THE LEVEL OF AIR POLLUTION WITH SEDIMENT PARTICLES IN BIHOR COUNTY BETWEEN 2016 AND 2018

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Abstract

This paper presents the study conducted on pollution with sediment particles in Bihor county over a period of three years (2016 – 2018). The data were obtained from the Bihor County Environmental Protection Agency, the institution which monitors the level of pollution with sediment particles. In the area of Bihor county there are 14 sampling points, which are grouped in three strategic areas. The samples are collected on a monthly basis.

The first area is located in the north – western part of Bihor county and includes the sampling points in Tărian, Biharia, Sălard, Episcopia Bihor.

The second area includes the sampling points in 1st May Spa, at the Oradea Weather Station and at the Oradea Environmental Protection Agency.

The third area consists of the sampling points in Telechiu, Chistag, Peștera, Aleșd, Aștileu, Subpiatră, Țețchea.

These sampling points ensure the monitoring of the areas polluted with sediment particles in Bihor county, and they also take measures to reduce pollution.

The analysis of the level of pollution with sediment particles shows that the maximum permissible concentration of 17 g/m^2/month was not exceeded.

Key words: maximum permissible concentration, monitoring, sampling points, sediment particles

INTRODUCTION

Pollution of the air with sediment particles can be caused by a great number of various sources, such as mechanical processes, road building, road transport, waste and sterile dumps, solid fuel power plants, cement factories, the metallurgical and steel industries, the building materials industry etc. (Măhăra Ghe.,1969, 1976, 2003; Vancea et al, 1992; Mănescu et al ., 1994; Petrea, 2001; Domuța et al., 2010; Moza, 2009, 2010; Pereș, 2011; Köteles, 2010, 2011, 2015); Pârloiu, 2011; Ciulache, 2004; Dumiter., 2005.

MATERIAL AND METHOD

In order to conduct this study, data provided by the Bihor County Environmental Protection Agency, which is the institution that monitors the level of air pollution in Bihor county (www.apmbh.ro), were used. The study covered a period of three years (2016-2018), and the maximum

permissible concentration of sediment particles is 17 g/m^2/month (sampling on a monthly basis) (STAS 12574/1987, Ordinance 592/25.06.2002).

In Bihor county there are 14 sediment particle monitoring points, spread out across three areas:

- First area (the northwest of the county): Tărian, Biharia, Sălard, Ep. Bihor;
- Second area: 1st May Spa, Oradea Weather Station, Oradea Environmental Protection Agency;
- Third area: Telechiu, Chistag, Peştera, Aleşd, Aştileu, Subpiatră, Ţeţchea.

RESULTS AND DISCUSSIONS

Annual evolution of sediment particles

The evolution of the sediment particle concentrations shows that the highest concentration was recorded in 2016, at the Episcopia Bihor sampling point, 8.548 g/m^2. A value close to this was measured in Sălard, 8.295 g/m^2, followed by Biharia with 5.684 g/m^2, which means that the maximum permissible concentration was not exceeded.

In 2017, the highest concentration of sediment particles was recorded in Aștileu, 6.558 g/m^2, followed by 6.121 g/m^2 in Subpiatră and 6.076 g/m^2 in Țețchea. The values recorded at the other sampling points are close, between 5.980 g/m^2 in Telechiu and 4.241 g/m^2 în Peștera. For the year 2018, the highest concentrations were recorded in Subpiatră, 7.347 g/m^2, Episcopia Bihor, 6.770 g/m^2, and Peștera, 5.529 g/m^2 (Fig. 1).

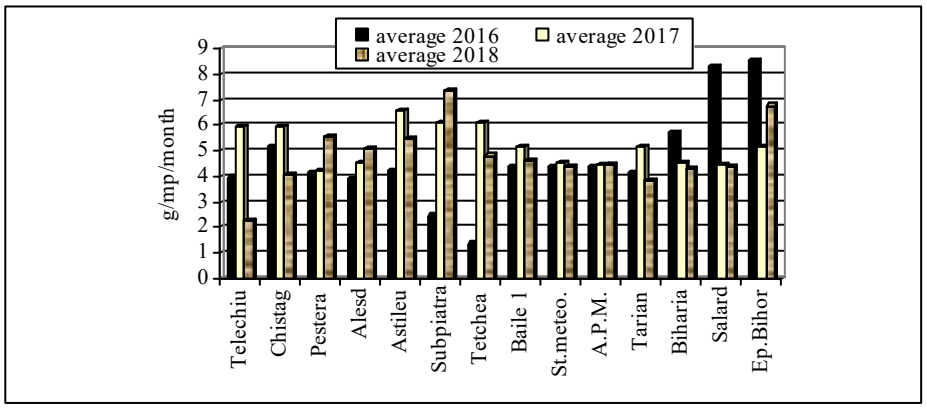

Fig. 1. The evolution of sediment particles average concentrations in Bihor county, 2016 – 2018

The averages of the three years included in the study shows that the highest concentration was recorded in Episcopia Bihor, the value of 7.353

g/m^2, followed by Sălard, 5.598 g/m^2, and then by Aștileu, 5.429 g/m^2. The lowest values were recorded in Telechiu, 4.056 g/m^2, Țețchea, 4.083 g/m^2, and Tărian, 4.191 g/m^2 (Fig. 2).

Looking at the level of pollution with sediment particles between 2016 and 2018, it can be concluded that the 17 g/m^2/month was not exceeded.

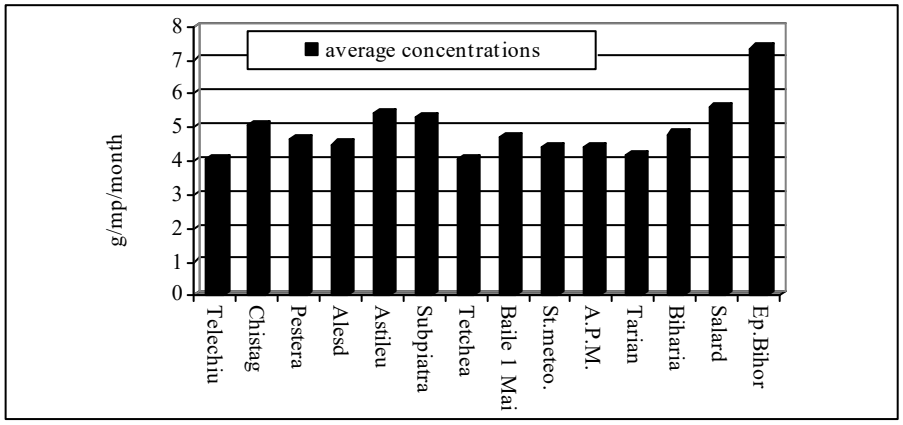

Fig. 2. Evolution of the multiannual average concentrations (2016 – 2018) of sediment particles at the 14 monitoring points in Bihor county

Monthly evolution of sediment particles

The average concentration of the 14 sampling points for the period included in the study (2016 – 2018) shows that the highest value is reached in 2017, in January, 8.004 g/m^2, followed by 7.493 g/m^2 in March 2016 and by 6.933 g/m^2 in August 2018 (Fig. 3).

The lowest concentrations of sediment particles were recorded in February, 2.813 g/m^2, and January, 2.819 g/m^2, 2018, followed by 3.030 g/m^2 in November 2016 (Fig. 3). The values recorded at the 14 sampling points show that the maximum permissible concentration was not reached.

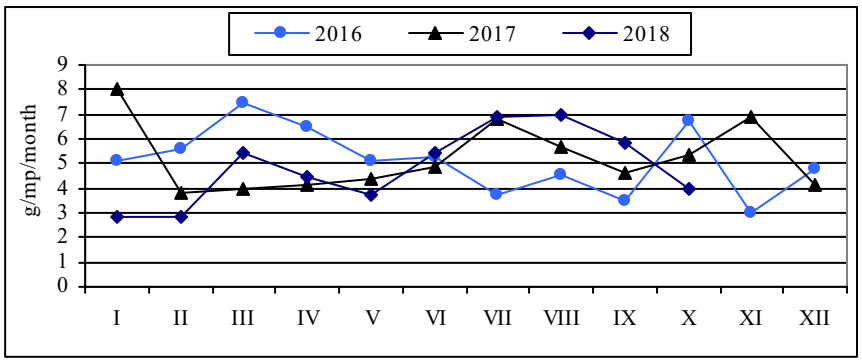

Fig. 3. Monthly pattern of sediment particles in Bihor county (the average of the 14 sampling points)

Looking at the monthly evolution over the three years included in the study, the average for the month of July is 5.808 g/m^2, for August 5.716 g/m^2 and for March 5.628 g/m^2. The lowest concentrations were recorded in February 4.076 g/m^2, followed by May, 4.428 g/m^2, and December, 4.462 g/m^2 (Fig. 4).

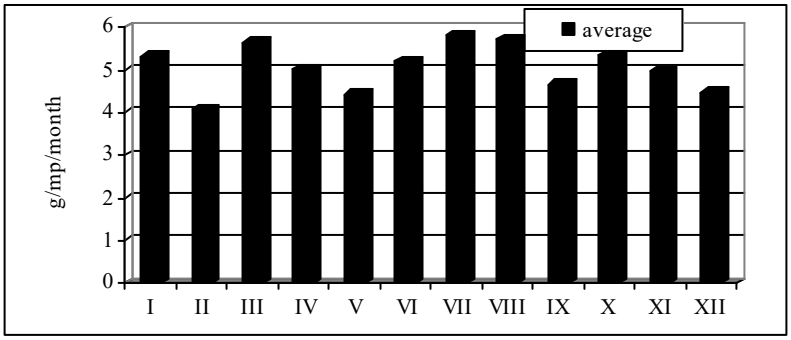

Fig. 4. The evolution of multiannual monthly average concentrations of sediment particles in Bihor (the average of the 14 sampling points)

Evolution of sediment particles by areas

The highest concentrations were recorded in the first area, in 2016, a value of 6.669 g/m^2, followed by the third are in 2017, 5.633 g/m^2, and then the by the third area again in 2018, with a value of 4.938 g/m^2 (Fig. 5).

The lowest concentration was recorded in the third area also, in 2016. In 2017 – 2018 the values in the second and third areas are close, between 5.633 g/m^2 in the third area and 4.480 g/m^2 in the second.

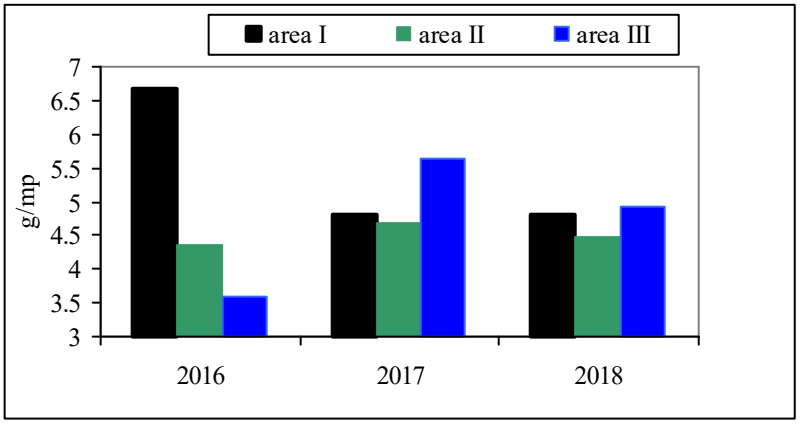

Fig. 5. The evolution of the annual average concentrations of sediment particles in the three areas of Bihor county, 2016 – 2018

The averages of the three years included in the study show that the highest level of sediment particles is recorded in the first area, which is the result of this area being close to the industrial area of Oradea, followed by the third area, where the highest value is 4.726 g/m^2/month and the second one with a concentration of 4.514 g/m^2/month (Fig. 6).

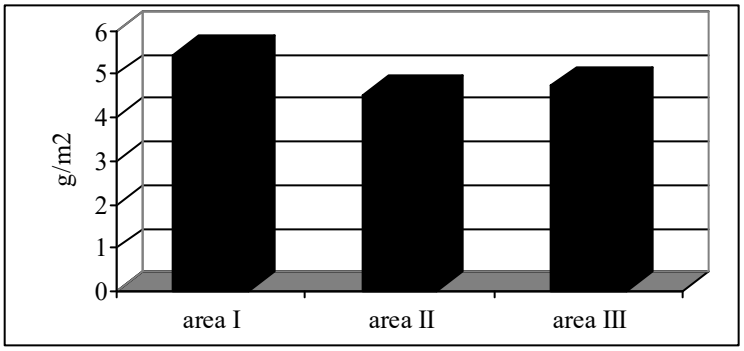

Fig. 6. Distribution of multiannual average concentrations of sediment particles in the three areas of Bihor county, 2016 – 2018

CONCLUSIONS

From the analysis of the average of the 14 sampling points it can be concluded that the level of pollution with sediment particles was the highest in 2016, 8.548 g/m^2, in Episcopia Bihor, followed by 8.295 g/m^2 in Sălard.

The highest concentration of sediment particles was recorded in the first area, where the industrial area of the city is located, but the maximum permissible concentration of 17 g/m^2/month was not exceeded.

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