MASSIVE COOLINGS IN DOBROGEA BETWEEN 1965-2005

M. LUNGU, C. CARAPIT

ABSTRACT. - Massive coolings in dobrogea between 1965-2005. In the category of climatic hazards coldness waves are also included, materialized through thermic extremes . The position of maximum and minimum air pressure areals, as well as the frequency and intensity of cooling processes, facilitate the penetration on the Dobrogea territory of some frosty and dry masses of air, which introduce large deviations, perturbations from their normal conditions. They represent non-periodical variations of the climate, whose intensity amplifies or diminishes in direct ratio to the characteristics of the underlying surface of the structure .

Key words: thermic extremes, coldness, climatic hazards, Dobrogea.

1. General considerations

In the category of climatic hazards coldness waves are also included, materialized through thermic extremes, sometimes with quite serious consequences on the environment.

The geographic position of Dobrogea, in an area of interference between main baric centres which succeed one another along the year, whose activity constitutes the engine which starts the whole gearing of atmospheric circulation, makes sure that in the temporary and spatial evolution of climatic elements or natural phenomena will appear striking deviations from the multiannual average situations taken into consideration as normal.

The position of maximum and minimum air pressure areals, as well as the frequency and intensity of cooling processes, facilitate the penetration on the Dobrogea territory of some frosty and dry masses of air, which introduce large deviations, perturbations from their normal conditions. They represent non-periodical variations of the climate, whose intensity amplifies or diminishes in direct ratio to the characteristics of the underlying surface of the structure .

All of these non-periodical deviations, in view of their occasional occurrence, are considered climatic singularities on Dobrogea's territory.The occurrence of some massive ample coolings and their consequences were recorded in time by a series of foreign travellers passing through Dobrogea. The first information referring to coldness waves, provided by Orudj bin Adel in "Cronici turcesti privind Țările Romane"(Bucharest, 1965, p.52), tells about the winter of

RISCURI ŞI CATASTROFE Vol. VIII, Nr. 6 / 2009

1436-1437 that it was "a very frosty winter and because of that many people had their hands and feet numbed".

Later, Constantin Mihailovici from Ostravita in "Călători străini despre Țările Române" (Edit.St.,1968,vol.1,p.126), referring to the winter of 1462 said: "The Danube was frozen and the ruler (Dracul cel Tânăr/ The Young Devil)) crossed the Danube along with all of his men(his army)".All this was, however, subjective information. Objective information can be found after 1770 when first meteorological stations appear, or more exactly, after 1884 when Central Meteorological Institute is founded. Out of numerous cases of singular negative temperatures, only the most significant for Dobrogea were analysed.

2. Monthly and annually negative thermic singularities

They are generally caused by coldness waves which carry polluted air, but especially by continental arctic air from Greenland or the Euro-Asian continent (the Greenland anticyclone, respectively the East-European anticyclon and quite rarely, the Siberian anticyclone which determines the advective coolings); also, the predominance of the anticyclonic time(clear and calm) favours the apparition of radiative coolings.

Between 1965-2005, in Dobrogea, there were numerous situations in which temperatures below -15 Celsius degrees were registered, but we have taken into consideration only those which were recorded as absolute minimum temperatures at stations during the entire period of observation(1965-2005), for which reason we named them massive coolings.

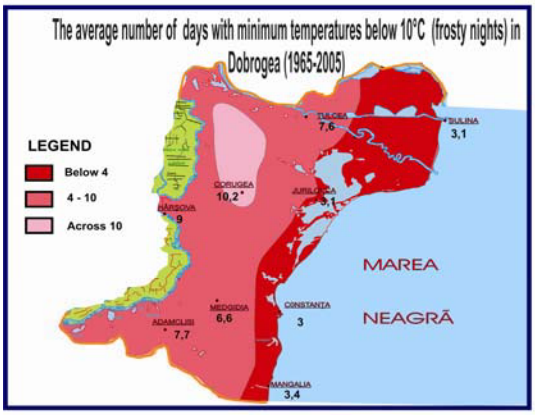

Fig. 1. The average number of days with minimum temperatures below 10^0C (frosty nights) in Dobrogea (1965-2005)

3. The number of days with minimum temperatures ≤ 10°C (frosty nights)

In the discussed period, we established that the smallest number of days with minimum temperatures less than 10 Celsius degrees(frosty nights) were recorded at the seaside and in the central and eastern side of the Danube Delta

TASTROFE 2009

(less than 4), because of the attenuating effect of the port waters. In most of Dobrogea's territory, the average number of days was between 4 and 10 days a year, while the largest number was recorded in the higher northern areas of Dobrogea(more than 10), figure 1.

4. Aspects of hazard

The massive coolings, which reflect large deviations from the usual variation, directly influence the metabolism itself of all living things.

It is clear that the most significant climatic stress is the thermic one(the cold stress in our case).A coldness which surpasses the temperature we are used to, provokes adaptation reactions of the organism in order to keep its inner temperature constant .In
addition to this, these thermic variations are accompanied by certain values of the other climatic elements, which could amplify stress.

In conditions of cold stress, the mechanism of growth of the amount of heat is turned on, heat made in the organism, by intensifying metabolic combustions, through involuntary contractions of the striated muscles, through making use of alimentary proteins for chemical thermic adjustment.
Diminishing the loss of heat in the environment is made through vasoconstriction, through blood concentration, the water moving to organ tissues, the irradiation area reduces through body squatting, warm clothes are used, etc. When being exposed for a long time to a low temperature, the body temperature decreases, and at an inner temperature under 24 Celsius degrees, the body temperature adjustment mechanism stops from working and it starts losing heat, like any other lifeless body, until its own temperature equals the one in the environment. Coldness provokes numbness, acro-asphyxie, rash *à frigore,* facial or radial paralysis, neuritis, infectious maladies, rheumatic pain.

Humidity and wind amplify the coldness sensation, producing more quickly the thermic inconvenience sensation.

In association with significant variations of atmospheric pressure, specific to the passing of deep cyclones, the symptomatology of cardiovascular, rheumatic or respiratory deseases exacerbate, and, associated with viral maladies, the maximum frequency of deceases is maximum in these periods. Also strong wind, which is specific to tornadoes or blizzards, amplifies thermic stress, through the pressure it exerts directly upon the skin. This way, at a speed higher than 4m/s the pressure is 1,87 kg/mp, at 11m/s it becomes 15,27 kg/mp, and at more than 28m/s, it goes higher than 95,4 kg/mp . Also, the wind stimulates cutaneous nerves, increases blood pressure, and could provoke anginous attacks or extrasystoles, and has an unfavourable influence on pulmonary tuberculosis.

RISCURI ŞI CATASTROFE Vol. VIII, Nr. 6/ 2009

Therefore, any kind of special coldness wave involves response reactions of the organism, trying to defend itself this way from the environment stress. The longer the natural phenomenon is, the lower the self-defence capacity of the organism is, and the consequences could often be irreversible(Teodoreanu Elena,2002).

We conclude by considering that the massive coolings which determined low values of temperature over large areas are recorded in the category of thermic singularities, as an expression of coldness waves provoked by continental anticyclones (ex. The Siberian Anticyclone) which blows towards Romania some quite cold polar air, and especially arctic.

Their unfavourable consequences over agriculture, particularly, are the same as in the case of hard frost, because the amplitude of coldness/cooling determines the intensity of frost, as a physical phenomenon, taken as such.

REFERENCES

1. Bălteanu, D., Rădița, A. (2001), *Hazarde naturale şi antropogene*, Edit.Corint, Bucureşti.
2. Bogdan, Octavia, Niculescu, Elena (1999), *Riscurile climatice din România*, Academia Romana, Institutul de Geografie, Tipar Compania Sega - International, Bucureşti.
3. Bogdan, Octavia (1978), *Fenemone climatice de iarnă şi de vară*, Edit. Ştiințifică şi Enciclopedică, Bucureşti.
4. Bogdan, Octavia (1992), *Asupra noțiunilor de hazarde, riscur şi catastrofe meteorologice şi climatic*, S.C. Geografic, t. XXXIX, Bucureşti.
5. Ciulache, S., Ionac Nicoleta (1995), *Fenomene atmosferice de risc şi catastrofe climatice*, Edit. Ştiințifică, București.

RISCURI ŞI CATASTROFE
Vol. VIII, Nr. 6 / 2009