CHARACTERISTICS OF THE ATMOSPHERE HUMIDITY IN STEI CITY AREA

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Abstract

In the current work, the most important sizes of the relative humidity (relative moisture, water vapor tension and the saturation deficit) are presented, using data registered at Ştei weather station for a period of 22 years.. The values of these sizes differ according to the convective and advective movements, to the turbulence movements as well as to the water stage changess.

Key words: relative moisture, water vapor tension, saturation deficit.

INTRODUCTION

The quantity of water vapors depends on the origin of the air masses, on the physical-geographical conditions, on the estate of the ground surface, on the degree of the continental aspect, on the fallen rainfall, etc (Măhăra Gh., 2001).

In the analyzed area, the highest quantities of water vapors come from the Atlantic Ocean and from the Mediterranean Sea. In a small percentage, the evaporation of the water from the soil, from the surfaces of rivers and lakes, from wet surfaces, from plant sweat contributes to the increase of air humidity.

MATERIAL AND METHOD

In order to study the main hygrometric sizes we have used data related to relative moisture, water vapor tension and saturation deficit from the Ştei weather station for a period of 22 years, meaning the time interval 1990 – 2011. The main methods used in the current work are: the analysis method, the comparative method, the statistics method, the mathematical method and the graphical method.

RESULTS AND DISCUSSIONS

Relative moisture

In the analyzed area, the relative moisture shows relatively high values due to the influence of the wet climate from the west of the continent.

In Ştei city area, the multi annual average value of the relative moisture is of 78%.

The values of the air relative moisture are influenced by the evolution of air temperature so that in winter, when the air temperature has got the lowest values, the relative moisture registers the maximum values and in summer things happen vice versa.

Analyzing the annual regime of the relative moisture we can notice that it is characterized through higher values during winter, especially in January, then the values being 84%. The high values of the relative moisture from the cold season are tightly related to the low values of the air temperature as it comes out from the comparative analysis of the evolution of these two weather factors for the studied period (1990 – 2011). High values of the relative moisture are also registered in December with a multi annual average of 82%. These values are due to the high frequency of the hot and wet air coming from the Mediterranean Sea.

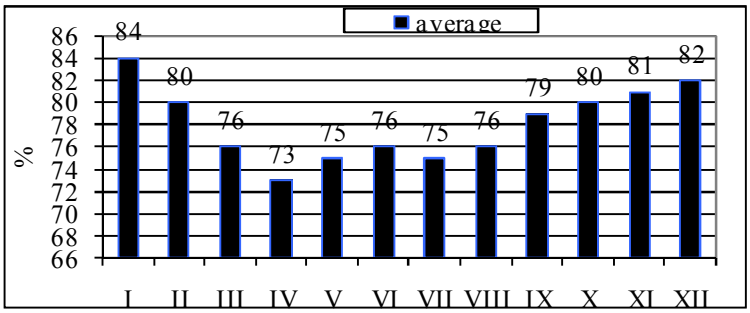

Figure 1. Distribution of multi annual monthly average values of the relative moisture (%) in Ştei

The minimum values of the relative moisture are produced during the hot period of the year, thus in April 73% is registered, in May and in July 75% is registered and in March, June and August 76% is registered (see figure 1).

In spring, the values of the air relative moisture are lower than in winter due to the predominance of the anti – cyclone regime and due to the increase of the air temperature. Thus, the highest multi annual monthly average belongs to March, with 76%, decreasing in April to 73% and in May to 75%. Starting with September, in close correlation with the decrease of air temperature, the values of the air relative moisture start to increase. Thus, during fall, the lowest values of the relative moisture are registered in September when the multi annual monthly average is of 79%. This value, lower in comparison with other autumn months, is due to the higher temperature from this month but also to the predominance of the anti – cyclone regime and to the serene weather, situations that issue reduced quantities of rainfall. For October the multi annual monthly average value is

of 80% and in November, the autumn month with the highest values of relative moisture, the average is 81%.

As it comes out from figure 2, the monthly course of the relative moisture is inversely proportional with the air temperature, thus the highest values of the relative moisture are registered in winter months (January and December) when the air temperatures are the lowest in the year.

The monthly variations of the relative moisture have got a great practical importance if correlated with the air temperature mainly due to the influence that they have upon the human body.

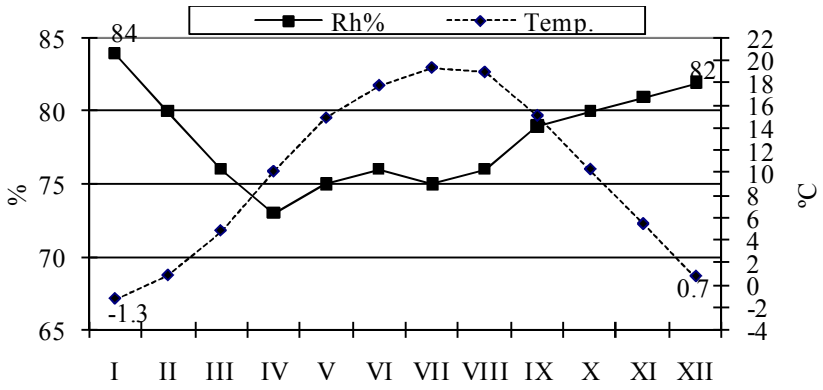

Figure 2. Monthly course of relative moisture and of monthly average temperature in Ştei

The annual average number of days with relative moisture ≤ 30% (dry days) and ≥ 80% (moisture days) present an important practical interest, thus, the number of days with relative moisture ≤ 30% is considered an indicator of the dry weather while the number of days with relative moisture ≥ 80% is considered an indicator of the moisture weather (Măhăra Gh., 2001).

Table 1

Annual and monthly average number of days with relative moisture ≤ 30%; ≤ 50%; ≥ 80%, in Ştei

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
UR ≤ 30%	0.3	0.6	1.3	2.3	1.4	1.1	0.9	1.7	1.3	0.8	0.4	0.2	12.3
UR ≤ 50%;	3.7	5.8	12.2	14.8	13.9	11.3	15.0	15.7	14.4	13.0	7.6	2.5	129.9
UR ≥ 80%	13.0	8.7	5.8	4.6	5.0	5.0	4.0	3.3	4.3	4.5	9.6	14.9	82.7

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

The annual average number of days with very low air relative moisture, with values ≤ 30% at any of the observation hours, registers an average of 12.3 days. During the year, the monthly average frequency of the days with ≤ 30% humidity has got higher values in spring, thus April registers a value of 2.3 days. In the studied area, in winter, more exaclty in

December and in January, relative moisture ≤ 30% registers the fewest days (0.2 days in December and 0.3 days in January).

The annual average number of days with relative moisture ≤ 50% at least one of the observation hours is of 129.9 days. The monthly average frequency of the days with relative moisture ≤ 50% presents the maximum values in the hot period of the year, in August and in July with an average of 15.7 days and of 15.0 days and the lowest monthly average are produced in December and in January with 2.5 days and with 3.7 days respectively (see table 1).

In Ştei, the annual frequency of the days with relative moisture ≥ 80% at noon (at the hour when the maximum temperature occurs) drops below 100 days to 82.7 days. During the year, the monthly average number of days with relative moisture ≥ 80% registers the highest values in the cold season, thus the maximum is produced in December with 14.9 days and in January there are 13.0 days. The values of the relative moisture are higher in winter because then the air temperature is lower and the advection of the Mediterranean wet air is more frequent. The minimum values are registered in the summer months (July and August) so there are: 3.3 days in August and 4 days in July. The values are lower in summer because the average air temperatures are higher.

Water vapor tension

The values of the water vapor tension vary inversely proportional with the altitude, the annual average in Ştei city area being of 10.2 mb.

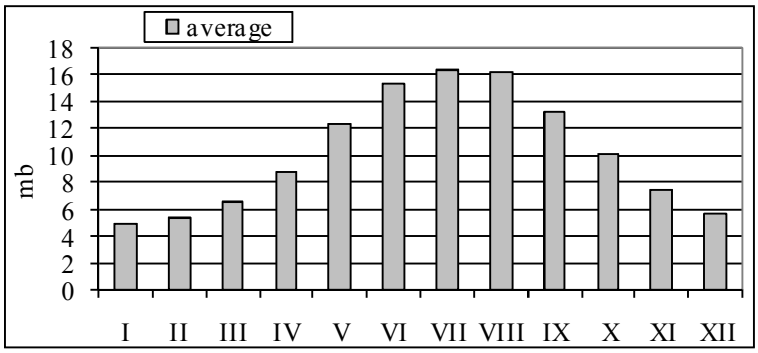

Figure 3. The monthly evolution of the water vapor tension (mb) in Ştei

During the year, the monthly average values of the water vapor tension increase at the same time with the air temperature increase and with the wind intensification that accelerates the evaporation. Thus, the highest values are produced in summer, in July 16.4 mb are registered, in August 16.2 mb are registered and in June 15.3 mb are registered.

The lowest water vapor tension values are produced in winter. Thus, in January 4.9 mb are registered, in February 5.4 mb are registered and in December 5.7 mb are registered. In spring and in autumn intermediary values are registered, these being between approximately 6 mb – 13 mb (see figure 3).

The saturation deficit

In Ştei city area, the multi annual average value of the saturation deficit registers 3.8 mb. During a year, the course of the saturation deficit is increasing starting from January until July and after that period the values begin to decrease. Thus, the monthly average values of the saturation deficit within a year are higher in the summer months, July registering the maximum value with 7.1 mb and August registering 6.9 mb (see figure 4).

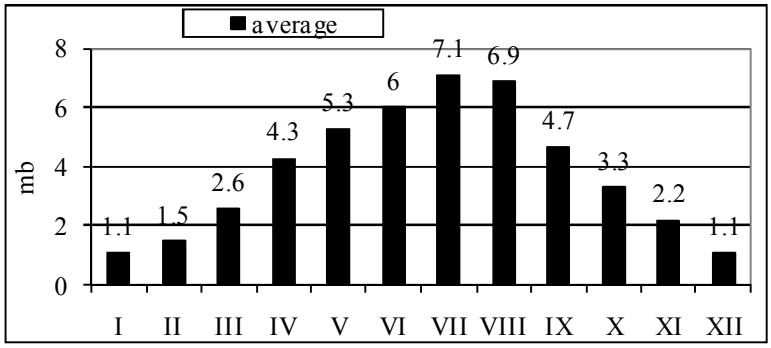

Figure 4. The monthly evolution of the saturation deficit (mb) in Ştei

The lowest values are registered in winter, thus in January and in December 1.1 mb are registered on average and in February 1.5 mb are registered. The transition seasons present intermediary values covered between approximately 2 – 5 mb.

CONCLUSIONS

The multi annual average value of the relative moisture in Ştei city area is of 78%. The yearly regime of the relative moisture is characterized through higher values in winter, especially in January when 84% is registered. The high relative moisture from the cold season is tightly related to the low air temperature values.

During the year the monthly average values of the water vapor tension increase at the same time with the increase of temperature and with the wind enhancement, which speeds-up the evaporation. Thus, the highest values are produced in summer, in July 16.4 mb are registered and the lowest values are in January with only 4.9 mb. The multi annual average is of 10.2 mb.

The multi annual average value of the saturation deficit registers 3.8 mb. During a year, the course of the saturation deficit increases starting with January until July and after this month the values start to decrease. Thus, in July the maximum value of 7.1 mb is registered.

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