

THE COLD WAVE OF THE 25 JANUARY – 18 FEBRUARY 2012 PERIOD ON THE TERRITORY OF THE REPUBLIC OF MOLDOVA

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Key words: cold wave, extreme temperatures, impact, blizzard, Republic of Moldova.

Abstract. In the present article, the cold wave of January 25-February 18, 2012 is described from the climatic point of view, in terms of indicators such as average daily temperature, minimum temperature, maximum temperature, etc. Factual material was provided by the State Hydro-Meteorological Service (SHS), for a network of 18 weather stations. It is emphasized the risk aspect of the mentioned cold wave on the socio-economic life of the Republic of Moldova.

Introduction

The geographical position of the Republic of Moldova in the South - Eastern Europe, in an interference area of the main barometric centers, sequence and direction of air masses movement, as well as the frequency and intensity of the cooling processes, facilitates the penetration of Mediterranean cyclones and cold waves in winter on the territory of the republic.

Blizzard is a negative phenomenon for the socio-economic development because of snow drifting and agricultural crops unveiling that, due to the snow absence, undergo freezing in winter. Snow movement, then its depositing in sheltered places, forms drifts that impede or interrupt traffic on roads, railways, airports, etc.

In Moldova, the cold waves are caused by the polar air movement, especially by the continental arctic air from Greenland, or from the Eurasian continent (Greenlandian anticyclone and East European one).

In the specialized literature, we find numerous references to the consequences of these anticyclones, which cause cooling (Lasse G. F., 1978, Mihailescu, C., 2004, Constantinov T., and Nedeačov M., 2003, Boian I., 2012 etc.).

In the last 65 years, in the Republic of Moldova, there were numerous situations when temperatures below 30⁰C were recorded. The strongest cooling occurred in January, 1954, 1963, 1985, 2006, 2010. Powerful February cooling occurred in the years 1954, 1956, 1985 etc.

1. Genetic causes of cold waves

Cold waves that were produced from the end of January 2012 and continued throughout the month of February 2012 were the result of the Siberian anticyclone absolute domination on the entire European continent. Although centered on the extremity of continent - in the far North of European Russia – its extraordinary development (over 1060 mb in the central region) facilitated the advection of air masses over the Urals to central Europe. The continental polar air covered most of the continent and the Arctic one advanced in the same direction resulting in extremely low temperatures in Eastern Europe.

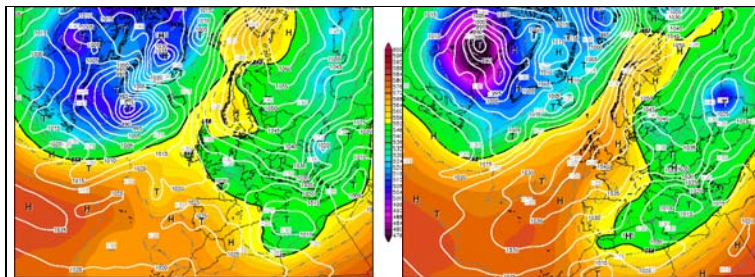


Fig. 1 Geo-potential and temperature distribution at the level of isobaric surface of 500 hPa and air pressure on 31.01.2012 (a) and, respectively, 9.02.2012 (according to www.wetterzentrale.de)

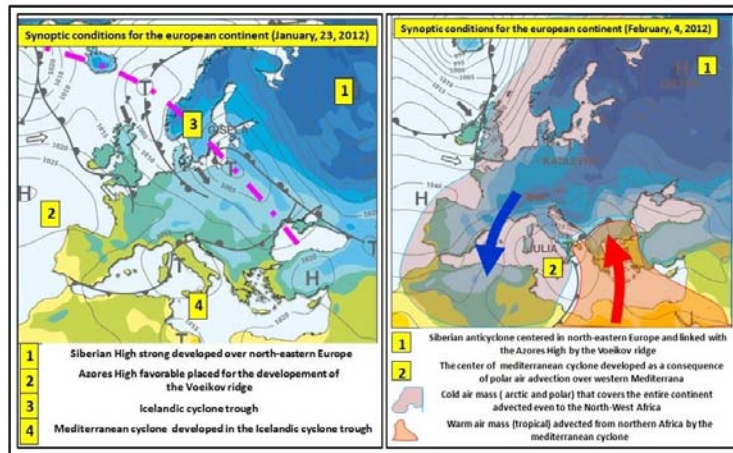


Fig. 2. Synoptic situation on the European continent on 23.01.2012 (a), and 04.02.2012 (b), respectively, – processing according to www.wetter.net

Cold air, both transported and produced by the anticyclone, came to North Africa, causing short snow-fall periods even in the Maghreb countries, in the North - West Africa, where snowfall is rare. Cold air over the western and central Mediterranean spurred cyclo-genesis in this region, thus the cyclones that formed there moved toward the Balkan Peninsula between 24.01.2012 - 18.02.2012, imposing the weather patterns (heavy snow-fall, cold waves, and blizzard) in the Republic of Moldova, too. (Fig. 2).

2. Manifestation

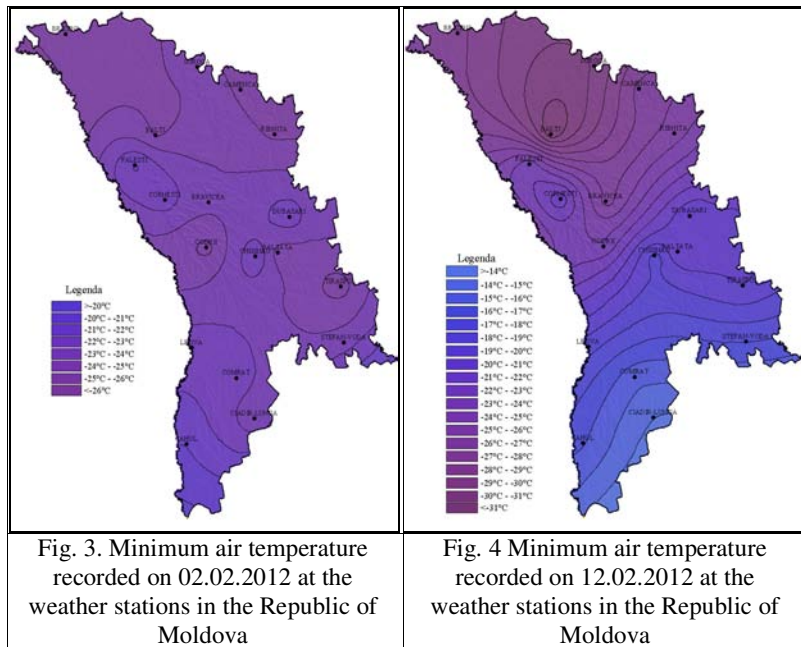
Winter 2011-2012 highlighted various aspects, the most notable one being the very low temperature regime at the end of January up to the first decade of March, which maintained the snow layer, frequency, duration and intensity of blizzards, drifts height etc.

Analyzing the average daily temperature values recorded since the last decade of January, 2012, up to the last decade of February, 2012, we deduce that on February, 02 and 12, 2012, the lowest values of the whole period were recorded (Table 1).

Tab. 1. Average and minimum daily temperature values at weather stations in the Republic of Moldova on February 02 and 12, 2012

Date	Average/Minimum Daily Temperature			Date	Average/Minimum Daily Temperature		
	Station	Av T °C	Min T°C		Station	Av T °C	Min T°C
02.02.2012	1. Briceni	-21,5	-25,7	12.02. 2012	1. Briceni	-20,5	-27,7
	2. Soroca	-19,9	-24,7		2. Soroca	-22,5	-29,9
	3. Camenca	-19,7	-25,1		3. Camenca	-19,3	-26,6
	4. Bălți	-19,1	-25,2		4. Bălți	-24,1	-32,0
	5. Fălești	-17,6	-21,8		5. Fălești	-18,3	-23,1
	6. Râbnița	-20,1	-25,2		6. Râbnița	-18,1	-25,6
	7. Cornești	-17,7	-22,5		7. Cornești	-16,5	-21,2
	8. Bravicea	-18,8	-23,8		8. Bravicea	-19,3	-26,5
	9. Dubăsari	-18,5	-22,4		9. Dubăsari	-15,2	-19,9
	10.Codrii	-19,5	-25,4		10.Codrii	-17,3	-23,9
	11.Bălțata	-19,5	-24,7		11.Bălțata	-15,9	-21,2
	12.Chișinău	-18,9	-22,2		12.Chișinău	-14,9	18,5
	13. Tiraspol	-20,0	-25,4		13. Tiraspol	-15,1	-20,0
	14.Șt.-Vodă	-19,2	-23,4		14.Șt.-Vodă	-13,5	-17,0
	15. Leova	-18,6	-22,3		15. Leova	-14,6	-18,4
	16. Comrat	-18,4	-22,5		16. Comrat	-12,8	-15,3
	17.C.-Lunga	-19,0	-23,8		17.C.-Lunga	-12,1	-14,0
	18. Cahul	-17,2	-21,0		18. Cahul	-13,3	-16,1

From 24.01.2012 to 18.02.2012 three blizzard periods of 3-5 consecutive days (24-27.01.2012; 3-7.02.2012, 12-14.02.2012) occurred on the Moldovan territory. Blizzards were accompanied by snowfall, the most significant amount of precipitation being recorded in the Southern districts, where in the first period (24 - 27.01.12) at Ceadâr-Lunga and Cahul weather stations, the snow thickness reached 20 cm. In the period of 03 - 07.02.2012, snowfall was stronger in the Northern districts. In Briceni, the snow thickness reached 51 cm and its equivalent rainfall approached 46.6 l/m². During the last blizzard period (12 - 14.02.2012), almost everywhere in the Republic the snow thickness ranged from 30 to 48 cm. The analysis of daily snow thickness values stated that its thickness had been increasing continuously from late January up to the second decade of February, when it reached its peak, and then began to decrease.



Because of snowfall and wind speed of 50-90 km/h, snow did not settle evenly, being visibly influenced by the shelter provided by the Curvature Carpathians, the micro-relief, the orientation of thoroughfares, the local shelter provided by human settlements. Under these conditions, the snow was blown and drifted, reaching heights of 2-4 m at the orographic barrier of the Eastern Carpathians and the Curvature ones.

Steppe Hill Plain of Balti was the region most affected by the cold waves. Here, it was recorded the absolute minimum of -32.0°C from January 25 to February 18, 2012. Though during winter, an average of 15-20 frosty nights (minimum temperature $\leq 10^{\circ}\text{C}$) occurs in the Southern and central part of the Republic of Moldova and from 20 to 30 days in the Northern part, in the 2011-2012 winter, there were recorded between 20 and 30 days in the Southern part of the Republic of Moldova and from 24 to 30 days in the north. It was remarkable that at all of the 18 weather stations in the Republic of Moldova, at least 20-24 consecutive cold nights occurred between 26.01.2012 - 18.02.2012.

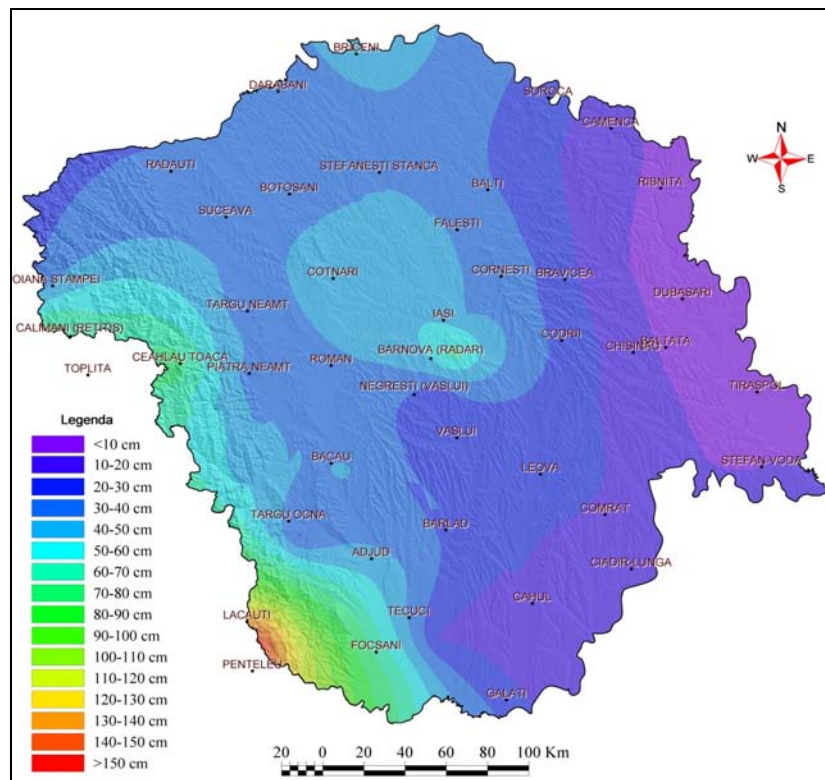


Fig. 5. Snow thickness in Moldova on February 7, 2012 at least 20-24 consecutive cold nights occurred between 26.01.2012 - 18.02.2012.

3. Risk issues

The deposited snow in urban areas of the Republic of Moldova, which often exceeded 40 cm, caused, especially during the days with snowfall and blizzard and

the first 2-3 days after they stopped, hindered traffic and damages mainly to weak buildings due to the weight of the formed snow layer, such as the roofs of kindergartens and secondary schools in the villages of Suvorovca and Ilenuța (district of Fălești). The Republic of Moldova suspended wheat exports because a third of winter crops were affected by frost; 282 Moldovan schools were closed because of the cold and snowfall. Chisinau City Hall organized the installation of hot air tube tents, where they served hot drinks. Such tents were arranged in Balti, Comrat, as well as in Soroca, Hâncești and Cahul.



Fig. 6. Tent for shelter. Hâncești – the Republic of Moldova

During the period from 25 January to 18 February 2012, numerous fires were caused, for example, on February 4, 2012, the Department of Emergency Situations of the Republic of Moldova announced an average of 14-15 fires in 24 hours. Two hundred and fifty-one vulnerable people received home care from the employees of the Dubasari Social Assistance Directorate. Three hundred and sixty-one elders from Soroca were supported with coal, firewood, electricity bills paid by the Dutch Foundation "MAX". In the period from January 25 to February 18, 2012, according to the Chisinau Emergency Hospital data, 47 people were hospitalized with hypothermia. On February 15, the Dubăsari weather station recorded the lowest depth of soil freezing - 101 cm, which is reported as the second time in the last 50 years.

Conclusions

Weather conditions in January-February, 2012, must be taken as a benchmark for what a true winter means in Europe. The baric configuration of these days, with a highly developed Siberian anticyclone, which expanded to the Western part of the continent and joined the Azores anticyclone by Voeikov Dorsal, represents the

typical model of large cold waves that can affect the whole Europe, and, of course, the Republic of Moldova.

Compared to the cooling waves of the other years, the one of January-February, 2012, proved to be more "gentle" (January, 1963-6 cases with $t \leq 30^\circ \text{C}$, 1954 - 2 cases with $t \leq 30^\circ \text{C}$, February, 2012 - 1 case of $t \leq 30^\circ \text{C}$).

The relief configuration, especially the depression, had an important role in the manifestation of the most intensive cooling. It is not accidental that the absolute minimum in the period from January 25 to February 18, 2012, was recorded at the Balti weather station, on the Northern Moldova Plain ($t -32.0^\circ \text{C}$ on 12.02.12), and the second lowest value at Soroca ($t -29.9^\circ \text{C}$ on 12.02.12), in the Superior Dniester Valley.

The period from January 25 to February 18, 2012 had two "peaks" of cooling: February 02 and 12.

Risks posed by cold waves require better authority training at different levels for prompt actions to mitigate human and material damage. These issues are more successful in the urban settlements of the Republic of Moldova, a fact that we cannot state about the rural settlements.

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