

ASPECTS RELATED TO THE RISK WEATHER PHENOMENA FROM THE COLD SEASON OF THE YEAR IN ORADEA AREA

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Abstract

In our country and in Oradea respectively, due to the temperate continental weather with ocean influences, the most commonly met risk weather phenomena from the cold season that make the object of our work are: the rime, the glazed frost, the hoarfrost, the fog, the foggy air, the mist, the transport of snow on the ground, the blizzard. When these dangerous phenomena are at a certain point determined by certain weather conditions, the latter constitute risk weather phenomena but when they have a higher frequency and when they are a feature of a certain territory, reflecting themselves in the average multi-yearly values then they make up weather risks.

Key words: risk phenomena, rime, hoarfrost, fog, blizzard.

INTRODUCTION

The unfavourable weather conditions have a great temporal and spacial variability, they can be dangerous and they can have serious repercussions in all the social and economical fields. Thus, the risk weather conditions renders man's practical activity more difficult and they can produce damage, causing even material and human losses. The aim of this work is to analyze the spacial and temporal variations of the risk weather phenomena during the cold semester of the year in the area of Oradea city.

MATERIAL AND METHODS

The analysis of the risk weather phenomena has been realized on the basis of the data mentioned in the weather observations, from the station taken into study. With the help of the mathematical and statistics methods the data obtained from the archives of the National Meteorological Administration (N.M.A.) have been processed. The results obtained mathematically and statistically have been presented graphically in order to emphasize the time variability of the weather phenomena.

The use of specific methods and means of weather research has followed a very exact processing of all the data that were at our disposal; we have tried to follow the role the city plays as a weather factor in the evolution of the weather phenomena.

RESULTS AND DISCUSSIONS

In order to emphasize the risk weather phenomena from the area of Oradea city we have used data that cover the period from 1970 to 2010, data obtained from the visual and instrumental observations performed at the meteorological station in Oradea.

The rime

In certain weather conditions the rime can become a weather risk due to the intensity of the way they get cold. Thus, rimes can appear during the transition seasons when there is an alternance of the cold air advections from the north and of the warm air from the south.

The yearly average rime days in Oradea are of 54.4 days/year. This phenomenon can appear in Oradea from September all the way until May. It registers the biggest number of days in winter months, especially in the period December-February, the month of December being also the one with the most rime days, an average of 10.3 days. In January the yearly average rime days is of 9.8 days and in February there is an average of 9.9 days (see table 1).

Table 1

The yearly and monthly average number of rime days in Oradea in the period 1970-2010

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	An
Average number of days	9.8	9.9	8.8	2.0	0.1	0.0	0.0	0.0	0.3	4.7	8.5	10.3	54.4

Source: data processed from the N.M.A Archive

The smallest number of rime days is produced during the transition season, in the beginning months and the ending months of the possible interval; in May there are 0.1 rime days and in September there are 0.3 rime days. Thus, the rime registers maximum values in winter months when there are frequent thermic inversions and the small values are produced in spring and in autumn.

The glazed frost

Through its duration and its intensity this phenomenon renders the transport activity difficult, produces damage to agriculture, to forestry; by the ice deposit on the air conductors it can render the passing of the electric power difficult through them or sometimes it can make these conductors actually break.

The multi yearly average number of glazed frost days is reduced; there are 3.3 days with glazed frost each year. This reduced number of glazed frost days is due to the weather influences from the west and the south-west of the continent that are present in this part.

During the 41 years studied the biggest yearly number of glazed frost days in Oradea had been registered in 2002 when there were 13 cases of

glazed frost days, 7 of them in December and 6 of them in January. A big number of glazed frost days had also been registered in the year 1982 when there were a number of 10 days registered in January. In the studied area the glazed frost is present from November until March.

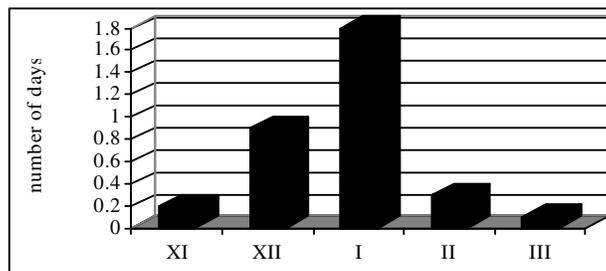


Fig. 1 The monthly schedule of the glazed frost days in Oradea

The biggest monthly average number of glazed frost days is registered in January, 1.8 days/month, then there are 0.9 days in December and the lowest number with such days is produced in the months from the beginning and from the end of this phenomenon's apparition possibility, that is in March 0.1 days and in November 0.2 days (see figure 1).

The hoarfrost

The massive hoarfrost deposits are harmful for the forestry vegetation and for the aerial conductors as these deposits can lead to the breaking of the conductors.

The multi yearly average number of hoarfrost days in Oradea is of 8.9 days but this number presented variations during the analyzed period, from one year to another. The biggest number of hoarfrost days has been signaled in the years 1977, 1986 and in 2003 when 19 days with hoarfrosts deposits had been signaled for each of the above mentioned years in particular.

Table 2

The yearly and monthly average number of hoarfrost days in Oradea

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	An
Average number of days	3.6	1.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	3.3	8.9

Source: data processed from the N.M.A. Archive

The number of days with hoarfrost vary not only from one year to another but also from one month to another. The hoarfrost is signaled in Oradea in the interval November-March. The monthly average number of hoarfrost deposit days has the maximum value in January – then it has 3.6 days and in December –then it has 3.3 days. In the months from the end of fall and from the beginning of spring the number of the days with hoarfrost

deposits is reduced, registering a minimum in March with 0.2 days (see table 2).

The high frequency of the hoarfrost number of days in the winter months is in a strong interdependence with the advection of some cold and humid air masses of sea origin. The hoarfrost can also appear when two air masses with different thermic features – a warm air mass of Mediterranean origin and a cold air mass of polar-arctic origin - come into contact with each other. The contact between the two air masses is accompanied by fog formation with hoarfrost deposits, a frequently met phenomenon in Oradea during the cold season.

The fog

The multi yearly average number of fog days for the period 1970-2010 is of 35.5 days. During the 41 analyzed years the yearly number of the fog days in Oradea varied from one year to another, there were 55 fog days in 1978 and 19 fog days in 2002. During the year the fog registers the highest values in Oradea in January with a multi yearly average of 9.3 days a month and it registers the lowest number of days in August, 0.4 days respectively. The number of fog days register high values in all the months of the cold season. In December the monthly average number is of 8.1 days and in February of 5 days (see table 3). The high frequency of fog days during the cold season can be explained by the lower temperatures during the winter, by a high atmosphere humidity, by the high values of the atmosphere pressure and by the higher degree of atmosphere pollution from this season. The lowest values during the year are produced in summer months and are caused by high temperature that maintain a reduced humidity and atmosphere pressure. In spring months the number of fog days show intermediary values – between the winter and the summer values – so 2.3 fog days can be registered in March, 0.6 days in April and 0.8 days in May.

Table 3

The monthly and yearly average and maximum number of fog days in Oradea

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Yearly
Average number	9.3	5.0	2.3	0.6	0.8	0.5	0.6	0.4	0.8	2.3	4.8	8.1	35.5
Maximum number	20	15	14	2	4	2	4	2	3	7	14	13	55

Source: data processed from the N.M.A. Archive

During fall, the number of fog days increases registering higher values compared to the summer period. Thus, in September there can be registered 0.8 fog days, in October 2.3 fog days and in November their number rises to 4.8 days (see table 3). For the studied period, the highest monthly number of fog days registered in Oradea has been in January 1989 when 20 fog days had been signalled.

Foggy air

The foggy air represents the initial stage of fog and cloud formation. The multi yearly average number of foggy air in Oradea is of 180.1 days (see table 4).

Table 4

The yearly and monthly average number of foggy air days in Oradea

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Average number of days	25.1	20.4	16.4	11.1	8.3	8.8	9.6	9.6	12.4	14.1	19.9	24.4	180.1

Source: data processed from the N.M.A. Archive

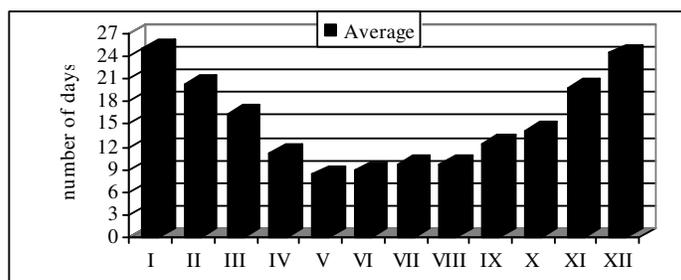


Fig. 2 Monthly schedule of the foggy air days in Oradea

During the year the most days with foggy air are signalled in the cold season; the maximum value is registered in January with a multiyearly average of 25.1 days a month. The lowest numbers of foggy air days are produced during the warm season, in may respectively with 8.3 days a month (see figure 2). The number of days with foggy air registers high values in all the months of the cold season. In December the monthly average number is of 24.4 days and in February of 20.4 days. The high frequency of the foggy air days during the cold season can be explained by the lower temperature during winter but mostly by the higher degree of air pollution in the cold season when the air's high pressure does not allow the dispersion of the polluting agents and when the atmosphere humidity reaches the highest values.

The mist

The multi yearly average number of mist days for the period 1970-2010 is of 2.7 days. During the 41 years of research the yearly number of mist days in Oradea varied from one year to another, the maximum number of mist days were produced in 1982 when there were 13 such days. There were more years when this litometeor did not appear.

In Oradea the biggest values are produced, all along the year, during the transition seasons, so there are 0.6 days in October and 0.5 days in March and in November. Low values are registered in the cold and in the

warm season, the minimum values of 0.1 days are produced in the majority of the months (see table 5).

Table 5

The yearly and monthly average number of mist days in Oradea

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Average no. of days	0.1	0.2	0.5	0.1	0.1	0.1	0.1	0.2	0.1	0.6	0.5	0.1	2.7

Source: data processed from the N.M.A. Archive

Transport of snow on the ground

The transport of snow on the ground represents an assembly of snow particles raised by the wind from the soil surface to a low height and transported almost in parallel with the surface of the ground. The horizontal visibility at the eye level and the vertical visibility are not reduced due to this phenomenon.

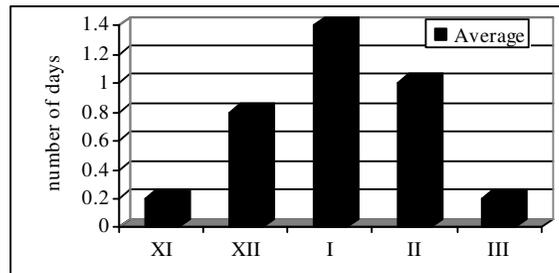


Fig. 3 Monthly schedule of the snow transport on the ground in Oradea

Analyzing the multi yearly schedule of the hydrometeor during the 41 years taken into study it can be noticed that in Oradea its values register a number of 3.6 days. During the year the maximum values of the snow transport on the ground days are registered in January due to the fact that in this month even the snow layer has got a maximum value. Thus, the number of days with snow transport on the ground registers the highest values in January with a number of 1.4 days. The lowest values are produced in the months from the beginning and from the end of the snow layer depositing period, that means in November and in March when there are a number of 0.2 days with transport of snow on the ground registered (see figure 3).

Blizzard (transport of snow at height)

The blizzard is a meteorological phenomenon which is signalled in Oradea during the cold season though its frequency is reduced.

The multi yearly average number of blizzard days in Oradea is of 0.9 days and the possible apparition interval of this phenomenon is November – March. The few number of days with blizzard in Oradea is explained by the features of the atmosphere dynamics in this part of the country, which

shows the poor influence of the climate from the east and from the north-east of the European continent which generates such phenomena. The highest yearly number of blizzard days had been registered in 1987 when there were 7 such days, all of them in January. It is to be mentioned that in Oradea in over 50% of the total studied years not one case of blizzard had been registered. During the year the multi yearly average of blizzard days has registered the maximum number in January and in February, that meaning 0.4 days. It is also to be mentioned that in November and in March – in the analyzed period – there was one blizzard day in November 1995 and one blizzard day in March 2004.

CONCLUSIONS

The most frequent risk weather phenomena are the rimes which on certain conditions can become weather risks due to: the cooling intensity, the moment of the year in which they are produced and due to their consequences. The most dangerous such phenomena are produced outside their season, that is at the beginning of autumn and at the end of spring when there is an alternance of the cold air advections from the north with the ones of warm air from the south. In these periods the rime can have a risk feature as it may damage the agricultural crops (vegetables, fruit trees, wine, etc) in different vegetation stages (before the end of the vegetation cycle or at the beginning of this cycle). In the analyzed period the multi yearly average number of rime days in Oradea is of 54.4 days a year. The rime registers the highest number of days in the period December – February, the month of December registering the highest number of such days, with 10,3 respectively. The maximum values registered in the cold period of the year are due to the thermic inversions that have a higher frequency in this period.

The ice deposits make up a risk weather phenomenon when produced on the ground (they make transport activity difficult or even prevent it) as well as when produced in the air (they overburden the cables and the tree branches which can even break and tear).

The fog represents one of the risk weather phenomena from Oradea, a phenomenon which can be present all the year round with higher values during winter in January and in December. The multi yearly average number of fog days is of over 35 days.

The blizzard, the hoarfrost and the glazed frost present a high risk degree when they manifest themselves at high intensity but they have quite a relatively reduced frequency in Oradea.

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