THE INFLUENCE OF AIR POLLUTION OVER THE METEORIC WATERS COMPOSITION IN THE DISTRICT OF GORJ

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Abstract
In the district of Gorj one may name the following critical areas with respect to the atmospheric pollution: Rovinari Energetic Complex, Turceni Energetic Complex and the limitrophe areas of the mining quarry exploitations. The quality of the precipitations in the year 2010 has been monitored in the prelevation points: The Meteorological Station Targu-Jiu and The Hydrological Station Rovinari.
The area of Targu-Jiu municipality joins the category of areas with acid precipitations and medium total ionic content.
According to the quality data of the precipitations, the Rovinari area joins the category of areas with acid precipitations with medium total ionic content.
The best method against acid rainfall is given by the retechnologization of the installations that are using fossil fuels, C.T.E. Rovinari and C.T.E. Turceni respectively.
According to the results obtained from the monitorization process, results compared with the normative acts in force, the district of Gorj may be classified in the area with low pollution.

Keywords: gases emissions, air pollution, meteoric waters

1. INTRODUCTION

The analysis of the annual quantities of precipitations fallen in the district of Gorj in the past 25 years indicates an average of 685,3 litri/m^2, a very close value to the multiannual average from the Targu-Jiu depression.
Selecting the draughty years and the rainy years, one may note an interesting succession of draughty and rainy years.
Over an year, one may find long periods without precipitations or with very few, but also intervals with great quantities of precipitations.
In strict dependence to the periodicity of the annual conditions of precipitations, one may also note a great variability of the hidrologic conditions from one year to the other.
The anthropic activities with the most important share in generating gases with greenhouse effect are the combustion processes. In the district of Gorj are in function two high power energetic centres, C.T.E. Turceni and C.T.E. Rovinari.
The level of the gase emissions responsible with the production of the greenhouse effect has dropped in the interval 2005 – 2010, in comparison to the level registrated before 2005 as a main consequence of the reduction of the economic activity in the entire country, but in the interval 2005 – 2010 at the level of the entire district of Gorj it has been noted a growth tendency mainly following the growth of the fossil fuels consumption in the thermoenergetic sector [1,5].
According to the data obtained from D.J.S. GORJ, the production of electric energy in the thermocentrals has dropped in 2010 in comparison to 2007 with about 1.5%, a fact reflected also in the level of gase emissions with greenhouse effect.
Table 1 presents the gase emissions with greenhouse effect in the period between 2005 – 2010.

Table 1. The gases emissions

Year t	CO_2 t	CO t	CH_4 t
2005	11985151	35124	32577
2006	11494927	35534	34460
2007	12623534	37019	32455
2008	14647330	37439	37220
2009	13643306	36930	33974
2010	13845610	38332	35786

The paper presents the influence of the air pollution over the meteoric waters composition in the district of Gorj.

2. MATERIAL AND METHOD

The quality of the precipitations in the year 2010 has been monitored in the prelevation points: The Meteorological Station Targu-Jiu and The Hydrological Station Rovinari.
The collection frequency of the precipitation samples is made on a weekly bases.
The physico-chemical parameters are: the pH, conductivity, alkalinity, acidity, Ca^{2+}, Mg^{2+}, Cl^{-}, SO_4^{2-}, NO_3^{-}, NH_4^{+}.
The quality indicators have been analyzed by standardized methods according to national regulations (Drinking Water Law 2004; G.D., 2005; G.O., 2002) [2,3,4].

3. RESULTS AND DISCUSSION

For the establishment of the precipitations quality one may apply the multicriterial method. The norms by which the integration within classes of impurification of the precipitations are made, are the following:
• the annual ponderate average (in comparison with the registered quantity of precipitations) of the pH;
• the fraction (R) from the annual quantity of precipitations of the quantity of acid rain falls (pH < 6.5);
• the annual ponderate average of the conductivity;
• the minimum pH registered in the period taken into consideration.
The characteristics of the precipitations fallen in Targu-Jiu are presented in table 2.

Table 2. The characteristics of the precipitations

Year	Medium balanced pH	R (Pp acid / Pp total)	Medium balanced conductivity (µS/cm)	Minimum pH	Total quantity of pp. (l/mp)
2008	6.57	0.035	44.79	6.2	697.2
2009	6.57	0.064	49.98	6.4	914.3
2010	6.23	0.26	46.76	6.2	1348.6

In comparison with the year 2009, one may note a decrease of the minimum pH, the medium balanced pH and of the medium balanced conductivity, but an increment of the acid fraction in the conditions of excedentary annual quantities of precipitations, greater with 47.5%.
The evolution of the pH for the area of Targu-Jiu is presented in Figure 1. The minimum pH has been registered in June (6,2), and the maximum value in January (6,7).

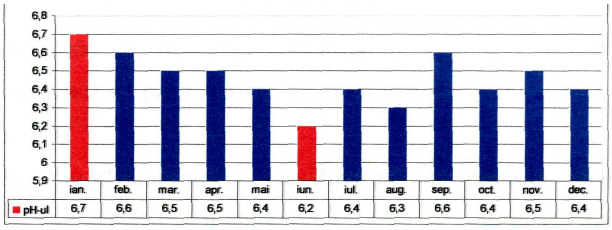

Figure 1 The evolution of the pH in the Meteorological Station Targu-Jiu. Monthly averages – Year 2009

The medium monthly values of the conductivity in the area of Targu-Jiu are presented in the Figure 2. The minimum conductivity has been registered in July (32,6 µS/cm), and the maximum value in October (87,5 µS/cm).

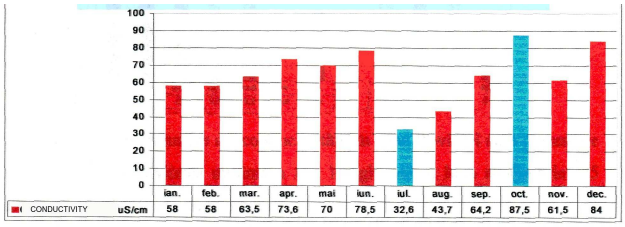

Figure 2 The medium monthly values of the conductivity in the Meteorological Station Targu-Jiu - Year 2009

The Targu-Jiu area joins the category of areas with acid precipitations and medium total ionic content.
For the Rovinari area the characteristics of the analysed precipitations are presented in tab 3.

Table 3. The characteristics of the analysed precipitations for the Rovinari area

Year	Medium balanced pH	R (Pp acid / Pp total)	Medium balanced Conductivity (µS/cm)	Minimum pH	Total quantity of pp. (L/m^2)
2007	6.21	0.731	99.49	6.0	889.3
2008	5.96	0.859	77.03	5.9	1219.4

For the Rovinari area one may also note that in 2008 the minimum pH and the medium balanced pH registered a decrease while the acid fraction increases. The total quantity of precipitations registered is comparatively greater with 37% than the total quantity of 2010.
The evolution of the pH for the Rovinari area is presented in Figure 3. The minimum pH has been registered in June (5.9), and the maxium value in September (6.5).

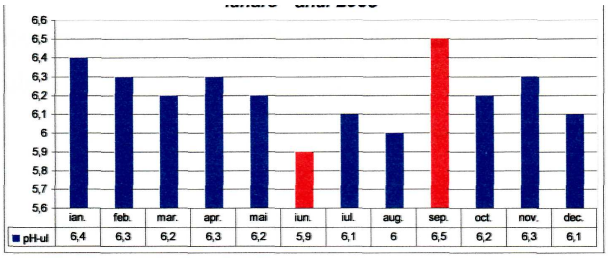

Figure 3 The evolution of the pH in the Hydrological Station Rovinari. Monthly averages – year 2010

According to the quality data of the precipitations, the Rovinari area joins the category of the areas with acid precipitations with medium total ionic content.
The annual quantity of precipitations fallen in the year of 2010 is comparatively excedentary to the multiannual average.
The most significant contribution to the polluant emissions with acidic effect being incumbent to the combustion processes for the generation of energy and to the transformation industries, the evolution of these emissions is closely linked to the evolution of the fossil fuels consumption in the thermoelectric plants and to the growth of the industrial production.

4. CONCLUSIONS

According to the results obtained from the monitorization process, results compared with normative acts in force, the district of Gorj may be classified in the area with reduced pollution.
The best method against the acid rainfall is the reduction of SO_2 and NO_x quantity emanated by the thermoelectric plants, motor vehicles and factories.
For their reduction one has to retechnologize the installations that use fossil fuels.

5. REFERENCES

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