RISK ASPECTS IN THE WARM SEASON 2014 - CLIMATOLOGICAL AND SYNOPTIC CHARACTERISATION DURING SUMMER 2014 IN WESTERN REGION OF ROMANIA

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Abstract. *Climatological characterisation for summer 2014 in Western region of Romania, namely the interval june-august 2014, is a result of an arduous analysis regarding two different climate parameters: air temperature but also, rainfall amount. Using as a reference, multiannual normal values (1961-2013) we made representations with standard deviations of average temperature and rainfull amount for each summer month, taking into account raw data registered at four representative weather stations: Oradea, Arad, Timișoara and Reșița. We also used synoptic charts with surface presssure and geopotential height at 500 hPa.. As a result of this systematic analysis, summer 2014 was an ordinary summer regardind thermal regime, but one thing arouses our attention, rainfall excess, causing troubles in the socio-economic, mainly floods in most part of Banat. Floods, as a risk phenomena for agriculture and also for civile society, will be revealed by ilustrating an example of a dangerous weather phenomena happened the last summer, which created tragically effects, not only financially, but also in human field. Of course, this is one of more others, happened in summer 2014, but very important to focus on it, because it succedeed a period of rainfall excess. In contrast, the summer has not been proven to be according to the expectations in the mass-media, with tropical nights and hot days. Throughout the summer there have been three such cases of hot weather and heat discomfort, which on average haven't had a longer duration of 2...3 days. Another risk phenomenon to agriculture specific in warm season of the year is the hail. When the diameter of hailstones is high the damage may be significant. The applicability of the study conducted in co-operative activities as well as its actuality lies in the fact that is a useful support with a reference to a topical subject. We intend to continue the study with a new analysis of summer 2015 and highlighting the similarities and differences between these two successive periods in Western region of Romania.*

Key-words: *thermal regime, rainfall excess, hail, dangerous weather phenomena*

INTRODUCTION

In Romania, namely in the Western region, the summer of 2014 was a season rich in extreme weather phenomena, mainly those time periods associated with an exacerbated atmospheric instability, which prevailed throughout the three months of summer, and less those time periods with hot days, which effectively in Banat-Crișana region were immaterial (up to 2 cases). Due to the dominance of the situation above, one can state that the summer of 2014 was a rainy summer. To support this statement, in the study we will present an analysis of each month with the evolution of ground-level pressure, geopotential height at 500 hPa level, but especially on standard deviations of average air temperature and rainfall amount from multiannual normal values (reference time 1961-2013).

MATERIALS AND METHODS

We were used, in the first phase, raw data from four representative stations: Oradea, Arad, Timișoara and Reșița, after which, we succeed to highlight the deviations from

multiannual normal values. Synoptic characterization was made using ground-level pressure maps, which show the distribution of cyclones and anticyclones, and also altitude maps with geopotential at 500 hPa level, for about 5500 meters.

RESULTS AND DISCUSSIONS

The onset of the summer, in the western region, was a chilly one, with minimum temperature values that have descended into depressions up to 5ºC. Throughout June we faced with a single wave of warmth, fairly short term (6th-11th of June), bur only for one day on were registered maximum temperature values over 35ºC (the 10th of June, 35,8ºC in Oradea).

Depending on the average temperature deviations in June 2014, compared with multiannual normal values, average air temperature was situated around normal values at Reșița, in South of Banat, and relatively close to normal at weather stations Oradea, Arad and Timișoara.

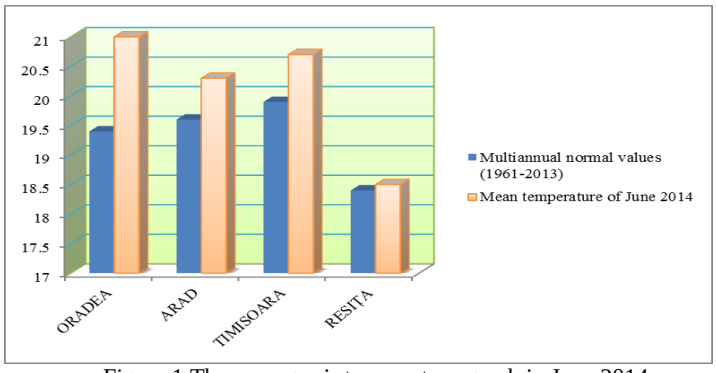

Figure 1 The average air temperature graph in June 2014, compared with multiannual normal values

June is recognized, as being a month with unstable weather, with quick passes from the periods with beautiful and warm weather at periods with unstable weather and even cooler. The greatest monthly precipitation amount was expected to register this month. June 2014 has been framed only partially in this pattern. Rainfall amounts recorded this month were slightly under the multiannual values in the Western Plain and northern Crișana, while in southern Banat was registered a surplus.

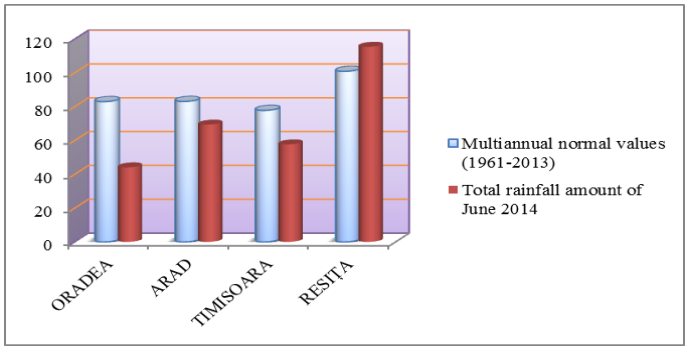

Figure 2 Total rainfall amount graph in June 2014, compared with multiannual normal values

This is a result of the synoptic analysis, which reveals that june was largely dominated by the existence of some cyclonic cores in the Mediterranean Sea, whose action was felt in the southern part of the country where incidentally the amount of precipitation was slightly higher compared to the rest of the region, especially in the second half of the month.

For example, the 25th of June, was a day dominated by instability. There were reported significant amounts of precipitation, lightning and hail. Especially, hail produced extensive damages to crops. In Caraş-Severin County, the hailstone diameter reached 3...4 cm causing several crashes as you can see in the pictured below from local media.

Figure 3 Hail in Caraş-Severin County

As for the synoptic context, at the level of 500 hPa, in the 25th of June, 12 GMT, we were situated on the upward slope of the geopotential trough. On the ground level it can be observed a low-pressure area extended from central basin of Mediterranean with multiple cores, whose clouds systems affected the west of the country.

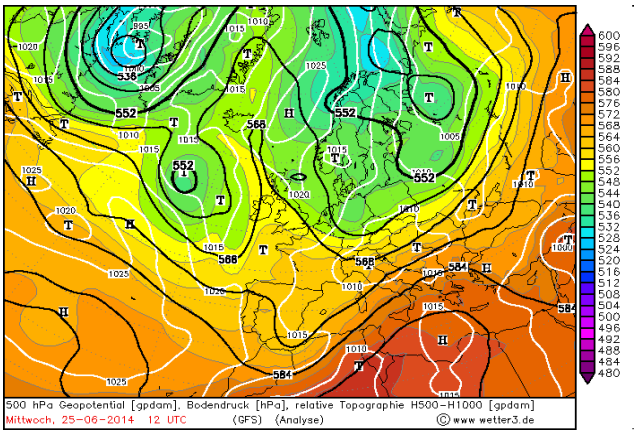

Figure 4 Geopotential at 500 hPa and ground pressure in 25.06.2014 h 12 GMT

Called among ordinary people hot July, it should be characterized by high air temperature values, hot days and tropical nights being normal for this period.

Mean air temperature in July 2014 was close to normal for this month, but lacked the intense and long-lasting heat waves we've faced in previous years. Temperatures were modest, in large part due to the sharp nebulosity. Although there were many hot days, heat threshold was reached only one day (the 20th of July, at Chişineu-Criş, 35,1°C).

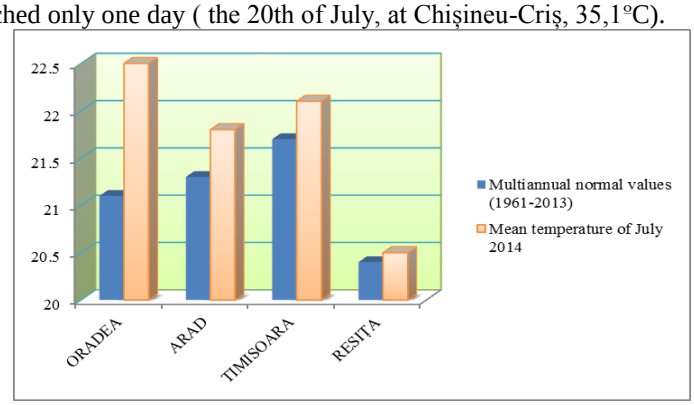

Figure 5 The average air temperature graph in July 2014, compared with multiannual normal values

July was a particular month in terms of rainfall. Rainfall amounts in July 2014 were two or even three times higher than multiannual normal values, so, on say true records in western region were reached.

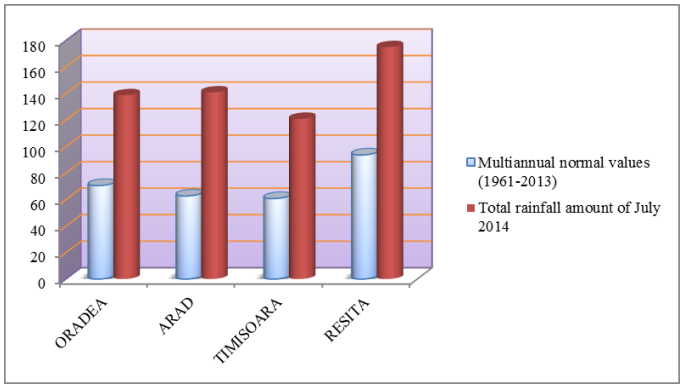

Figure 6 Total rainfall amount graph in July 2014, compared with multiannual normal values

Also, in the table below it can be seen some weather stations from western region recorded the biggest amounts of precipitation in July.

Table 1

Monthly rainfall amounts

Weather station	**Rainfall amounts-July**
Holod	230,2 l/mp
Gurahont	182,8 l/mp
Banloc	180,4 l/mp
Caransebeș	240,4 l/mp
Oravița	207,2 l/mp

July is also the month with the most massive floods of the last few years from Banat. The last two days of the month (the 30th and the 31st of July) were characterized by a marked instability due, as synoptic analysis indicates, to an intense activity of a mediterranean cyclon, causing abundant precipitations, on large areas.

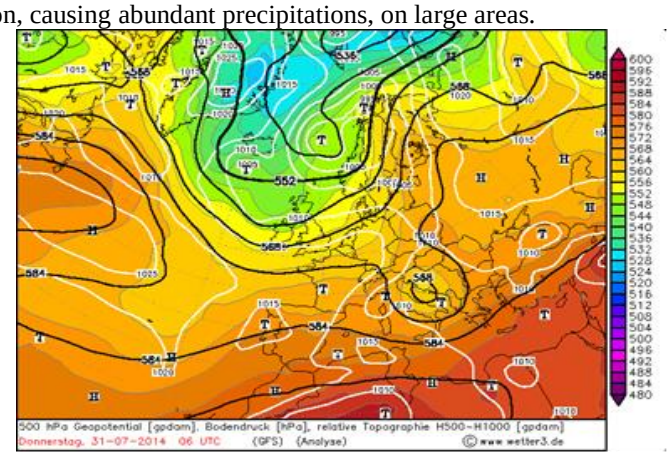

Figure 7 Geopotential at 500 hPa and ground pressure in 31.07.2014 h 06 GMT

The rainfall excess in these two days (for example in Timiș County: 141,2 l/mp to Moravița, 127,8 l/mp Gătaia) has caused devastating effects. From the information provided by Inspectorates for Emergency Situations, the data were as follows:

- for Timiș County: 465 persons discharged, 150 households flooded, a house that had collapsed, the road DJ 588 linking localities Denta-Gătaia has been closed;
- for Caraș-Severin County: 4 deads, 11 houses flooded, also 96 yards and gardens

Figure 8 Images collage from local mass-media

In august, weather was influenced by an intense activity of the Icelandic depression. Frontal systems relating to it, reaching our area, had determined, this time, higher amounts of precipitations in Crișana region (114,0 l/mp at Ștei, 165,4 l/mp at Șiria-Cetate, 210 l/mp at Stâna de Vale), amounts fallen, especially in hilly and mountainous areas, where the orography had a decisive role in front of air masses coming from the Atlantic Ocean.

Analysing multiannual normal values it can be noticed that average air temperature deviations have been framed in normal range, with slightly above average values in Crișana, where convective activity was more intense and, at the same time with slightly negative deviations in Banat, up to 0,3˚C, but not significant. Considering rainfall amounts, cumulative quantities of water exceeded the multiannual values.

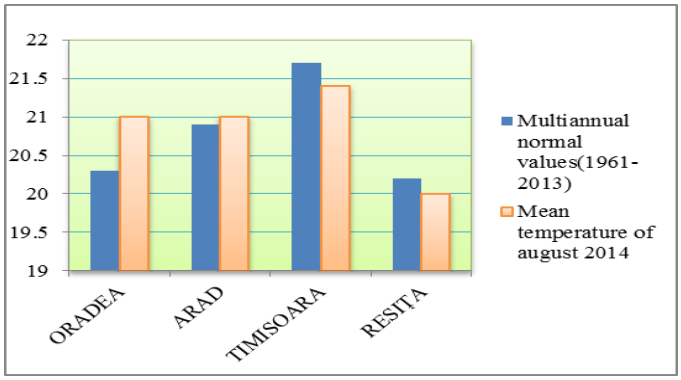

Figure 9 The average air temperature graph in August 2014, compared with multiannual normal values

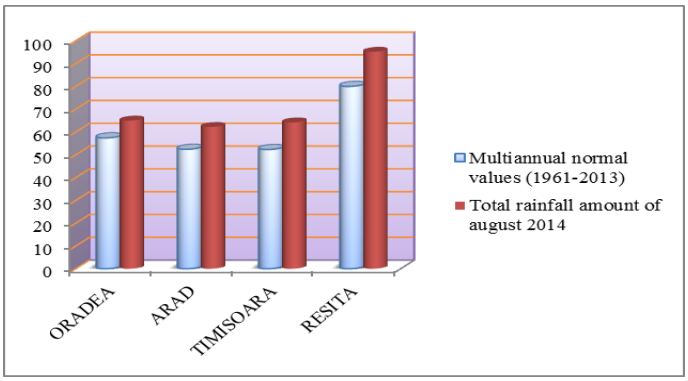

Figure 10 Total rainfall amount graph in August 2014, compared with multiannual normal values

CONCLUSIONS

The thermal deviations in summer 2014 showed no exceptional circumstances. There was a fast dynamic of weather conditions that generated higher temperatures for a short period (2 ... 3 days), followed by a decrease (during an intense cyclonic activity exhibit in the area) and rising again, the string may continue so on. On the other hand, rainfall distribution and amounts recorded sparked some interest, highlighting the exceptional amounts recorded in July. The rainfall amount of the other two months, even if not quite as high, were also above multiannual values.

By presenting these features we wanted to highlight general issues that have marked and influenced the weather in warm season 2014 in the western region, correlated with the effects induced in social sphere.

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