THE STUDY OF CLIMATE CHANGE AND THEIR EFFECTS ON SOIL

Irina-Ramona Pecingină, Uni*versity "Constantin Brâncuşi",* Tg-Jiu, ROMANIA
Roxana-Gabriela Popa, Uni*versity "Constantin Brâncuşi",* Tg-Jiu, ROMANIA

ABSTRACT: Climate change had multiple effects on soil, many of the effects empowering themselves in feed-backs were positive. The impact of climate phenomena soils are either direct (resulting due to rising temperatures, volume and intensity of rainfall and the concentration of carbon dioxide) or indirectly as a result of changes in climate changes bring the vegetation or soil biota.

KEY WORDS: climate change, soil

1. INTRODUCTION

Global warming involves currently two major problems to humankind: on the one hand the need for drastic reduction of emissions of greenhouse gas emissions in order to stabilize the level of concentration of these gases in the atmosphere to prevent human influence on the climate system and enable ecosystems natural adapt naturally, on the other hand need to adapt to climate change effects, taking into account that these effects are already visible and unavoidable due to the inertia of the climate system, regardless of the outcome of actions to reduce emissions.

Despite all efforts to reduce global greenhouse gas emissions emissions, average global temperature continues to rise in the coming period as urgent measures are needed to adapt to climate change effects.

Regarding the effects of climate change on natural and anthropogenic systems and the potential effects should be differentiated waste if the implementation of adaptation measures.

• Potential impact - effects arising from climate change in the future without taking into account adaptation measures.

• Residual Impact - climate change effects that may arise after the adaptation measures.

2. THE MAIN FACTORS INFLUENCING CLIMATE CHANGE

Figure 1 presents the main factors influencing climate change (both natural and owe the human factor intervention - anthropogenic).

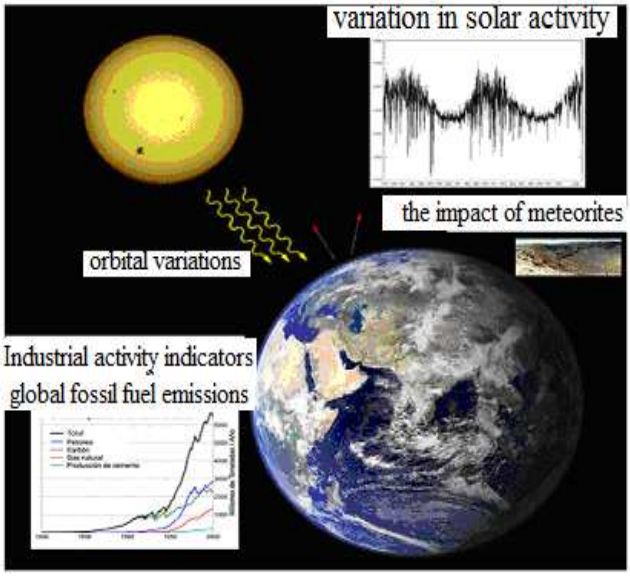

Fig. 1. Factors influencing climate change

2.1. Natural causes

Climate variations are correlated with those of sunstroke, Milankovic parameters, albedo, solar cycles and concentrations of

atmospheric greenhouse gases such as carbon dioxide (CO_2) and aerosols.

a) Heatstroke - defined in meteorology as an area of exposure to sunlight.

b) parameters or Milankovic - corresponding to three astronomical phenomena affecting certain planets of the solar system, namely: eccentricity, obliquity and precession. These natural climate changes have the primary glacial and interglacial periods accordingly.

c) terrestrial albedo (At) - is one of the important indicators in forecasts for temperature recorded at the surface. Albedo is defined as the ratio of solar energy reflected by a surface and the incident solar energy (between 0 and 1).

2.2. Anthropogenic causes

These changes are due to the industrialization of the planet and massive use of fossil fuels. While natural climate changes occur very long periods of time, which enables an adaptation of plant and animal species to new climate conditions, anthropogenic changes are very fast and therefore threatens enormous ecosystems characterized by fragility. According to the vast majority of scientists, global warming is widely attributed to the greenhouse effect, additional greenhouse gas emissions (GHG) emissions from human activities, and mainly CO2. Besides CO2, GHG sources ranging from artificial remember: chlorofluorocarbons (CFCs), NOx (N2O) and CH4.

Earth's atmosphere most important greenhouse gases (GHG - greenhouse gases - GHG = greenhouse gas emissions) are: carbon dioxide (CO2), methane (CH4), (hydro) halogencarbons (resulting from human activities), nitrous oxide (N2O), ozone (O3), water vapor (H2O), aerosols, etc.

The greatest increase in emissions of greenhouse gases, between 1970-2015 was due to energy consumption, transport and industry. GHG emissions increased due to residential and commercial buildings, deforestation and agriculture has been slower. (Figure 2 a, b, c)

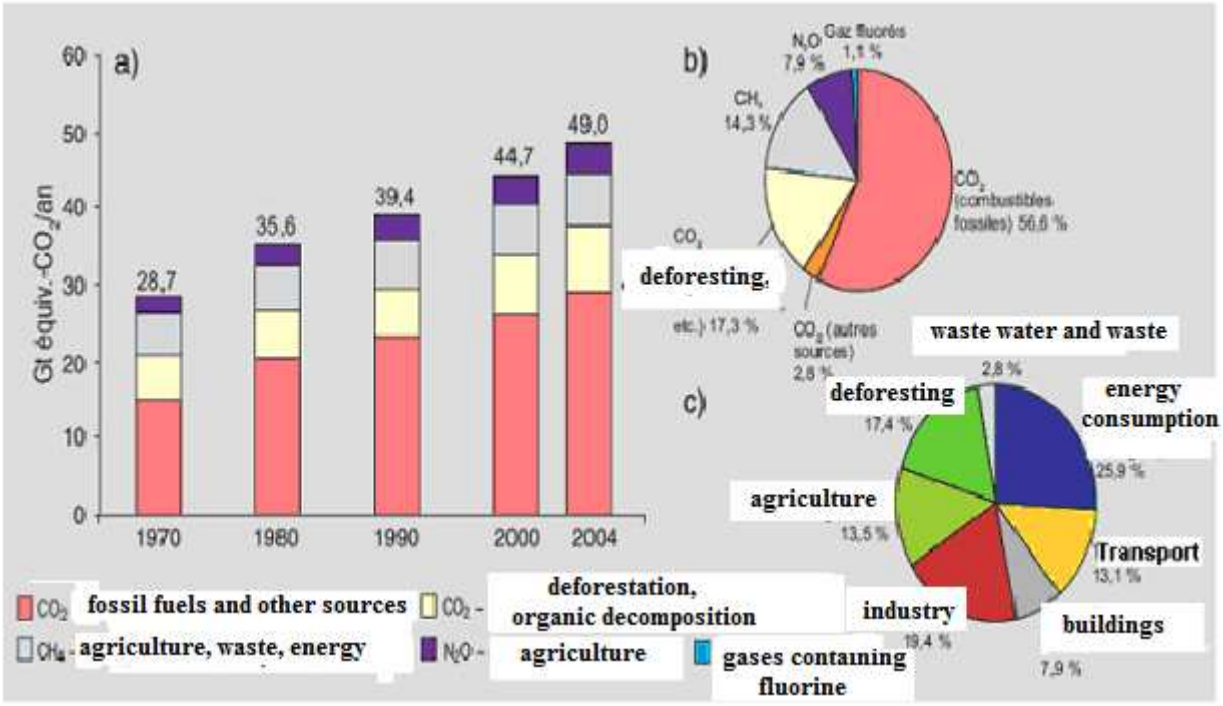

Fig. 2. a, b, c. Causes increase in emissions of greenhouse gases in the range of 1970-2015

3. CLIMATE CHANGE IMPACTS ON SOIL ENVIRONMENTAL FACTOR

Climate change had multiple effects on soil, many of the effects empowering themselves in feed-backs were positive (leading ultimately to aggravated original). These phenomena are presented (with their interrelations positive feedback) in fig.3.

The impact of climate phenomena soils

are either direct (resulting due to rising temperatures, volume and intensity of rainfall and the concentration of carbon dioxide) or indirectly as a result of changes in climate changes bring the vegetation or soil biota.

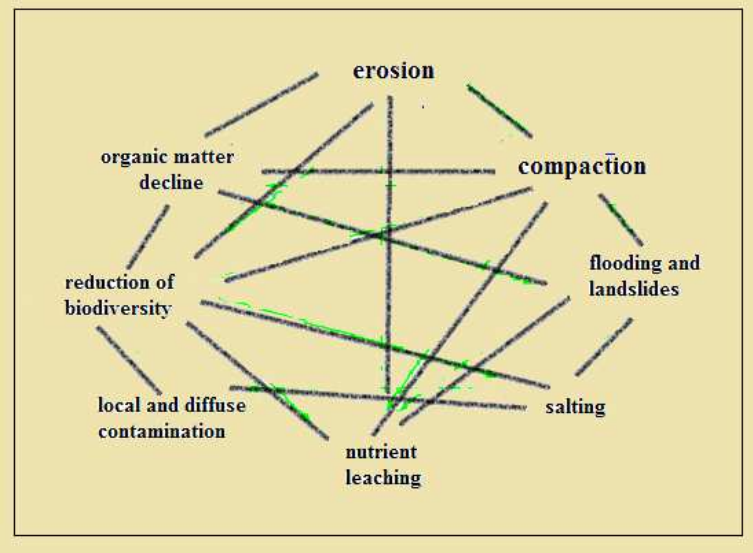

Fig.3. Effects of climate change on soil and interrelationships of these effects

Climate change produce:

- increase water erosion of soil and washing/leaching of nutrients (in surface water or groundwater) because of changing rainfall volume and intensity; (Figure 4).
- changing the structure and texture of the tendency of improved soil disaggregation/altered under the influence of excessive climatic factors;
- amplification of wind erosion due to higher summer temperatures and reduced rainfall in summer (Figure 5).
- reducing the quantity and quality of soil organic matter due to reduced photosynthesis in plants (inhibited at temperatures above 35ºC)
- reduction of biodiversity in the soil biota due to increasing temperature and reducing water content
- soils salting processes due to increased irrigation

Fig. 4. Water erosion of soil

Fig.5. Wind erosion

Another aspect of these changes paradoxically climate is dryness associated flooding. This result is paradoxically due to changes in rainfall pattern: mild winters with rain producing floods, warmer summers and scarce rainfall and more violent and most important in terms of quantity.

Climate change already has caused successive waves of floods in 2005 in Romania (country mainland) and a prolonged drought in Portugal (country oceanic).

Another element that is very difficult to assess where climate change is the water situation. Clearly soil water will see an obvious trend of reduction due to increased temperature (Figure 6.).

This trend of reducing the water content of soils in summer is quickly dispatched in all models considered, the crops being optimally supplied with water through irrigation systems.

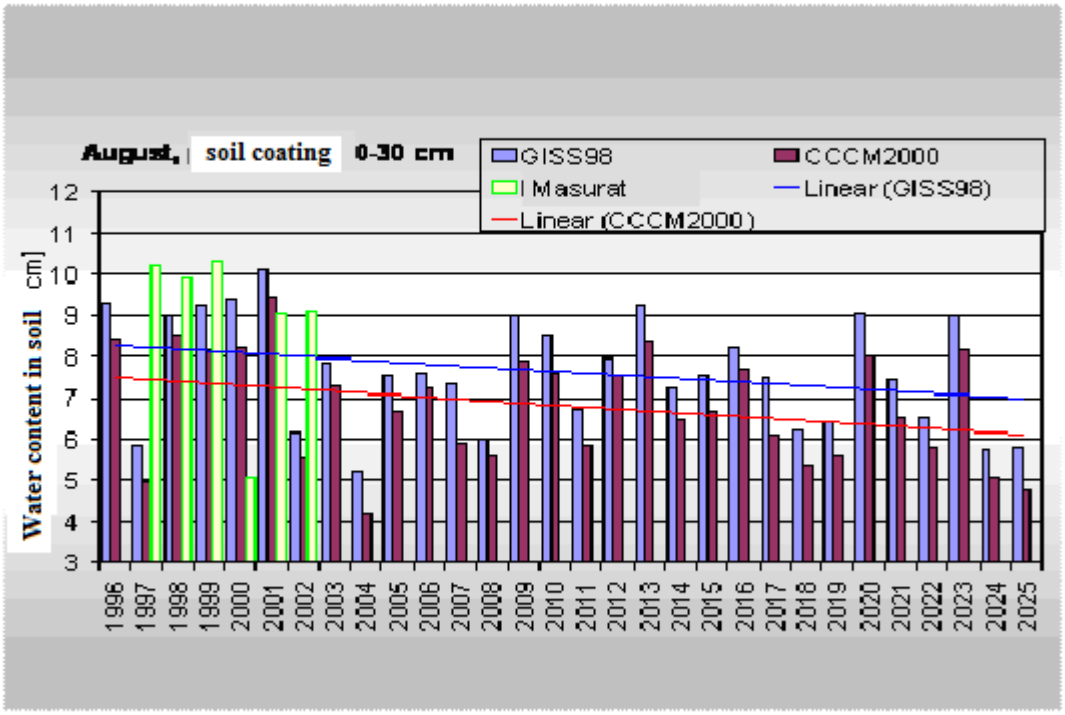

Fig.6. Reducing soil moisture after climate changes

Interrelations between soil and greenhouse gazelles are multiple. Recalcitrant soil organic matter storage tanks is one of excess carbon dioxide fixation of carbon in the biomass occurs in the process of photosynthesis in two phases, phase and light phase of photosynthesis. In the light phase of photosynthesis is taken radiant energy of the sun and the energy is transferred in reduced equivalents (NADPH + H +) and energy phosphate bonds of ATP.

In the second phase so accumulated metabolic energy is used for fixing carbon dioxide (Calvin cycle). Calvin cycle end products are then used by plants for proper metabolism (catabolism and anabolism) or rizodepusi in soil organic matter.

Vegetable organic matter is converted then all the dead organic matter, much coming into humus composition.

The soil and climate are closely coupled. Climate change and variation in the concentration of carbon dioxide in the atmosphere can cause changes in the structure and function of soil / terrestrial ecosystems. In turn changes the structure and function of soil terrestrial ecosystems influence the climate system through biogeochemical processes that involve exchanges of greenhouse gases (CO2, CH4, N2O) between soil and atmosphere, and processes dowsing involving exchanges of water and energy.

The combined consequences of these effects and feedback ("feedbacks") must be taken into consideration when evaluating the future state of the soil in interaction with the atmosphere.

Scientific studies of the impact of climate change and options for adaptation highlighted the changes caused by climate change on soil and analyzed measures to adapt to these changes to be minimal so as to ensure food resources and long-term development of society and the economy.

Thus, adaptation measures relate mainly to the processes of reducing soil vulnerability to climate change, while mitigation measures relate to reducing greenhouse gas emissions effects resulting from human activity.

Such a level should be achieved within a time frame that allows ecosystems to adapt to climate change, to ensure that food production is not threatened and to enable sustainable economic development.

One solution to reduce the impact of greenhouse gases is the use of agricultural management that allows recovery recalcitrant soil carbon reservoir (Figure 7).

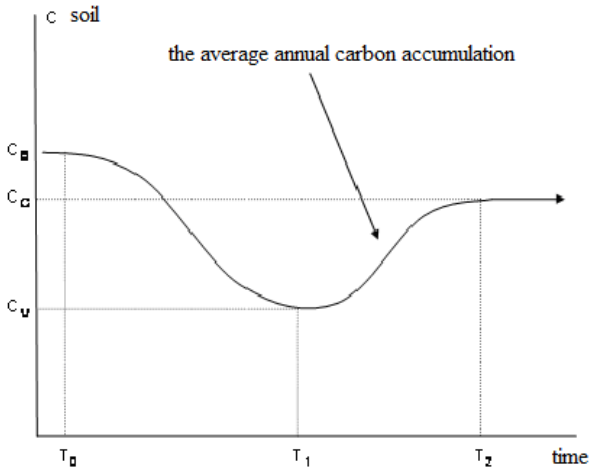

Fig.7. Using an improved agricultural management to restore recalcitrant soil carbon reservoir

4. CONCLUSIONS

Climate change had multiple effects on soil, many of the effects empowering themselves in feed-backs were positive. . The impact of climate phenomena soils are either direct (resulting due to rising temperatures, volume and intensity of rainfall and the concentration of carbon dioxide) or indirectly as a result of changes in climate changes bring the vegetation or soil biota.

REFERENCES

[1.] Bica, I., Elements of environmental impact, Ed. Matrix Rom, Bucharest, 2000.

[2.] Bâlteanu, D., Climatology Meteorology and Hydrology, Ed. Teaching and PedagogicalBucureşti, 1987.

[3.] Gavrilescu, E., Pollution sources and pollutants of the environment, Publishing Sitech, Craiova, 2007.

[4.] Ionac N., Meteorology and climatology essential, Ed. University, Bucureşti, 2007.

[5.] Negulescu M., Ianculescu. S., Environmental protection, Technical Publishing House, Bucharest

[6.] Sârbu R., Marchiş D., Sustainable development and its connections , Ed. Universitas, Petroşani 2010.

[7.] Stefan S., Physics of the atmosphere, weather and climate, Ed. University of Bucharest, 2004.