COMPARATIVE CLIMATIC CHARACTERISTICS BETWEEN THE WINTER OF 2011–2012 AND THE WINTER OF 1953–1954 IN THE SOUTH OF ROMANIA

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Key-words: climatic hazard, snowstorm, severe winter phenomena, snow layer, Oltenia.

Comparative climatic characteristics between the winter of 2011–2012 and the winter of 1953–1954 in the south of Romania. The authors makes a comparative analysis of the typical climatic evolution in two winter season: 2011–2012 and 1953–1954, the latter interval representing a 20th-century risk-high record. The beginning was January 25, 2012 when, after an excessively dry autumn, the weather would change all of a sudden. The first two warm winter months, which had lasted until January the 24th 2012, were followed by true winter weather between January 25 and February 15, when temperatures dropped below -20°C, associated with heavy snowfalls, snowstorms and strong winds (70–80 km/h) that blew and drifted the snow with disastrous effects for Romania's south-east counties, in particular. National losses: disrupted traffic of all types, snow-blocked households and animal shelters, black-outs, closed schools, difficulties in conducting supply and salvage operations for the population, etc. Although the harsh weather lasted only 25 days (blizzards, 40–135 cm-deep snow cover, 2–3 m-high snowpacks), yet the picture was partly similar to the 1953–1954 winter season which remains the severest one not only in the 20th century, but in the whole history of meteorological observations in Romania.

1. INTRODUCTION

The extremely droughty and excessively warmish first half of autumn 2011 was followed by the warm winter of 2011–2012 in December and in most of January. Then, the radical change of the thermal regime, starting with 25 January 2012, marked an extreme climatic anomaly, during which (25 January 2011 – 15 February 2012) the excessive 21-day frost caused the death of many people not only in Romania, but also throughout Europe. This type of climatic evolution caught most of the population unprepared. As a result, there were not only human casualites, but also significant material damage. In view of it, this winter was the severest one since the beginning of the 21st century, and yet according to the history of meteorological observations in Romania, it is the winter of 1953–1954 that holds the record, as presented in what follows.

2. DATA AND METHODS

This paper is based on the analyses of statistical data supplied by Oltenia Regional Meteorological Centre, the results of daily processing with a special weather forecast software, synoptic maps currently produced by operational activity, and those on the Internet provided by the analysis and forecast of international centres and the Bucharest National Meteorological Administration (NMA), as well as the facilities offered by the MS Office for the elaboration of tables

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and charts. A comparative analysis of the main elements and meteoro-climatic phenomena is made for each month of the two winters.

3. CLIMATIC CHARACTERISTICS OF WINTER 2011–2012

3.1. The thermal regime of December 2011

In December 2011, *air temperature means* in Oltenia were of -1.2°C at Voineasa station (Voineasa Intracarpathian Depression) and 3.6°C Calafat Station, with deviations from the multiannual means of 0.7°C at Voineasa and 2.9°C at Bâcleş. According to the Hellmann Criterion, in December 2011 the thermal time type[1] at the weather stations of Oltenia ranged between normal (N) at Voineasa and warm (W) at most of the other stations. The monthly temperature mean for the entire region was 1.8°C, with deviation from the multiannual mean of 1.9°C, which classifies December as a warmish month (WS) throughout the region (Table 1).

Table 1

The air thermal regime in December 2011: normal (N); mean (M); deviation from normal (ΔT), Hellmann Criterion (CH), air minimum temperature (Tmin), air maximum temperature (Tmax) and minimum temperature on soil (Tmin Soil) in Oltenia, (Hm=altitude of station)

Weather station	Hm	N	M	ΔT	CH	Tmin		Tmax		Tmin Soil	
						°C	Date	°C	Date	°C	Date
Drobeta Turnu Severin	77	1.4	3.2	1.8	**WS**	-6.0	2	16.7	4	-7.8	2
Calafat	66	1.0	**3.6**	2.6	**W**	-6.2	2	19.8	4	-9.4	1
Bechet	65	0.4	2.2	1.8	**WS**	-8.2	2	19.9	**5**	-8.0	1;2;3
Băileşti	56	0.4	2.9	2.5	**W**	-8.2	2	**20.1**	**5**	-10	25
Caracal	112	-0.1	2.5	2.6	**W**	**-5.4**	1	17.9	4	-8.1	1
Craiova	190	0.1	2.3	2.2	**W**	-7.0	27	16.8	**5**	***-6.0***	1
Slatina	165	0.3	2.2	1.9	**WS**	-6.8	1	14.7	4	-6.7	2
Bâcleş	309	-0.4	2.5	**2.9**	**W**	-6.9	24	16.5	**5**	–	–
Târgu Logreşti	262	0.1	1.3	1.2	**WS**	-9.7	1	15.6	3	**-10.7**	1
Drăgăşani	280	0.6	2.8	2.2	**W**	-6.0	27	13.6	11	-8.2	27
Apa Neagră	250	0.1	1.2	1.1	**WS**	-10.2	1	15.0	4	-10.2	1
Târgu Jiu	210	0.1	1.7	1.6	**WS**	-8.9	24	14.8	4	-10.4	1
Polovragi	546	0.1	1.9	1.8	**WS**	-7.4	24	13.3	4	-9.6	1
Râmnicu Vâlcea	243	0.5	2.4	1.9	**WS**	-6.5	24	13.5	11	-7.0	1
Voineasa	573	-1.9	***-1.2***	***0.7***	N	***-12.5***	24	***11.2***	**5**	–	–
Parâng	1585	-3.7	-2.0	1.7	**WS**	-12.6	24	7.9	2	–	–
Mean for Oltenia	–	-0.1	1.8	1.9	**WS**	-8.0	–	15.5	-	-8.6	-
Obârşia Lotrului	1348	-4.9	-3.5	1.4	**WS**	-17.5	22	9.1	1	–	–

Source: *Oltenia Regional Meteorological Centre, processed data.*

The maximum thermal values were all positive (11.2°C at Voineasa and 20.1°C at Băileşti, both registered on December 5) (Fig. 1).

The monthly minimum air temperatures, recorded on different dates, ran between -5.4°C at Caracal (1 December) and -12.5°C at Voineasa (24 December 2011). At ≤250 m altitude, monthly minimum values were registered in the first part of the month during a cooling spell (1–2 December, followed immediately by weather warming), high-area values being registered during the cooling episode of 24–27 December (Table 1).

[1] According to the Hellmann Criterion, the thermal time type is: excessively warm (EW), very warm (VW), warm (W), warmish (WS), normal (N), cool (CO), cold (CL), very cold (VC) and excessively cold (EC).

The daily maximum temperatures were all positive in December 2011, all *daily minima* being positive only on 5, 6, 11–17 and 20, namely for 10 days.

The monthly minimum thermal values on soil surface, registered mostly in the first two days of the month, were of -6.0°C at Craiova on 1 December and -10.7°C at Târgu Logreşti on the same date.

Within that interval the soil was frozen, it starting to thaw on 3 December.

Variations of daily average temperature values, as well as of daily minimum and maximum temperature means in December 2011 indicate a tendency to weather cooling (Fig. 1).

In that month, in the lower troposphere, at the isobar surface of 850 hPa (about 1,500 m altitude) there were 13 days of cold advections (T≥0°C), 17 days of close-to-normal temperatures (-10°C≤T≤ 0°C) and one cold day (-14°C≤T≤ -1.5°C) (Table 2).

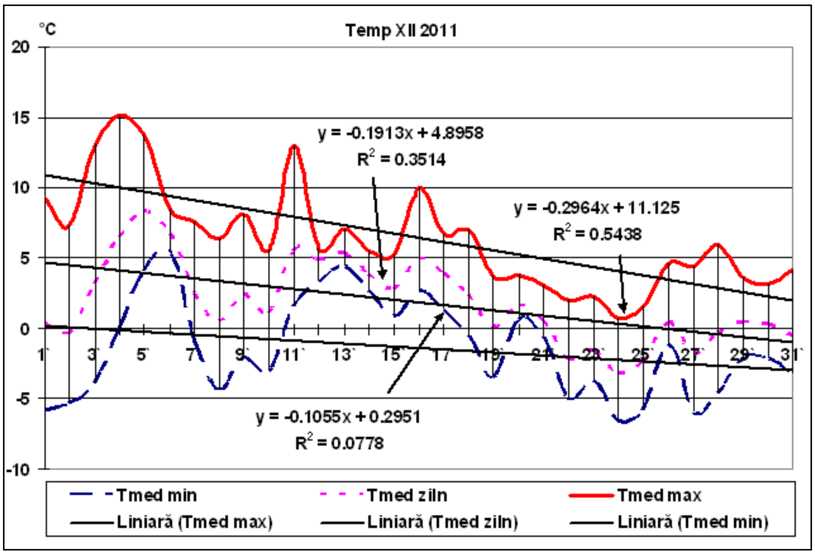

Fig. 1 – The variation of air temperature, daily means (Tmed ziln), daily minimum (Tmed min) and maximum temperature mean (Tmed max), calculated for the entire region in December 2011 and the linear (liniară) tendency of evolution.

Most of December 2011 was dominated by an anticyclonic regime (excepting the 11–22 December interval, when the Azores High coupled with the Mediterranean Cyclones), generated either by the Azores High itself or coupled with the North-African Anticyclone, or the East-European Anticyclone.

At the end of the month (20–26 December), there were a few light snowfalls, too (due to the interaction between the high air pressure belt formed of the ridge of the Azores High with the East-European Anticyclone and the Mediterranean Cyclones), which produced a discontinuous and ephemeral snow layer.

Table 2

Isotherms (°C) at 850 hPa above Romania, 00 UTC, December 2011

Date	*Isotherms*	Date	*Isotherms*	Date	*Isotherms*	Date	*Isotherms*	Date	*Isotherms*
1	+1…+6	8	-4…0	15	2…6	22	-8…-5	29	0…+4
2	-1…+4	9	-6…-4	16	0…5	23	-8…-2	30	-5…0
3	**+4…+6**	10	0…5	17	0…5	24	**-10…-5**	31	-6…-2
4	+2…+6	11	0…6	18	-5…+1	25	-7…-4		
5	**+4…+6**	12	-2…4	19	-6…-2	26	-6…-4		
6	-2…+6	13	4…6	20	-4…+3	27	-1…0		
7	-4…0	14	2…5	21	-8…0	28	+1…+5		

Source: http: // *www.wetterzentrale.de*.

3.2. The pluviometric regime of December 2011

The monthly quantities of precipitation registered in December 2011 were low and varied (12.0 l/m^2 at Bechet and 44.9 l/m^2 at Apa Neagră), with percentage deviation from normal values of -69.7% at Bâcleş (Mehedinți Hills), -25.7% at Polovragi (the Subcarpathian depressions), and -77.5% at Voineasa (the Intracarpathian area) (Table 3).

Lowest deviation in the mountain area (-23.8%) was registered at Parâng Station. The pluviometric time type (Hellmann Criterion), at the meteorological stations of Oltenia was droughty (D) at Craiova, Polovragi and Parâng and excessively droughty (ED) at Drobeta Turnu Severin, Bechet, Bâcleş, Târgu Logreşti, Drăgăşani and Voineasa. The overall mean across Oltenia region was of 25.2 l/m^2 with a percentage deviation of -50.7%, which shows that December 2011 was an ***excessively droughty*** month throughout Oltenia, thus confirming the extension of the excessively droughty autumn of 2011 to the first month of winter all over southern Romania, as well.

Table 3

The monthly quantities of precipitation registered in the winter of 2011–2012 (ΣP), as compared to normal values (N) over the 1901–1990 period, deviation (Δ%) and pluviometric time type by the Hellmann Criterion (CH), (Hm=altitude of station)

Weather station	Hm	December 2011				January 2012				February 2012				Winter 2011–2012			
		ΣP	**N**	**Δ%**	**CH**	**ΣP**	**N**	**Δ%**	**CH**	**ΣP**	**N**	**Δ%**	**CH**	**ΣP**	**N**	**Δ%**	**CH**
Drobeta Turnu Severin	77	20.1	61.2	-67.2	**ED**	44.5	51.4	-13.4	**LD**	81.8	47.9	**70.8**	**ER**	146.4	160.5	-8.8	**N**
Calafat	66	24.8	45.5	-45.5	**VD**	64.2	40.4	58.9	**ER**	47.7	38.0	25.5	**R**	136.7	123.9	10.3	**LR**
Bechet	65	***12.0***	36.3	-66.9	**ED**	81.3	33.5	142.7	**ER**	***29.9***	34.8	***-14.1***	**LD**	***123.2***	104.6	17.8	**LR**
Băileşti	56	23.7	46.8	-49.4	**VD**	65.7	38.5	70.7	**ER**	47.0	36.1	30.2	**VR**	136.4	121.4	12.4	**LR**
Caracal	112	22.8	39.5	-42.3	**VD**	81.7	34.7	135.4	**ER**	35.2	34.5	2.0	**N**	139.7	108.7	28.5	**VR**
Craiova	190	29.7	41.8	-28.9	**D**	**108.9**	37.5	**190.4**	**ER**	48.1	30.4	58.2	**ER**	186.7	109.7	**70.2**	**ER**
Slatina	165	22.1	42.8	-48.4	**VD**	72.6	36.0	101.7	**ER**	52.9	38.4	37.8	**VR**	147.6	117.2	25.9	**R**
Bâcleş	309	16.6	54.7	-69.7	**ED**	–	50.5	–	–	–	44.1	–	–	–	149.3	–	–
Târgu Logreşti	262	16.0	44.8	-64.3	**ED**	55.0	35.9	53.2	**ER**	70.0	41.0	70.7	**ER**	141.0	121.7	15.9	**LR**
Drăgăşani	280	20.9	44.6	-53.1	**ED**	58.0	34.1	70.1	**ER**	45.1	35.4	27.4	**R**	124.0	114.1	8.7	**N**
Apa Neagră	250	**44.9**	82.3	-45.4	**VD**	81.8	70.9	15.4	**LR**	**106.2**	66.4	59.9	**ER**	**232.9**	219.6	6.1	**N**
Târgu Jiu	210	25.5	64.0	-60.2	**ED**	58.3	53.9	8.2	**N**	81.0	52.0	55.8	**ER**	164.8	169.9	-3.0	**N**
Polovragi	546	41.7	56.1	***-25.7***	**D**	***31.4***	48.9	***-35.8***	**VD**	50.8	48.4	5.0	**N**	123.9	153.4	***-19.2***	**D**
RâmnicuVâlcea	243	27.9	46.2	-39.6	**VD**	46.0	35.5	29.7	**R**	64.3	38.4	67.4	**ER**	138.2	120.1	15.1	**LR**
Voineasa	573	12.4	55.1	**-77.5**	**ED**	–	42.7	–	–	–	44.0	–	–	–	141.8	–	–
Parâng	1585	41.6	54.6	-23.8	**D**	88.8	57.7	53.9	**ER**	31.8	47.7	-33.3	**VD**	162.2	160.0	1.4	**N**
Mean for Oltenia	-	25.2	51.0	-50.7	**ED**	67.0	43.9	52.7	**ER**	56.6	42.3	33.6	**VR**	148.8	137.2	8.5	**N**

Source*: Oltenia Regional Meteorological Centre,* processed data*.*

3.3. Climatic aspects of December 1953

The winter of 1953–1954 was an unusually abnormal case compared to other winters, coming second to the cold winter of 1941–1942, when the lowest temperatures in Romania had been recorded (Bogdan 1969; Bogdan, Niculescu 1999; Bogdan and Marinică 2007).

From a synoptic point of view, this winter features an ***extremely active atmosphere dynamics*** which caused an abundance of snowfalls, snowstorm and snow accumulation (Diaconescu 1954, quoted by Bogdan 1999; Bogdan and Marinică 2007). The snow layer was gradually increasing from December to February, when it reached the apex, subsequently starting to decrease.

Therefore, in the last two decades of ***December*** 1953, the predominantly cold continental air was advected by the East-European Anticyclone, the influence of the Mediterranean perturbations, felt in the last decade, triggered few and scarce precipitation, therefore ***the month was considered to be cool*** (Table 4) ***and very droughty.***

The warm period of December 1953 spanned the interval 1–6 December 1953, with a dominant atmospheric circulations from the western sector (W, NW, SW), and weather cooling on 7 December 1953, with circulations coming from the eastern sector (NE, E, SE). The warmest day was 1 December 1953, the coldest one 25 December 1953. The whole month was under an anticyclonic regime: 1–6 December, when the Azores High coupled with the North-African Anticyclone; after 7 December, there was the Central-European Cyclone with the Scandinavian Ridge, followed on 9 December by the East-European Anticyclone. Light snowfalls occurred on 17 December and 29–31 December 1953 through the coupling with a poorly developed Mediterranean Cyclone. After 1961, the minimum temperatures of December 1953 would be surpassed.

In December 1953, in the lower troposphere at the level of 850 hPa (about 1,500 m a.s.l.) there were 6 days with *warm advections* (≥0°C), 8 days with *cold advections* (-13.5°C – -1.5°C), and *17 days with close-to-normal temperatures* (-6.5°C – +5°C) (Table 5). Although the monthly maximum thermal values in December 1953 were higher than in December 2011, yet monthly means were lower than in the latter case, but ***on the whole, December 1953 was colder than December 2011.***

Table 4

Extreme temperature values in December 1953 and registration date[2]

Locality	Tmin		Tmax		Locality	Tmin		Tmax	
	°C	Date	°C	Date		°C	Date	°C	Date
Cumpăna	-19.5	25	13.0	1	Ruşeţu			17.8	1
Voineasa	-19.7	25	14.2	1	Făurei			18.6	1
Olăneşti			17.3	1	Jurilovca			17.2	1
Polovragi			17.5	1	Valea Călugărească			18.6	1
Târgu Jiu			17.5	1	Măneşti			21.0	1
Târgu Logreşti			18.5	1	Pietroasa			20.0	1
Aninoasa			17.3	1	Buzău			19.7	1
Strehaia			18.4	1	Istriţa			20.0	1
Doiceşti			**22.0**	1	Adjud			18.6	1
Câmpina			20.5	1	Nicoreşti			17.3	1
Voineşti			19.5	1	Panciu			18.5	1
Bocşa Montană	-16.2	25			Târgovişte			21.0	1
Şviniţa			18.1	1	Pucioasa			21.6	1
Slăveşti			16.6	1	Curtea de Argeş			18.6	1
Găeşti			18.2	1	Moroeni			15.5	1
Nucet			17.7	1	Arefu			17.6	1
Piteşti			19.6	1	Câmpulung			17.2	1
					Omu Peak			8.2	1

Source: *Socialist Republic of Romania Climatological Atlas*, 1966.

In general, ***the first snow-layer day*** occurred 2–3 days later than ***the first snowfall day,*** and sometimes even on the same day, which means earlier in the east of the Romanian Plain (17 December) than in the West Plain (23 December), the delay being about one week. The cause was on the one hand, the presence of the Carpathian Curvature in the way of the air masses, deviating and delaying their simultaneous arrival on all the Plain, and, on the other hand, the milder (Submediterranean) climatic influences from the south and west of the Oltenia Plain. In Northern Bărăgan and the Lower Siret Plain, the North wind would scatter the snow, so that the first snow layer was formed around 23–24 December 1953.

[2] The date is assumed by the intensity of cooling at the level of 850 hPa, for all minimum temperatures registered in Tables 4, 7 and 10, Tmin=Minimum temperature, Tmax = Maximum temperature.

Table 5

Isotherms (°C) at 850 hPa above Romania, 00 UTC, in December 1953

Date	*Isotherms*	Date	*Isotherms*	Date	*Isotherms*	Date	*Isotherms*	Date	*Isotherms*
1	***3.5…8.0***	8	-3.0…3.0	15	**-10.0…-1.5**	22	-5.0…-1.5	29	-5.0…-3.0
2	*0…6.5*	9	-1.5…1.5	16	**-10.0…-3.0**	23	-6.5…-1.5	30	-3.0…1.5
3	*1.5…6.5*	10	-1.5…1.5	17	**-10.0…-5.0**	24	**-10.0…-5.0**	31	-3.0…3.0
4	*5…6.5*	11	-1.5…1.5	18	**-10.0…-3.0**	25	**-13.5…-10.0**		
5	*5…6.5*	12	-5.0…0.0	19	**-10.0…-3.5**	26	**-10.0…-5.0**		
6	*3.5…5*	13	-6.5…-1.5	20	-6.5…-1.5	27	-5.0…-3.5		
7	-1.5…5	14	-5.0…-1.5	21	-5.0…0.0	28	-5.0…-3.0		

Source: http: // *www.wetterzentrale.de*.

3.4. The thermal regime of January 2012

The monthly thermal means ranged between -3.9°C at Voineasa and +0.8°C at Drobeta Turnu Severin and Calafat, with deviations from the monthly multiannual means of 0.0°C at Apa Neagră and 2.6°C at Calafat. The thermal time types (Hellmann Criterion) of January 2012 registered by weather stations were normal (N) in the hillsides and Subcarpathian depressions (Târgu Logreşti, Apa Neagră, Târgu Jiu, and Polovragi) and warm (W) in the Oltenia Plain and the Mehedinți Hills (Calafat, Băileşti, Caracal, and Bâcleş). The overall monthly mean of the entire region was -1.6°C, with deviation from the normal mean of 1.2°C, therefore January 2012 was assumed to be a warmish (WS) month (Hellmann Criterion).

The monthly maximum air temperatures, registered in the first part of the month (2–4 January) and in its second decade (23 January), stood between 11.6°C at Drăgăşani and Apa Neagră, and 16.1°C at Calafat, with a monthly maximum mean of 12.4°C throughout Oltenia (Table 6).

Table 6

The air thermal regime in January 2012: normal (N); mean (M); deviation from normal (ΔT), Hellmann Criterion (CH), air minimum temperature (Tmin), air maximum temperature (Tmax) and minimum temperature on soil (Tmin Soil) in Oltenia, January 2012 (Hm=altitude of station)

Weather station	Hm	N	M	ΔT	CH	Tmin		Tmax		Tmin Soil	
						°C	Date	°C	Date	°C	Date
Drobeta Turnu Severin	77	-1.1	**0.8**	1.9	**WS**	***-16.6***	31	14.2	3	-13.8	31
Calafat	66	-1.8	**0.8**	**2.6**	**W**	-19.2	31	**16.1**	3	**-27.8**	31
Bechet	65	-2.2	-0.5	1.7	**WS**	-24.4	31	15.1	23	-22.0	31
Băileşti	56	-2.3	-0.3	2.0	**W**	-24.0	31	14.5	23	-28.2	31
Caracal	112	-2.9	-0.8	2.1	**W**	-23.0	31	12.7	23	-22.5	30
Craiova	190	-2.6	-0.9	1.7	**WS**	-20.4	31	12.8	23	-26.0	31
Slatina	165	-2.4	-1.2	1.2	**WS**	-19.7	31	11.9	23	-23.3	31
Bâcleş	309	-3.0	-1.0	2.0	**W**	-17.7	31	12.4	3	–	–
Târgu Logreşti	262	-2.7	-2.6	0.1	**N**	-23.9	31	12.5	4	-23.6	31
Drăgăşani	280	-2.2	-0.8	1.4	**WS**	-16.8	31	***11.6***	23	-23.3	31
Apa Neagră	250	-2.6	-2.6	***0.0***	**N**	**-24.6**	31	***11.6***	4	-18.8	31
Târgu Jiu	210	-2.6	-1.7	0.9	**N**	-19.3	31	12.4	23	-21.6	31
Polovragi	546	-3.2	-2.5	0.7	**N**	-20.4	31	11.7	3	-26.2	31
Râmnicu Vâlcea	243	-2.2	-1.2	1.0	**WS**	-18.6	31	12.8	4	***-18.3***	31
Voineasa	573	-4.7	***-3.9***	0.8	**N**	-22.0	31	7.4	13	–	–
Parâng	1585	-5.9	-6.9	-1.0	**CO**	***-16.6***	31	8.2	2	–	–
Mean for Oltenia		-2.8	-1.6	1.2	**WS**	-20.5		12.4		-22.7	
Obârşia Lotrului	1348	-6.2	-7	-0.8	**N**	-27.3	31	5.6	3	–	–

Source: *Oltenia Regional Meteorological Centre*, processed data.

The monthly minimum air temperatures in Oltenia, registered on the last day of the month, were of -24.6°C at Apa Neagră in the Subcarpathian depression and -16.6°C at Drobeta Turnu Severin and Parâng, with a monthly minimum mean of -20.5°C. Minimum temperatures were caused by severe frost wave at the end of January and the first decade of February, and the cooling process that started on the night of 26/27 January 2012 (Table 3, Fig. 3), as revealed by the linear tendency of evolution of the three thermal parameters (daily minimum, mean and maximum).

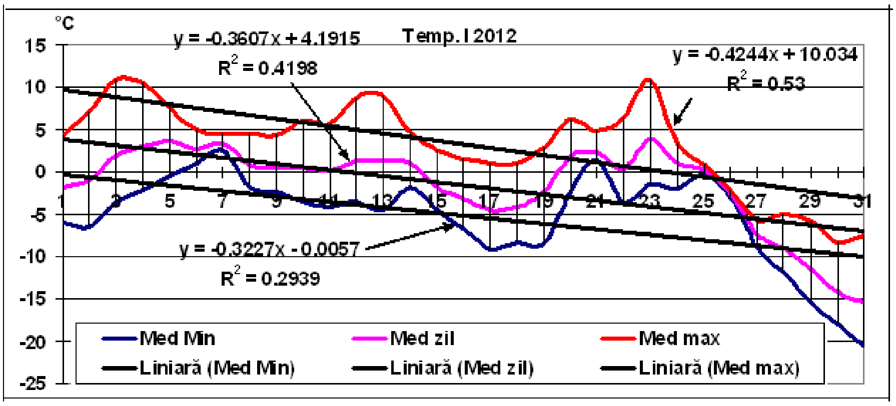

Fig. 2 – The variation of air temperature, daily means (Med zil), daily minimum (Med Min) and maximum temperature mean (Med Max), calculated for the entire region and the linear tendency of evolution, January 2012.

The monthly minimum temperature on soil surface: -27.8°C at Caracal and -18.3°C at Râmnicu Vâlcea, also registered on most of the territory on 31 January.

The monthly minimum temperature mean on soil surface was of -22.7°C throughout the region (Table 3). Analysing weather evolution in the lower troposphere at the level of 850 hPa (Table 3), it emerges that there were 2 days with warm advections (≥0°C on 2nd–3rd) and ***11 days with cold advections*** (-14…-5°C on 15th–19th and -16…-5°C on 26th–31st), as well as 18 days with close-to-normal temperatures (-8 – +5°C).

Table 7

Isotherms (°C) at 850 hPa above Romania, 00 UTC, in January 2012

Date	Isotherms	Date	Isotherms	Date	Isotherms	Date	Isotherms	Date	Isotherms
1	-8…-4	8	-6…0	15	**-10…-6**	22	-8…-4	29	**-10…-8**
2	-6…+1	9	-6…-4	16	**-12…-9**	23	-5…0	30	**-16…-8**
3	***+1…+6***	10	-8…-5	17	**-14…-12**	24	-5…0	31	**-15…-10**
4	*0…+5*	11	-8…-6	18	**-15…-10**	25	-6…-2		
5	-3…+5	12	-6…-4	19	**-12…-5**	26	**-10…-4**		
6	-2…+2	13	-5…+1	20	-5…0	27	**-12…-5**		
7	-5…+2	14	-8…-5	21	-5…0	28	**-8…-6**		

Source: http: // *www.wetterzentrale.de*.

Most of January 2012 was dominated by an anticyclonic regime characterised by ***the presence of a high air pressure belt*** (formed of the Azores High coupled with the North-African Anticyclone and the East-European Anticyclone, or only of the Azores High and the East-European Anticyclone), which at different periods of time:(24–28 and 30–31 January, 1–4, 5–8 and 13–14 February) acted coupled either with the Icelandic Depression, or more often with the Mediterranean Cyclones in generating snowfalls, sometimes very abundant and snowstorms, the heaviest snowstorm occurring on 25 January.

3.5. The pluviometric regime of January 2012

Monthly quantities of precipitation: 31.4 l/m^2 at Polovragi and 108.9 l/m^2 at Craiova in the central part of the region, with percentage deviations from the multiannual means of -35.8% at Polovragi and 190.4% at Craiova (Table 3). The pluviometric time type (Hellmann Criterion) at the meteorological stations of Oltenia was very droughty (VD) at Polovragi and exceedingly rainy (ER) in most of the region.

The precipitation mean for the whole region(67.0 l/m^2), with percentage deviation of 52.7%, classifies January as an exceedingly rainy (ER) month.

Climatic risk phenomena were: fall of liquid precipitation (1–24 January), ***mixed*** falls (25 January), and ***snowstorm-associated heavy snowfalls*** (a yellow code warning of dangerous meteorological phenomena having been issued the previous day), ***wind gusts*** of 60–80 km/hr, especially in the south-east of the country and glazed-frost in the south of the Dobrogea Plateau and the Romanian Plain.

The heavy snowfalls deposited a consistent < 10 cm – thick snow layer in the east of the Bărăgan Plain and the north of the Dobrogea Plateau and of over 100 cm in the Southern Carpathians (Parâng 106 cm, Bâlea Lake 164 cm, Omu Peak 107 cm, etc.).

The local geographical conditions (altitude, landform, orientation towards wind direction, etc.), caused uneven snow accumulation, snowstorms, snowdrifts and piles that blocked the road traffic and buried in snow settlements, especially in the counties in the east of the Romanian Plain and in the Carpathian Curvature area.

3.6. Climatic aspects of January 1954

In ***January 1954,*** the same territory was also under the influence of high pressure anticyclonic formations from North-Eastern Europe, with advections of very cold air that, interferring with the Mediterranean depressions, caused abundant snowfalls and severe frosts, that month being qualified as very cold.

In the middle of the month, after two days (16th and 17th) of positive temperatures (+9…+10°C), the weather cooled again under the influence of the Scandinavian Anticyclone (22–28 January).

In the second part of January, Romania was under the influence of this anticyclone and also of a vast cyclonic Mediterranean area, located in the south of Italy, which moved slowly towards the east and north-east. Consequently, the wind blew very strongly from the east and north-east, the sky was overcast and there were snowfalls in most of the region, with severe cooling and snowstorms in the east.

In January 1954, ***very low minimum thermal values*** were being registered ***(4 values ≤ -30.0°C)***, some of them still not exceeded to this day.

We notice that ***January 1954 monthly minimum and maximum thermal values are much lower than in January 2012***.

Analysing soil surface synoptic maps it emerged that the snowstorms of January 8, 10, 15 and 29–31 were the consequence of the coupling of the Mediterranean Cyclones with the anticyclonic belt formed between the Azores High and the East-European Anticyclone, or between the Azores High and the Scandinavian Anticyclone, that lasted the whole month. The ensuing snow layer persisted and became ever thicker that winter.

In the short intervals of close-to-normal temperature, the Azores High coupled with the North-African Anticyclone prevailed, the advection of a warmer air mass leading to a rise in temperature on 20 and 21 January (Table 8).

Table 8

Isotherms (°C) at 850 hPa above Romania, 00 UTC, in January 1954

Date-Isotherms		Date-Isotherms		Date-Isotherms		Date-Isotherms		Date-Isotherms	
1	-5…0	8	-7.5…-3	15	-7.5…-1.5	22	**-10…-5**	29	**-10…-3**
2	**-10…-5**	9	**-10…-7.5**	16	-5…-1.5	23	**-15.0…-7.5**	30	**-15.0…-5.0**
3	**-10…-7.5**	10	**-12.5…-7.5**	***17***	***-3…0***	24	**-20.0…-15.0**	31	**-10…-1.5**
4	**-12.5…-6**	11	**-12.5…-7.5**	18	-5…0	**25**	**-20.0…-17.5**		
5	**-10…-5**	12	**-15.0…-12.5**	19	**-10…-7.5**	26	**-20.0…-15.0**		
6	-7.5…-5	13	**-15.0…-10.0**	20	**-12.5…-5**	27	**-20.0…-15.0**		
7	-7.5…-3	14	**-15.0…-5.0**	21	-5…0	28	**-20.0…-12.5**		

Source: http: // *www.wetterzentrale.de*.

The weather evolution in January 1954, in the lower troposphere at the level of 850 hPa (about 1,500 m a.s.l.) was characterized by ***22 days with cold and very cold advections*** (-20 and -3°C) and 9 *days with close – to – normal temperatures* (-7°C – 0°C) (Table 8).

The whole month was very cold (VC) and extremely cold (EC) in the interval 22–31 Janaury 1954, when the ***frost wave lasted for 9 days*** with a ***peak of 6 days*** (23–28 January), while in January 2012, lowest minimum temperatures (-25…-24°C) were registered only for one day at the end of the month (31 January).

3.7. The thermal regime of February 2012

The monthly average air temperature values were -6.6°C at Caracal (in the south-east of Oltenia) and -3.9°C at Râmnicu Vâlcea (in the Olt Corridor), with deviations from the multiannual means of -6.2°C at Bechet in the south of the region and -2.7°C at Voineasa. Thermal time-types (Hellmann Criterion), in Oltenia ranged between very cold (VC) in most of the Oltenia Plain in the Getic Plateau at Târgu Logreşti and in the Subcarpathian Depression at Apa Neagră, and cold (CL) in the high hilly and mountainous area (Table 9).

The minimum air temperature values (-28.9°C at Băileşti and -17.9°C at Drăgăşani) were registered on 1 February, while the *monthly minimum temperature* mean of -23.1°C, was lower than in January.

The minimum temperatures at Calafat, Bechet, Băileşti, Târgu Logreşti, Apa Neagră and Obârşia Lotrului, marked with an asterisk in Table 9, represent ***climatic records*** for these stations, being the lowest values of the whole data series, not only because of frost waves, but also of radiative cooling caused by the cold air flows from the Carpathian-Balkan Mountains and the temperature inversions. The record low minimum temperatures in February registered in Bulgaria, a country situated south of the Danube, were also caused by these factors.

In February 2012 there were two frost waves. A first one from 31 January to 18 February, with certain temperature increases for a few days, basically ***a lengthy interval of 19 consecutive days***. It was one of the longest frost wave episodes ever registered in Romania, with extremely low minimum values on ***31 January, 1 and 9 February*** (Table 9, Fig. 3). The second frost wave came at the end of February and lasted for 3 days: 27, 28, 29.

This was also confirmed by the analysis of the thermal field at the level of 850 hPa (Table 10). The configuration of this field shows the presence of ***two cold and very cold advections*** (-18 – 0°C), which generated 21 days of severest frost on 1 and 9–10 February 2012. Furthermore, there were 7 days with close-to-normal temperatures (-9 – +2°C) and a relatively warm day (0–5°C).

The official number of casualties left by the **severe lasting** ***frost wave (31 January – 18 February),*** was of 86, on 10 February about 60,000 people were blocked by accumulations of frozen snow formed by wind drifted snow all over the country. Note: more than 600 casualties on the Continent until that date.

Table 9

The air thermal regime in February 2012: normal (N); mean (M); deviation from normal (ΔT), Hellmann Criterion (CH), air minimum temperature (Tmin), air maximum temperature (Tmax) and minimum temperature on soil (Tmin Soil) in Oltenia, January 2012 (Hm=altitude of station)

Wheather station	Hm	N	M	ΔT	CH	Tmin °C	Tmin Date	Tmax °C	Tmax Date	Tmin Soil °C	Tmin Soil Date
Drobeta Turnu Severin	77	0.9	-3.9	-4.8	**CL**	-21.7	9	13.6	25	-23.4	9
Calafat	66	0.4	-5.2	-5.6	**VC**	-26.1*	9	12.6	25	-28.6	9
Bechet	65	-0.1	-6.3	**-6.2**	**VC**	-24.0*	1	11.8	25	-24.0	1
Băileşti	56	-0.1	-5.9	-5.8	**VC**	**-28.9***	1	9.6	25	-31.6	9
Caracal	112	-0.7	**-6.6**	-5.9	**VC**	-23.2	1	***7.2***	25	-23.2	2
Craiova	190	-0.4	-5.9	-5.5	**VC**	-22.6	9	8.9	25	-27.0	1
Slatina	165	-0.2	-6.0	-5.8	**VC**	-23.9	9	10.4	25	-25.7	2
Bâcleş	309	-0.9	-5.9	-5.0	**VC**	-19.5	1	8.5	25	-	-
Târgu Logreşti	262	-0.7	-5.9	-5.2	**VC**	-28.1*	9	12.6	25	**-32.2**	9
Drăgăşani	280	-0.2	-4.6	-4.4	**CL**	***-17.9***	1	11.5	25	-24.0	1;2
Apa Neagră	250	-0.6	-6.0	-5.4	**VC**	-28.4*	9	12.4	24	-29.6	9
Târgu Jiu	210	-0.4	-4.7	-4.3	**CL**	-22.6	9	**16.9**	24	-29.4	9
Polovragi	546	-1.4	-5.0	-3.6	**CL**	-20.6	2	12.0	25	-26.7	9
Râmnicu Vâlcea	243	0.0	***-3.9***	-3.9	**CL**	-19.4	9	17.1	25	***-23.0***	9
Voineasa	573	-2.5	-5.2	***-2.7***	**CL**	-22.7	1	12.2	24	–	–
Parâng	1585	-5.6	-9.1	-3.5	**CL**	-21.7	2	5.6	23	–	–
Mean for Oltenia	–	-0.8	-5.6	-4.9	**CL**	-23.1		11.4		–	–
Obârşia Lotrului	1348	-5.5	-8.8	-3.3	**CL**	-28.6*	1	5.4	23	–	–

Source: *Oltenia Regional Meteorological Centre,* processed data.

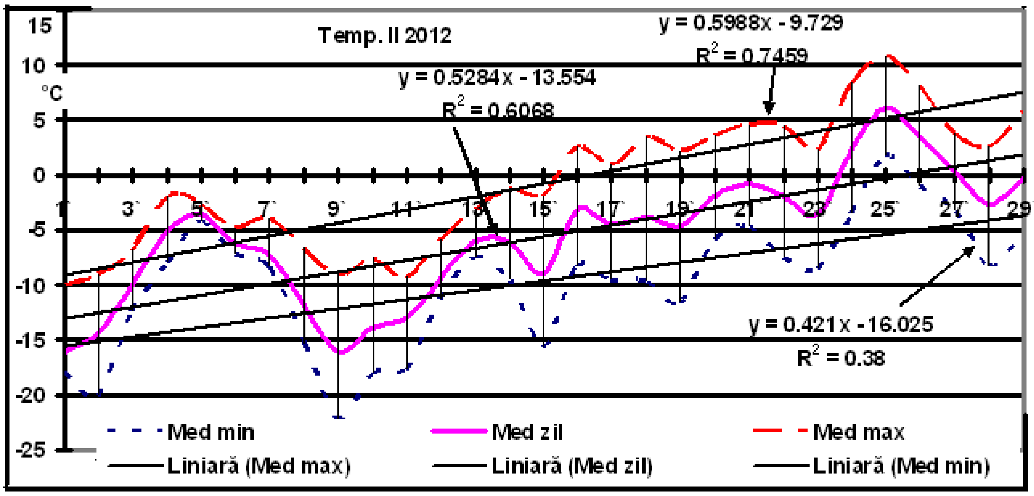

Fig. 3 – The variation of the air temperature, daily means, daily minimum and maximum temperature mean, calculated for the entire region in February 2012.

Source: *Oltenia Regional Meteorological Centre,* processed data.

The arrival of spring, associated with weather warming, was the result of some macro-processes at the level of the whole northern hemisphere and of Europe, being more obvious starting on 16 February, when daily maximum temperatures became positive (Fig. 3) and on 24 February, when daily thermal means became positive, too. There was a general trend of air temperature increase.

Table 10

Isotherms (°C) at 850 hPa above Romania, 00 UTC, in February 2012

Date	Isotherms	Date	Isotherms	Date	Isotherms	Date	Isotherms	Date	Isotherms
1	**-16…-10**	8	**-15…-5**	15	**-15…-8**	22	-5…-1	29	**-12…-4**
2	**-18…-12**	9	**-14…-12**	16	-9…-6	23	-4…0		
3	**-16…-10**	10	**-15…-14**	17	**-14…-8**	24	-4…+2		
4	**-10…0**	11	**-14…-12**	18	**-12…-5**	25	*0…+5*		
5	**-10…+1**	12	**-12…-8**	19	-8…-4	26	-5…+2		
6	**-10…0**	13	**-10…-4**	20	-6…0	27	**-10…-4**		
7	**-10…+1**	14	**-12…-4**	21	**-10…0**	28	**-12…-10**		

Source: *www.wetterzentrale.de.*

Minimum temperatures on soil surface were extremely low (-23°C at Râmnicu Vâlcea and –32.2°C at Târgu Logreşti (Table 9), which shows that severe cooling was not only in the air, on soil surface and at depth, but also on rivers and lakes, covering them with a thick ice layer. The severe frost registered at the end of February and the beginning of March blocked river traffic, damaged the ships caught in the ice and the installations of the Danube harbours.

3.8. The pluviometric regime of February 2012

The monthly quantities of precipitation in February (29.9 l/m^2 at Bechet and 106.2 l/m^2 at Apa Neagră), and their deviations from the multiannual means stood between -14.1% at Bechet (-33.3% at Parâng in the mountain area) and 70.8% at Drobeta Turnu Severin. Pluviometric time-types (Hellmann Criterion), looked as follows: little droughty (LD) at Bechet and exceedingly rainy (ER) at Drobeta Turnu Severin and Craiova, Târgu Logreşti, Târgu Jiu, Polovragi and Râmnicu Vâlcea, and very droughty (VD) at Parâng in the mountains (Table 3).

The monthly precipitation mean for the entire region was of 56.6 l/m^2, with percentage deviation from the multiannual mean of 33.6%, which classifies February as a very rainy (VR) month throughout the region.

Apart from ***the lasting frost wave,*** *another climate risk phenomenon* was snowdrifting, which formed a thick snow pack (Fig. 4) not only in Oltenia, but also in the south of Moldavia, Dobrogea and Muntenia, with wind gusts of over 70–80 km/h, and visibility below 50 m in some snowstorm-affected areas. The storm buried in snow roads and railways, thus interrupting the traffic; in the Carpathian Curvature many villages, households and annexes were snow-covered. Highways, as well as cross-border roads in the south and south-east of the country were closed for almost 2 weeks, mainly because road traffic in the neighbouring countries was blocked.

The last snow fell between 11 and 15 February, associated with snowstorm on 14–15 February, deepest snow packs reaching 40 cm at Râmnicu Vâlcea and 135 cm at Balta (Mehedinți County). ***Oltenia was one of the areas with the deepest snow pack*** (Fig. 4).

Snow started melting on 16 February, when maximum positive temperatures were being registered, and lasted until 6 March. The process being slow, there was no flooding, so that on 4 March, a thin snow layer was seen only in the Subcarpathian area of Gorj County.

In this way, the soil water reserve could be remade, benefitting agriculture after an exceedingly droughty autumn.

Fig. 4 – Maximum snow depth through accumulation (cm), was registered on 14 February 2012 at 08 o'clock (Source: National Meteorological Administration Bucharest).

3.9. Climatic aspects of February 1954

In February 1954, ***minimum thermal values were very low,*** some of them not yet exceeded (Table 11). Most of the monthly minimum values were registered on 5 February, others on 20–21 February, the majority between -26.0°C and < -30.0°C.

In February 1954, in the lower troposphere, at the level of 850 hPa (about 1,500 m a.s.l.), ***there were 17 days with cold and very cold advections*** (-17.5 – -2.5°C) and 11 days with close-to-normal temperatures for this month (-7.5 – +2.5°C) (Table 12). The whole month was cold and extremely cold (1–11 and 18–23 February). The two severe frost waves lasted for 11 days with a peak on February 4–7, the second wave, of 6 days, reached a peak on 20–23 February. ***The second frost wave is unusual for such a late period,*** when the February air temperature is normally increasing.

Table 11

Minimum thermal values (Tmin) in February 1954 (°C)

Locality	Tmin		Locality	Tmin		Locality	Tmin	
	°C	**Date**		**°C**	**Date**		**°C**	**Date**
Slobozia	-25.4	5	Amara	-28.5	5	Cernavodă	-24.6	5
Perieți-Misleanu	-27.1	5	Grivița	-29.1	5	Hârşova	-23.6	5
Viziru	-27.5	5	Ion Sion	-28.0	5	Ruşețu	-28.5	5
Videle	-29.0	5	Pârscov	-23.6	5	Măicăneşti	-26.4	5
Giurgiu	*-30.2*	*5*	*Nucet*	*-30.5*	*5*	Tulnici	-25.2	5
Piteşti	-23.4	5	*Snagov*	*-30.5*	*5*	Pucioasa	-23.5	5
Voineşti	-26.1	5	Roşiori de Vede	-29.0	5	Lehliu	-27.0	5
Budeşti	-27.4	5	Doiceşti	-23.5	5	Bucureşti Băneasa	-26.2	5
Găeşti	-27.0	5	Râmnicu Vâlcea	-26.0	5	*Slăveşti*	*-31.2*	*5*
Craiova	-27.6	5	Târgu Jiu	-28.3	5	Târgu Logreşti	-28.6	5
Polovragi	***-19.0***	5	Iancu Jianu	-27.5	5	Voineasa	-25.8	5
Sălcioara	***-28.5***	5						

Source: *Socialist Republic of Romania Climatologic Atlas*, 1966.

In ***February 1954***, atmospheric dynamics ***reached a climax, out of the four snowstorm intervals*** (2–4, 7–9, 17–19, and 21–22), the first was the most characteristic one.

Thus, ***on 3 February,*** a high pressure belt was formed above northern Europe through the juncture of the Azores High (extended over England) with the East-European Anticyclone (Fig. 5), further coupling with the Mediterranean Cyclones. At about 3,000 m altitude, there was an invasion of wet tropical air (+7…+8°C) over the arctic air, with temperatures of -15°C.

Table 12

Isotherms (°C) at 850 hPa above Romania, 00 UTC, February 1954

Date	Isotherms	Date	Isotherms	Date	Isotherms	Date	Isotherms
1	**-12.5…-2.5**	8	**-10.0…-5.0**	15	-2.5…0.0	22	**-12.5…-5.0**
2	**-15.0…-2.5**	9	**-10.0…-5.0**	16	-5.0…0.0	23	**-15.0…-2.5**
3	**-12.5…-2.5**	10	**-10.0…-5.0**	17	-7.5…0.0	24	-7.5…-5.0
4	**-15.0…-12.5**	11	**-10.0…-5.0**	18	**-10.0…0.0**	25	-7.5…-5.0
5	**-17.5…-10.0**	12	-5.0…-2.5	19	**-17.5…-7.5**	26	-7.5…-5.0
6	**-15.0…-7.5**	13	-5.0…-2.5	20	**-17.5…-10.0**	27	-5.0…-2.5
7	**-15.0…-7.5**	14	-2.5…0.0	21	**-17.5…-10.0**	28	-2.5…+2.5

Source*:* http: // *www.wetterzentrale.de.*

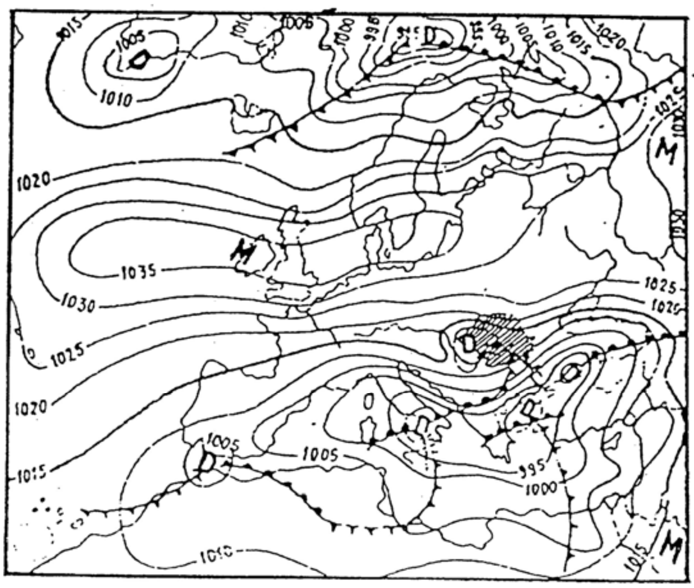

Fig. 5 – Distribution of pressure on soil surface, 00 UTC, 3 February 1954, (Source: Bogdan and Marinică 2007).

Consequently, there was ***abundant snowfall, snowstorm,*** and winds of 125 km/hour.

The same situation persisted on ***4 February*** when, after abundant snowfalls, a snow layer was formed in the Romanian Plain thick of 60–70 cm in the eastern sector and 70–80 cm in the western sector.

The dominant west and north-east wind, deviated by the Carpathian Curvature, intensified the snowstorm, scattering and piling up the snow. ***This was the severest snowstorm in the Romanian Plain,*** having occurred three times until the end of the month. At the end of the 4 snowstorm intervals, snow packs were 4–6 m deep; on the meteorological platforms, ***the maximum depth of the snow layer accumulated after the falls, registered throughout the month, varied between 130 and 150 cm*** (Fig. 6), with maximum depth at Călăraşi (170 cm) and Calafat (173 cm) (Bogdan 1969).

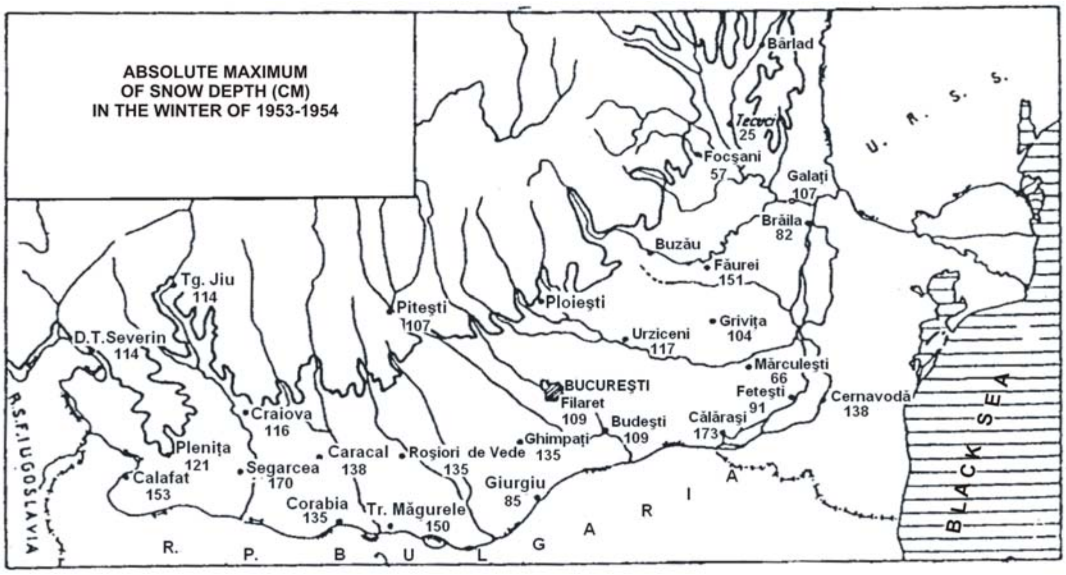

Fig. 6 – Absolute maximum of snow depth (cm) in the winter of 1953–1954.

Due to the extremely active dynamic of this winter, to the intensity of snowstorms, maximum snow layer, snowpack height, snow layer duration and the quantity of water yielded by it, February (the month of annual minimum pluviometric values, and of annual maximum pluviometric in 1954, at Griviţa in the Bărăgan Plain (234.3 mm, compared to normal values of 20–30 mm), ***the winter of 1953–1954 represents a 20th – century climatic record (still holding today) in terms of snow layer particularities, except for duration.***

Moreover, February 1954 was the ***second frosty winter in the 20th century*** (after Janurary 1942), with minimum temperatures below -30.0°C, of which 20.0% represent absolute minima registered at the respective stations; there were 60 winter days (Tmax≤0°C), which is twice the normal, and 140–150 frosty days (about 1/3 over the normal), so the snow layer lasted, which was an exceptional situation of maximum snow-layer days (Bogdan 1969; Bogdan and Marinică 2007).

A synthesis of the characteristic features of the two winters (Table 13) suggests that the ***winter of 1953–1954 was by far severer than the 2011–2012 one***. With few exceptions, it can be considered the severest winter in the whole country.

The very thick snow packs (4–6 m), favoured by the presence of the Carpathian Curvature, occurred at ***the north-eastern outskirts of all localities in the south-east of Romania,*** even Bucharest, the capital of Romania, was isolated and unable to supply its inhabitants with food; electricity was also missing because wires gave way under the weight of wet snow deposits turned into ice.

Many animals died suffocated. There were numerous cases when tunnels were dug in order to feed and water the cattle. Because of snow drifts, in which the north wind and the snowstorm played a significant role, ***all traffic roads lying perpendicular to wind direction were buried in snow, especially in the south-east (Bărăgan Plain) and east (Moldavian Plateau) of Romania, including those around Bucharest, the capital-city.***

There was quite a "spectacle" along the roads lined with trees and wood plantations, actual snow fences holding back huge snow accumulations.

For example, along the Bucharest-Giurgiu highway, the tree line was all buried in snow. *The highway, kind of white way with snow dunes* and meandering paths at the level of telegraph wires, was used by workers on their way to and from Jilava rubber plant (south of Bucharest). Of all roads, most snowdrifts were on the ***Bucharest – Lehliu – Feteşti road and railway*** (in the very heart of the Bărăgan

Plain), stretching out west-eastwards exactly perpendicular to the direction of the North wind. Consequently, many railway stations, cereal storehouses and trains were buried in snow and many houses in the north and north-east of localities were covered by the snowstorm (Bogdan 1980).

Table 13

Climatic indexes typical of the two severe winters: 1953–1954 and 2011–2012.

No.	*Climatic indexes*	Winter 1953–1954	Winter 2011–2012
1.	Maximum temperature	12.4°C…≤ 22.0°C	7.4°C…≤ 20.1°C
2.	Minimum temperature	-31.2°C …≤-19.0°C	-28.9°C …≤ -6.0°C
3.	The total number of frosty days	39	32
4.	Snowstorm intervals in the same month	4 (II.1954)	3 (II.2012)
5.	The maximum number of snowstorm days in the same month	12 (II.1954)	7 (II.2012)
6.	Wind speed during snowstorms	125-140 km/hour	60-80 km/hour
7.	Thickness of drifts	3 – 6 m	2-3 m
8.	Maximum snow depths	173 (Călăraşi)	153 (Balta)
9.	The water amount resulting from precipitation during snowstorm maximum monthly episodes	234.3 mm/Grivița (II. 1954)	106.2 mm/Apa Neagră

All forest patches in the Bărăgan were also buried in the snow that reached up to the tree top. Animals would leave their shelters, rabbits would gnaw at the bark of tree-top branches, and wolves would roam around settlements.

Snowmelt left a distressing picture due to the mechanical effect of snow on the forest vegetation. The bridge of ice formed ***on the Danube*** could easily be crossed by tractor, thus linking the crossing-points of Ghecet and Brăila, Giurgeni and Vadu Oii, Cernavodă and Feteşti.

Snowmelt might have triggered new risks (flooding) had there not been four droughty months before the winter (September excessively droughty, October and November droughty and December very droughty) which left the soil dry, reduced river and ground water levels, so that snowmelt water could seep into the ground. On the other hand, the moderate thermal regime of March favoured slow snow melting. In the third decade of March, when the dominant atmospheric circulation changed from east to west (with the western component prevailing), snow melting got momentum, so that the ice on the Danube and the other rivers did produce some local floods.

The moderate thermal regime made the snowmelt period in the mountains coincide with that in the plain, so that mountain waters did contribute to increasing downstream river discharge (Tiron 1954).

Due to slow snow melting and the big capacity of water absorption, the whole Romanian Plain benefitted from significant water reserves at the beginning of the vegetation period.

After snowfalls, there was intense weather cooling due to the extremely cold air advection from the north, north-east and east, local thermal inversion and intense nocturnal cooling, the clear sky and thick snow layer enhancing the cooling effect.

In the winter of 2011–2012, wind gusts of 60–80 km/hr buried in snow villages in the Curvature area (Buzău County). The wind-drifted snow covered the fields, and outskirts houses were actual defenses against the snowdrifts.

At Craiova (Oltenia) the snow layer was 68 cm thick, at Balta (Mehedinți) 153 cm (uneven snow layer), being the deepest in the south of the country. Yet, no house was covered in snow, only a few roads and the railway were blocked by snowpacks for a short period of time. Here, maximum snowstorm intensity ***was reached between February 6 and 7 (2 o'clock p.m. and 6 o'clock p.m., respectively).***

The only characteristic in common with winter 1953–1954 ***was slow snowmelt,*** allowing most water to seep into the ground and renew the soil and underground water reserve.

In conclusion, ***the winter of 1953–1954*** *was unusual, a specific case for the Romanian Plain and, with some exceptions, for the entire country.*

In ***winter 2011–2012,*** *between 25 January and 15 February, an extremely severe winter episode occurred with snowstorm, lasting biting frost that made human causalities and material damages. The very intense climatic phenomena covered a territory extending from the Pacific Ocean (Japan), through Asia and Europe, to the Atlantic Ocean (Great Britain). The winter surprised people by the succession of events, and the fearful harsh weather phenomena led to some inadequate decisions, but also to actions of human solidarity, mutual assistance and donations (money, food, clothes, etc.).* However, from many viewpoints (appearance / disappearance, duration, severe cooling, monthly snowstorm episodes, number of snowstorm days, abundance of snowfalls, thick snow layers, height of snowdrifts, maximum wind speed, consequences, damages, etc.), *it did not surpass* ***winter1953–1954,*** *which remains a major climatic hazard and a multiple climatic record not only for the 20th century, but also for the entire period since meteorological observation have been made in Romania.*

BIBLIOGRAPHY

Bogdan, Octavia (1969), *Contribuţii climatologice asupra iernii 1953–1954 în Câmpia Română*, Comunicări de Geografie, **VII,** pp. 119–133.

Bogdan, Octavia (1980), *Potenţialul climatic al Bărăganului*, Edit. Academiei, Bucureşti, 173 p.

Bogdan, Octavia, Niculescu, Elena (1999), *Riscurile climatice din România*, Academia Română Institutul de Geografie, Bucureşti, 280 p.

Bogdan, Octavia, Marinică, I. (2007), *Hazarde meteo-climatice din zona temperată. Geneză şi vulnerabilitate cu aplicaţii la România*, Edit. Univ. „Lucian Blaga", Sibiu, 422 p.

Bogdan, Octavia, Marinică, I. (2009), *Caracteristici climatice ale iernii 2007–2008 în Oltenia*, Revista Geografică, Serie Nouă, **XVI**, 2009, pp. 73–81.

Bogdan, Octavia, Marinică, I., Marinică, Andreea Floriana (2010), *Frequency of warm winters within Oltenia in 1999–2008 decade*, in vol. *Aerul şi Apa. Componente ale Mediului*, Univ. Babeş-Bolyai, Fac. Geogr. (eds Gavril Pandi and Florin Moldovan), Edit. Presa Univ. Clujeană, Cluj-Napoca, pp. 45–54.

Bogdan, Octavia, Marinică, I., Mic, Loredana-Elena (2008), *Consideraţii asupra „fenomenului de iarnă caldă" din România*, Comunicări de Geografie, **XII**, Edit. Univ. din Bucureşti, pp. 139–144.

Bogdan, Octavia, Marinică, I., Rusan, N., Rusu, Simona (2008), *Warm winter risk in Romania*, Conference on water observation and information system for decision support, BALWOIS 2008 abstacts 27–31 May & CD, Ohrid, Republic of Macedonia, p. 84, edited by M. Morell, Institut de Recherche pour le Développement, France.

Diaconescu, Gh. (1954), *Caracterul anormal al viscolului din februarie 1954*, Rev. Transporturilor, **3,** Bucureşti.

Marinică, I. (2006), *Fenomene climatice de risc în Oltenia*, Edit. Autograf MJM, Craiova, 386 p.

Tiron, Gh. (1954), *Topirea zăpezii din iarna 1953–1954*, Buletinul lunar al observaţiilor meteorologice / 1954, IMC, Bucureşti.

*** (1966), *Atlas climatologic al Republicii Socialiste România*, Institutul Meteorologic, Bucureşti.

Received January 15, 2013