INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN ENVIRONMENT & GEOGRAPHY
www.kwpublications.com
ISSN: 2313-769X

Considerations upon the Air Temperature Characteristics during the Month of May in Oltenia

Andreea Floriana Marinica, Dana Maria (Oprea) Constantin, Ion Marinica, Victor Viorel Vatamanu

To Link this Article: http://dx.doi.org/10.46886/IJAREG/v2-i1/1872 DOI: 10.46886/IJAREG/v2-i1/1872

Received: *22 February 2015,* ***Revised:*** *25 April 2015,* ***Accepted:*** *12 May 2015*

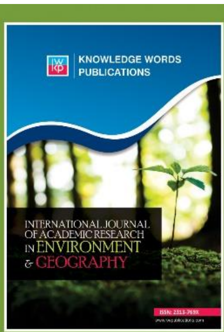
Published Online: 19 June 2015

In-Text Citation: (Marinica et al., 2015)

To Cite this Article: Marinica, A. F. D. M. (Oprea) C., Marinica, I., & Vatamanu, V. V. (2015). Considerations upon the Air Temperature Characteristics during the Month of May in Oltenia. *International Journal of Academic Research in Enviornment & Geography*, *2*(1), 19–33.

Vol. 2, No. 1 (2015) Pg. 19 - 33

https://kwpublications.com/journals/journaldetail/IJAREG **JOURNAL HOMEPAGE**



INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN ENVIRONMENT & GEOGRAPHY

www.kwpublications.com
ISSN: 2313-769X

Considerations upon the Air Temperature Characteristics during the Month of May in Oltenia

Andreea Floriana Marinica[1], Dana Maria (Oprea) Constantin[2], Ion Marinica[3], Victor Viorel Vatamanu[4]

[1] Klimacampus, Germany, [2] University of Bucharest, Faculty of Geography, Romania, [3, 4]Regional Meteorological Center Craiova, Romania

Email: marinica.andreea@gmail.com, danamartines@yahoo.com, ionmarinica@yahoo.com, victor.vatamanu@gmail.com

Abstract

The paper is based on the analysis of the thermic regime on May in the South-Western Romania, which highlights the significant variations of the air temperature. Typically, this month begins with a cooling in the early days. In some years, the cooling is followed by an early heat wave and the last significant cooling occurs from May 20th till May 22nd. For all the meteorological stations, the air temperature trend is of increasing, highlighting the phenomenon of global warming. The climate warming is also highlighted by the fact that after the year 1952, there were not recorded negative monthly minimum temperatures, except the mountain area and the one of the Subcarpathians. The frequency, intensity and extension of the late hoar-frosts have dropped considerably, limiting themselves, in the last 62 years, only in the Subcarpathic area, while their duration became insignificantly. In Oltenia, the absolute maximum air temperature in May is 39.6 ° C, recorded on May 27th, 1950 in the South-East, at Corabia, in the sand area of the Olt county, this showing that the type of underlying active surface plays an important role in the air heating. The absolute minimum air temperature for Oltenia, is -3.2 °C and it was recorded recently in the Subcarpathians, on May 6th, 2011 at Apa Neagra, in the Padeș commune. For all the meteorological stations, the minimum temperatures recorded in the night of May 21st to May 22nd, 1952 were not surpassed, this remaining the most intense and most extensive cooling of May, so far. The paper is also useful to all those interested in the evolution of the thermic regime on May.

Keywords: Early Heat Waves, Absolute Minimum Temperatures, Absolute Maximum Temperatures, Thermic Regime.

Introduction

May is characterized by the specialists as *the hottest and the most unstable month of spring*.

The monthly average temperature ranges from 12.1 °C at Voineasa to 17.5 °C at Bechet. Values greater than 17.0 °C were recorded in the Southern half of the region: 17.0 °C at Craiova, 17.1 °C at Dr. Tr. Severin and Caracal, 17.3 °C at Calafat, 17.4 °C to 17.5 °C at Baileşti and Bechet, the highest values being in the extreme South.

The multiannual monthly average air temperature for May, calculated for the whole region of Oltenia, with the values from all levels of relief and data from the meteorological stations with long lines, is 15.4 °C, recording an average increase of 5 °C comparing to April, being the third largest temperature increase (≥ 5.0 °C) during the year, after March and April, foreshadowing the arrival of the warm summer time. This high increase in temperature has an important role in the rapid development of all phases of vegetation for the whole vegetation cover.

In the Eastern region, on the Olt Valley, it can be noticed the influence of the warm air circulation throughout, but also the Eastern influence, with continental origin.

In the Gorj county and the Eastern part of the Mehedinti county, the influence of the fohn is felt, this bringing a cooler air to the mountain area until beyond the Southern part of the Gorj county, in the Balacita Plateau.

The absolute maximum temperature of May, in Oltenia, is 39.6 °C, recorded in the South-Eastern extremity of Oltenia, at Corabia, on May 27th, 1950. At that time, there were also recorded: 37.7 °C at Leu, 38.0 °C at Caracal, 37.5 °C at Tg. Jiu and 36.5 °C at Calafat in 1908 (Table 1). The maximum monthly temperatures are usually recorded in the last decade of the month. It must be remarked that the exceptional maximum temperatures of May, recorded in the last five days of the month, in the middle of last century, remained the same after 65 years. *The overall of the absolute maximum temperatures* for the region is 34.5 °C, with 3.1 °C lower than the first month of summer.

The absolute minimum temperature of May in Oltenia is -3.2 °C, recorded at Apa Neagra, on May 6th, 2011. In May 2011, except for three meteorological stations: -0.2 °C at Tg. Logreşti, -1.4 °C at Voineasa and -5.1 °C Voineasa at Ob. Lotrului, the monthly minimum temperatures were positive. *The overall of the absolute minimum temperatures*, for the entire region is -1.3 °C, being the last average of the overall negative temperature since the begining of the year.

Until this date, the absolute minimum temperature of May was -2.8 ° C, recorded at Baia de Arama in 1909, and in the mountain area -6.8 °C at Parâng in 1944. Some other absolute minimum temperatures, almost as low as these are: -2.5 °C at Iancu Jianu in 1952, -2.3 °C at Leu in 1952, -2.0 ° C at Slatina in 1909, -1.5 °C at Dragaşani in 1908, -1.2 °C at Tg. Jiu in 1938, -1.2 °C at Caracal in 1952 and -1.0 °C at Craiova in 1909. The monthly minimum temperatures are usually recorded in the first decade of the month. *The period of intense late cooling weather* in May, is popularly called ,,*ice saints' days*" and according to the old calendar ranged from May 11th to May 15th. After the calendar reform, this begins around May 23rd. The systematic observations have shown that it is quite variable the day of cooling in May, this could also happen at the end of the month. According to the traditions, people say that *just after passing of "Sophie the cold", spring weather will stabilize and will slowly - slowly, let the summer start*. Statistics reveal that the most common cooling period is on or around May 8th or May 9th.

Results and Discussion

The absolute amplitude of the air temperature in May, in Oltenia is 42.8 °C.

May is the last month of spring and the last month of the year when the minimum temperatures can go lower, below 0 °C. As a result of the global warming, it can be noticed the increase in the frequency of the hottest months and the decrease of the colder months.

The graphic of the air temperature variation in May, the monthly minimum, the monthly averages and the monthly maximum for the period 1961 – 2012, show a linear growth trend for all the meteorological stations situated at all levels of relief.

Here it is an example of the air temperature variation in May at the meteorological station of Craciova (Figure 1).

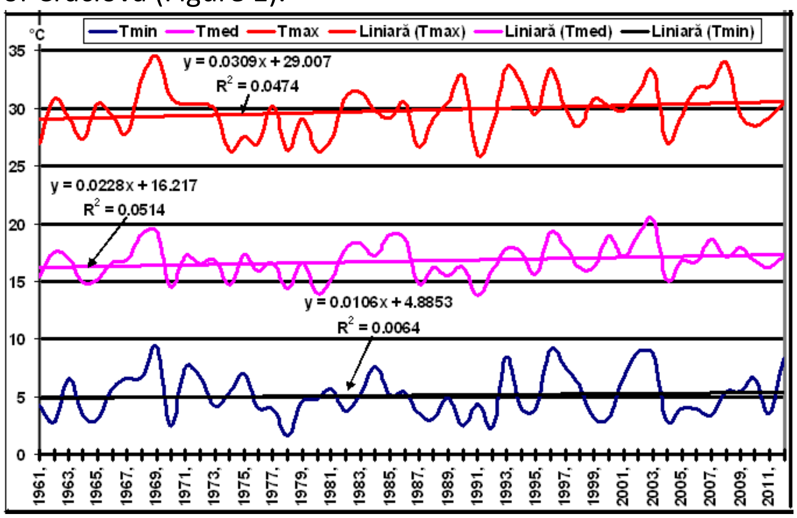


Figure 1. The variation of the air temperature in May at Craiova during the period 1961-2012
Source: processed data from CMR Oltenia

The maximum monthly temperatures had the fastest and highest growth (according to the slope 0.0309≈0.03), the average (according to the slope 0.0228≈0.02) and then the monthly minimum temperatures (according to the slope 0.0106 ≈ 0.01), which confirm the trend of global warming for this month.

Among *the hottest May*, we quote the years: 1908, 1950, 1951, 1969, 1993, 1996, 2008.

Among *the coldest May*, we quote the years: 1909, 1938, 1952, 1965, 1970, 1978, 1988.1994, 1981, 2005, 2011.

Heat waves in May

Although in most years, the thermic regime of May is moderate, with fairly extensive period of chilly and unstable weather, in some years, heat waves occur causing the increase of the air temperature to 40 °C. The frequency of these exceptional heating is 1/100 years. The earliest date of occurrence of the heat waves in May is on May 6th, which often occurs after a slow period of warming in the entire continent of Europe, which typically begins right on May 1st.

An example is *the early heat wave which reached its maximum on May 6th, 1968,* when , in Oltenia, there were recorded maximum temperatures of: 31.2 °C at Tg. Jiu, 32.8 °C at Dr. Tr. Severin, 33.0 °C at Caracal, 33.7 °C at Calafat, 34.3 °C at Baileşti and 34.4 °C at Bechet, approaching the threshold of the heat. After 47 years, a smaller heat wave reached its maximum intensity on May 6th, 2015, while in the Western Romania; there were registered maximum values of 33.0 °C.

The moderate intensity of these early heat waves is because the thermic equator of the planet is still far in the South, and its slow Northward movement will continue until the interval July 24th - August 10th, when it occupies the most Northern position when, over time, there have been the most intense heat waves that hit Europe, including Romania. This dynamic warming weather in summer is directly related to *the Earth-Sun geometry* that increases the duration of sun exposure and the amount of heat received from the sun, which, at this time, causes a strong warming of the atmosphere and at the surface of the Atlantic and Mediterranean waters. The production of the heat waves is caused by certain types of air circulation over Europe, as the tropical circulations, which produce intense warm air advection to North-West.

After the heat waves reach the maximum phase, typically intense cooling of the weather occurr, which bring back to normal the thermic regime or sometimes underneath.

The statistical analysis of the data occurrence of the heat waves in May, for a period of 121 years (1894-2015) shows that they usually occur in intervals: 6 – 10th of May, 14 – 19th of May, 24 – 28th of May. In the latter period of occurrence of the heat waves, there are usually recorded the monthly maximum temperatures and the absolute monthly maximum temperature (Table 1).

As a result of the global climatic warming phenomenon, it can be observed the increase in the frequency and intensity of the heat waves in May.

Here it is a further *analyze of the sinoptic causes of the earliest heat wave in May, registered on May 6th, 1968.*

On May 6th, 1968 at 12 o'clock UTC, at the ground level, the distribution of the barometric centers over Europe was as it follows: the Azoric Anticyclone, with values, at the center, above 1030 hPa pressure, was positioned over the Atlantic Ocean, and it was joined by a waist of high atmospheric pressure over the Southern Europe with the vast East European anticyclone, which values exceeded 1030 hPa at the center (Figure 2). A vast cyclone, originally Icelandic, dominated the Western and Northern Europe and its center with values below 1005 hPa was positioned over Scandinavia. The inclination of the cyclone was extended to the Gulf of Lion and a secondary cyclonic nucleus with values of 1005 hPa was positioned over Germany.

Because of this distribution, of the barometric centers at the ground level, for Romania, in the lower troposphere, the air circulation was from South-West. This type of movement is also active in the upper troposphere. Thus, *in the upper troposphere, at the level of 500 hPa*, the geopotential field distribution was as it follows: most of Europe was in a high geopotential field and the 552 damgp dryness line presented a vast thalweg, extending to the North of Spain (Figure 2). In this valley floor, above Great Britain, a low geopotential nucleus was positioned with a value in the core under 544 damgp. In the South of the Svalbard Archipelago was a low geopotential nucleus, with values below 520 damgp at the center. A geopotential dorsal with a value of 584 damgp used to dominate the Southern Europe, the Mediterranean Sea and the North Africa and its peak was positioned over Romania.

Table no. 1. The maximum values (TmaxV) and minimum values (TminV) of the air temperature in May recorded in Oltenia from 1894 till 2012 (° C) and the monthly average temperatures calculated for the period 1901 – 1990.

Statia meteorological	H_m	Tmedie	Δ=V-IV	TmaxV	An/zi	TminV	An/zi
Dr. Tr. Severin	77	17.1	5.2	35.6	1908/x	-0.7	1935/x
Calafat	66	17.3	**5.5**	36.6	1969/16	-1.6	1952/x
Bechet	65	**17.5**	**5.5**	37.0	1969/16	1.6	2006/4
Baileşti	56	17.4	**5.5**	36.9	1969/16	-1.2	1952/x
Caracal	112	17.1	**5.5**	38.0	1950/27	-1.2	1952/x
Craiova	190	17	**5.5**	35.3	1950/27	-1.0	1909/x
Slatina	165	16.9	**5.5**	34.5	1950/27	-2.0	1909/x
Bâcleş	309	15.5	5.3	33.7	1969/16	0.2	1978/13
Tg. Logreşti	262	15.3	5	33.4	2008/28	-0.6	1988/2
Dragaşani	280	15.8	4.9	34.6	1950/27	-1.5	1938/x
Apa Neagra	250	15.1	5	32.8	2008/28	**-3.2**	2011/6
Tg. Jiu	210	15.9	5	37.5	1950/27	-1.2	1938/x
Polovragi	546	14.3	***3.9***	***30.1***	2003/10	-0.5	1991/28
Rm. Vâlcea	243	15.4	4.6	34.2	2008/28	0.7	1982/3
Voineasa	587	***12.1***	4.4	32.0	1969/16	-2.5	1965/4; 2007/3
Parâng	1585	7.1	4.8	22.6	1958/x	-6.8	1944/x; 1978/13
Media Oltenia		15.4	5	34.5		-1.3	
Corabia*	43			**39.6**	1950/27	1.0	1938/x
Braniştea*	83			33.5	1950/27		
Aninoasa*	161			33.5	1950/27	-1.3	1952/x
Strehaia*	140			36.0	1950/27	-2.0	1952/x
Studina*	90			36.0	1950/27	-0.4	1952/x
Baia de Arama*	360			33.9	1908/x	-2.8	1909/x
Novaci*	680			30.0	1950/27	-1.5	1952/x

(H_m = the altitude of the meteorological station, Δ=V – IV = the increase of the monthly average temperature in May comparing to that in April)

(H_m = the altitude of the meteorological station, x=lack of data, Source: statistical data of CMR Oltenia)

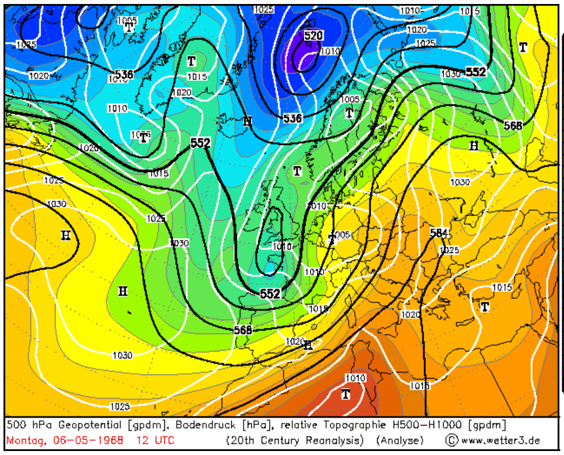


Figure 2. The synoptic situation over Europe, at the ground level, superimposed with the geopotential field at the 500 hPa isobaric surface level and the relative topography 500/1000 on May 6th, 1968, at 12 o'clock UTC, during the peak of the heat wave.

After http://www1.wetter3.de/Archiv/

This distribution of the geopotential field over Europe is typically for *the continental tropical atmospheric circulation* (cT), causing a strong continental tropical hot air advection (cT) originating from the Northern Africa, across the Southern Europe to Romania.

The analysis of the thermic field and the geopotential field at 850 hPa isobaric surface (at an average altitude of about 1500 m) confirms the foregoing. Thus, on May 6th, 1968, over Europe, the distribution of the geopotential field at 850 hPa was: over the Atlantic Ocean, there was positioned a vast field of high geopotential with values over 160 damgp in the center which was joined by a belt of a high gepotential field over the Southern Europe and the Mediterranean Sea to the vast field of high geopotential positioned Eastwards North of the Black Sea, which values exceeded 160 damgp in the center. Over northern Scandinavia and at the South of the Svalbard Archipelago, there was positioned a low geopotential nucleus, with values below 136 damgp at the center, while the geopotential thalweg of this field was extended to the Southern half of France (Figure 3). The dorsal of the high geopotential field from the Eastern Europe (156 damgp izohypse) was extended over Sicily. The rear of the air movement at this level was South-West, which coupled with the previous geopotential riverbed, lead to severe hot air advection from the Northern Africa over Italy and the Balkan Peninsula to the North of Romania. This very warm air advection is confirmed by the isotherm of 15.0 °C which was extended North over the Western Romania, Eastern Hungary, Southern Poland and Eastern Ukraine. Above the West of Romania, at this level, the 16.0 °C isotherm is closed.

Vol. 2, No. 1, 2015, E-ISSN: 2313-769X © 2015 KWP

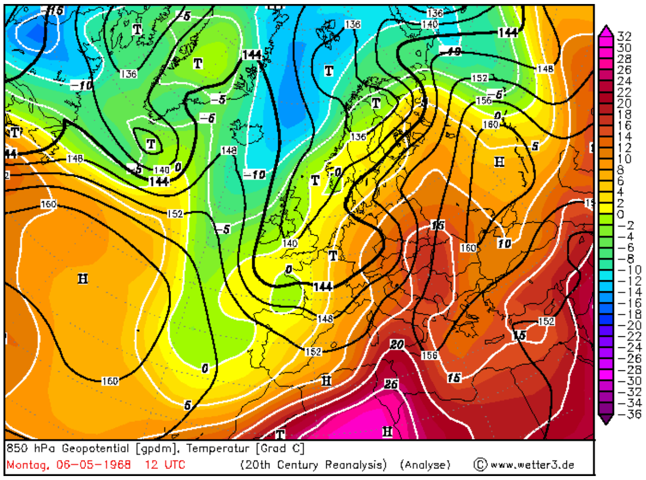


Figure 3. The geopotential field over Europe at the 850 hPa isobaric surface and the thermic field at this level on May 6th, 1968, at 12 o'clock UTC, during the peak of the heat wave

Source: http://www1.wetter3.de/Archiv /

The massive penetration of the warm air advection of atmospheric circulation is also highlighted by the isobaric level of 700 hPa (about 3000 m altitude). The maximum phase of the heat wave lasted 24 hours and the cooling was done slowly, during four days until the night of May 10th/ May 11th, 1968 when the values of temperatures became close to the multiannual averages of this period.

The Synoptic Causes of the Most Intense Heat Wave of May

The most intense heat wave recorded over time in May had a maximum phase on May 27th, 1950, when the absolute maximum temperature was recorded in Romania in May: *40.8 °C at Marculeşti in Baragan, while in Oltenia was of 39.6 °C at Corabia* (Table 2). Exceptional temperature values for May in Romania, at that date, were also recorded in the localities: Slobozia 40.0 °C, 39.5 °C at Lehliu, 39.3 °C at Videle, 39.1 °C at Zimnicea, 36.6 °C at Bucharest Filaret and 36.4 °C at Bucharest Baneasa. The most maxima of temperatures recorded in Romania remained the same and havent been recorded until nowadays (after 65 years), which confirms the exceptional intensity of this heat wave. A heat wave with intensity such May has the frequency of manifestatiom of 1 to 100 years.

Table no. 2. The maximum temperature recorded on May 27th, 1950 in Oltenia (T) (° C)

Statia meteorologica	H_m	T	Statia meteorologica	H_m	T
Corabia*	43	**39.6**	Strehaia*	140	36.0
Studina*	90	36.0	Aninoasa*	161	33.5
Caracal	112	38.0	Iancu Jianu*	167	35.0
Amarași (Amaraștii de Jos)	118	36.5	Balcești*	202	33.4
Leu*	160	37.7	Dragaşani	280	34.6
Slatina-Striharet	165	34.5	Sadu*	333	32.0
Plenita*	174	33.5	Olanești*	450	32.0
Craiova	190	35.3	Folești*	637	30.8
Rm. Vâlcea	243	34.0	Novaci*	680	30.0
Tg. Jiu	210	37.5	Media Oltenia		34.7

Source: processed data from CMR Oltenia

The heat wave swept across the country. The maximum average temperature on May 27th, 1950, calculated for the entire region Oltenia was 34.7 °C, also being *the climatic record of the highest monthly maximum average temperatures* for May, in Oltenia, without being recorded a similar one until now. However, the climatic warming in May was manifested by the increase in the frequency of the temperatures over 35.0 °C, of the monthly average temperatures ≥ 17.0 °C, of the monthly minimum temperatures that became positive after 1952 at all the meteorological stations, except Voineasa station situated in the Voineasa Depression. All these justify the increasing trends of the air temperature for all the meteorological stations in Oltenia.

The heat wave in May 1950, in Europe, was initiated on May 21st, 1950 when over the Western Europe was formed a blocking atmospheric circulation and the rear of the jam advection of warm air from the North Africa particularly affected successively vast areas of the continent. In Romania, the heat wave broke on May 23rd, 1950 and the cooling of the weather was on the night of May 29th/May 30th, 1950. Thus, it was recorded exceptionally a long duration for May – 6 days and in this time, *the maximum heat wave phase lasted three days* (May 26th, 27th and 28th, 1950) when on the surface of the 850 hPa isobaric line, Romania was positioned above 20.0 °C closed isotherm, showing exceptionally a high duration and intensity of this heat wave.

The synoptic situation on May 27th, 1950 at 12 o'clock UTC

At this time, the atmospheric block was located above the Southern Italy, the Balkan Peninsula and the Western Black Sea (Figure 4).

Vol. 2, No. 1, 2015, E-ISSN: 2313-769X © 2015 KWP

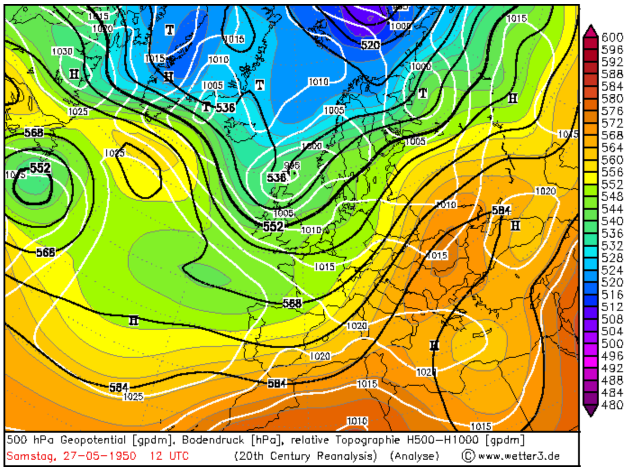


Figure 4. The synoptic situation over Europe at the ground level superimposed with the geopotential field at 500 hPa isobaric surface level and on the relative topography 500/1000 on May 27th, 1950, at 12 o'clock UTC, during the peak of the heat wave

Source: http://www1.wetter3.de/Archiv/

At the ground level, the position of the barometric action centers of the atmosphere over Europe on May 27th, 1950, at 12 o'clock UTC was:

The Azoric Anticyclone, positioned over the Atlantic Ocean, West of the Iberian Peninsula, had values above 1025 hPa at the center and was joined over the Southern Europe and the Mediterranean Sea with the vast anticyclone field in the Eastern Europe, which had a core of high pressure values above 1020 hPa over the Eastern half of the Black Sea.

The Northern Europe was dominated by vast cyclonic fields: the Icelandic cyclone was positioned to the North-West of Iceland and Southern Greenland with values at the center under 1005 hPa, over the Great Britain, there was a cyclone, originally Icelandic, with values at the center below 995 hPa, and East of the Kola Peninsula, there was another cyclone, with values below 1000 hPa in the center.

Because of this distribution of the barometric centers, the air circulation in the lower troposphere of Romania was from the West.

In altitude, at 500 hPa isobaric surface (Figure 4), the geopotential field distribution was as it follows: most of Europe was dominated by a vast high geopotential field, while North of 54 ° parallel, there was present a vast low geopotential field, which had an extented thalweg Southward to the half of the United Kingdom (552 damgp izohypse). For the Southern and South-Eastern Europe, it can be observed the presence of a blocking circulation (the Greek ,,Ω shape" of the 584 damgp izohypse). As a result, for Romania, at this level, as in almost all lower troposphere, the air circulation was from South-West, continental tropical (CT), advecting very warm tropical air masses from Northern Africa to our country.

At the isobaric surface of 850 hPa (about 1500 m altitude), the Northern Europe was dominated by a vast field of low geopotential, with multiple cores of low geopotential situated above the cyclone centers from the ground surface: one positioned in the Northern Britain with values at 132 damgp at the center, one to the Northwest of Ireland with values below 136 damgp at the center and other islands North-East of Novaya Zemlya with values below 124 damgp at the center. In this field of low gepotential, a vast thalweg was extended to the

Southern Britain. The high geopotential field that occupied most of the continent, presented 2 high geopotential cores, one on the Atlantic Ocean, West of the Iberian Peninsula with values over 160 damgp and the second one in the Southern and Eastern Europe which dorsal extended up over the Gulf of Tunis, with values of more than 156 damgp (Figure 5). This arrangement of the geopotential field at this level caused an air movement towards the South-West, having a continental tropical (cT) air advection, a very warm air from the Northern Africa intensifying in the Southern and South-Eastern Europe. This is highlighted by the area bounded by the 20.0 °C isothermic hot air positioned over Romania. Particularly warm air advection occurred over the Bay of Tunis, Sicily, Southern Italy and the Balkans, as over a "continental bridge", a process that frequently occurs in situations of this kind.

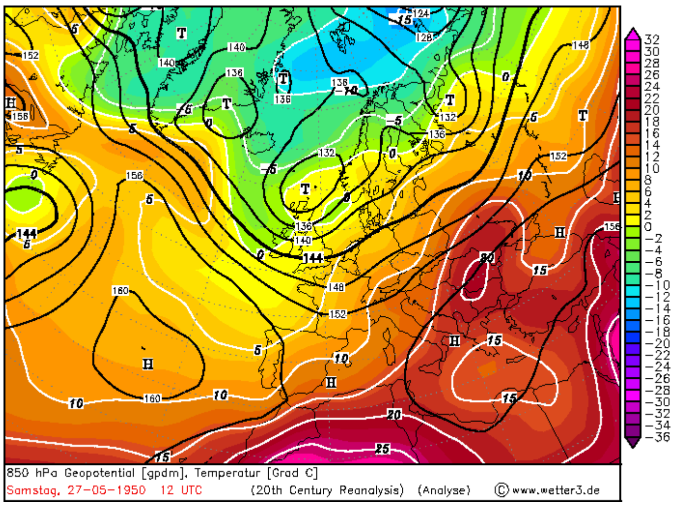


Figure 5. The geopotential field over Europe at 850 hPa isobaric surface and the thermic field at this level on May 27th, 1968, at 12 o'clock UTC during the peak of the heat wave
Source: http://www1.wetter3.de/Archiv/

Because of this particularily hot air advection and the gradually warming in the previous days, the maximum temperatures were records, which at this time, are still the highest in the area (Table 2).

Furthermore, there will be analyzed *the latest intense cooling weather in May*, recorded in the night of May 21st/May 22nd, 1952. Important aspects of this very intense cooling that swept across the country and caused hoar-frost were treated by N. Topor (1958) and Octavia Bogdan, Elena Niculescu (1999, pp. 200). These authors showed that: *the cooling and the hoar-frost from May 21st – May 22nd, 1952, were generated by a mass of arctic air advection operated by the Scandinavian anticyclone, on the North-West -South-East direction.*

For Oltenia, the analyzed data show that the cooling presented above was the last great weather cooling in the South-Western Romania and beyond this year, negative values of temperature in May were not recorded, except the mountains and the area of three meteorological stations: Voineasa, located in the depression with the same name, Apa Neagra and the Polovragi in the Subcarpathic area. This is directly related to global warming which determined the increase of the average air temperature across the planet, while specific manifestations of this process are outlined in various ways across the planet.

For Oltenia, the absolute minimum temperature of May is -3.2 °C, registered at Apa Neagra on May 6th, 2011, but the cooling produced this time was limited to the mountains and to the Subcarpathians.

The intense cooling of the weather during the night of May 21st/ May 22nd, 1952, was a real ,,*climate disaster*" because surprised the very advanced development stages of vegetation, due to the very late date of manifestation. In Table 3, it is shown the lowest temperatures recorded in the morning of May 22nd, 1952 at the meteorological stations in Oltenia, functioning during that time.

Table no. 3. The minimum temperature values registered on May 22nd, 1952 in Oltenia

Statia meteorologica	H_m	Tm	Statia meteorologica	H_m	T
Calafat	66	-1.8	Strehaia*	140	-2.0
Bailești	56	-1.2	Leu*	160	-2.3
Studina*	90	-0.4	Aninoasa*	161	-1.3
Caracal	112	-1.2	Iancu Jianu*	167	-2.5
Amarași (Amaraștii de Jos)	118	-0.3	Novaci*	680	-1.5
			Media Oltenia	-	-1.5

Source: processed data from CMR Oltenia

Some important aspects related to the structure of the atmosphere and the air circulation during the night of May 21st – May 22nd, 1952, from the perspective of the modern maps made by the 20th Century reanalysis will be detailed further:

The anticyclone field over Scandinavia was formed on May 16th, 1952 and came from a Greenland anticyclone which moved slowly toward the South-Eeast, uniting with the Azoric anticyclone which dorsal was extended to the Southern Scandinavia. At this time, the air circulation in the lower troposphere over Europe at 500 hPa was an atmospheric blocking with a strong geopotential dorsal extended to the North to Iceland and half of Scandinavia, while its geopotential thalweg located at the front of the jam, caused a Nordic movement for Romania, initiating the cold air advection towards Romania.

This type of movement persisted 7 days, changing slowly, while the slow demotion of the geopotential riverbed above the blockage has maintained the guidance for Romania of the cold air advection during all this time. As a result, the cold continental arctic and polar air mass (cP + A) occupied most of the Central and Eastern Europe and has expanded far to the South-East, while the soil surface has cooled slowly. The climax of the cooling occurred on the night of May 21st/ May 22nd, 1952, when the brighten of the sky caused an intensification of the nocturne thermic radiation and the air cooling intensified.

On May 22nd, 2015, at 00 o'clock UTC, at the ground level, the position of the baric centers over Europe was as it follows: a strong anticyclone waist from the Azoric Anticyclone, the Scandinavian and East European ones dominated most of Europe.

The Eastern extremity of the continent was dominated by a weak cyclonic field that coupled with the anticyclone field and the cyclonic circulation nucleus positioned over Ukraine and Poland (with values below 1025 hPa at the center) strenghtening the cold air advection towards Romania (Figure 6). At the level of 500 hPa in this time, the high geopotential field from the South of the continent presented a dorsal extended over Scandinavia (568 damgp isohypse) and in the thalweg of its previous geopotential, there was present a low geopotential nucleus with values below 552 damgp at the center, over Ukraine and Poland.

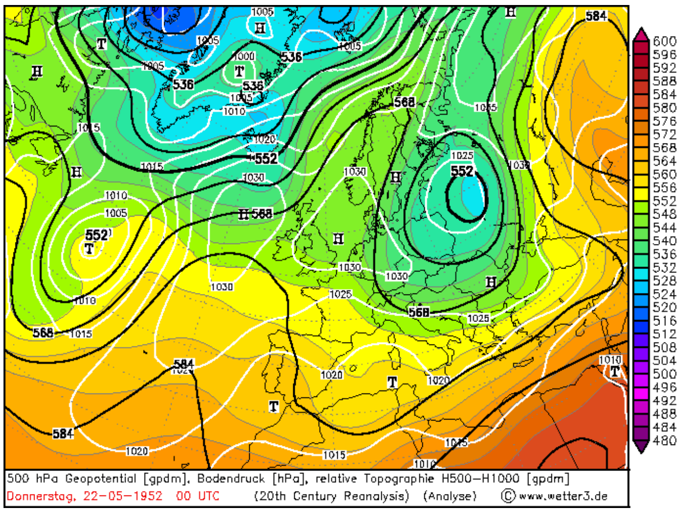


Figure 6. The synoptic situation over Europe at ground level superimposed with the geopotential field at 500 hPa isobaric surface level and the relative topography 500/1000 on May 22nd, 1952 at 00 o'clock UTC, at the time of the hoar-frost

Source: http://www1.wetter3.de/Archiv/

This arrangement of the barometric centers emphasized, particularly, the cold air advection to Romania. *The analysis of the thermic and geopotential field from the level of 850 hPa* (Figure 7) shows an arrangement of the geopotential field similar with the ground one, and the thermic field shows that the 0 °C isotherm formed an extended valley floor to the North of Romania. In this valley floor, the -2 °C isotherm shows a dark nucleus towards North-West of Romania. The air circulation at this level highlights the origin of the Arctic air mass that has been advected over Romania. The decrease in air temperature below 0 °C in the Northern Romania began the first part of the night and in the South-West, the temperature dropped below 0 °C, beginning 0 o'clock UTC. As a result, the time the air temperature was ≤ 0 °C was slightly higher than 6 hours which caused massive destruction of orchards, crops and generally, of all kind of crops.

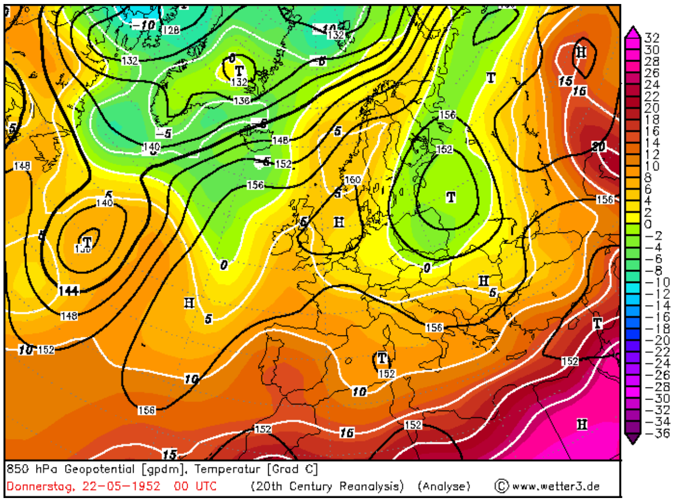


Figure 7. The geopotential field over Europe at 850 hPa isobaric surface and the thermic field at this level on May 22th, 1952, at 06 o'clock UTC during the hoar-frost

Source: http://www1.wetter3.de/Archiv/

At the level of 500 hPa, the -20.0 °C isotherm was positioned above the Northern half of Bulgaria and former Yugoslavia, and over the Northern Romania, the -26.0 °C isotherm was positioned, which indicates that the entire country was under the influence of a particular arctic air, extremely cool. This analysis highlights the exceptional nature of this cooling, particularly late. The climate data analysis shows that over time, cooling weather in May, the most frequently occurred in the date range of May 2 – May 5, less frequently in the range of May 8 – May 13 and often in the range of May 20 – May 22nd, and in this last period, with a frequency of 1 in a century or even lower, cooling weather was exceptionally intense. The global warming determined the decrease in the intensity of the cooling, while the cooling intensity from May 21st and 22nd, 1952 became a singular process in the climatic context of May.

Conclusions

The analysis of the thermic regime of May in the South-Western Romania, highlights significant variations of air temperature, which typically begin in the early days with cooling. In some years, the cooling is followed by an early heat wave and the last significant cooling occurs within May 20th– 22nd.

At all the meteorological stations, the air temperature variation trend shows an increase, highlightening the global warming. The climate warming is evidenced by the fact that after 1952, there were not recorded negative monthly minimum temperatures, except for the mountain area and the Subcarpathians, the frequency, intensity and extinction of the late hoar-frosts in May fell sharply, limiting in the last 62 years only to the Subcarpathians, while their duration has become insignificant.

In Oltenia, *the absolute maximum temperature* in May is 39.6 °C, recorded on May 27th, 1950 at South-East of Corabia, in the sands area of the Olt County, which indicates that the underlying active surface type plays an important role in warming the air.

The absolute minimum temperature in Oltenia is -3.2 °C and it was recorded recently in the Subcarpathians, on May 6th, 2011, at Apa Neagra in the Padeş commune.

For all the meteorological stations, the minimum temperatures recorded in the night of May 21st/ May 22nd, 1952 were not outclassed, this still being, by far, the most intense and most extensive cooling of May.

References

Octavia, B., Niculescu, El. (1999), Riscurile climatice din România, Academia Româna Institutul de Geografie, Bucureşti, 280 p.

Marinica, I. (2006), *Fenomene climatice de risc în Oltenia,* Edit. Autograf MJM, CRAIOVA, 386 p;

Sandu, I., Elena, M., Marinica, I., Vatamanu, V. V. (2012), *Consideratii privind clima Olteniei şi tendinte actuale*, Publicatiile Societatii Nationale Române pentru Ştiinta Solului, Nr 38, A XX-a

Marinica, I. (2006), Fenomene climatice de risc în Oltenia*,* Editura Autograf MJM, ISBN 973-87422-0-X , *Craiova*, p: 386.

Topor, N. (1958), Bruma și înghetul. Prevederea și prevenirea lor, Edit. Agrosilvica de Stat, București 140 p.