

CONTRIBUTION TO DEFINE THE BLIZZARD PHENOMENA THROUGH CLIMATE STUDY IN SOUTHEASTERN ROMANIA

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ABSTRACT. – Contributions to define the blizzard phenomenon through climate study in southeastern Romania. The definition of the phenomenon of blizzard implies two distinct aspects: the transport of snow on ground and the transport of snow at heights or also known as the actual blizzard. In order for a phenomenon to be defined as blizzard, it has to meet two mandatory conditions: strong wind (>15 m/s) and snow cover (previously deposited or associated with snowing phenomenon). The delineation between the two phenomena, respectively snow transport at heights as compared to the one on the ground is often subjective or difficult to assess (being determined visually by the observatories at the meteorological stations.) The topography of the place, the moment of day when the phenomenon is produced, the luminosity, the visibility landmarks, etc. can often times lead to the incorrect assessment of the phenomenon. The only parameter measured exactly (among the meteorological parameters that define the phenomenon) is the wind (parameter that is determined automatically by the sensors in the meteorological stations where they exist), aspect that might be a delineating factor when the occurrence of the phenomenon is estimated. The climatological analysis of the data derived from 19 meteorological stations located in the South-East of Romania, throughout a period of over 50 years (1961-2012) revealed the existence of the phenomenon of blizzard (transported on ground or at height), associated/not-associated to the phenomenon of snow, with a snow layer/without and at different intensities of the wind. Being a natural phenomenon with climatic hazard and negative impact on the environment and the human society, the correct delineation of the two phenomena might highlight the territories with increased vulnerability to its occurrence. Starting from those presented above, the hereby paper aims to make a detailed climatological analysis regarding the snow transport on ground and at height and their delineation based on the data given by the 19 meteorological stations placed in the South-East of Romania (1961-2012).

Keywords: blizzard, snow transport on ground or at height, wind, snow cover.

1. INTRODUCTION

The blizzard is a severe phenomenon characteristic of the cold season, defined as “a strong snowstorm, sustained by powerful enough wind, that lasts for at least three hours.” (www.wmo.int). According to another definition, the blizzard is a meteorological phenomenon of hazard, caused by strong wind that reduces visibility to a large enough extent, associated or not with snowfalls. In the United States, for a phenomenon to be defined as blizzard, the wind velocity has to be over 56km/h (>15m/s) and the visibility has to be under 400 m, for at least three hours

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(www.wheater.gov). According to the Australian Bureau of Meteorology, the blizzard is a very cold and strong wind that raises the snow from the ground where it is deposited. (Bom.gov.au). In The Meteorological dictionary (Țăștea et al., 1965), the blizzard is defined as being “a snow transport over the surface of the earth, caused by a strong enough and turbulent wind, accompanied or not by snowing phenomenon”. These being only some of the definitions of the phenomenon, definitions that have in common strong wind and snow layer deposited prior to the start of the phenomenon or associated snowing phenomenon.

Of the terms used to characterize the phenomenon, one can enumerate: general blizzard → the snow is heavily blown, being impossible to assess if it is snowing or not; blizzard with snow → the snowing phenomenon is noticed; snow transport or blown snow, separating the snow drift on ground (<1.80 m) from the snow transport at height or the blizzard per se (>1.80 m height), (Moldovan 2003, Lungu and Panaitescu, 2010).

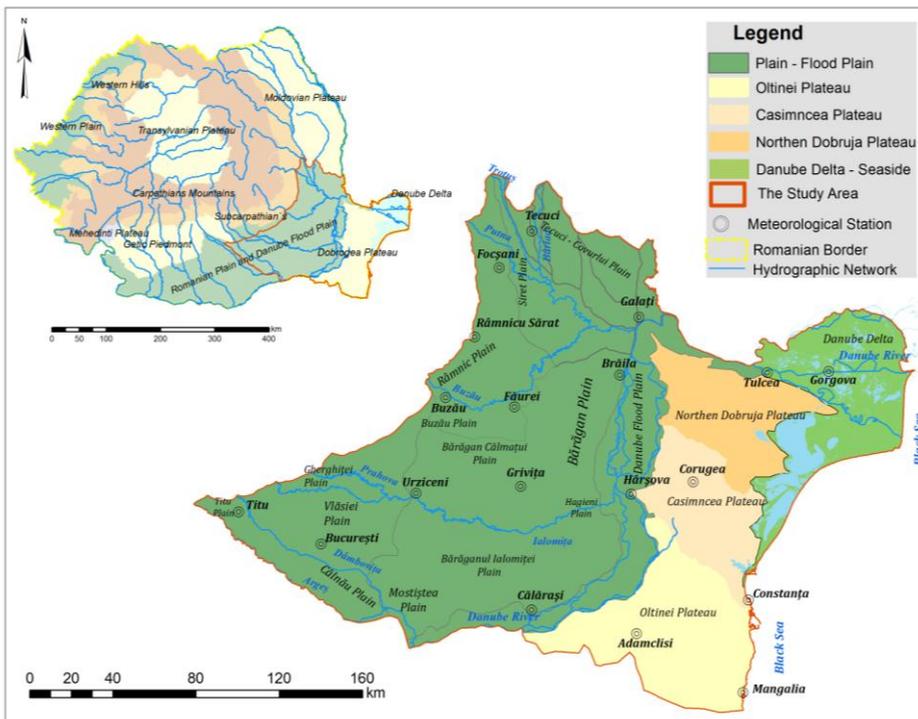


Fig. 1. The map of the studied area (South-East Romania)

In the South-East and East of Romania (Fig.1), the blizzard is associated with the phenomenon of “Crivăț”, without any mention whether it is accompanied or not of snowfalls or only by its blowing (Bălescu, Beșleagă, 1962). At the moment, in Romania, the meteorological instructions in force, define the term snow transport (blizzard) like this “ensemble of snow particles lifted from the ground by a strong enough and turbulent wind” (***) Instructions, 1986). The term actually implies two aspects: 1. snow drift on ground (the snow cover already existing is blown at the

surface of the ground, in layers under 1.80m) and 2. snow transport at height, the snow previously deposited or that falls simultaneously with the phenomenon is blown and in high layers, of over 1.80 m. Therefore, in order for a phenomenon to be defined as blizzard or drifting snow, it has to meet the two conditions: 1. strong enough and turbulent wind and 2. the existence of the snow cover previously deposited or snowing phenomenon simultaneously with its occurrence.

According to the definition of the phenomenon and the meteorological parameters that characterize it, the subject of this paper is to bring some contributions to the improvement of the definition of the blizzard notion or snow transport and mark a clear delineation of these two. The analyse region (Fig. 1) is located in the South-Eastern part of the Romanian Plain, East of Argeş River up to the contact with the Sub-Carpathians in the West and West-North-West and the Central Moldavian Plateau in the North, including Dobrogea entirely.

2. DATA AND METHODS

For the present paper, were used the climatological data found in the archives of the National Administration of Meteorology that come from the 19 meteorological stations located in the South East of Romania. The period referred to ranges between 1 October 1961 and 30 April 2012. Meteorological data that was used refers to: the occurrence of the phenomenon, days with blizzard or snow transport on ground, wind velocity, precipitations and snow cover.

The meteorological stations that provided data are: Adamclisi (1961-2012), Bucureşti Băneasa (1961-2012), Brăila (1975-2012), Buzău (1961-2012), Călăraşi (1961-2012), Constanţa (1961-2012), Corugea (1961-2012), Făurei (1961-2001), Focşani (1977-2012), Galaţi (1961-2012), Gorgova (1961-2012), Griviţa (1961-2012), Hârşova (1961-2012), Mangalia (1961-2012), Râmnicu Sărat (1961-2012), Tecuci (1961-2012), Titu (1961-2012), Tulcea (1961-2012) and Urziceni (1961-2012).

The selected meteorological data were subject to a process of verification after being analysed. For the statistical analysis, the series of distribution for the calculation of the environments, the frequency for the calculation of various frequencies and the GIS programme for the making of themed maps were used.

3. RESULTS AND DISCUSSIONS

3.1. Results

As shown in the Introduction, the definition of the blizzard phenomenon implies two distinct aspects: the snow transport on ground and the transport at heights or the blizzard per se. The delineation of the actual blizzard phenomenon from that of the snow transport on ground might highlight the areas with increased vulnerability at the production of the phenomenon. A blizzard can become dangerous for the society or the environment when certain thresholds are overcome, like that of the wind velocity, the accumulated precipitations or the deposited snow layer.

3.1.1. The number of days with blizzard and drifting snow

For the analysed period, it was noticed that there were days when the phenomenon of blizzard and that of drifting snow were produced simultaneously and days when they happened separately. On the one hand, there are the days when the blizzard phenomenon was present (even if on the same day there was also present a drifting snow) and days when only the drifting snow phenomenon occurred.

Analysing the results presented in Table 1, it can be noted that at the meteorological stations: Călărași (77.92%), Urziceni (72.51%), Constanța (68.93%), Corugea (66.97%), Mangalia (65.93%), Făurei (63.14%), Hârșova (61.39%), Tulcea (60.0%), Grivița (56.85%), Buzău (55.13%), Gorgova (54.72%) and Titu (51.14%) the blizzard prevailed, and at the meteorological stations: Focșani (86.22%), Tecuci (71.47%), Galați (66.89%), Râmnicu Sărat (59.06%), București Băneasa (57.14%) and Brăila (54.20%) prevailed the phenomenon of drifting snow. At the meteorological station Adamclisi, the drifting snow (50.29%) and the blizzard (49.71%), had close enough values of frequencies. Also, in Figure 2, on the map of the area, phenomena distributions were highlighted using graphic signs (blizzard and surface snow transport). These were highlighted by different color tones and different shades, aiming to a better reflection of the results presented in Table 1.

Table 1. The absolute and relative frequency (%) of the days with blizzard and drifting snow in South-East Romania (1961-2012)

| The meteorological station | The absolute frequency of days with blizzard | Days with blizzard and drifting snow | | Days with drifting snow | |
|----------------------------|--|--------------------------------------|---------------------------|-------------------------|---------------------------|
| | | The absolute frequency | The relative frequency(%) | The absolute frequency | The relative frequency(%) |
| Adamclisi | 175 | 87 | 49.71 | 88 | 50.29 |
| Brăila | 131 | 60 | 45.80 | 71 | 54.20 |
| București Băneasa | 140 | 60 | 42.86 | 80 | 57.14 |
| Buzău | 156 | 86 | 55.13 | 70 | 44.87 |
| Călărași | 231 | 180 | 77.92 | 51 | 22.08 |
| Constanța | 177 | 122 | 68.93 | 55 | 31.07 |
| Corugea | 276 | 184 | 66.67 | 92 | 33.33 |
| Făurei | 255 | 161 | 63.14 | 94 | 36.86 |
| Focșani | 225 | 31 | 13.78 | 194 | 86.22 |
| Galați | 296 | 98 | 33.11 | 198 | 66.89 |
| Gorgova | 53 | 29 | 54.72 | 24 | 45.28 |
| Grivița | 394 | 224 | 56.85 | 169 | 42.89 |
| Hârșova | 202 | 124 | 61.39 | 78 | 38.61 |
| Mangalia | 64 | 42 | 65.63 | 22 | 35.94 |
| Râmnicu Sărat | 127 | 52 | 40.94 | 75 | 59.06 |
| Tecuci | 333 | 95 | 28.53 | 238 | 71.47 |
| Titu | 96 | 49 | 51.04 | 47 | 48.96 |
| Tulcea | 110 | 66 | 60.00 | 44 | 40.00 |
| Urziceni | 171 | 124 | 72.51 | 47 | 43.27 |

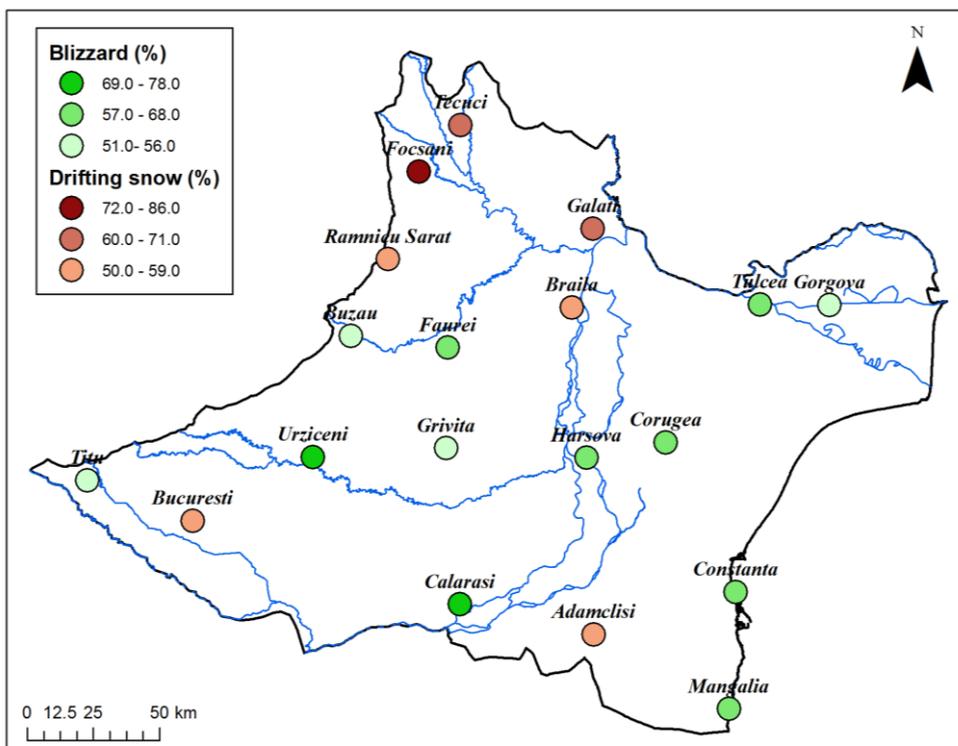


Fig. 2. The relative frequency (%) of the days with blizzard and drifting snow in South-East Romania (1961-2012)

3.1.2 The wind

The average wind velocity characterizes the intensity of the occurrence of the phenomenon (Bălescu and Beșleagă, 1962, Bogdan, Niculescu, 1999). In a previous work, Bălescu and Beșleagă (1962) established certain defining thresholds that characterize the intensity of the phenomenon, namely there are: moderate blizzards (6...10 m/s), heavy (11...17 m/s) and violent ones (>17 m/s). From the analysis performed at the 19 meteorological stations located in the area intended to study (South-East Romania), it is noted that during the blizzards, the wind velocity (average and maximum) registered values under 6m/s, they were characterized as light blizzards.

Across the territory of Romania, the wind velocity registered during blizzards ranges between 11-17 m/s (Bălescu, Beșleagă, 1962, Bogdan, Niculescu, 1999, etc), but during the occurrence of the phenomenon, this velocity is frequently surpassed. In the South-East part of Romania (1961-2012), the days with blizzard were characterized by moderate intensity at București Băneasa, Buzău, Călărași, Focșani, Galați, Gorgova, Râmnicu Sărat, Tecuci, Titu, Tulcea and strong at Adamclisi, Brăila, Constanța, Corugea, Făurei, Grivița, Hârșova, Mangalia and Urziceni. And during the days with drifting snow, the weak intensity was typical at Râmnicu Sărat, moderate at: Adamclisi, București Băneasa, Brăila, Buzău,

Constanța, Corugea, Făurei, Focșani, Galați, Gorgova, Grivița, Hârșova, Mangalia, Tecuci, Titu, Tulcea and strong at Titu and Urziceni (Table 2).

Table 2. Relative frequencies (%) of the average velocity of the wind registered in days with blizzard and drifting snow, typical thresholds, in the South-East Romania (1961-2012)

| The meteorological station | The relative frequency (%) to the average velocity days with blizzard and drifting snow, specific thresholds (Bălescu and Beșleagă, 1962) ¹ and Cirlău (2015) [*] | | | | | | | |
|----------------------------|---|---------------------|---------------------|------------------|-----------------|---------------------|---------------------|------------------|
| | Blizzard | | | | Drifting snow | | | |
| | <6 [*] | 6...10 ¹ | 11..17 ¹ | >17 ¹ | <6 [*] | 6...10 ¹ | 11..17 ¹ | >17 ¹ |
| Adamclisi | 2.86 | 20.00 | 23.43 | 3.43 | 18.86 | 25.71 | 5.71 | 0.00 |
| București | | | | | | | | |
| Băneasa | 17.14 | 20.71 | 4.29 | 0.71 | 26.43 | 27.14 | 3.57 | 0.00 |
| Brăila | 7.63 | 12.98 | 19.08 | 6.11 | 10.69 | 27.48 | 12.21 | 3.82 |
| Buzău | 11.54 | 23.72 | 15.38 | 4.49 | 12.82 | 17.31 | 11.54 | 3.21 |
| Călărași | 13.00 | 44.39 | 19.73 | 3.59 | 13.90 | 2.69 | 5.83 | 0.45 |
| Constanța | 10.73 | 20.34 | 33.33 | 4.52 | 5.65 | 12.43 | 12.43 | 0.56 |
| Corugea | 8.33 | 21.38 | 29.71 | 7.25 | 6.16 | 18.12 | 9.06 | 0.00 |
| Făurei | 6.67 | 16.86 | 24.31 | 15.29 | 7.45 | 12.55 | 16.47 | 0.39 |
| Focșani | 3.11 | 5.78 | 3.56 | 1.33 | 29.78 | 36.89 | 16.00 | 3.56 |
| Galați | 0.68 | 14.19 | 13.18 | 5.07 | 19.59 | 39.53 | 7.43 | 0.34 |
| Gorgova | 7.55 | 28.30 | 18.87 | 1.89 | 5.66 | 32.08 | 5.66 | 0.00 |
| Grivița | 7.36 | 19.04 | 25.13 | 5.33 | 15.74 | 18.78 | 8.63 | 0.00 |
| Hârșova | 4.95 | 15.35 | 31.68 | 9.41 | 7.92 | 14.85 | 15.35 | 0.50 |
| Mangalia | 9.38 | 23.44 | 31.25 | 1.56 | 0.00 | 25.00 | 9.38 | 0.00 |
| Râmnicu Sărat | 3.94 | 25.20 | 11.81 | 0.00 | 34.65 | 17.32 | 7.09 | 0.00 |
| Tecuci | 1.50 | 14.41 | 9.61 | 3.00 | 27.63 | 36.34 | 5.71 | 1.80 |
| Titu | 14.58 | 23.96 | 10.42 | 2.08 | 13.54 | 16.67 | 16.67 | 2.08 |
| Tulcea | 6.36 | 34.55 | 16.36 | 2.73 | 10.00 | 25.45 | 4.55 | 0.00 |
| Urziceni | 5.85 | 24.56 | 36.84 | 5.26 | 11.11 | 7.02 | 8.19 | 1.17 |

The maximum velocity of the wind characterizes the maximum intensity which the phenomenon can reach during its time of manifestation (Bălescu and Beșleagă, 1962, Bogdan, Niculescu, 1999). During the days with blizzard, the maximum intensity of the wind was predominantly strong at Adamclisi, București Băneasa, Călărași, Constanța, Corugea, Gorgova, Mangalia, Râmnicu Sărat, Titu, Tulcea and violent at Brăila, Buzău, Făurei, Focșani, Galați, Grivița, Hârșova, Tecuci and Urziceni. The days with drifting snow had the maximum intensity predominantly moderate at București Băneasa, Călărași, Gorgova; predominantly strong at: Adamclisi, Buzău, Constanța, Focșani, Galați, Grivița, Hârșova, Mangalia, Râmnicu Sărat, Tecuci, Titu, Tulcea and predominantly violent at: Brăila, Corugea, Făurei and Urziceni (Table 3).

3.1.3. The atmospheric precipitations and the snow layer deposited during the days with blizzard or snow transport on ground

In its time of occurrence, the blizzard phenomenon can be accompanied or not by snow, but it is important the presence of the snow layer previously deposited or simultaneously to the occurrence of the phenomenon. In the period characterized (1961-2012), in the South-East Romania, the presence of the snow phenomenon at the same time with that of blizzard or snow transport on ground had a frequency ranging between 90.22% (Grivița) and 100% (Focșani, Gorgova and Mangalia) and 62.75% (Călărași) and 100% (Gorgova and Mangalia) in the days with snow transport on the ground.

Table 3. The relative frequency (%) of the maximum velocity of the wind registered in the days with blizzard and drifting snow by thresholds typical to the South-East Romania (1961-2012)

| The meteorological station | The relative frequency (%) to the maximum velocity days with blizzard and drifting snow, specific thresholds (Bălescu and Beşleagă, 1962) ^a and Cirlău (2015) [*] | | | | | | | |
|----------------------------|---|---------------------|----------------------|------------------|---------------|---------------------|----------------------|------------------|
| | Blizzard | | | | Drifting snow | | | |
| | <6* | 6...10 ¹ | 11...17 ¹ | >17 ¹ | <6* | 6...10 ¹ | 11...17 ¹ | >17 ¹ |
| Adamclisi | 0.00 | 1.71 | 29.71 | 18.86 | 0.00 | 15.43 | 25.14 | 9.14 |
| Bucureşti Băneasa | 0.00 | 11.43 | 21.43 | 10.00 | 3.57 | 26.43 | 20.00 | 7.14 |
| Brăila | 0.00 | 1.53 | 10.69 | 33.59 | 0.76 | 7.63 | 12.98 | 32.82 |
| Buzău | 0.64 | 16.67 | 17.31 | 20.51 | 0.00 | 14.74 | 17.31 | 12.82 |
| Călăraşi | 0.00 | 12.99 | 41.99 | 22.08 | 0.00 | 10.39 | 9.52 | 3.03 |
| Constanţa | 2.26 | 12.43 | 30.51 | 23.73 | 2.26 | 7.91 | 18.08 | 2.82 |
| Corugea | 0.00 | 5.07 | 35.51 | 26.09 | 0.00 | 2.90 | 13.04 | 17.39 |
| Făurei | 0.00 | 5.10 | 14.90 | 43.14 | 0.00 | 2.75 | 13.73 | 20.39 |
| Focşani | 0.00 | 1.78 | 5.78 | 6.22 | 0.00 | 7.11 | 48.00 | 31.11 |
| Galaţi | 0.00 | 2.03 | 9.80 | 21.28 | 2.03 | 16.55 | 35.81 | 12.50 |
| Gorgova | 0.00 | 9.43 | 32.08 | 13.21 | 0.00 | 26.42 | 11.32 | 7.55 |
| Griviţa | 0.25 | 2.54 | 22.39 | 31.81 | 0.51 | 10.94 | 22.65 | 8.91 |
| Hârşova | 0.00 | 0.00 | 23.27 | 38.12 | 0.00 | 5.45 | 23.27 | 9.90 |
| Mangalia | 0.00 | 10.94 | 39.06 | 15.63 | 0.00 | 14.06 | 17.19 | 3.13 |
| Râmnicu Sărat | 0.00 | 8.66 | 24.41 | 7.87 | 0.00 | 17.32 | 36.22 | 5.51 |
| Tecuci | 0.00 | 3.90 | 9.01 | 15.62 | 0.00 | 13.51 | 46.55 | 11.41 |
| Titu | 0.00 | 8.33 | 23.96 | 18.75 | 0.00 | 8.33 | 20.83 | 19.79 |
| Tulcea | 0.00 | 10.00 | 34.55 | 15.45 | 1.82 | 12.73 | 24.55 | 0.91 |
| Urziceni | 0.00 | 0.58 | 22.22 | 49.71 | 0.00 | 4.09 | 8.77 | 14.62 |

As concerns the presence of the snow layer, in the case of the snow days, its frequency ranged between 73.77% (Constanţa) and 100% (Făurei), whereas during the days with snow transport on ground, it ranged between 72.34% (Titu) and 98.74% (Tecuci) (Table 4).

3.2. Discussions

A great frequency of the phenomenon of drifting snow can be noticed in the North-East of the analysed area, along the Focşani-Tecuci-Galaţi line that continues in the East part up to Brăila and on the Western part up to Râmnicu Sărat, but its predominant frequency is noticed also at Bucureşti Băneasa. From the geographical point of view, the respective area overlaps across the North of the Romanian Plain (Râmnicu Plain, Lower Siret Plain, Tecuci and Covurlui Plain and the North of Brăilei Plain). If in the case of Râmnicu Sărat locality, the reduced frequency of the blizzard might be explained by its location at the cover of the Sub-Carpathians of Curvature, the other localities (Focşani, Tecuci, Galaţi) are situated on the pathway of the Northern or Eastern winds that propagate towards the South at the periphery of the Oriental Carpathians, Siret valley favouring this thing. From a geographical point of view, this area is situated at the South of the Central Moldavian Plateau, which might determine us to say that they could constitute an orographic obstacle diminishing the wind speed, reflected in the intensity of the blizzard. On the other hand, the local conditions (placing the meteorological station within the respective localities) might constitute a local factor that leads to the diminishing of the intensity of the phenomenon (e.g. Focşani). In the case of Bucureşti municipality, the great frequency of the snow transport on ground might be explained by the local factor, the proximity of the woods

in North Bucharest could constitute a natural barrier in the wind's way, however the concentricity of the shape of the town and the layout of the street lanes favour in the inside of the locality the channelling of the wind along them, creating difficulties in the unfolding of the economical activities each winter when the blizzard is present.

Table 4. The frequency of the days with snow and snow layer during the occurrence of the blizzard phenomenon or drifting snow in the South-East of Romania (1961-2012)

| The meteorological station | The relativer frequency (%) of days with rainfall | | The relative frequency (%) of days with snow cover | |
|----------------------------|---|---------------|--|---------------|
| | Blizzard | Drifting snow | Blizzard | Drifting snow |
| Adamclisi | 96.55 | 98.86 | 94.25 | 93.18 |
| Brăila | 98.31 | 87.95 | 98.31 | 90.36 |
| București Băneasa | 98.36 | 78.57 | 82.25 | 84.29 |
| Buzău | 95.35 | 79.71 | 86.05 | 75.36 |
| Călărași | 98.31 | 62.75 | 89.27 | 94.12 |
| Constanța | 96.72 | 89.09 | 73.77 | 87.27 |
| Corugea | 96.55 | 69.57 | 82.61 | 76.09 |
| Făurei | 90 | 73.12 | 100 | 96.77 |
| Focșani | 100 | 84.77 | 96.77 | 91.37 |
| Galați | 96.94 | 84.85 | 90.82 | 92.93 |
| Gorgova | 100 | 100 | 82.76 | 79.17 |
| Grivița | 90.22 | 79.17 | 90.67 | 88.69 |
| Hârșova | 92.74 | 67.95 | 76.61 | 93.59 |
| Mangalia | 100 | 100 | 95.24 | 90.91 |
| Râmnicu Sărat | 97.87 | 90.24 | 87.23 | 93.9 |
| Tecuci | 90.53 | 84.45 | 92.63 | 98.74 |
| Titu | 97.96 | 68.09 | 93.88 | 72.34 |
| Tulcea | 95.38 | 84.44 | 89.23 | 86.67 |
| Urziceni | 95.97 | 68.09 | 90.32 | 85.11 |

The meteorological stations where the blizzard phenomenon showed great frequency are placed generally in open space (Călărași, Urziceni, Făurei, Grivița, Hârșova), the predominance of the blizzard phenomenon being favoured equally by local, synoptic and general factors. In the case of the coast localities (Constanța, Mangalia), the intensity of the phenomenon is favoured by geographical and synoptic factors (the proximity of the Black Sea). Tulcea locality is located at the entrance in Danube Delta, here the local factor (the placing of the meteorological station within the locality) may explain the great frequency of the blizzard phenomenon; in the case of Corugea locality, that is placed on the Western part of Casimcei Plateau, the geographical factor might be the one that favours the predominance of the blizzard.

To define as blizzard phenomenon the moment when snow is blown at height (>1.80m) is often hard to determine and rather subjective. The presence or not of the snow cover or the snowing phenomenon simultaneously with the occurrence of the phenomenon cannot be a factor of distinct delineation of the two phenomena, even if at some meteorological stations there are shown smaller values of their frequency in the case of the drifting snow. As shown in the definition, it is not them that define the phenomenon itself. However, on the other hand, in the case of the phenomenon of drifting snow, the presence of a snow layer previously deposited should be a mandatory requirement, although the analysis of the climatic data at the 19 meteorological stations did not reveal this fact each time. The analysis of the climatic data about blizzard or

drifting snow for a long enough period and at rather many meteorological stations (19), in the area with the most annual days with blizzard, there was not highlighted any significant difference that might lead to a clear differentiation of the two phenomena.

Currently, in Romania the blizzard is defined as *a strong enough wind*, but without specifying how strong it is. In the USA, where the blizzard phenomenon is present each winter and at strong intensities, in order to be characterized as blizzard phenomenon, the wind velocity must be over 15 m/s, so an exact specification of the wind threshold, element that is also measured exactly, by the wind sensor of the automated station. Also, in the case of storm phenomena (dust or sand transport on ground or at height) or strong wind, the wind velocity is specified as over 15 m/s, the blizzard which is also some sort of snow storm (in some specialty books it is defined as such), a limitative factor might be established to differentiate for the two phenomena the speed threshold of the wind at 15 m/s.

4. CONCLUSIONS

The South-East of Romania is the area where the blizzard has the biggest number of days yearly. Due to the favouring geographical factor, the area is intensely populated presenting developed infrastructure, and the blizzard is one of the phenomena of the cold season that puts its negative imprint on the environment and society each winter, hence the delineation of the two aspects of the blizzard phenomenon (transport on ground or at height) might present a practical importance, and based on these studies the areas with increased vulnerability at the occurrence of the phenomenon can be established. In the present paper, were analyzed the elements that define the blizzard phenomenon (number of days, wind velocity, precipitations and snow layer) based on climatological data derived from 19 meteorological stations placed in this area between 1961-2012, from which it turned out that the meteorological stations with the biggest frequency of the blizzard phenomenon are: Buzău, Călărași, Constanța, Făurei, Grivița, Tulcea and Urziceni (72.5%) and those where the drifting snow show the biggest frequency are: București Băneasa, Brăila, Focșani, Galați and Râmnicu Sărat.

The elements that define the phenomenon, respectively the wind velocity and the presence of the snow layer previously deposited of the snow phenomenon simultaneously with blizzard were also analysed, but there was no significant difference concerning the occurrence of the two phenomena.

Keeping in mind the definition of the phenomenon and taking as an example USA, it could be considered as delineating factor for the definition of the two phenomena, the maximum velocity of the wind with a speed threshold of 15 m/s, and in the case of the snow transport on ground, the presence of a previously deposited snow layer as mandatory condition.

Therefore, the definition of the blizzard phenomenon might sound like this: ***the blizzard is a natural phenomenon, characterized by snow transport at height (>1.80 m), within which due to the great velocity of the wind (>15 m/s), the falling or fallen snow is strongly blown, thus reducing the visibility in vertical and horizontal plane (<200 m) being very difficult to assess if it is still snowing or not.***

Personal contribution are the detection and definition of the light intensity blizzards (wind velocity >6m/s).

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