FROM THE WEATHER TO CLIMATE IN THE WESTERN PLAIN

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Abstract. *The aspect from one day to another represents the change in a specified weather that express themselves through decreased or increased temperature, precipitation, strong wind, fog or other meteorological phenomena.*
The concept of climate is situated on a higher level of abstraction than the concept of weather (Ion-Bordei and Bojariu, 2005). The climate of a place, of a country of the Earth can be defined as one long-term synthesis measure by the time walking from one day to another. The World Meteorological Organization offered in 1984, the next definition " climate represents synthesis of weather conditions in a particular region based on long observation sequences (at least 30 years) of atmospheric variables" (Climatological practices Guide, WMO, 1984).
Weather is what is happening in nature at a time, while climate is a measure of what is expected to happen in any month, season or year and refers to certain statistical parameters calculated from the data of observations for a period of several years. These statistics parameters relating generally to the mean, standard deviation, and so on, include extreme events (droughts, floods, heat waves, cold waves, and so on).
The climate of a region is determined by factors such as radiative, dynamic and physical geography. They directly affect spatial-temporal variation of climatic elements in a given territory.
Western Plain has a warm temperate continental climate with moderate humidity throughout the year, without excessive dry season and relatively mild summers, warm and cold season, is thermally well delimited.
During 1961-2010, the average annual air temperature in the Western Plain has been growing. Growth is not alarming, growth rate is reduced. The largest increase is noted in the southern weather stations, most commonly affected by advection of warm tropical air masses.
The warmest year of the period 1961-2010 was 2000 and 2007, and the coldest year was 1980 and 1985. There were no years "exceptionally warm" (deviations> 2.5 ° C).
Also were not reported years "very warm" nor "too cold".
Annual rainfall is a typical temperate continental climate, with a maximum in June and a minimum in February.
Summarizing data on seasonal mean temperature regime during 1961-2010, significant heating is evident during the summer. In winter and in spring this trend is reduced, the average temperature variations are less important. Autumn is seen even a slight decrease in average temperature. Summer warming trend can be caused by an increased anticyclonic configurations simultaneous ground and altitude centered in the north, which intensified after 1987. This increase was caused either by natural causes or anthropogenic (increased greenhouse gases) or by overlapping the two factors.

Key words: *weather, climate, Western Plain, rainfall, temperature,*

INTRODUCTION

1.Weather and climate

Mark Twain said, "Climate lasts all the time, while weather lasts only a few days." The aspect from one day to another represents the change in a specified weather that express themselves through decreased or increased temperature, precipitation, strong wind, fog or other meteorological phenomena.

The concept of climate is situated on a higher level of abstraction than the concept of weather (Ion-Bordei and Bojariu, 2005). Climate of a place, a country of the Earth can be defined as a synthesis of a long-term weather evolution from one day to another. Weather Meteorological Organization offered in 1984, the next definition "climate represents synthesis of weather conditions in a particular region based on long observation sequences (at least 30 years) of atmospheric variables" (Climatological practices Guide, WMO, 1984).
Weather is what is happening in nature at a time, while climate is a measure of what is expected to happen in any month, season or year and refers to certain statistical parameters calculated from the data of observations for a period of several years. These statistics parameters relating generally to the mean, standard deviation, and so on, include extreme events (droughts, floods, heat waves, cold waves, and so on).
The climate of a region is determined by factors such as radiative, dynamic and physical geography. They directly affect spatial-temporal variation of climatic elements in a given territory.
Solar radiation is the most important climatic factor. It is the source of air dynamics that influence the weather and the climate of all regions of the globe. Dynamic factors are contributing to climate genesis are general circulation of the atmosphere and baric centers of action (Azores Anticyclone, Icelandic Cyclone, Eastern European Anticyclone, Mediterranean Cyclones and so on). Active subjacent surface, the differences required by the relief, hydrography, vegetation, soils, introduces a variety of topoclimates that making a contribution to the local variation of climatic elements.

2. Climatic elements

The components that interact and define the observed climate condition are the atmosphere, oceans, cryosphere, continents (lithosphere) and the biosphere.
Sun is the main element in the climate system, transmitting solar radiation that heats the Earth. Solar energy is stronger in equatorial regions, the intensity of solar radiation decreases at the poles. This determines the type of movement of winds and ocean currents that influence climate system development. The atmosphere acts as a protective blanket, maintaining a suitable temperature ecranand life on Earth and sun's harmful rays. The atmosphere consists of several distinct layers, and acts as a "deposit" for various gases and particles. Both the structure of the atmosphere and how the air circulation is achieved have a significant effect on climate and weather systems, including rainfall.
2 .1 The main factors that determine the characteristics of global climate

- Life cycle of the Sun and solar activity variability
- Characteristics of ground motion around its axis and around the sun
- Geological changes (eg moving continents)
- Internal variability due to the complexity geosystem (the interactions of components: ocean, atmosphere, continents).
- Composition of the atmosphere
  Natural greenhouse effect
  Some gases in the atmosphere of Earth formes a layer of insulation and prevent heat to escape into space. These are the so-called greenhouse gases (GHG). They act like a blanket, absorbing heat and reflecting it back to the surface of the Earth, warming the atmosphere and causing what is known as the natural greenhouse effect.

Greenhouse gases

The greenhouse highlight the contribution of certain gases, emitted naturally or artificially warming Earth's atmosphere by changing the permeability of atmosphere at solar radiation reflected by the earth's surface.

The main element responsible for producing the greenhouse effect are water vapor, with a share of 36-70% followed by carbon dioxide, accounting for 9-26% methane, accounting for 4-9% and ozone, with accounting for 3-7%. Human activities result in the release of large quantities of gases and aerosol particles that changed the composition and structure of the atmosphere. Gases, fumes and residues from industrial complexes, urban and agricultural land (trees burning, deforestation and intensive use of fertilizers) led to air and water pollution. Deforestation and grazing caused soil erosion and substantial changes have changing surface albedo, eventually leading to desertification.

2.2 General climatic characteristics

Climate is the average and other statistical quantities that measured variability of weather conditions in a region at a particular time.

Climatic elements include: temperature, precipitation, humidity, sunshine, wind speed, atmospheric phenomena such as storms, frost, fog and other weather features. A meteorological phenomenon is considered extremely when determining a condition transition system analyzed much different from the climatic norm.

MATERIAL AND METHODS

3.Observed changes of climatic parameters in Romania, during 1961-2010

Romania has a temperate continental climate with four seasons, determined by its position on the globe, halfway between the pole and the equator, and its geographical position on the European continent from the Atlantic Ocean at about 2000 km, 1000 km from the sea Baltic, 400 km from the Adriatic Sea. The relief of the country has a vital role in the natural setting climate delimitation. Double arch of Carpathian Mountains forms a complex barrier to the movement of air caused by the interference of the main centers of action that generates the weather systems in Atlanto-European region.

Changes in air temperature and rainfall were not produced uniform throughout the twentieth century. In the second half of last century, the analysis conducted out with a number of stations indicate more significant trends of temperature increase, but regionally differentiated (Busuioc, 2005). The dynamics of change, emphasizing the variation trends of various climate parameters in recent decades, and it is a character suggests that global effect of human activities began to feel in the the climate system.

In the last 50 years of the twentieth century, the average global temperature has risen by 0.13° C / decade, compared with 0.074 º C / decade over the last 100 years (1906-2005), as shown Fourth Assessment Report of the Intergovernmental Panel Climate Change (IPCC, 2007). Between 1906-2005 global average temperature has risen by 0.74°C, compared to 0.6ºC during 1901-2000 (IPCC Report, 2001).

According to the 2007 IPCC report, Europe has warmed by about 1ºC over the last century (1906-2005), faster than the global average during the same period.

Observational data indicate, for the twentieth century that variations of air temperature and precipitation are not uniform. In the second half of the last century, analyzes trends indicate increased temperature differential regional.

For temperatures

• an increase in mean annual temperature of 0.3°C in the entire country, more pronounced in the middle eastern countries (eg, in the twentieth century, at Bucharest-Filaret Weather Stations, at Constanta and Roman Weather Stations was registered warming of 0.8°C);

• intra-region heating stations is insignificant, except Baia Mare Weather Station (0.7 C°) where pollution is assumed that the effect occurs more in changing climatic characteristics

For quantities of rainfall

• downward trend in annual quantities more pronounced in the center of the countries. Seasonal characteristics of air temperature variation in the twentieth century

• significant increases of air temperature were recorded especially in winter and summer (for example, at Bucharest-Filaret Weather Station, the temperature increase was 1.9 ° C in winter);

• A significant cooling occurred in western countries in autumn.

Seasonal variation in rainfall during the twentieth century

• Winter has been a downward trend of precipitation in most regions, more pronounced in the South and West;

• In spring and in summer rainfall variation trends have regional character;

• In autumn trends were recorded increases of rainfall in North and South East and decrease in the rest of countries.

Changes in production of extreme events in the twentieth century

• increased frequency of tropical days;

• decreasing the frequency of winter days;

• significant growth across the country the average minimum temperature in summer;

• increase in the average maximum temperature during winter and summer (up to 2 ° C in the south and south-east country).

Changes in the producing of socio-economic phenomenons with influence in winter

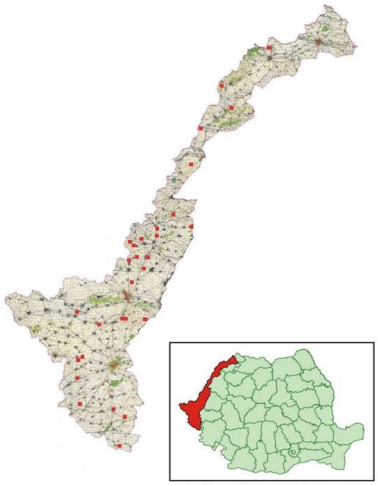
• a significant decrease in the thickness of the snow in the northeast, central and western country;

• significant increases, long-range, the annual frequency of hoarfrost accretion, glazed frost and rime all over the country.

4. Observed changes of climatic parameters in the Western Plain

4.1. The geographic location

The Western Plain of Romania, also known as the Banato-Crisana Plain, is situated in the west of the country, west of the Western Hills and the Carpathians. It takes the form of a narrow strip widths, oriented approximately north-south. It is a region and covers an area of 7% of the country.



4.2. The Western Plain has a warm temperate continental climate with moderate humidity throughout the year, without excessive dry season and relatively moderate summers. The warm and the cold season are thermal well defined.

The Western Plain is characterized by a large opening in all directions of the wind, with air advections of different masses. Rainy periods are determined generally by cyclonic baric formations. In the west and southwest, weather fronts have a higher frequency due to the position of their trajectories and orographic dam of the Carpathians, which is why predominates frontal rains.

The precipitation and air masses are closely related. The main types of air masses under whose influence is situated the Western Plain are:

- Polar air masses have the highest frequency.
- Maritime polar air masses - wet, cold and unstable, from the west and northwest, from the Atlantic Ocean through the Azores Anticyclone. It Has a higher frequency in summer, but it is present in winter too, causing precipitation.
- Old polar maritime air masses - less wet and cold because the polar maritime air cross the continent, belonging to the same circulation west. In the Western Plain they have the highest frequency in almost all months, with a more active presence in the months: April, May, July and November.
- Continental polar air masses - cold, dry and stable, are generated from Eastern European and Scandinavian Anticyclone. In the study area, the presence of these masses is felt especially in winter, less in spring and autumn.
- Tropical air masses are generally hot and dry.
- Maritime tropical air masses are transported from the North African anticyclone and Mediterranean cyclones. When they are wet they generate quite abundant rainfall, with higher frequency in June, July and December.
- Continental tropical air masses - drier, moving from North Africa over the Balkan Peninsula and enter in our region on a southern circulation. Their presence causes advection of high temperatures in summer and winter snowmelt.

The air temperature

During 1961-2010, the average annual air temperature in the Western Plain has been growing. Growth is not alarming but the growth rate is reduced. The largest increase is noted in the southern stations, which are most commonly affected by advection of warm air masses, tropical

Warmest year of the period 1961-2010 was 2000 and 2007; the coldest years in 1980 and 1985. There was no year "exceptionally warm" (deviation> 2.5). Nor were reported years "very warm" but not "excessive cold".

Rainfall

Average annual rainfall quantities are between 525-565 mm in the western border and grow to the east to 615-640 mm, the hills being marked by izohieta 700 mm. Rainfall increases from South to the North, especially in the western hills.

The richest rainfall in the eastern boundary is signaled in Crisana Plain and Arad Plain and in their area of contact with the Crisana high hills and Zarand Mountains, and in low Somes Plain.

The lowest rainfall are found in the Aranca Plain - because of the lowered altitude and Mediterranean influences - and Salonta Plain.

Annual rainfall is a typical continental temperate climate, with a maximum in June and a minimum in February. Secondary peak occurs in December with a delay of approximately 1-2 months compared to maximum Mediterranean regions. As a result, we believe that it is related

to increased Island Depression, which reaches maximum development on this month and less the influence of Mediterranean Cyclone.

RESULTS AND DISCUSSION

5. Long-term variations of the annual quantities of precipitation and annual average air temperature.

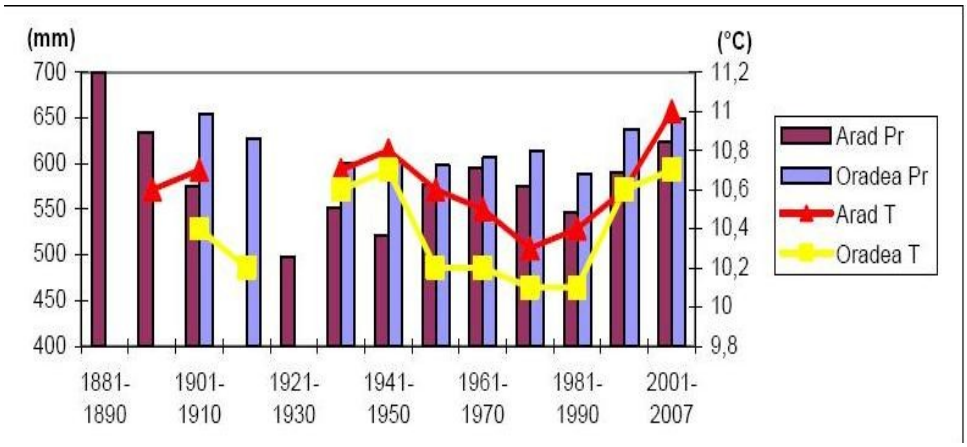
To show secular rainfall fluctuations were analyzed annual rainfall amounts of plain Arad station, operating during 1880-2007 (128 years), and Oradea station during 1901-2005 (105 years). During this time, the precipitation has been decreasing in Arad and in Oradea remained constant.

The driest year was 2000 (252.0 mm in Arad). The wettest years were 1941 (920 mm in Oradea) and 1889 (893.3 mm in Arad). Strictly speaking rainfall, the drought of 2000 exceeded that of the years 1946-1947. Moreover, the Arad drought years 1946-1947 was exceeded even that of 1928 and that of the years 1926.

To highlight the secular fluctuations of annual average air temperature were used a series of dates available from the same two stations. For Arad station was analyzed during 1897-2007 (111 years), and for Oradea between 1901-2005 (105 years). In the second period of time, the temperature was kept constant. There is a very slight decrease in annual values, especially to Arad station. Warmest year was 1934 (12.3 ° C) and the coldest in 1940 (from 7.9 to 8.3 ° C).

The driest decade was 1921-1930 at Arad station, followed by 1941 -1950. The wettest decade was the first, from 1881 to 1890. The decade 2001-2007 was moderately warm and rainy. The decade 1941-1950 was the opposite, warm and dry. Decades 1971-1990 were cooler. Therefore recent years, warm, were compared with some years cold and not "normal" thermally as thought. It follows reason appeared among climatologists unrest from the country when discussing the issue of air temperature increase in recent years.

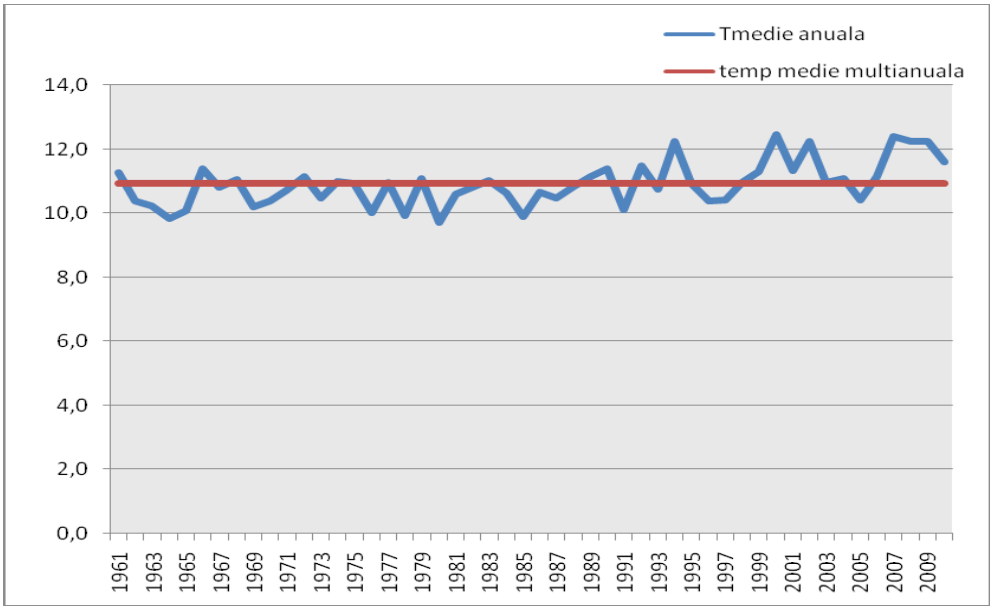
During the years 1934-1952 there were warmer than in recent years, from 1994 to 2007. Warmest decade was 1943-1952, when the average temperature reached 11.2° C. On the analyzed territory, winter and early spring have become drier in recent years, while the beginning and middle of autumn and middle of summer rainiest.



Average of the annual quantities of precipitation and air temperature decades, at Arad weather stations (1881-2007) and Oradea (1901-2005)

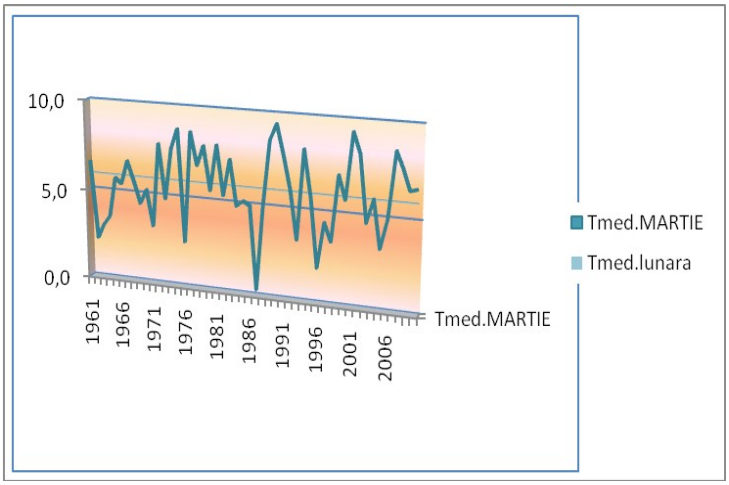
Annual quantity of precipitation at Timişoara WS (1961-2010)

At Timisoara weather station where the data series was recorded between 1961-2010, it can be seen that, compared with normal quantity of annual rainfall 603.7 l / m², years 1969-1970, 1974-1975, 1981 -1982, 1991, 1995-1996-1997, 1999, 2001, 2004, 2005 and 2010 were years with excess rainfall, years in which floods occurred more or less severe. Years 1961-1962, 1967, 1971, 1973, 1976, 1983-1984, 1992-1993-1994 and 2000 were relatively dry years. In Timisoara the wettest year was 1970, when there were 844 l / m², while the driest was 2000 with 296.3 l / m².



Average annual temperatures (1961-2010) recorded at WS Timisoara

The following graphics are multiannual monthly average temperatures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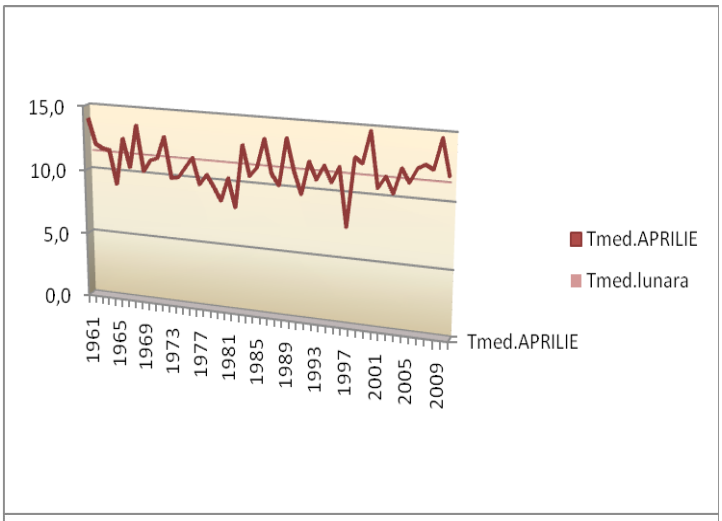
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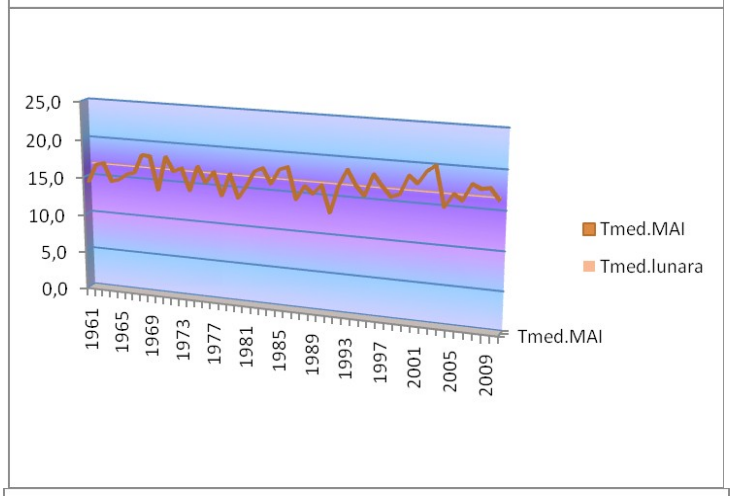
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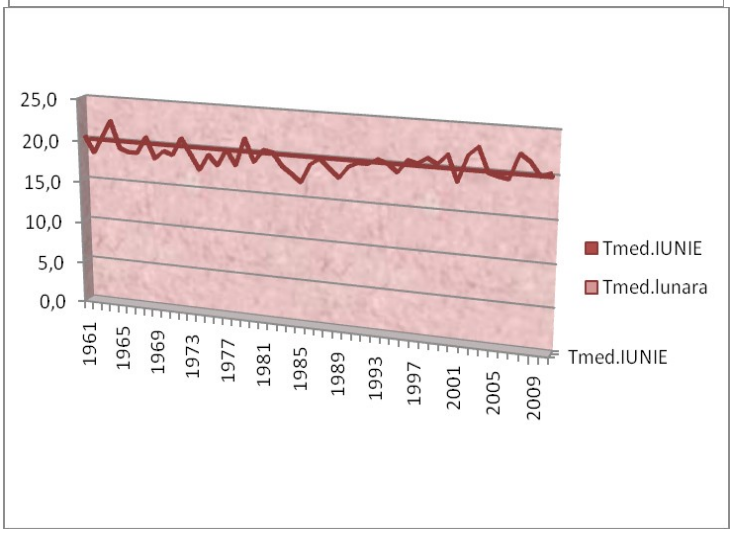
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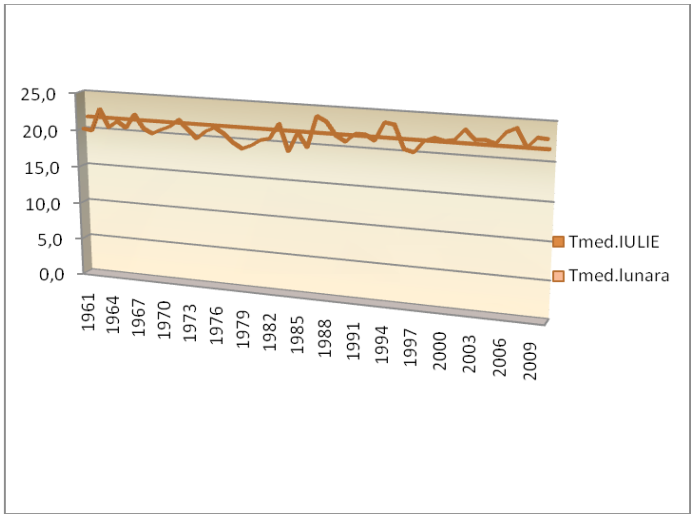
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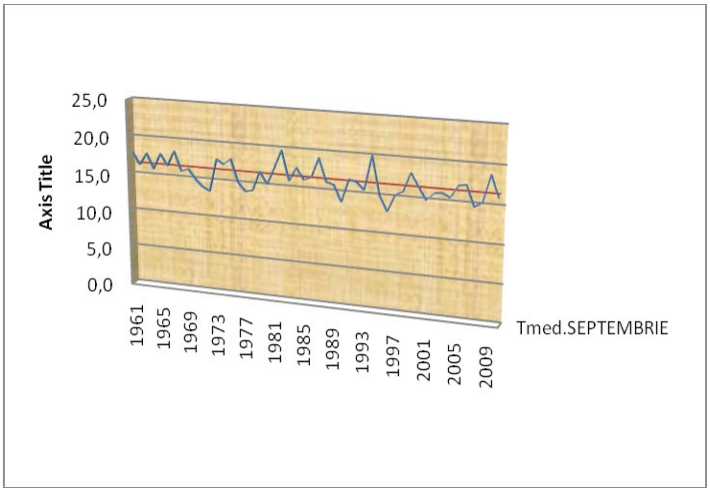
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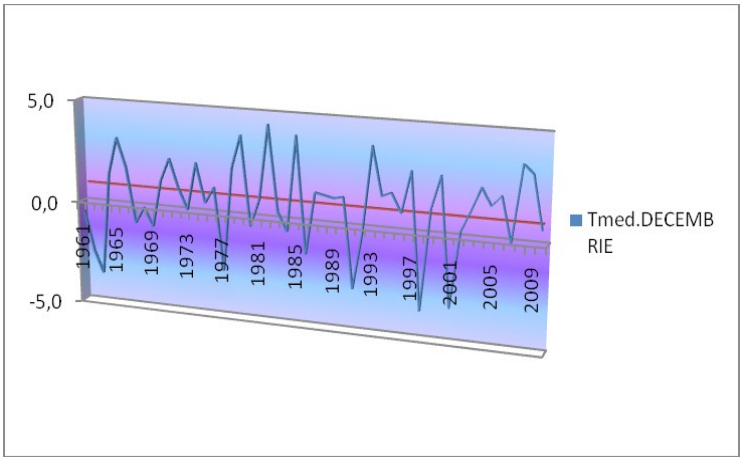

It is noted that the average temperature at Timisoara Weather Station is part of the increase tendency, belongs to the interval which occurs throughout the country.
Summarizing data on average temperature regime in seasons during the 1961-2010 is obvious significant warming in summer. In winter and in spring this trend is reduced, the average temperature variations are less important.
In autumn is seen even a slight decrease in average temperatures. Tendency of warming in summer may be due to increased frequency of anticyclonic configurations simultaneous ground and altitude centered in the north, which intensified after 1987. This increase was caused either by natural causes or anthropogenic (increased greenhouse gases) or by overlaying the two factors.

CONCLUSIONS

Heavy rain accumulated in short intervals (2, 3, 4 or 5 days) have increased in recent years in the west. The cause is an increase in air temperature, which favors thermal convection, but also increase rainfall in the last period. During the year, the most favorable period to producing excessive rainfall is from May to September, especially the hot summer months from June to July. The month with the highest risk of these events is June, the month of maximum rainfall. In the case of exceptional quantities of more than 70 mm accumulated during 2 days, the risk month is July, the month of maximum heat. Excessive rainfall periods have the highest frequency in the last decade of July, then in the first decade of June, followed by the second decade of the month.
On the territory of the Western Plain, climatic hazard affecting most powerful socio-economic life of the population is considered generally excessive humidity. This opinion is based on the fact that the predominant substrate of plain is clay wich prevent water from seeping underground in situations of surplus rainfall, but also on the groundwater near the surface, especially in lowlands, alluvial. Both causes water puddles and swampy areas appearance.
As intense and damaging droughts have become recent years - especially since the territory consists mainly of agricultural land - as well as hazards that storm or hail. It was seen that they can cause serious damage. In general, higher than the droughts damage excess rainfall as it affects much wider territories and storms have become more frequent, especially in southern areas. In addition, when there are excess quantities of precipitation in the hot season, the excess

water on the surface is evaporated rapidly under high temperature of the air and soil in recent years.

Since the temperature in the coming years will continue to grow, that the most important hazards to which the society is vulnerable are not only excess precipitation, but also droughts, storm or hail. The intense dynamics of air attributed to the increase in air temperature will continue to affect the west of the country, the strong lines of instability across the region and provide all associated hazardous weather phenomena.

Local authorities will need to know preventive measures of these hazards and transmission of weather warnings as soon as possible is of prime importance. Population should be informed rapidly of the risks to which it is exposed, if the event of hazardous weather phenomena with rapid deployment across the west territory of the country. This is perhaps the best measure of defense of life of citizens and their property.

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