

## FREQUENCY AND QUANTITY OF ATMOSPHERE RAINFALL IN BĂILE BOGHIȘ SPA AREA

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### Abstract

*The frequency and quantity of atmosphere rainfall in Băile Boghiș spa have been analyzed over a period of 11 years, more exactly for the time interval 1990-2000. For this analysis we have used data related to atmosphere rainfall that had been registered at the weather station which is placed at a distance of 2 km away from Băile Boghiș spa, in Nușfalău commune.*

*With in Băile Boghiș spa area the multiannual average quantity of atmosphere rainfall registers 615.9 mm. During the year the highest quantity of rainfall is registered in the hot season of the year, for example in the interval May-September 58.5% of the annual rainfall quantity is being registered as a consequence of a more intense frontal activity and due to the more powerful convective processes of thermic origin which lead to showers during which significant quantities of rainfall appear.*

**Key words:** atmosphere rainfall, frequency, quantity.

### INTRODUCTION

Băile Boghiș resort is situated at an altitude of 238 m, in the terraced, assymetrical valley of Barcău river. In the north-west it neighbors Nușfalău commune, in the north-east it does the same with Crasna commune, in the south it is situated near Valcău de Jos commune and in the south-west it neighbors Plopiș commune. Due to the presence of the thermal mineral springs Băile Boghiș spa is recommended for the treatment of different diseases or for relaxation and fun, representing the ideal place for recovery and recreation (<http://primariaboghis.ro>).

Băile Boghiș spa is under the influence of the air masses that come from west and north-west, meaning the wet ocean air masses. The incidental lack of the atmosphere rainfall or its very reduced quantity is due to the predominant anti cyclone weather, with high frequencies of some stationary anti cyclone baric formations which are formed above Central, North-East, and South-East Europe and which can also unite with the anti cyclone dorsal from the north part of the Atlantic Ocean. The installation of the anti cyclone weather leads to a blue and cloudless sky, to atmosphere calmness, with sunstroke and high temperature especially during the hot season of the year, which is thus very poor in what rainfall is concerned, during all these kind of years (Stoica, 1960; Măhăra, 2001; Gaceu, 2005).

## MATERIAL AND METHOD

The pluviometric regime from Băile Boghiş spa area has been analyzed on the data base registered in the meteorological observation tables obtained from instrumental and visual observations performed at Nuşfalău weather station. The weather station has functioned until 2000, being placed at a distance of 2 km away from Băile Boghiş spa. The meteorological data regarding the atmosphere rainfall have been processed for a period of 11 years, for the time interval 1990 – 2000 respectively.

## RESULTS AND DISCUSSIONS

The multiannual average quantity of atmosphere rainfall registers 615.9 mm.

Calculating the frequency of the different annual rainfall quantities we could emphasize the probability of producing certain quantities of rainfall. Thus, rainfall quantities between 601 – 650 mm, 651 – 700 mm and 751 – 800 mm have been the most frequent, 2 such cases being registered and they represented 18.2% from the total of the years taken into consideration. The lowest frequency and thus the lowest production probability belongs to the values included between 301 – 350 mm, 401 – 450 mm, 451 – 500 mm, 551 – 600 and those between 801 – 850 mm/year. In those 11 years taken into consideration there is only one annual value that fits between these limits, having an apparition probability of 9.1% (Figure 1). It is to be noticed that there has not been any rainfall between the following values: 351 – 400 mm, 501 – 550 and 701 – 750 mm.

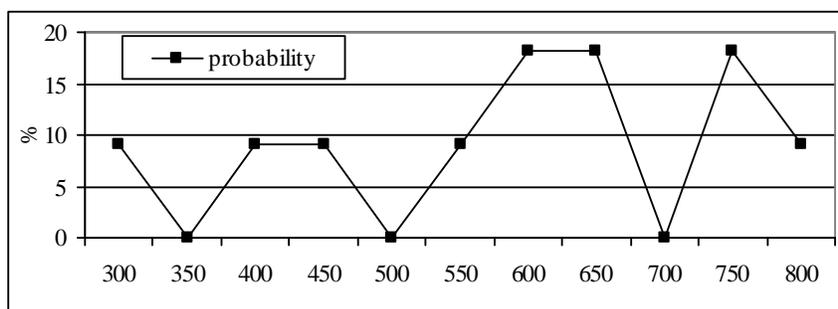


Fig. 1. The production probability of different rainfall quantities

In order to emphasize the non periodical fluctuations of the annual rainfall quantities we have calculated the annual rainfall quantity deviations from the multi annual average expressed in percents so as to be able to determine the pluviometric character of the years according to Hellman's criterion (Table 1).

It is thus to be noticed that in all those 11 years only one year was considered normal (the annual average deviation was between -5.0...+5.0) from the pluviometric point of view and also the high number of the years with excessive rainfall, representing 45.5% from the total of the analyzed years. The years with excessive drought have been registered in 36.4% from the total of the analyzed years.

The high values of the annual rainfall quantities emphasize an intense circulation of the atmosphere from the west, north-west and south-west of the continent.

*Table 1*

The pluviometric character of the years according to Hellman's criterion, at Băile Boghiș

Annual average deviation %	Mark	No. of cases	Years
<-20	Excessively droughty	4	1990, 1992, 1994, 2000
-20,0...-15,1	Very droughty	0	-
-15,0...-10,1	Droughty	0	-
-10,0...-5,1	Medium droughty	0	-
-5,0...+5,0	Normal	1	1997
5,1...10,0	Medium rainy	1	1991
10,1...15,0	Rainy	0	-
15,1...20,0	Very rainy	0	-
>20,0	Excessively rainy	5	1993, 1995, 1996, 1998, 1999

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

The monthly frequency of certain rainfall quantities represent a special practical importance and it is illustrated in figure 2, figure realized by calculating the number of cases with rainfall included between certain limits, 8 value classes being established in that sense which are considered representative (from 25 to 25 mm).

In Băile Boghiș spa area the predominant are the rainfalls that have quantities included between 25.1 – 50 mm as well as the quantities included between 0.1 – 25 mm.

For the winter months the highest frequency belongs to the values included between 0.1 – 25 mm, the latter registering in January and in February 72.7% of the cases and in December 36.4% of the cases.

Rainfall with quantities between 25.1 – 50 mm are predominant in spring. Thus, in March these are produced in a percent of 36.4%, in April in a percent of 45.5% and in May they are of 18.2%. It is to be noticed that in March the most often rainfalls have been those between 0.1 – 25 mm, with a frequency of 54.6% and in May the predominant were the rainfalls between 50.1 – 75 mm with a frequency of 27.3%.

In summer the high frequency belongs to the rainfalls with quantities between 50.1 – 75 mm when in each month from this season there is predominant rainfall between 50.1 – 75 mm with a frequency of 27.3%.

A high frequency during this season also belongs to the rainfalls between 75.1 -100 mm which in June register a frequency of 27.3%. In July the same frequency of 27.3% is registered by the rainfalls with values between 25.1 – 50 mm while in August the same percent appears for the rainfalls between 100.1 – 125 mm.

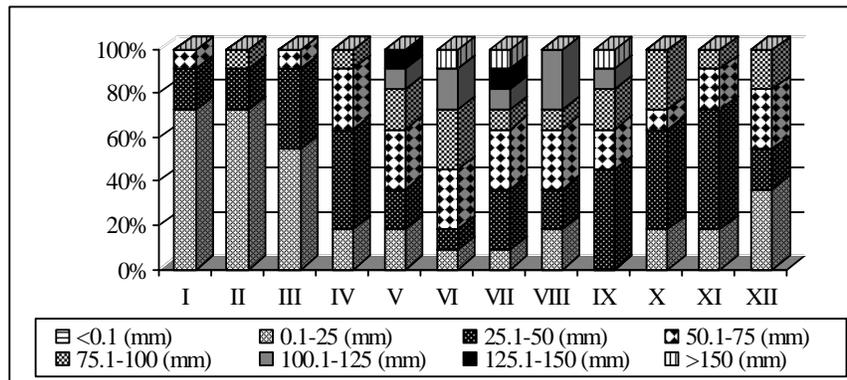


Fig. 2. The monthly frequency of the rainfall quantities at Băile Boghiș

During the fall months rainfall quantities between 25.1 – 50 mm are a characteristic. It is to be noticed that in the first two months their frequency is of 45.5% and in August of 54.6%.

The annual average value of the maximum rainfall quantity in 24 hours is of 41.7 mm, value which represents 6.8% from the multiannual average rainfall quantity (615.9 mm). The maximum rainfall quantity in 24 hours varied from one year to another and the lowest value belongs to the year 2000, the value being of 1.2 mm, in November and the highest value belongs to the year 1995, it was of 54.4 mm, the value having been registered on August 26, 1995 (Table 2).

In Băile Boghiș spa area there can be noticed the maximum quantities of rainfall that have fallen in 24 hours during the hot season, quantities which register the highest values in August when the highest rainfall has been of 54.4 mm on August 26, 1995, value which represents over 84.7% from the monthly average rainfall quantity (64.2 mm) and 52.9% from the total rainfall quantity fallen in that respective month (102.8 mm).

High quantities of rainfall are also registered in 1993 with a maximum quantity in 24 hours on July 18, 1993 when 50.5 mm of rain has fallen.

The high rainfall quantities fallen in 24 hours during the hot season are due to the high intensity of the convective processes, of dynamic and of

thermic origin as well as due to an intense frontal activity, thus the high quantities of rainfall being predominantly generated in the case of the cold fronts which during this period of the year reach this area.

It is also to be taken into consideration the fact that during the cold season the maximum rainfall quantities fallen in 24 hours are more reduced from the quantity point of view in comparison with those from the hot season, a fact due to the higher frequency of the continental origin anti cyclone regime characterized by a high atmosphere stability, low temperature and low air humidity.

*Table 2*

The maximum rainfall quantities fallen in 24 hours (mm) and the monthly average quantities at Băile Boghiș

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Maximum quantity 24 hours	13.3	17.2	33.1	45.1	34.0	36.0	50.5	54.4	48.0	36.7	41.6	19.4	54.4
Date	02.96	23.99	20.95	06.00	15.96	15.97	18.93	26.95	30.92	19.96	01.90	21.96	26.08.1995
Average	21.6	24.4	25.2	48.5	66.5	84.2	76.2	64.2	69.2	47.1	41.0	47.8	615.9

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

The maximum rainfall quantities in 24 hours usually have as an origin the wet air advectons from the west sector during the hot season, the ones from the Mediterranean area during the cold season to which we can add the the frontal and orographical dynamic convection that can be produced all over the year and the thermic convection that meets better manifestation conditions during the hot season of the year and especially during the summer months.

For the studied period there have been two months in which the rainfall quantity fallen in 24 hours has been higher than the multiannual average of the respective month. Thus, in March, the multiannual average is of 25.2 mm and the quantity fallen in 24 hours has been of 33.1 mm. The second case is in November when the multiannual average is of 41.0 mm and the maximum quantity fallen in 24 hours was of 41.6 mm (Table 2).

## CONCLUSIONS

The maximum quantities of rainfall are lower during the cold season of the year due to the continental anti cyclone regime in which the air masses have got a reduced content of water vapors and where the thermic convection is very poor. In the hot period of the year the quantity of water fallen in 24 hours reaches the highest values due to the intensification of the frontal processes (especially of the cold fronts) and of the convective ones.

After having calculated different climate index we have noticed that the drought phenomenon registers an annual frequency of over 50% of the year's months and that the maximum rainfall quantities fallen in 24 hours

have not got very high values, the maximum being of 54.4 mm on August 26, 1995 representing over 84.7% from the monthly average quantity of rainfall and 52.9% from the total quantity of rainfall that has fallen in the respective month.

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