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INTRODUCTION
The main object of this study was examination of atmospheric pollution with heavy metals due to copper mining Bucić near Radoviš, Republic of Macedonia (Figs. 1 and 2). Moss samples (Hylocomium splendens and Pleurozium schreberi) were used for biomonitoring the possible atmospheric pollution with heavy metals in mine vicinity. Sixteen elements (Al, As, Ba, Ca, Cd, Co, Cr, Cu, Fe, K, Mn, Na, Ni, Pb, Sr, and Zn) were analysed.

EXPERIMENTAL
Sampling

The collection of moss samples was performed according to the protocol adopted within the European Heavy Metal Survey.

Sample preparation

Microwave digestion system

Analyses

Analyses were performed with atomic emission spectrometer with inductively coupled plasma, ICP-AES (Varian, 715ES), for Al, Ba, Ca, Cr, Cu, Fe, K, Mn, Na, Ni, Pb, Sr, Zn and electrothermal atomic absorption spectrometer, ETAAS (Varian, SpectrAA 640Z) for Cd, Co, As.

Data processing

The obtained values were statistically processed using nonparametric and parametric analysis. Multivariate (factor analysis) method was used to reveal the associations of the chemical elements.

The universal kriging method with linear variogram interpolation was applied for the construction of the areal distribution maps.

RESULTS

Three factors were identified, one anthropogenic and two geogenic, interpreted as Factor 1, Factor 2 and Factor 3, which includes 90 % of variability of treated elements (Table, Fig. 3).

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CONCLUSION

From the distribution map of Factor 1 scores and distribution maps for all elements from this Factor (Figs. 3 and 4) it is clearly visible that the higher contents of these elements are deposited in close vicinity of the mine. Distribution of these elements at greater distances from the mine is not determined. This confirms the influence of the presence of the copper mine and flotation plant on increasing content of these metals in the atmosphere. Increasing content of anthropogenic elements in moss samples in the close vicinity of the mine, precisely near villages Bucić and Topolnica, assumed as most polluted settlements. Maximum values for the content of As, Cd, Cu, Fe, Pb and Zn are obtained from moss samples close to village Bucić.

Reference