AIR RELATIVE HUMIDITY REGIME IN THE HUEDIN DEPRESSION

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Abstract

The present study was achieved based on a rich collection of meteorological data that were recorded at the meteorological station Huedin over a long period of time, i.e. between the years 1970 – 2008.
Relative humidity is the ratio of water vapor pressure (e) and saturation voltage (E). This amount raises interest in practice because it indicates the degree of saturation of a volume of air with water vapor.
Relative humidity of the air is conditioned in the bottom layer of the atmosphere, of the degree of wetting of the underlying surface,local evapotranspiration characteristics change the features required by the general circulation of the atmosphere. As with other parameters the altitude of the relief is a major factor of influence. The vertical gradient of relative humidity has values between 0.5-0.9% / 100m altitude, with lower values in mountainous areas.

Key words: relative humidity, water vapor.

INTRODUCTION

Humidity is the actual water vapor content in the atmosphere at a certain point. It is defined through a range of sizes: absolute humidity, specific humidity, water vapor pressure, relative humidity, saturation deficit and dew point.

The air humidity is a component of the complex atmospheric which is an aggravating factor of contamination because it prevents dispersion of impurities by reducing displacement,especially in the periods of high humidity (fog). This element links to wer smog, i.e. the mixture of smoke and mist suspended in the air in the vicinity of the active surface, which reduces visibility and causes shortcomings, sometimes serious ones, to the public health or to the economic activities. Because of the intensity of the solar radiation, under certain synoptic situations, it appears the photochemical oxidant smog.

The high humidity of the air usually prevents the diffusion and consequently the dilution of pollutants in the air and the suspension are the condensation nuclei favoring the emergence of mist. Fog is actually one of the worst weather conditions of the self purifying, which happens by reducing the diffusion capacity. In addition, the fog dissolves in water soluble pollutants being able to confer mist toxic properties.

MATERIAL AND METHODS

The analysis of relative humidity has been achieved based on data entered in the meteorological observation tables taken to study from the meteorological station for a period of 39 years, respectively for the period 1970 – 2008.

Using specific means and methods of the climatological research pursued a more accurate processing of all data we had available.

RESULTS AND DISCUSSION

Conditions of monthly and annual relative humidity

Relative humidity in the area of analysis is relatively high due to the influence of west wet climate.

Table 1

Multiannual monthly average values of relative humidity (%) of the air in Huedin, during 1970 – 2008

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Annual
Average	86.4	81.9	75.2	71.5	71.8	73.1	72.0	72.5	77.0	80.6	85.0	87.2	77.9

Source: Data processed after A.N.M Archive

Air relative humidity values are influenced by the air temperature so in winter when the air temperature has the lowest values recorded the maximum relative humidity and summer is going backwards.

The multiannual average of relative humidity value of Huedin basin area recorded around 78% (see table 1).

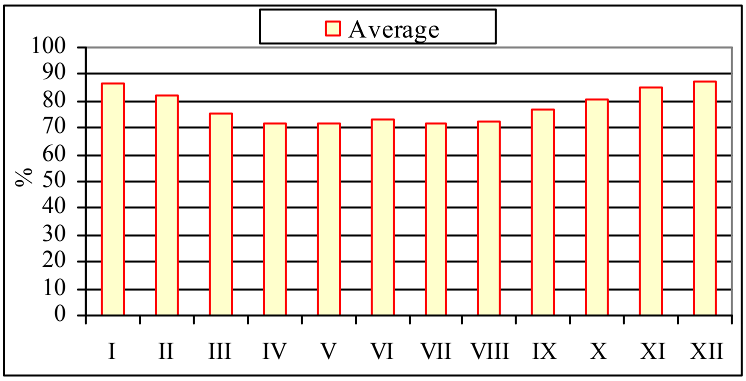

Figure 1 Distribution of multiannual monthly average values of relative humidity (%) of the air in Huedin

Analyzing annual relative humidity regime shows that it is characterized by higher values in winter, especially in December, 87.2%.

Higher humidity in December may be explained by the greater frequency of warm and moist air from the Mediterranean, compared with month of January when the cold, dry air increases the frequency of the north and northeast because of the east European, Siberian and Scandinavian anticyclone (Gaceu O., 2005). The minimum values of relaive humidity are recorded in the warm period of the year, i.e. 71.5% in April, 71.8% in May (see figure 1).

During the 39 years of study in the analized area, the maximum values were 97% recorded in November 1978.

Mean annual deviations are suffering from one year to another, compared to annual average due to the general circulation of the atmosphere, physical and geographical factors, etc. Thus, from all analyzed cases in 59% of cases the annual values have suffered positive violations of the annual average, while 41% of cases were small deviations (see figure 2).

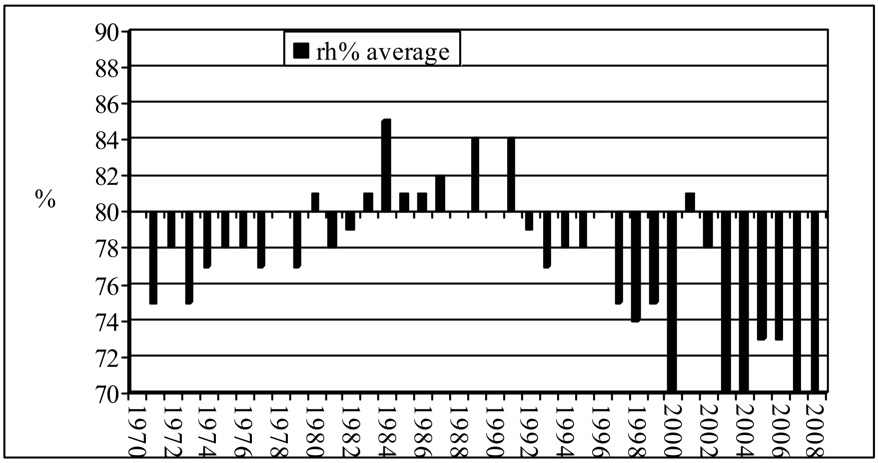

Figure 2 Annual deviations from the annual average of relative humidity in Huedin, (1970 – 2008)

As refected in tab.2 and fig.3, the monthly circuit of relative humidity is inversely proportional to air temperature, so the higher values are recorded in winter (December and January) when the temperatures are lower.

On the Spring, because of the predominance of the anticyclone regime and increasing air temperature, air humidity values are lower than winter. Thus, the highest multiannual monthly average belongs to month of March 75.2%, decreasing in April (71.5%) and May (71.8%) (see figure 3).

Since September, in close correlation with the decrease of air temperature, the relative humidity values of air start to rise. Therefore, the lowest relative humidity values are recorded during the fall, in September when the multiannual monthly average registered a 77% value. This value, lower than other months of fall are due to the higher temperatures from this month but also due to the predominance of the anticyclone regime and the clear sky situations generating small amounts of precipitation. For the month of October the value of multiannual monthly average was 80.6%, and in November, fall month, with the highest values of relative humidity, the average was 85% (see figure 3).

Table 2

The monthly circuit of relative humidity and monthly average temperature at Huedin (1970 – 2008)

Month		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Annual
Average	Rh%	86.4	81.9	75.2	71.5	71.8	73.1	72.0	72.5	77.0	80.6	85.0	87.2	77.9
	Temp.	-3.4	-1.6	3.1	8.4	13.9	16.8	18.8	18.1	13.5	8.2	2.4	-2.0	8.0

Source: data processed after A.N.M Archive

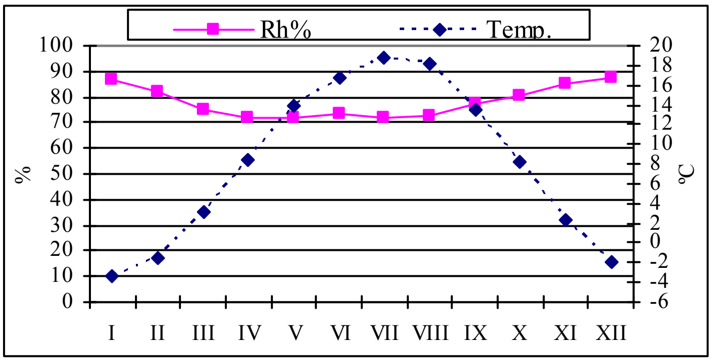

Figure 3 The monthly circuit of relative humidity and monthly average temperature at Huedin, (1970 – 2008)

A practical importance of a monthly relative humidity variations were correlated with air temperature, mainly due to the influence which exercise on the human body.

Monthly and annual minimum of relative humidity

Analyzing the multiannual minimum evolution of relative humidity in the analyzed area, it appears that the minimum multiannual value was 15% recorded on 02.12.2000 (see table 3).

Table 3

Minimum multiannual values of relative humidity at Huedin, during 1970 – 2008

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Annual
UR%	28	18	17	19	26	24	18	18	24	18	18	15	15
Date	27.97	24.90 28.98	20.74	01.01	11.71 03.94	28.00	05.04	29.03	08.03 16.03	29.88 23.00	06.88	02.00	02.12.00

Source: data processed after A.N.M Archive

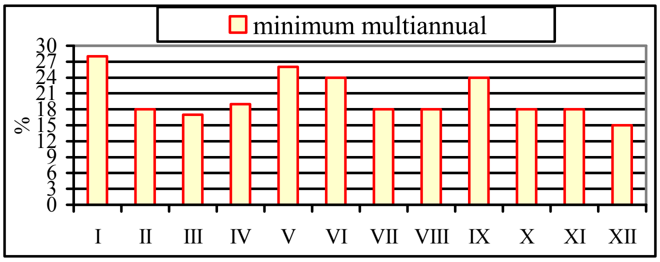

Figure 4 Multiannual monthly evolution of minimum of relative humidity in Huedin

The average frequency of days with relative humidity ≤ 30%; ≤ 50%; ≥ 80%

The average annual number of days with relative humidity ≤ 30% (dry days) and ≥ 80% (wet days) has an important practical interest, the number of days with relative humidity ≤ 30% is considered an indicator of dry weather, while number of days with relative humidity ≥ 80% is considered an indicator of wet weather.

The frequency of days with different characteristics of relative humidity shows a variation both in space and time.

The annual average number of days with very low relative humidity, with values ≤ 30% at either of the times of observation, recorded an average of 6.6 days (see table 4).

During the year, the monthly average frequency of days with humidity ≤ 30% has higher values in spring, i.e. month of April recorded a value of 1.5 days, and 0.9 days in May. The relative humidity ≤ 30% recorded the fewest days in the analyzed area in winter, in December and January (0.1 days) (see table 4).

Table 4

Monthly and annual average number of days with relative humidity ≤ 30%; ≤ 50%; ≥ 80% at Huedin, during 1970 – 2008

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Annual
UR ≤ 30%	0.1	0.2	0.7	1.5	0.9	0.7	0.5	0.5	0.5	0.6	0.3	0.1	6.6
UR ≤ 50%;	2.7	5.2	10.8	15.1	14.4	12.2	13.7	14.4	10.9	9.5	4.0	2.2	115.1
UR ≥ 80%	14.6	8.1	5.5	5.7	4.2	4.6	3.3	3.0	4.0	5.0	11.0	16.5	85.5

Source: data processed after A.N.M Archive

The average annual number of days with relative humidity ≤ 50% at at least one of the observation hours is 115.1 days. The monthly frequency average of days with relative humidity ≤ 50% represent the maximum values in April, as are 15.1 days,and the lowest monthly average produced in December, 2.2 days (see table 4).

Annual frequency of days with relative humidity ≥ 80% at noon (at the time of maximum heat production) falls below 100 days in the Huedin depression, 85.5 days.

During the year, the monthly average number of days with relative humidity ≥ 80% recorded the highest values in winter, so the maximum occurs in December, 16.5 days, and 14.6 days in January. Relative humidity values are higher in winter because temperatures are lower and the advection of moist Mediterranean air is more common. Minimum values are recorded in the summer months (July and August) as are: three days in August and 3.3 days in July (see table 4). Summer values are lower because the average air temperatures are higher.

CONCLUSION

Atmospheric humidity values in the Huedin depression are affected by the Atlantic Ocean and Mediterranean Sea.

The multiannual average of relative humidity of Huedin basin area recorded around 78%.

Analyzing annual relative humidity regime shows that it is characterized by higher values in winter, as are 87.2% in December. The higher humidity in this month can be explained by the greater frequency of warm and moist air from the Mediterranean Sea.

Mean annual deviations are suffering from one year to another, compared to annual average due to the general circulation of the atmosphere, physical and geographical factors, etc. Therefore, from all analyzed cases in 59% of cases the annual values have suffered positive violations, while 41% of cases were small deviations.

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