THE PLUVIOMETRICAL EXCEEDING AND DEFICIENT PERIODS IN THE SOMEŞAN PLATEAU

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ABSTRACT.- The pluviometrical exceeding and deficient periods in the Someşan Plateau. In the following paper is analyzed the short time periods (season and month) with pluviometrical exceeding and scarcity in a region with predominant western climatic influences, but also with nuances determined by its geographic position and by its morphometrical conditions in the area and around it. For this there were used data for a period of 40 years (1970-2009) from 2 meteorological stations and 10 pluviometrical posts. From the large range of methods to evaluate scarcity periods, we used the method of WASP Index (Weighted Anomaly Standardized Precipitation). These exceeding and deficient periods were determined for periods of three months (seasons) and one month (February and June), because they better highlight the torrential rainfalls characteristics. Also, they allow better exposure of risk situations determined by exceeding and scarcity pluviometrical periods.

Key-word: exceeding, deficient, periods, seasons, month, Someşan Plateau

1. INTRODUCTION

As a part of the Transylvanian Depression, the Someşan Plateau represents the north-north-western unit of this depression, the most vast (2679 km^2) and complex from the total of three. Its geographical position, altitude and exposure to western air masses' advection, that come through the lower sectors of the Intra-Carpathian Yoke (the Someşan Gate and the Chioar Depression), influence the space distribution of the main climatic elements and the river flow potential. The effect of this distribution is represented by the alternation of exceeding and deficient periods that determine the apparition of hydrological risk phenomena and hazards (floods, river depletion).

2. DATA BASE AND METHODS

For this study we used data for a period of 40 years (1970-2009) from two meteorological stations and ten pluviometrical posts.

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From the very large range of methods and indexes to evaluate pluviometrical exceeding and scarcity periods, which were grouped by I. C. Stângă (2012) in four categories (pluviometrical indexes and criteria, complex and hydrological balance indexes, indexes determined using satellite imagines, diagrams and climograms), we used the WASP method (Weighted Anomaly Standardized Precipitation).

3. RESULTS AND DISCUTIONS

Compared to the obtained results using long and medium time calculus (for semesters and years), those for shorter periods, such as three months (seasons), highlight much better the rainfalls' torrential characteristics. The explication is that the shorter is the mediation period, the better are represented the real time pluviometrical risks situations.

3.1. WASP Index for 3 month period (season).

Winter. From the frequency analysis of the WASP classes resulted that in the studied period there were no extremely rainy or dry winters.

The medium frequency in this region of very rainy winters is very low – 2.1%. They were missing at the hydrometric posts from Sălătruc Hills, Someş Corridor, and also at the posts from the Dejului Hills (Recea Cristur). The other areas from the Someşan Plateau presented very rainy winters (2.6%), a frequency similar with the region's average value.

Medium rainy winters have a higher frequency, with lower values than the average ones (16.1%) in the southern part of the Clujului Hills, in the eastern part of the Dejului Hills and at the eastern border of the Purcăreţ – Boiu Mare Plateau. In the other parts of the plateau, the values exceed the average ones, reaching the maximum values in the Sălătruc Hills (23.7% at Chiueşti).

Rainy winters have, in general, a much lower frequency than the moderate rainy ones, with values between 10.3 and 23.7%. Only at the pluviometrical posts from the southern part of Clujului Hills, the percentage values of rainy winters exceed those of moderate rainy winters. The Aşchileu Mare and Coroieni posts and those from Someş Corridor present a lower frequency of rainy years than the average values for the entire region (14.6%).

From all WASP value classes, the highest frequency belongs to normal pluviometrical winters, which are below the average values of the entire region (33.7%). The values for these classes vary between 26.3% (Chiueşti) and 43.6% (Jibou).

In the entire region there were no extremely dry winters, and the very dry ones had a very low frequency (2.6 – 5.1%) or were absolutely absent like in the Clujului and Dejului Hills (excepting Borşa pluviometrical post) and in the eastern part of Purcăreţ – Boiu Mare Plateau.

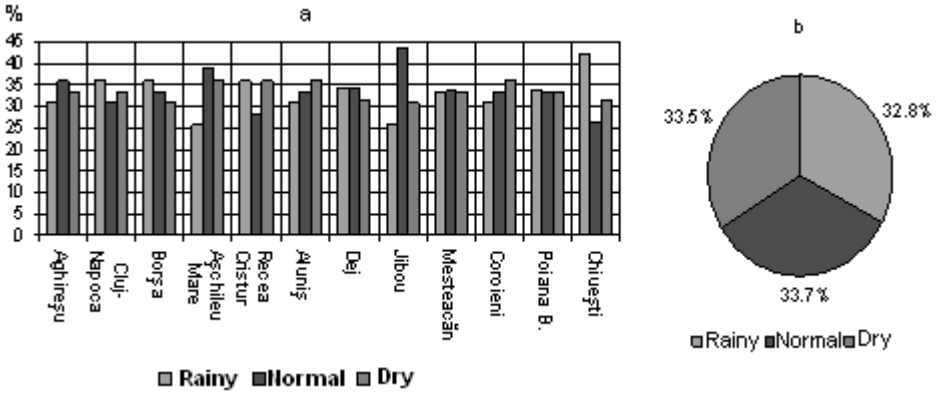

Figure 1. Winters' average frequency for pluviometrical domains at meteorological stations and pluviometricalal posts (a) and in the entire Someşan Plateau (b).

In less dry winters, the situation is reversed to the one presented above. So, the frequency of dry winters is higher in Cluj and Dejului Hills (15.4, -23.1%) than in the subunits of the Someşan Plateau situated north from Someş Valley (10.5 – 17.9%).

The average frequency of moderate dry winters (14.6%) is much lower than of the less dry winters (17.4%). Moderate dry winters have a lower frequency in Clujului and Dejului Hills (10.3 – 17.9%) than in Purcăreţ – Boiu Mare Plateau and in Sălătruc Hills (12.8 – 20.5%).

If we analyze the frequency of *pluviometrical domains,* we can see that in Someşan Plateau the values vary around 33 % (Fig. 1 b). At some pluviometrical posts the frequencies of rainy and dry domains are identical (Recea Cristur, Mesteacăn, Poiana Blenchii); in other cases the main frequency belongs to the rainy domain (Cluj-Napoca, Borşa, Dej and Chiueşti) or to the dry domain (Aghireşu, Aşchileu Mare, Aluniş, Jibou and Coroieni).

Spring. From the analysis of the WASP values it can be seen that the highest areal distribution belongs to extreme classes from rainy domain. For example, extreme rainy springs appeared at three pluviometrical posts (Aluniş, Coroieni and Poiana Blenchii) with a frequency of 2.6%; compared to this, extreme dry springs did not appear at any pluviometrical post.

Also, very rainy springs appeared at most pluviometrical posts with a frequency of 2.6% (Borşa, Aşchileu Mare, Aluniş, Dej, Mesteacăn and Chiueşti) to 7.7% (Cluj-Napoca and Jibou). But very dry springs appeared only at few pluviometrical posts, with a frequency of 2.6% (Aşchileu Mare, Aluniş and Chiueşti) to 5.1% (Aghireşu).

The classes with moderate rainy springs (P2) have a lower frequency (5.1 – 13.2%) than those belonging to moderate dry classes (10.3 – 20.5%).

The frequency of classes with dry springs is also much higher than that of rainy spring classes.

Most normal pluviometrical springs (more than 43% from the total value) appear in the southern part of Clujului Hills, in the eastern part of Purcăreţ – Boiu Mare Plateau and in the sheltered areas of the eastern Dejului Hills.

After analyzing the frequency for each pluviometrical domain, it can be seen that the highest frequency of normal domains at most stations belongs to the spring season (35.9 – 46.2%). The exceptions are the posts Coroieni, where the normal domain (25.6%) is exceeded by the rainy domain (38.5%) and by the dry domain (35.9%), and Aşchileu Mare, where the normal and dry domains have similar frequencies (Table 1).

Table 1. Spring rainfall frequency by pluviometrical domain (%).

Domain / Meteo. station and pluvio. post	Rainy	Nor-mal	Dry
Aghireşu	25,6	46,2	28,2
Cluj-Napoca	20,5	46,2	33,3
Borşa	30,8	35,9	33,3
Aşchileu M.	28,2	35,9	35,9
Recea Cristur	23,1	46,1	30,8
Aluniş	30,8	38,4	30,8
Dejului	26,3	36,9	36,8
Jibou	17,9	43,6	38,5
Mesteacan	25,6	43,6	30,8
Coroieni	38,5	25,6	35,9
Poiana B.	25,6	46,2	28,2
Chiueşti	31,6	36,8	31,6
Average	**27,0**	**40,2**	**32,8**

Table 2. Springs frequency of pluviometrical risk and no risk (%)

Group / Meteo. station and pluvio. post	Risk by exceeding	No risk	Risk by deficient
Aghireşu	12,8	66,7	20,5
Cluj-Napoca	15,4	71,8	12,8
Borşa	12,8	71,8	15,4
Aşchileu M.	15,4	71,8	12,8
Recea Cristur	12,8	74,4	12,8
Aluniş	15,4	64,1	20,5
Dejului	13,2	68,4	18,4
Jibou	12,8	69,3	17,9
Mesteacan	12,8	71,8	15,4
Coroieni	12,8	66,7	20,5
Poiana B.	12,8	76,9	10,3
Chiueşti	15,8	68,4	15,8
Average	**13,7**	**70,2**	**16,1**

At most meteorological stations and pluviometrical posts, the normal domain exceeds the rainy domain. At Aluniş and Chiuşeti posts, the frequency of the two domains is the same, and at Coroieni Post the rainy domain exceeds the dry domain (Fig. 2 a). In the Someşan Plateau the highest frequency belongs to normal domain (40.2%), followed by dry and rainy domain (Fig. 2 b).

The frequency analysis of pluviometrical risk and non risk groups shows that the highest frequency belongs to non risk groups (Fig. 3). At some posts this group even exceeds the frequency of 74% (Table 2).

Even though the frequency of deficient risk groups exceeds the one with exceeding risk (Fig. 3 b), the effects determined by exceeding pluviometrical springs are very severe, because they can cause catastrophic floods (May 1970, March 1981, May 1978 etc.).

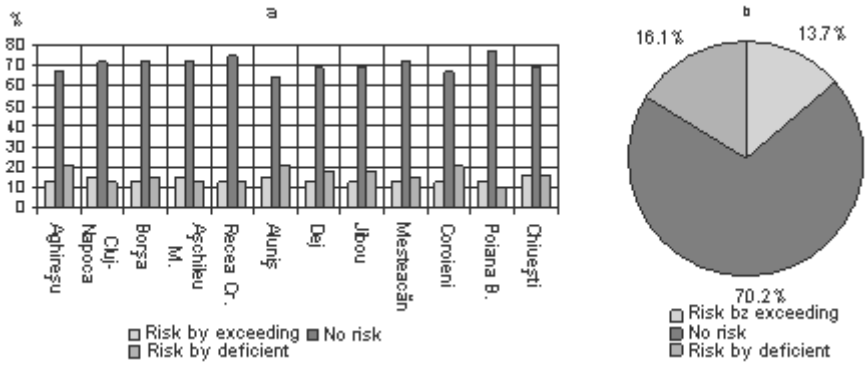

Figure 3. Average frequency of springs with pluviometrical risk and no risk at meteorological stations and pluviometricalal posts (a) and in the entire Someşan Plateau (b).

The risk situations determined by exceeding spring rainfall quantities are determined also by their high intensity and duration, and also by air temperature increase that determined the release of water reserve stored in the snow layer. Thus, the water level and discharge increase are the cumulated result of fallen rainfall quantities during springtime and also during the previous winter.

Summer. After analyzing the frequency of WASP value classes, it can be observed that in the studied period there are no extremely rainy or dry summers (Table 3). Also, it can be observed a similitude with the situation in the previous season, as very rainy summers have a higher frequency and a bigger distribution than the very dry summers, which appeared only at Borşa pluviometric post.

Very rainy summers are more frequent in Sălătruc Hills (5,3 % at Chiueşti) and Dejului Hills (5,3 % at Dejului and 5,1 % at Aluniş).

There is in the studied area a certain balance between the apparition frequency of moderate rainy (14.2 %) and moderate dry summers (16.3 %). In Dejului Hills, Someş Valley and in the southern and central part of Purcăreţ – Boiu Mare Plateau, the appearance frequency of moderate dry summers is higher than of moderate rainy summers. In return, in Clujului Hills, Sălătruc Hills and in the eastern part of Purcăreţ – Boiu Mare Plateau, moderate rainy summers have an equal frequency (Aghireşu) or even higher than the one of moderate dry summers.

Almost the entire Someşan Plateau presents a higher frequency of less dry

summers compared to that of less rainy summers. The exception is a small area in the eastern part of Dejului Hill.

The frequency by pluviometrical domains shows some territorial particularities: normal pluviometrical domain has a higher frequency in Clujului Hills, Dejului Hills and in Sălătruc Hills, and in Someş Valley and Purcăreţ – Boiu Mare Plateau the higher frequency belongs to the dry domain (Table 3).

Table 3. Summer rainfall frequency by pluviometrical domains (%)

Domain / Meteo. Station and pluvio. post	Rainy	Normal	Dry
Aghireşu	28,2	41,0	30,8
Cluj-Napoca	33,3	28,2	38,5
Borşa	25,6	41,0	33,3
Aşchileu Mare	30,8	35,9	33,3
Recea Cristur	25,6	41,0	33,3
Aluniş	30,6	35,9	33,5
Dejului	36,8	21,1	42,1
Jibou	38,5	25,6	35,9
Mesteacan	38,5	25,6	35,9
Coroieni	28,2	35,9	35,9
Poiana Blenchii	25,6	30,8	43,6
Chiueşti	26,3	39,5	34,2
Average by region	**30,7**	**33,5**	**35,8**

Table 4. Summer rainfall frequency by pluviometrical risk or no risk groups (%)

Group / Meteo. station and pluvio. post	Risk by exceeding	No risk	Risk by deficient
Aghireşu	20,5	61,6	17,9
Cluj-Napoca	17,9	69,3	12,8
Borşa	17,9	69,3	12,8
Aşchileu Mare	17,9	64,2	17,9
Recea Cristur	17,9	66,7	15,4
Aluniş	15,3	64,0	20,7
Dejului	15,8	65,8	18,4
Jibou	15,4	61,5	23,1
Mesteacan	15,4	61,5	23,1
Coroieni	17,9	69,3	12,8
Poiana Blenchii	23,1	66,6	10,3
Chiueşti	21,1	65,7	13,2
Average by region	**18,0**	**65,5**	**16,5**

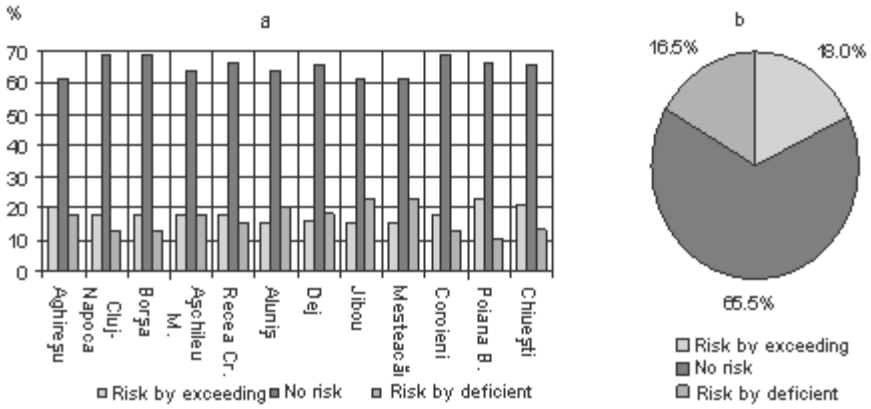

Figure 4. Average frequency of summers with pluviometrical risk and no risk at meteorological stations and pluviometrical posts (a) and in the entire Someşan Plateau (b).

In the Someşan Plateau, the average frequency of normal domain is of 33.5%, but may vary between 21.1 % (Dej) and 41.1 % (Aghireşu and Recea Cristuru) (Fig. 4). After that follows dry domain (35.8 %), with values that vary between 30.8 % (Aghireşu) and 43.6 % (Poiana Blenchii), and the rainy domain (30.7 %) varying between 25.6 % and 38.5 % (Fig. 4). The frequency by risk and no risk groups shows that, as above, the highest values belong to non pluviometrical risk compared to the year with risk by exceeding or with pluviometrical deficient (Table 4). The frequency is lower than the one in springtime, when it has an average value of 65.5 %. The percentage values vary in the entire Someşan Plateau between 61.5 % (Jibou and Mesteacăn) and 69.3 % (Cluj-Napoca, Borşa and Coroieni). The average frequency of exceeding pluviometrical risk in this region slightly exceeds the frequency of deficient pluviometrical risk.

After comparing the frequency of the two risk groups – exceeding and deficient – it can be see that at seven monitoring points, the exceeding pluviometrical risk is higher than the one produced by deficient values.

The frequency of summers with pluviometrical exceeding risk in Clujului Hills, Sălătrucului Hills and in the eastern part of Purcăreţ – Boiu Mare Plateau is higher than the frequency of summers with pluviometrical deficient risk. In exchange, in Dejului Hills, Someş Valley and in the western and central part of Purcăreţ - Boiu Mare Plateau the pluviometrical risk by deficiency has a higher frequency (Fig. 4).

In the entire Someşan Plateau, the summer rainfall exceeding risk can trigger through their high quantities and intensity very difficult crisis situations expressed in catastrophically floods (June 1980, June 1998, July 2008 etc.).

Autumn. The analysis of WASP values classes shows the lack of extreme classes (P4 and S4) due to the presence of very small rainfall quantities during summer under an anticyclone regime. Also, appears some similarities with the previous season – very rainy autumns have a higher frequency and a larger distribution area than the dry autumns, which appear only at Coroieni pluviometrical post.

Lower intensity classes have a much higher frequency, but have a different space distribution in the Someşan Plateau. So, in Dejului Hills and Purcăreţ - Boiu Mare Plateau, moderate rainy autumns (15.4 – 20.5 %) exceed the frequency of moderate dry autumns (12.8 – 17.9 %). But in Clujului Hills moderate dry autumns (12.8 – 17.9 %) have a higher frequency than moderate rainy autumns (7.7 – 12.8%).

Most monitoring points present a higher (or equal) frequency of dry autumns than rainy autumns (Table 6). The exceptions are Cluj-Napoca and Dej meteorological stations and Chiueşti pluviometrical post.

The normal class has the highest frequency of all WASP classes, with values varying between 30.8 % (Recea Cristuru) and 39.5 % (Chiueşti). The average value for the entire studied area is 35.2 %.

The frequency by pluviometrical domains shows some territorial particularities – normal pluviometrical domain has the highest frequencies in most of the studied area (Fig. 5 a). Only in Dejului Hills and in Someş Valley the highest frequency belongs to the dry domain (Table 5).

The average frequency of normal domain in the Someşan Plateau is 35.2 %, but varies between 30.8 % (Recea Cristur) and 39.5 % (Chiueşti).

Table 5. Frequency by pluviometrical domain of fallen autumn rainfall quantities (%)

Domain / Meteo. station and pluvio. post	Rainy	Nor-mal	Dry
Aghireşu	28,2	35,9	35,9
Cluj-Napoca	30,8	35,9	33,3
Borşa	30,8	35,9	33,3
Aşchileu Mare	28,2	33,3	38,5
Recea Cristur	28,2	30,8	41,0
Aluniş	28,2	33,3	38,5
Dejului	34,2	31,6	34,2
Jibou	28,3	35,9	35,9
Mesteacan	25,6	38,5	35,9
Coroieni	30,8	35,9	33,3
Poiana Blenchii	30,8	35,9	33,3
Chiueşti	28,9	39,5	31,6
Average by region	**29,4**	**35,2**	**35,4**

Table 6. Frequency by pluviometrical risk or no risk groups of fallen autumn rainfall quantities (%)

Group / Meteo. station and pluvio. post	Risk by excee ding	No risk	Risk by defici ent
Aghireşu	15,4	66,7	17,9
Cluj-Napoca	15,4	61,5	23,1
Borşa	12,8	71,8	15,4
Aşchileu Mare	15,4	71,8	12,8
Recea Cristur	17,9	69,2	12,9
Aluniş	23,1	59,0	17,9
Dejului	18,4	68,4	13,2
Jibou	18,0	59,0	23,0
Mesteacan	20,5	64,1	15,4
Coroieni	17,9	61,6	20,5
Poiana Blenchii	20,5	66,7	12,8
Chiueşti	13.2	73.7	13.1
Average by region	**17,4**	**66,1**	**16,5**

The dry domain has a similar frequency as the normal domain, being only exceeded in Dejului Hills (38.5 – 41 %), Someş Valley (35.9 %) and in the southern part of Clujului Hills (39.5 %). In the Someşan Plateau the rainy domain has a frequency of 29.4 %, which is smaller than the one for normal and dry domain (Fig. 5). The frequency of years with pluviometrical exceeding or deficient risk is not higher than 20.5 % (Table 5).

The analysis of pluviometrical risk or non risk groups shows that the highest values belong to autumn with non pluviometrical risk (66.1 %). At some posts the frequency of this group exceeds 73 % (73.7 % at Chiueşti), and at some stations decreases much below the average value in this region (59.0 % at Jibou and Aluniş) (Table 6).

At the level of studied region, from all risk groups the exceeding risk groups present values that are a little bigger than the values of deficient risk groups (Fig. 5 b).

The average frequency of exceeding risk (17.4 %) presents higher values at the pluviometrical posts from Dejului Hills and Purcăreţ - Boiu Mare Plateau (Fig. 6 a).

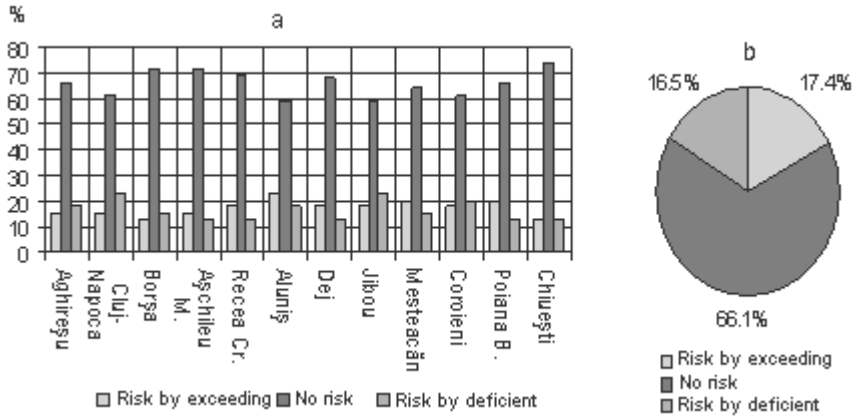

Figure 5. Average frequency of autumns with pluviometrical risk and no risk at meteorological stations and pluviometricalal posts (a) and in the entire Someşan Plateau (b).

The average frequency of deficient risk (16.5 %) is exceeded only at the pluviometrical stations and posts placed at the southern (17.9 % at Aghireşu, 23.1 % at Cluj-Napoca), north – western (23.0 % at Jibou) and north eastern margins (20.5 %) of the studied area.

3.2.WASP for monthly quantities.

For this study were chosen for analysis only the extreme pluviometrical months: February – the month with the lowest rainfall quantities during the year; and June – the highest multiannual average rainfall quantities.

After analyzing WASP values classes it can be observed that during February there are no extreme dry classes (Table 7), showing that in Someşan Plateau do not appear effects of rainfalls lack in this month.

In the studied area, P1 and P3 classes are less represented, their frequency not exceeding 7.7 %. Compared to this, P2 class has a better representation, with an average frequency of 11.3 %.

Normal class is characterized by the highest frequency values (between 34.2 and 48.7 %), with an average by region of 40.0 % (Table 8).

Table 7. Frequency by class of fallen rainfall quantities in February (%)

Class / Meteo. station Pluvio. post	P4	P3	P2	P1	N	S1	S2	S3	S4
Aghireşu	0.0	10.3	5.1	5.1	41.0	33.3	5.1	0.0	0.0
Alunis	0.0	5.1	7.7	10.3	48.7	10.3	17.9	0.0	0.0
Aschileul Mare	0.0	7.7	2.6	10.3	41.0	28.2	10.3	0.0	0.0
Borsa	0.0	5.1	12.8	7.7	41.0	20.5	12.8	0.0	0.0
Chiuesti	0.0	0.0	17.9	10.3	38.5	15.4	17.9	0.0	0.0
Cluj-Napoca	0.0	7.7	7.7	5.1	41.0	30.8	7.7	0.0	0.0
Coroieni	2.6	0.0	12.8	7.7	35.9	30.8	10.3	0.0	0.0
Dejului	0.0	2.6	15.8	7.9	34.2	26.3	13.2	0.0	0.0
Jibou	0.0	5.1	15.4	10.3	35.9	17.9	15.4	0.0	0.0
Mesteacan	2.6	5.1	10.3	5.1	48.7	15.4	12.8	0.0	0.0
Poiana Blenchi	0.0	5.1	15.4	5.1	35.9	23.1	15.4	0.0	0.0
Recea Cristur	0.0	7.7	10.3	7.7	38.5	23.1	12.8	0.0	0.0
Media pe egiune	0.4	5.1	11.3	7.7	40.0	22.9	12.6	0.0	0.0

Table 8. February rainfall frequency by pluviometrical domains (%)

Domain / Meteo. station and pluvio. post	Rainy	Nor-mal	Dry
Aghireşu	20.5	41.0	38.5
Aluniş	23.1	48.7	28.2
Aşchileul Mare	20.5	41.0	38.5
Borşa	25.6	41.0	33.3
Chiueşti	28.2	38.5	33.3
Cluj-Napoca	20.5	41.0	38.5
Coroieni	23.1	35.9	41.0
Dejului	26.3	34.2	39.5
Jibou	30.8	35.9	33.3
Mesteacan	23.1	48.7	28.2
Poiana Blenchii	25.6	35.9	38.5
Recea Cristur	25.6	38.5	35.9
Total by region	**24.4**	**40.0**	**35.6**

Table 9. February risk and no risk frequency

Group / Meteo. station and pluvio. post	Risk by exceeding	No risk	Risk by deficient
Aghireşu	15.4	79.5	5.1
Aluniş	12.8	69.2	17.9
Aşchileul Mare	10.3	79.5	10.3
Borsa	17.9	69.2	12.8
Chiuesti	17.9	64.1	17.9
Cluj-Napoca	15.4	76.9	7.7
Coroieni	15.4	74.4	10.3
Dejului	18.4	68.4	13.2
Jibou	20.5	64.1	15.4
Mesteacan	17.9	69.2	12.8
Poiana Blenchii	20.5	64.1	15.4
Recea Cristur	17.9	69.2	12.8
Total by region	**16.7**	**70.7**	**12.6**

After analyzing the frequency by pluviometrical domains in the Someşan Plateau, it can be observed that the highest frequency belong to normal domain (40%). After that follows the dry one with 35.6 % and the rainy domain with 24.4%.

In February, at the meteorological stations and at the pluviometrical posts inside the studied area, the lowest frequency belongs to the rainy domain, with values between 20.5 % and 30.8 % (Fig. 7).

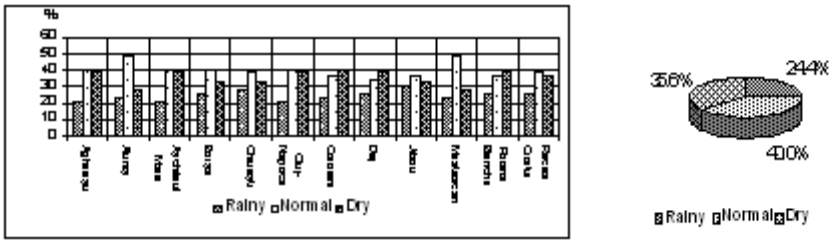

Figure 6. February frequency by pluviometrical domains at stations and pluviometrical posts (a) and the average frequency by region (b).

February months with pluviometrical exceeding and deficient risk present close frequencies, varying between 16.7 % and 12.6 %. Because February presents the smallest absolute rainfall values, the risk by deficient situations present no threat to the surrounding environment.

A very high frequency belongs to the non risk group (70.7 %). Inside the studied area, at the pluviometrical stations and posts, this frequency varies between 64.1 % and 79.5 % (Table 9).

Table 10. Frequency by class of fallen rainfall quantities in June (%)

Class / Meteo. station / Pluvio. post	P4	P3	P2	P1	N	S1	S2	S3	S4
Aghireşu	2.6	2.6	7.7	10.2	41.0	23.1	12.8	0.0	0.0
Alunis	0.0	5.1	15.4	5.1	43.6	15.4	15.4	0.0	0.0
Aschileul Mare	0.0	2.6	12.8	12.8	30.8	25.6	15.4	0.0	0.0
Borsa	0.0	2.6	10.3	17.9	30.8	23.1	15.4	0.0	0.0
Chiuesti	0.0	2.6	15.4	12.8	28.2	28.2	12.8	0.0	0.0
Cluj-Napoca	0.0	2.6	15.4	12.8	35.9	17.9	12.8	2.6	0.0
Coroieni	2.6	0.0	10.3	10.3	41.0	23.1	12.8	0.0	0.0
Dejului	2.6	0.0	10.5	13.2	39.5	15.8	18.4	0.0	0.0
Jibou	0.0	5.1	10.3	2.6	56.4	10.3	12.8	2.6	0.0
Mesteacan	2.6	2.6	7.7	12.8	46.2	15.4	12.8	0.0	0.0
Poiana Blenchi	2.6	2.6	7.7	12.8	41.0	25.6	7.7	0.0	0.0
Recea Cristur	2.6	2.6	7.7	10.3	41.0	20.5	15.4	0.0	0.0
Average by region	**1.3**	**2.6**	**10.9**	**11.1**	**39.7**	**20.3**	**13.7**	**0.4**	**0**

After analyzing the frequency of WASP values classes for rainfall quantities

fallen in June, it can be seen that two of the intensity classes are not represented (extremely dry and extremely rainy).

The frequency of classes belonging to the rainy domain is still smaller than the frequency of similar classes in the dry domain. This is very obvious for the classes with low intensity (Table 11). Some exceptions are Borşa, Cluj-Napoca, Dej and Mesteacăn, where the frequency rate between two similar classes is ½ (classes S1 and P1).

The highest frequency belongs to the normal pluviometrical class, with an average value of 39.7 %, varying between 30.8 % and 56.4 % (Table 11).

The frequency by pluviometrical risk and non risk groups for June shows a frequency increase for pluviometrical risk groups compared with February.

Many pluviometrical posts from Clujului Hills (Aghireşu, Aşchileu Mare) and from Purcăreţ – Boiu Mare Plateau (Coroieni, Mesteacăn) present identical frequencies for exceeding and deficient risks. But the stations from Dejului Hills and Sălătrucului Hills a higher frequency of exceeding risk (Table 12).

Table 11. June rainfall frequency by pluviometrical domains (%)

Domain / Meteo. station and pluvio. post	Rainy	Normal	Dry
Aghireşu	23.1	41.0	35.9
Aluniş	25.6	43.6	30.8
Aşchileul Mare	28.2	30.8	41.0
Borşa	30.8	30.8	38.5
Chiueşti	30.8	28.2	41.0
Cluj-Napoca	30.8	35.9	33.3
Coroieni	23.1	41.0	35.9
Dejului	26.3	39.5	34.2
Jibou	17.9	56.4	25.7
Mesteacan	25.6	46.2	28.2
Poiana Blenchii	25.7	41.0	33.3
Recea Cristur	23.1	41.0	35.9
Total by region	**25.9**	**39.6**	**34.5**

Table 12. June's risk and no risk pluviometrical frequency

Group / Meteo. station and pluvio. post	Risk by exceeding	No risk	Risk by deficient
Aghireşu	12.8	74.4	12.8
Aluniş	20.5	64.1	15.4
Aşchileul Mare	15.4	69.2	15.4
Borsa	12.8	71.8	15.4
Chiuesti	17.9	69.2	12.8
Cluj-Napoca	17.9	66.7	15.4
Coroieni	12.8	74.4	12.8
Dejului	13.2	68.4	18.4
Jibou	15.4	69.2	15.4
Mesteacan	12.8	74.4	12.8
Poiana Blenchii	12.8	79.5	7.7
Recea Cristur	12.8	71.8	15.4
Total by region	**14.7**	**71.1**	**14.1**

In the Someşan Plateau, the non risk group has frequency values varying between 64,1 % (Aluniş) and 79,5 % (Poiana Blenchii), and the average value is 71.1% (Table 12). After that follows as frequency the dry and rainy domain (Table 12).

CONCLUSIONS

After analyzing the frequency by pluviometrical domains (normal, rainy and dry), it can be seen that most analyzed periods belong to the normal domain. It is followed by the dry and rainy domain (Table 13).

The analysis of pluviometrical risk and non risk groups shows that non risk situations have the highest percentage. For periods with the same time length, the frequency of risk groups increases with the increase of the multiannual average rainfall quantity (in June, spring and summer).

In most situations, pluviometrical exceeding and deficient risks present the same number of situations (5), appearing in June, but missing in autumn.

Table 13. Predominance of rainy and dry domain after Normal domain Someşan Plateau.

Period	Number of pluviometrical posts and stations with predominance of rainy domain.	Number of pluviometrical posts and stations with predominance of dry domain.	Number of pluviometrical posts and stations where the two domains have equal predominance
February	2	3	-
June	2	3	-
Spring	1	1	1
Summer	4	5	-
Autumn	1	4	2
Winter	5	1	-
Sum	**15**	**17**	**3**

REFERENCES

1. Croitoru, Adina - Eliza (2006), *Excesul de precipitaţii din Depresiunea Transilvaniei,* ”Casa Cărţii de Ştiinţă” Publishing House, Cluj-Napoca.
2. Croitoru, Adina- Eliza, Sorocovschi, V., Moldovan, F. (2002), *Perioadele execdentare şi deficientare pluviometrical în Depresiunea Transilvaniei*, in the works of the “Dimitrie Cantemir” Geographic Seminar, no. 21-22, 2000-2001, Iaşi.
3. Dragotă, Carmen-Sofia (2006), *Precipitaţiile excedentare în România*, Academia Română Publishing House, Bucureşti.
4. Sorocovschi, V., Moldovan, F., Croitoru, Adina-Eliza (2001), *Les périodes pluviométriques excedentaires et les risques celles-ci générent dans la Dépression de la Transylvanie, în Climat et Environnement.* L’information climatique au service de la gestion de l’environnement Universidad de Sevilla.
5. Sorocovschi, V., Moldovan, F., Croitoru, Adina-Eliza (2002), *Perioade excedentare pluviometrical în Depresiunea Transilvaniei*, SUBB, Geogr.., 2, XLVII, Cluj-Napoca.

6. Sorocovschi, V., Horvath, Cs., Tudose, T., Roman, P. (2010), *Studiul perioadelor pluviometrice din Podişul Someşan,* in the Vol. "Aerul şi apa componente ale mediului", Presa Universitară Clujeană Publishing House, Cluj-Napoca.
7. Sorocovschi, V., Tudose, T., Selagea, Roman, P (2010), *Variaţia în cursul anului şi repartiţia teritorială a precipitaţiilor medii din Podişul Someşan*, Geographia Napocensis, Year IV, No. 2, Casa Cărţii de Ştiinţă Publishing House, Cluj-Napoca.
8. Stângă I.C. (2012) *Bazinul Tutovei. Riscurile naturale şi vulnerabilittea teritoriului* Universitatea "Alexandru Ioan Cuza" Publishing House, Iaşi.
9. * * * (2003), *Indici şi metode cantitative utilizate în climatologie*, Coordinator Cheval, S., Universitatea Oradea Publishing House, Oradea.