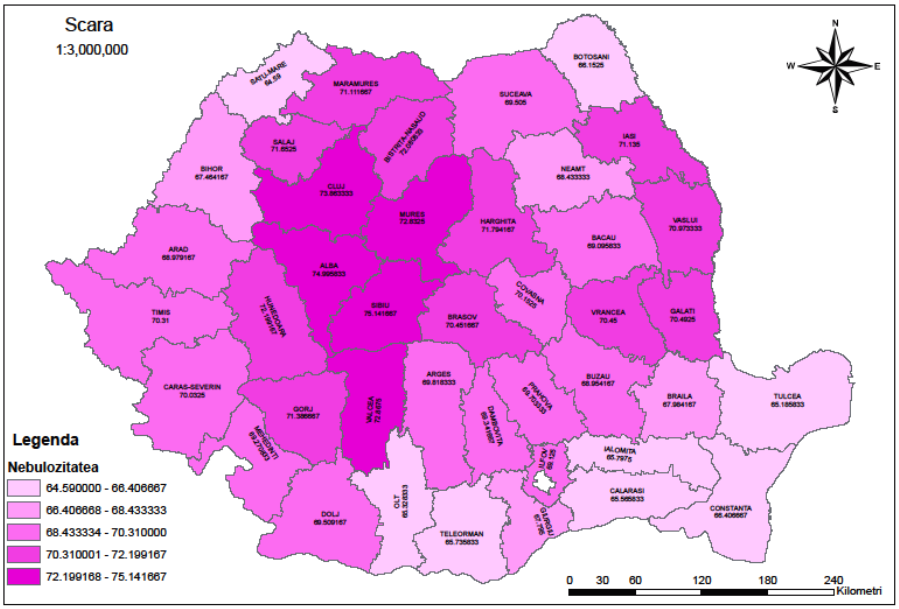

Fig. 3 - Cloud in Romania

Stralucirea soarelui in Romania

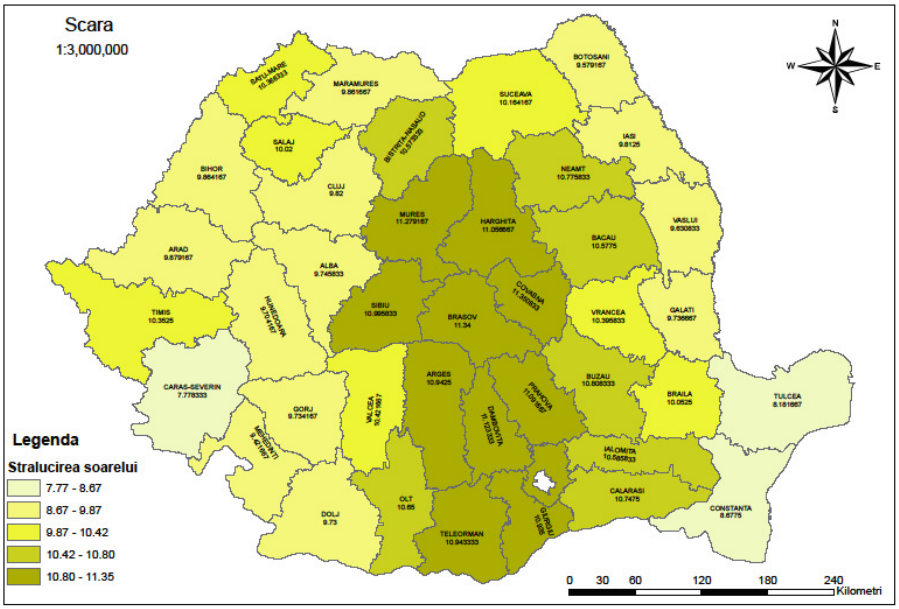

Fig. 4 - Sunshine in Romania

RESULTS AND DISCUSSION

Romania has an area of approximately 240,000 km^2 and the relief is characterized by variety, proportion and symmetry. The geographical position gives a temperate climate with four seasons prominently heat and rainfall.

The most important role in thermal distribution is relief and altitude and orientation also. In terms of rainfall throughout the landscape plays an important role. Rainfall decreases from the plain to the Danube Delta. And the most significant rainfall is June.

CONCLUSIONS

1. Romania, by its geographical position in Europe, is in the temperate climate zone of the Northern hemisphere and its climate has varying degrees of continentalism;

2. The climate of the country is due to the peculiarities of atmospheric circulation and of the physic-geographical conditions;

3. The climate is characterized by a difference of the average temperature of 13^0C;

4. Rainfall analysis shows that there are fluctuations between dry and rainy periods.

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