PLUVIOMETRIC HAZARDS IN THE RAINY SUMMER OF 2014 IN OLTENIA

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ABSTRACT - Pluviometric hazards in the rainy summer of 2014 in Oltenia. After the rainy spring of 2014, marked by five waves of pouring rains which caused floods and water bogging on crops, the rainy period also continued in the summer months reaching its peak in July. Air temperature which has been cool in some interval, but close to normal led to some gradual delays in June and July, and only in August some gradual enforcements brought the crops to a normal stage. The most intense rainfall of the summer was registered in the interval 27-31 July 2014 . The analysis of climatic conditions in the south-west of Romania in the summer of 2014 is a continuation of some extended studies on climate variability. The paper is useful to specialists, doctoral candidates and master graduates and to all people interested in the climate's evolution.

Key words: *waves of pouring rains, excess of humidity in ground, floods, hail.*

1. INTRODUCTION

The excessively rainy weather during the spring of 2014 has continued also during the summer. The intervals with rainy weather alternated with those in which weather cooling came after rainy periods has been significant. Consequently, in the rainy periods, the hydric and then the thermal stress were intense in crops and generally in all the environment, and the fast and intense weather cooling led to gradual stagnations in some periods of time. The analysis of climatic conditions in the south-west of Romania in the summer of 2014 is a continuation of some extended studies on climate variability (Marinică 2003, I. Marinică, I. Marinică, Andreea F. Marinică, 2013, Marinică F. Andreea, Constantin (Oprea) D. Maria, Marinică I., Vătămanu V. V. 2014).

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2. DATA AND METHODS

In our research on this rainy summer we used the data archive of CMR Oltenia, NAM Bucharest, NAM maps, synoptic maps, data provided by the archive of satellite and radar images, as well as the facilities of Office.

3. RESULTS AND DISCUSSION

3.1. Pluviometric regime of June 2014

Monthly quantities of precipitation were comprised between 72.6 l/m^2 in Calafat in the south-west of the region and 187.2 l/m^2 in Tg. Logreşti Oltenia hill area, and their deviations from multiannual means were comprised between -19.5% in Polovragi and 158.9% in Tg. Logreşti, which according to Hellmann criterion lead to classifications of pluviometric time type comprised between little droughty (LD) on extended areas in Polovragi and Voineasa and excessively rainy (ER) on extended areas in the central part of Oltenia in Craiova, in Getic Piedmont in Bâcleş, Tg. Logreşti and Drăgăşani and in Subcarpathians in Rm. Vâlcea (tab. 1).

Monthly mean of precipitation for the entire region was 115.6 l/m^2, and its deviation from the normal was 37.3% which led to the classification of a very rainy (VR) month overall for the entire Oltenia region.

The number of days with precipitation ≥ 15.0 l/m^2 was comprised between 12 in Calafat and Craiova and 18 in Slatina, Tg. Logreşti, Drăgăşani and Parâng.

The number of days with precipitation ≥ 20.0 l/m^2 was comprised between 0 in Slatina and 5 in Tg. Logreşti.

The number of days with precipitation ≥ 30.0 l/m^2 was comprised between 0 in Calafat, Băileşti, Slatina and Polovragi and 3 Drăgăşani and Parâng.

There were registered 2 days with quantities ≥ *40.0 l/m^2* in Craiova, Bâcleş and Tg Jiu, and the ***maximum monthly quantity in 24 hours*** was 65.0 l/m^2 in the central part of the region in Craiova on 18 June.

The rainiest day was 18 June when the precipitation mean registered at meteorological stations was 18.6 l/m^2.

There were registered *9 days with hail* sparsely and locally, and on 25 June the hail had a local extension in Mehedinţi County where caused significant damages in vegetables and corn crops.

There were registered 18 days of wind gusts sparsely or locally, and the maximum wind gust was 83 km/hour in Dr. Tr. Severin on 25 June.

Wind gusts especially in June and July are a significant ***agroclimatic hazard*** because they cause the windbreak of extended surfaces of straw, rape, and alfalfa, which cause the depreciation of these crops and raise significant problems for harvest works.

After the beginning of windbreak process, a significant "domino effect" occurs which causes the extension of the damaged surface.

Table 1. Precipitation registered in the summer of 2014 and their deviations from the multiannual average values calculated for the interval 1901-1990*

Stația Meteorologică	Hm	Iunie 2014				Iulie 2014			
		ΣVI	N	Δ%	CH	ΣVII	N	Δ%	CH
Dr. Tr. Severin	77	93.8	72.5	29.4	P	117.6	49.3	138.5	EP
Calafat	66	*72.6*	65.6	10.7	PP	157.9	45.6	246.3	EP
Bechet	65	70.6	62.3	13.3	PP	77.2	46.6	65.7	EP
Băileşti	56	95.6	66.5	43.8	FP	141.6	45.0	214.7	EP
Caracal	112	98.2	73.7	33.2	FP	58.5	53.8	*8.7*	N
Craiova	190	133.8	71.2	87.9	EP	92.8	51.4	80.5	EP
Slatina	165	74.4	80.6	-7.7	N	174	57.5	202.6	EP
Bâcleş	309	167.7	72.0	132.9	EP	177.6	47.1	277.1	EP
Tg. Logreşti	262	**187.2**	72.3	**158.9**	EP	216.2	49.5	**336.8**	EP
Drăgăşani	280	161.4	87.6	84.2	EP	**196.6**	51.6	281.0	EP
Apa Neagră	250	123.8	99.2	24.8	P	167.6	72.7	130.5	EP
Tg. Jiu	210	87.4	93.0	-6.0	N	173.4	61.9	180.1	EP
Polovragi	546	90.4	112.3	*-19.5*	PS	**290.4**	88.9	226.7	EP
Rm. Vâlcea	243	132.2	86.9	52.1	EP	230.0	98.0	134.7	EP
Voineasa	587	90.1	106.7	-15.6	PS	261.1	88.6	194.7	EP
Parâng	1585	**169.8**	124.1	36.8	FP	**268.7**	132.1	103.4	EP
Media Oltenia		115.6	84.2	37.3	FP	175.1	65.0	169.5	EP
Stația Meteorologică	Hm	August 2014				Vara 2014			
		ΣVIII	N	Δ%	CH	ΣVara	N	Δ%	CH
Dr. Tr. Severin	77	27.4	38.2	-28.3	S	238.8	160.0	49.3	EP
Calafat	66	32.0	35.6	-10.1	PS	262.5	146.8	78.8	EP
Bechet	65	*12.6*	37.9	-66.8	ES	*160.4*	146.8	9.3	PP
Băileşti	56	41.4	39.0	6.2	N	278.6	150.5	85.1	EP
Caracal	112	23.6	39.9	-40.9	FS	180.3	167.4	*7.7*	N
Craiova	190	55.6	42.1	32.1	FP	282.2	164.7	71.3	EP
Slatina	165	38.4	46.8	-17.9	PS	286.8	184.9	55.1	EP
Bâcleş	309	92.2	33.4	**176.0**	EP	437.5	152.5	**186.9**	EP
Tg. Logreşti	262	39.6	43.6	-9.2	N	443.0	165.4	167.8	EP
Drăgăşani	280	59.0	46.4	27.2	P	417.0	185.6	124.7	EP
Apa Neagră	250	84.6	60.1	40.8	FP	376.0	232.0	62.1	EP
Tg. Jiu	210	43.2	64.3	-32.8	FS	304.0	219.2	38.7	FP
Polovragi	546	16.8	76.5	*-78.0*	ES	397.6	277.7	43.2	FP
Rm.Vâlcea	243	87.2	69.4	25.6	P	**449.4**	254.3	76.7	EP
Voineasa	587	**116.2**	72.8	59.6	EP	467.4	268.1	74.3	EP
Parâng	1585	**118.6**	90.6	30.9	FP	**557.1**	346.8	60.6	EP
Media Oltenia		55.5	52.3	6.2	N	346.2	201.4	71.9	EP

*(Σ = monthly and seasonal sums, N=normal values, Δ%= percentage deviations, CH= Hellmann criterion).

Crop windbreak to the ground takes place at wind speeds ≥5m/s and < 10 m/s, when the wind occurs during rains or after a short period of time after the rain stops and plants are filled with the rain water.

The maintenance of a high humidity in the ground, frequent rains and relative low air temperature compared to the normal, led to frequent and intense attacks in vegetable and cereal crops of some pests specific to the moist weather: manna, bacteria withering (bacteria cancer), grey rot, Alternariosis, Septoriosis (white smear of leaves)**,** fruit blistering, mosaic, dwarf, black rot, antracnose, brown smear of leaves and fruits, hernia of cabbage roots, onion fly, common blast, (*Tilletia caries, T. foetida*), dwarf blast (*Tilletia controversa*), ground beetle (*Zabrus tenebrioides*) etc. All these need repeated and expensive treatments, causing significant problems to farmers. This aspect represents a significant ***agroglimatic hazard***[3] which contributed to the depreciation of crops and the production price increase of agricultural products. Some of these diseases have the specificity that once they appear, the treatments have poor effects or do not take effect, and therefore the preventive treatments are important, but hard to perform in rainy periods.

The synoptic causes of rains in the interval 15-20 June 2014.

The rainiest interval of June 2014 was between 15-20 June 2014, of which ***18 June 2014 was the rainiest day of the month***, with the daily mean of the quantities of precipitation for the entire region of 18.6 l/m^2.

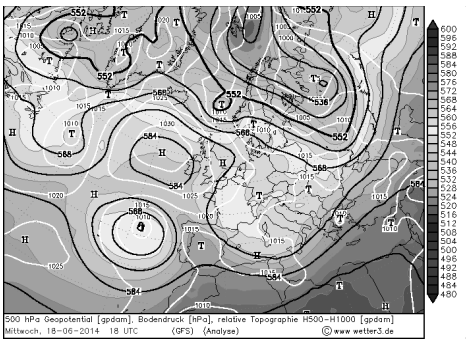

Figure 1. Synoptic situation at the ground level and in altitude at the level of 500 hPa, superposed over TR 500/1000, on 18 June 2014 at 18 UTC http://www.wetter3.de/Archiv/).

Rains have been produced by the evolution of a Mediterranean Cyclone, formed in the thalweg of Island Depression, at the periphery of Azores Anticyclone, which evolved during most part of the interval ***at intermediary levels of altitude*** having a poor correspondent at the ground level in a short interval of time (18 June 2014 at 12 UTC – 19 June 2014 at 06 UTC, fig. no. 1 and 2).

The synoptic situation at the level of 850 hPa indicates the position of the Mediterranean Cyclone at this time, above Central Italy and Adriatic Sea, which shows that at the intermediary levels in the lower troposphere the

[3]***Agroclimatic hazard*** represents a phenomenon or a process of climatic hazard with damaging effects in crops. The category of ***agroclimatic hazards*** is more extended than that of ***climatic hazards,*** because an agroclimatic hazards may not be considered a climatic risk, because in the first case the values of climatic parameters can be lower than in the second.

Mediterranean Cyclone had a strong warm and moist Mediterranean air supply which highly amplified the precipitation potential of cloudy systems. The dynamic convection produced by the ascension of cloudy systems above the relief in steps of Oltenia caused an intense precipitation, which led to significant quantities of precipitation in 24 hours and pouring rains in particular intervals of time. There have been issued meteorological warnings of significant quantitatively rains and hydrological warnings of yellow code for floods on Oltenia rivers. In the lower troposphere, the Mediterranean Cyclone is supplied with a mass of cool and moist air mP, advected from the Northern Atlantic Ocean at the periphery of Azores Anticyclone, from the circulation from lower troposphere. Air circulation in the upper troposphere was similar with the same type of advection of cool and moist air mP on the thalweg of geopotential field.

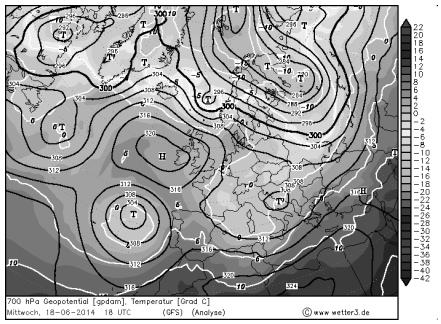

Figure 2. Synoptic situation in altitude at the level of 850 hPa on 18 June 2014 at 18 UTC (http://www.wetter3.de/Archiv/).

3.2. Pluviometric regime of July 2014

Monthly quantities of precipitation were comprised between 58.5 l/m^2 in Caracal and 290.4 l/m^2 in Polovragi, and their percentage deviations from the multiannual means were comprised between 8.7% in Caracal and 336.8% in Tg. Logreşti which lead to classifications of pluviometric time type of exceedingly rainy (ER) at all meteorological stations of Oltenia excepting an extremely restricted area in Caracal where there was a pluviometric normal month (N) (table no. 1).

In July 2014 at six meteorological stations in the hilly and mountainous area there were registered monthly values exceeding 200 l/m^2 (four of which over 250.0 l/m^2, and one of them approaches significantly of 300 l/m^2) : 216.2 l/m^2 in Tg. Logreşti, 230.0 l/m^2 in Rm. Vâlcea, 261.1 l/m^2 in Voineasa, 268.7 l/m^2 in Parâng, 290.4 l/m^2 in Polovragi and 299.6 l/m^2 in Ob. Lotrului[4] (very close to 300 l/m^2).

The percentage deviations from the multiannual means exceeded 200.0% at seven meteorological stations, and in Tg. Logreşti of more than 300% (tab. no. 1).

The monthly mean of July for the entire region of Oltenia was 175.1 l/m^2, and its percentage deviation from the normal was 169.5% which confirms the characteristic of excessively rainy month (ER) for the entire region.

[4] Meteorological station Ob. Lotrului has a short range of data and therefore it is not included in the tables, since it does not have significant multiannual means.

The number of days with precipitation was comprised between 11 days in Caracal, Rm. Vâlcea and Halânga and 21 days in Ob. Lotrului in the mountainous area (there were also registered 20 days in Voineasa and Parâng), with a mean of 15.8 days for the entire region.

The number of days with precipitation ≥ 15.0 l/m² was comprised between 1 in Bechet and Caracal and 8 in Parâng.

The number of days with precipitation ≥ 20.0 l/m² was comprised between 0 in Caracal and 6 in Voineasa and Rm. Vâlcea.

The number of days with precipitation ≥ 30.0 l/m² was comprised between 0 in Caracal, Craiova and Bechet and 3 in Apa Neagra, Tg. Logreşti, Tg. Jiu, Polovragi, Rm. Vâlcea and Parâng.

The maximum quantity of precipitation registered **in 24 hours** was 112.6 l/m² at pluviometric post Sadu in Gorj County on 27 July.

In 23 days, the maximum quantities of precipitation registered at meteorological stations or pluviometric posts were ≥ 20.0 l/m². There were registered 5 days with hail, of which ***on 10 July the hail was locally*** in Dolj, Olt and Vâlcea Counties, and in Vâlcea County the maximum hail diameter was 5 cm (in Strejeşti Vâlcea County), and the damages caused by hail were significant.

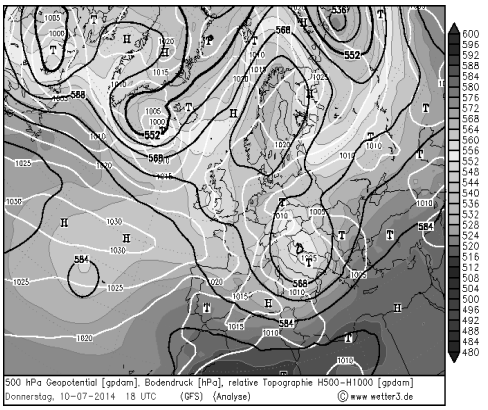

Figure 3. Synoptic situation at ground level and altitude al the level of 500 hPa, superposed on TR 500/1000, on 10 July 2014 at 18 UTC (http://www.wetter3.de/Archiv/).

Drăgăşani vineyard (maximum hail diameter - 3 cm) was destroyed and incentive treatments were needed to recover the wine branches in order to control the production of the next summer as much as possible (2015), and the ground thermometers on the platform of meteorological station Drăgăşani were completely broken and hardly on 1 September 2014 were they replaced.

There were registered 22 days with locally and isolated wind gusts which also had the form of storm wind, and the maximum wind gust was 119 km/hour in Drăgăşani on 10 July.

In July 2014 there were three ***waves of pouring rains*** in the intervals: 9-11 July (the maximum being registered on 10 July; the maximum quantity of precipitation in 24 hours was 80.0 l/m² on 10 July in Drăgăşani in Vâlcea County), 21-23 July (with the maximum on 23 July, and the maximum quantity of precipitation in 24 hours was 62.5 l/m² in Băile Olăneşti Vâlcea County) and 26-31

July (with the maximum on 27 and 28 July; the maximum quantity of precipitation in 24 hours was 112.6 l/m^2 at pluviometric post Sadu in Gorj County). There were issued meteorological warnings of yellow code for pouring rains and yellow and orange for floods on some rivers.

The synoptic causes of pouring rains in July 2014

Pouring rains in the interval 9-11 July 2014 had a maximum precipitation intensity in the night of 10/11 July 2014. *The analysis of the synoptic situation on 10 July 2014 at 18 UTC* At 18 UTC on 10 July, at the ground level there is an anticyclonic girdle formed of Azores Anticyclone and Scandinavian Anticyclone. Above Romania and Balkan Peninsula there is the Mediterranean Cyclone, formed in the altitude thalweg of Island Cyclone, with central values below 1005 hPa (fig. no. 5). In the lower troposphere for Oltenia air circulation was southern-eastern bringing a warm and moist air mass mT of Mediterranean origin.

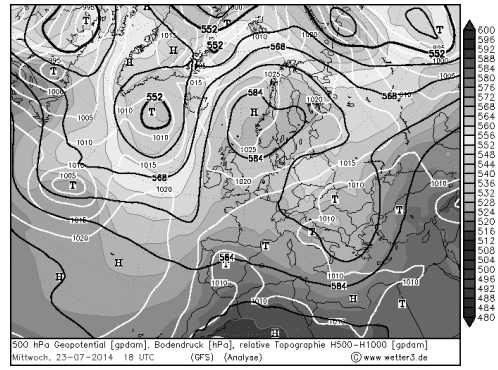

Figure 4. The synoptic situation at the ground level and in altitude at the level of 500 hPa, superposed on TR 500/1000, on 23 July. 2014 at 18 UTC (http://www.wetter3.de/Archiv/).

In altitude at the level of 500 hPa, there is a blocking circulation for Western Europe, and above Adriatic Sea there was a low geopotential nucleus with central values below 560 damgp. At this level air circulation in Oltenia was southern-western, and the air mass was mP+mT, therefore it was rich in water vapors and cool. Cold air advection from north was intense, and in the interval 10 July at 12 UTC -11 July at 06 UTC (during 18 hours), air temperature at the level of 850 hPa dropped from 16.0°C to 8.0°C above the west and south-west of Romania.

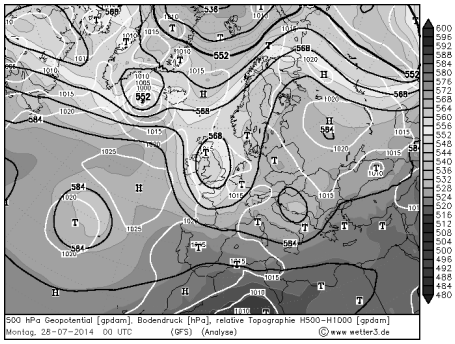

Figure 5. The synoptic situation at ground level and in altitude at the level of 500 hPa, superposed on TR 500/1000, on 28 July 2014 at 00 UTC (http://www.wetter3.de/Archiv/).

Consequently, the precipitation potential of cloudy systems was significant. At 18 UTC on 10 July there was a wide precipitation area above Oltenia, east of Muntenia and northern Bulgaria, and the mean of the quantities

of precipitation registered in Oltenia in the interval 10 July 2014 at 09 UTC -11 July at 09 UTC was 17.1 l/m^2.

Pouring rains in the interval 21-23 July 2014 had the maximum precipitation intensity in the afternoon of 23 July and in the first part of the night.

The analysis of the synoptic situation on 23 July 2014 at 18 UTC.

On 23 July 2014 at 18 UTC, at the ground level above Europe there is an anticyclonic girdle formed between Azores Anticyclone, with central values exceeding 1020 hPa and the Scandinavian Anticyclone with central values exceeding 1025 hPa (fig. no. 4).

Above the western half of the Mediterranean Sea, Balkan Peninsula and Romania there was a wide poor anticyclonic field with values below 1010 hPa, united with the Arabian Cyclone. In the lower troposphere air circulation was from the eastern sector bringing a moist and cool air mass mP+cP over the Black Sea.

In altitude at the level of 500 hPa, there is a blocking circulation for the Western Europe. Above Romania and Balkan Peninsula, at the intermediary levels of 850 hPa, 700 hPa and 500 hPa, there was a low geopotential nucleus with central values below 148 damgp, below 308 damgp and 568 damgp.

In altitude, for Oltenia, air circulation was from the northern sector bringing a cool; and moist air mass from the Atlantic Ocean and Northern Seas.

This ***cyclone with evolution at intermediary levels in altitude*** is the one which brought the pouring rains in the interval 21-23 July 2014.

Pouring rains in the interval 26-31 July 2014 had the maximum precipitation intensity on 27 and 28 July.

The analysis of synoptic situation on 28 July 2014 at 00 UTC

On 28 July 2014 at 00 UTC, at ground level above Europe there is an interruption of the anticyclonic girdle formed between Azores Anticyclone with central values exceeding 1025 hPa and the East-European Anticyclone with central values exceeding 1020 hPa (fig. no. 9). The interruption occurred above Scandinavia and Central Europe. The poor depression couloir crossed Europe from north to south above Romania, Balkan Peninsula and Italy making the connection with cyclonic fields in the Island area and the poor cyclonic field in the Mediterranean Sea and Arabian Peninsula. For Oltenia, in the lower troposphere air circulation was from the eastern sector bringing above the south of Romania an air mass mP+cP, rich in water vapors above the Black Sea.

In altitude the level of 500 hPa, above the Adriatic Sea a low geopotential nucleus was located with central values below 576 damgp. For Oltenia, air circulation in altitude was southern-western with a warm and moist air mass mT above the Mediterranean Sea. A significant input of moist and cool air mP above the Atlantic Ocean was due to the northern-western circulation from the posterior side of low geopotential nucleus located over the Great Britain.

Consequently, although the cyclone ***evolved at intermediary levels in the atmosphere,*** without the correspondent at the ground level, had a rich supply with moist air in three directions, which caused some precipitation intervals in which rains had a pouring character, and the interaction with high forms of relief highly contributed to precipitation intensification. Rains were intense in the west and north of the region where the highest quantities of precipitation were registered.

In the night of 27/28 July there were strong floods in: Novaci[5] (In the last 40 years, Băile Olănești, Novaci and Vaideeni have never been flooded, therefore the maps of climate hazard give a small probability of floods in these localities. There were issued warnings of abundant precipitation of yellow code and hydrological warnings of orange and red code.

In the area affected by intense precipitation in this interval with rains (26-31 July), the quantities of precipitation were comprised between 52.7 l/m^2 in Băilești and 200.2 l/m^2 in Ob. Lotrului, and the mean for the entire region was 81.9 l/m^2, being the highest mean of all summer during a rainy interval.

The quantities of precipitation registered in this interval highly exceeded the normal monthly values and were comprised between 50.6 l/m^2 in Dr. Tr. Severin and 184.5 l/m^2 in Voineasa, and the positive percentage deviations from the normal were up to 159.8% in Bâcleș (excepting a restricted area in Romanați Plain, where the deviation was 14.6 l/m^2).

In all three intervals of pouring rains the quantities of precipitation were comprised between 43.9 l/m^2 in Caracal and 233.2 l/m^2 in Polovragi, and their deviations from the normal values exceeded 100.0% at 11 meteorological stations (at three stations they exceeded 200.0%, Calafat, Bâcleș and Drăgășani) reaching 232.9% in Bâcleș.

The extremely abundant rains in July 2014 caused floods, damages of houses, roads and bridges, erosions of river banks, clogging with alluvial deposits of some localities (Vaideeni, Vâlcea County), floods of some crops, meadows and grasslands, water bogging in crops which caused the damage of plants in some areas.

Frequent rains and accentuated nebulosity at grapes led to the reduction and slacking of photosynthesis processes (grape needs more hours of solar luminosity), and the frequent attacks of diseases and pests led to a drastic decrease of production and a poor quality, thus representing a significant ***agroclimatic hazard*** for this crop. Straw crops (oat, barley, rye, wheat etc.) had significant

[5]The fastness of floods and the significant impact force of high floods were due to the fact that in the upstream mountainous area, in hydrographic river basins, which passes through these localities, deforestations were made, and high floods were fast formed. A significant characteristic is that these localities are situated immediately out of the mountains, and therefore high floods were fast and strong, the flow cliff being big) on Gilort river, in Băile Olănești, in some communes in the north of Argeș County, in Vaideeni on Luncavăț, on Cerna, on Bistrița.

production and quality decreases. Generally, all crops and three crops had production and quality decreases. On extended areas there was a humidity excess in the ground.

The balance of damages caused by the flood in July 2014, in the entire country of which most of them occurred in Oltenia, was the following (Gabriel Oprea, according to Agerpres): "The centralized situation of the main effects is as follows: dead people - one, disappeared people - four, evacuated people - 1.184, saved people - 726, destroyed homes - 99, damaged homes - 168, flooded homes - 2003, destroyed households - 233, damaged households - 3.335, flooded households - 3.718, destroyed economic objectives - one, damaged economic objectives – two, clogged fountains - 2.475, affected national roads - six on portions counting 1,5 km, affected county roads - 37 on portions counting 88,7 km, communal roads - 39 on portions counting 239 km, destroyed bridges - nine, destroyed footbridges - 53, affected footbridges - 242, water supply network - 25,7 respectively 125 de km, communication networks - 1,2 km, flooded fields - 17.015 hectares, of which plough land 11.869 hectares, meadows - 1.813 hectares, courtyards, gardens - 3.333 hectares, destroyed dams - 17,3 km, affected dams - 68,72 km".

In flooded areas or the regions with a highly flood hazard intervened: 1.120 employees, 697 technical equipment and one reserve of 4.643 firemen, gendarmes, policemen, border policemen and from Aviation Inspectorate.

3.3. Pluviometric regime of August 2014.

Monthly quantities of precipitation were comprised between 12.6 l/m^2 in Bechet and 116.2 l/m^2 in Voineasa, and their percentage deviation from the multiannual means were comprised between -78.0% in Polovragi and 176.0% in Bâcleș, having a great variety in time and space. These deviations lead to classifications of thermal time type at meteorological stations in Oltenia comprised between exceedingly droughty (ED) on Danube watermeadow in the extreme south in Bechet and in Subcarpathian Depression Polovragi (tab. no. 1).

Monthly precipitation mean for the entire region was 55.5 l/m^2 being the smallest of all summer months and 2.1 smaller than that of June and 3.2 smaller than that of July.

The number of days with precipitation was comprised between 3 days in Calafat and 13 in Parâng and Voineasa with a mean of 6.8.

The number of days with precipitation ≥ 15.0 l/m^2 was comprised between 0 in Bechet, Caracal and Polovragi and 4 in Voineasa.

Only in Bâcleș, Rm. Vâlcea, Voineasa and Parâng in two days, precipitation were *≥ 15.0 l/m^2*.

Atmospheric drought was registered in the intervals 8-22 July and 24-31 July amounting 21 days.

The maximum quantity of precipitation registered in 24 hours was 79.0 l/m^2 in Târmigani in Mehedinți County on 23. August.

There were registered 13 days with wind gusts isolated or locally, and the maximum wind gust was 86 km/hour in Drăgășani on 23 August.

3.4. Overall pluviometric regime of the summer of 2014

Seasonal precipitation values were comprised between 160.4 l/m^2 in Bechet and 467.4 l/m^2 in Voineasa, and their percentage deviations from the multiannual means were comprised between 7.7% in Caracal and 186.9% in Bâcleș leading to classifications of thermal time types at meteorological stations comprised between normal (N) on a restricted area in Romanați Plain and excessively rainy (ER) in most part of Oltenia (table no. 2).

The seasonal quantity of precipitation for the entire region was 346.2 l/m^2, and the percentage deviation from the multiannual mean was 71.9% which confirms the characteristic of exceedingly rainy summer (ER) for the entire Oltenia.

This distribution, as well as the rains from critical periods, spring and September caused a general difficult agricultural year because of frequent climatic and agroclimatic hazards especially related to exceedingly precipitation and frequent attacks of diseases and pests specific to moist weather. Agricultural works were difficultly done during all summer, and harvesting works were highly delayed.

The number of days with precipitation was comprised between 27 days in Calafat and 50 in Voineasa, and in the mountainous area in Parâng 51, and the mean for the entire region 38.2 days.

The percentage of days with precipitation and the number of summer days was comprised between 29.3% in Calafat and 54.3% in Voineasa, and in mountainous area 55.4% in Parâng.

Rainy intervals amounted a total of 47 days that is 51.1% of summer day.

These rainy intervals during summer as well as during spring and first part of autumn were caused by the intense activity of Mediterranean Cyclones in this summer, which correlated with the negative phase of North-Atlantic Oscillation.

CONCLUSIONS

In the rainy summer of 2014 weather was marked by *12 rainy intervals*: 2-4 June, 15-20 June, 24-26 June, 30 June, 3 July, 8-11 July, 15-19 July, 21-23 July, 25-31 July, 1 August, 5-6 August and 23 August, which amounted a total of 47 days.

In the summer of 2014 Oltenia was affected by 4 intervals of pouring rains: 15-20 June, 9-11 July, 21.23 July and 26-31 July, the latter being the longest and rainiest summer interval.

The maximum quantity of precipitation registered in 24 hours was 112.6 l/m^2 registered at pluviometric post Sadu din Gorj County in the last interval with pouring rains in this summer, on 27 July.

Pouring rains were caused by Mediterranean Cyclones with a strong precipitation potential, of which ***three have evolved at intermediary levels of altitude in the atmosphere*** (15-20 June, 21-23 July and 26-31 July), and ***in two situations their evolution occurred due to blocking circulation*** (9-11 July and 21-23 July).

The intense activity of Mediterranean Cyclones in this summer, spring and first part of autumn correlates with the negative phase of North-Atlantic Oscillation, and the interaction of atmospheric interaction with Oltenia forms of relief in steps had a significant role in amplifying precipitation. This interaction of air circulation with the forms of relief and the amplification effect of precipitation determines the high relief in the north of Oltenia to become "Oltenia water castle", and the rivers which spring from the Southern Carpathians in the north of the region or which cross them (Motrul, Gilortul, Amaradia, Olteţul (the biggest Olt stream), Lotrul, Luncavăţul, Jiul, Oltul etc.) to have a significant role in water supplies of Oltenia localities and in producing electricity.

Droughty intervals were insignificant and were registered in August.

These rains maintained the humidity excess in the ground on long intervals of time, water clogging damaging the crops and causing a difficult agricultural year overall, with significant economic damages.

Rainy weather (RW) had a spatial-temporal extension of 68.8%, droughty weather (DW) of 18.7%, and normal weather (NW) of 12.5%.

The effects of pouring rains, the impact force and the rapidity of high floods were amplified by deforestation actions in the mountainous area situated in the north of Oltenia.

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