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ISSUES REGARDING GLOBAL WARMING

CAMELIA SLAVE

University of Agronomic Sciences and Veterinary Medicine of Bucharest

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Abstract

The article presents some problems generated by climate change related to global warming, rainfall and temperature regime on a period of 100 years.

INTRODUCTION

Global warming and climate change are two terms highly used to describe the same phenomenon but the meaning of each is in fact different. The increase of air temperature is a result of heat capture from carbon emissions, leading to global warming, and global climate change is the alteration of multiple climate factors such as temperature and rainfalls on the planet. It can be noticed that the changes happen with different intensity in different places of the Earth.

MATERIAL AND METHODS

Climate change refers to statistical significant variables of climate parameters or their changes over a period of time due to modification inside climate system and interaction of its components as a consequence of natural factors or human actions.

The greenhouse effect is a natural characteristic of the atmosphere that keeps the face of the Earth warmer than in case it didn't exist. The natural greenhouse effect is amplified by the greenhouse effect due to the concentration of greenhouse effect gas as a result of human actions. Gases that create the greenhouse effect are: carbon dioxide, methane, azoth oxide and chlorofluorocarbon. Through this process an overheating of terrestrial surface and lower troposphere is produced. The changes that take place in the concentration of greenhouse effect gases and aerosols, in solar radiation or in properties of active layer could alter the energetic balance of climate system.

The last report of IPCC (Intergovernmental Panel of Climate Change) issued on 2nd of February 2007 in Paris shows that the global warming that highlights in the increase of average global temperature, seas temperature, glaciers and polar cap melting, led to sea level growth, all this because of human actions.

The greenhouse effect due to anthropic factors together with climate system feedback lead to an increase of global temperature and have as result the climate change on local level on a bigger scale.

Due to climate system inertia, global warming will continue to grow in spite of immediate measure to reduce the emissions, but the increase of temperature will be limited depending on the level of reduction that is applied. It is highly probable (more than 90%) that the rainfall increase at high latitudes and is probable (more than 66%) that they decrease in most of the subtropical regions. The configuration of these changes is similar to the one observed during the 20th century. It is highly probable that the tendency to increase of the extreme maximum temperatures and frequencies of heat waves to continue.

RESULTS AND DISCUSSION

In Romania the average annual temperature is only 0.3°C higher unlike global annual average temperature of 0.6°C between 1901 and 2000. From 1901 to 2006 the increase was 0.5°C comparing to 0.74°C at global level (1906-2005).

There have been though local differences: a higher warming in South and East of the country (up to 0.8°C in Bucharest-Filaret, Constanța and Roman) and irrelevant inside Carpathians Arch, except Baia Mare, where the effect of local human actions led to an increase of 0.7°C (Figure 1).

Starting 1961 this warming was superior to the one before and spread to all country.

Similar to global situation there have been changes in the regime of extreme events (based on data analysis done by several meteorological stations):

- Increase of frequency of tropical days per year (maximum > 30°C) and decrease of frequency of winter days per year (maximum < 0°C).
- Significant increase of minimum average temperature in summer and average maximum temperature in winter and summer (up to 2°C in South and South-East in summer).

Regarding the rainfalls from 1901 to 2000 all 14 stations observed, in a long row, a general tendency to decrease of annual rain quantity. Analyzing the short rows of observations several stations noticed an increase of drought phenomenon in South starting 1960. Accordingly they noticed an increase of maximum periods without rainfalls in South-West in winter and West in summer. As consequence of higher warming in South-East during summer, in concert with a bigger tendency to deficit, a barrenness of these counties took place. In some regions between 1946 and 1999 the frequency per year of very rainy days (the highest 12% daily quantities) and extremely rainy (the highest 4% daily quantities) increased.

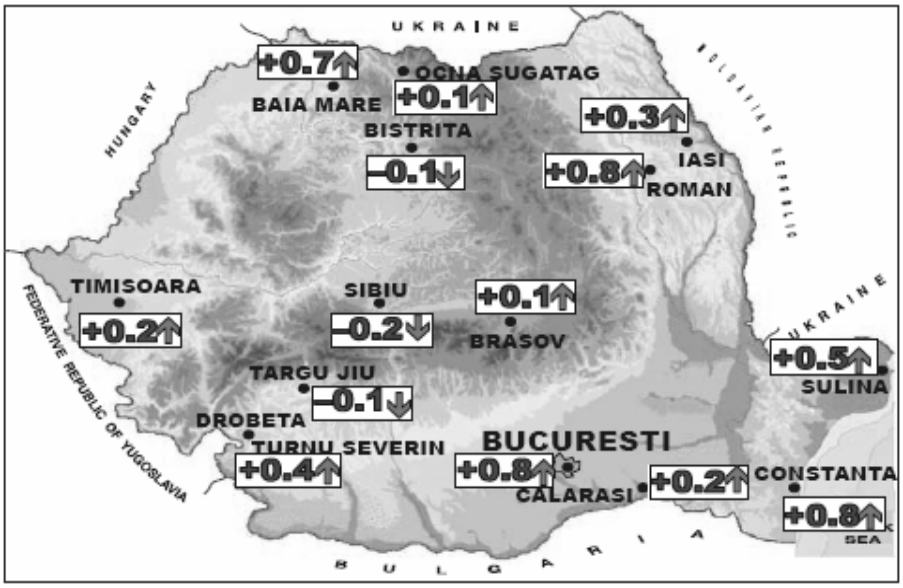

Fig. 1. The tendency of average annual temperature in (°C) from 1901 to 2000

In the last eight years (2000-2007) in Romania have taken place two extreme rainfall events perfectly opposite (the drought from 2003 and 2007 and the floods from 2005). In 2007 there has been an extreme temperature happening in the winter of 2006 that was the warmest winter ever registered in Romania, when high deviations of maximum/minimum temperature from the average multiannual regime persisted on long period of time.

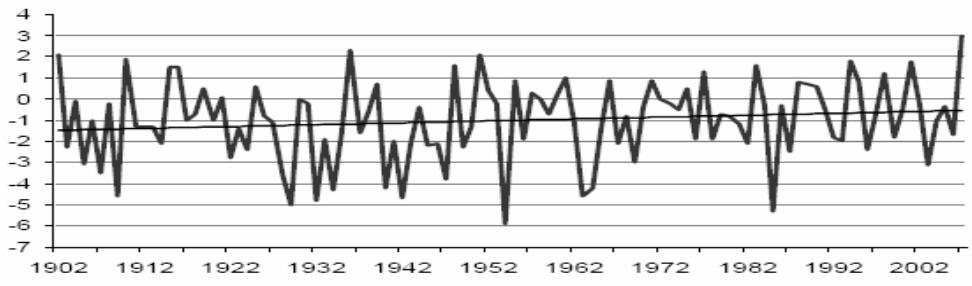

Fig. 2. Average country temperatures in winter (14 stations) from 1901 to 2007

CONCLUSIONS

1. The longest dry periods registered in the 20th century had one peak in: 1904, 1946, and 1990. The most affected area by the drought in Romania in the

last decades of 20th century and beginning of 21st century were in the South of the country, excessively in Oltenia.

2. The analysis of multiannual variation of rainfalls in Romania indicates that after 1980 a series of dry years started due to diminish of rain quantity together with a tendency of increase of annual average temperature especially in Romanian Plain and Barlad Hills.
3. The decrease of rainfalls volume from last years led to a shrinkage of most of the rivers especially in South and South-East Romania, in the context of concerted actions of several factors such as:

- increase of annual average air temperature which generated an amplification of evaporation and evapo-transpiration;
- lowering of phreatic waters level in meadows and rivers terraces, with negative implications over their supplies during dry;
- high frequency and long lasting phenomenon of drought of rivers with collector pools smaller than 500 km^2.

4. Analyzing other phenomenon in cold season, there have been found a significant increase, over all country, of annual hoarfrost days, influencing negatively the crops. The amount of snowy days also dropped off while the trend of warming during winter increased.

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