

LONGTIME GEOCHEMICAL EVOLUTION OF Cd-Pb-Zn DISTRIBUTION IN DEPOSITED ATTIC DUST

Biljana Balabanova¹, Trajče Stafilov², Robert Šajn³, Claudiu Tănăselia⁴

¹Faculty of Agriculture, University "Goce Delčev", Krste Misirkov bb, Štip, Republic of Macedonia

²Institute of Chemistry, Faculty of Science, Ss. Cyril and Methodius University, POB 162, 1000 Skopje, Macedonia

³Geological Survey of Slovenia, Dimičeva ulica 14, 1000 Ljubljana, Slovenia

⁴INCDO-INOE 2000 Research Institute for Analytical Instrumentation (ICIA), Cluj-Napoca, Romania

INTRODUCTION

ATMOSPHERIC DEPOSITION poses significant ecological concerns. Atmospheric particles originate both from natural (e.g., erosion, dust storm, volcanoes) and anthropogenic sources. Long-term airborne emissions from mining, power plants, smelting and industry have left a legacy of widespread contamination around industrial areas. Considering these long time emissions (eventually more than 50 years), an alternative approach is to use exposed attic dust, because over long periods of time atmospheric particles can accumulate, providing a record of historical local deposition. The determination of historical emissions is based on the data of heavy metals concentration in the ATTIC DUST from different measurement sites of the weight of total monthly air deposit. The present investigation aims on spatial hunting of dominant lithogenic and anthropogenic geochemical associations in the Bregalnica river basin.

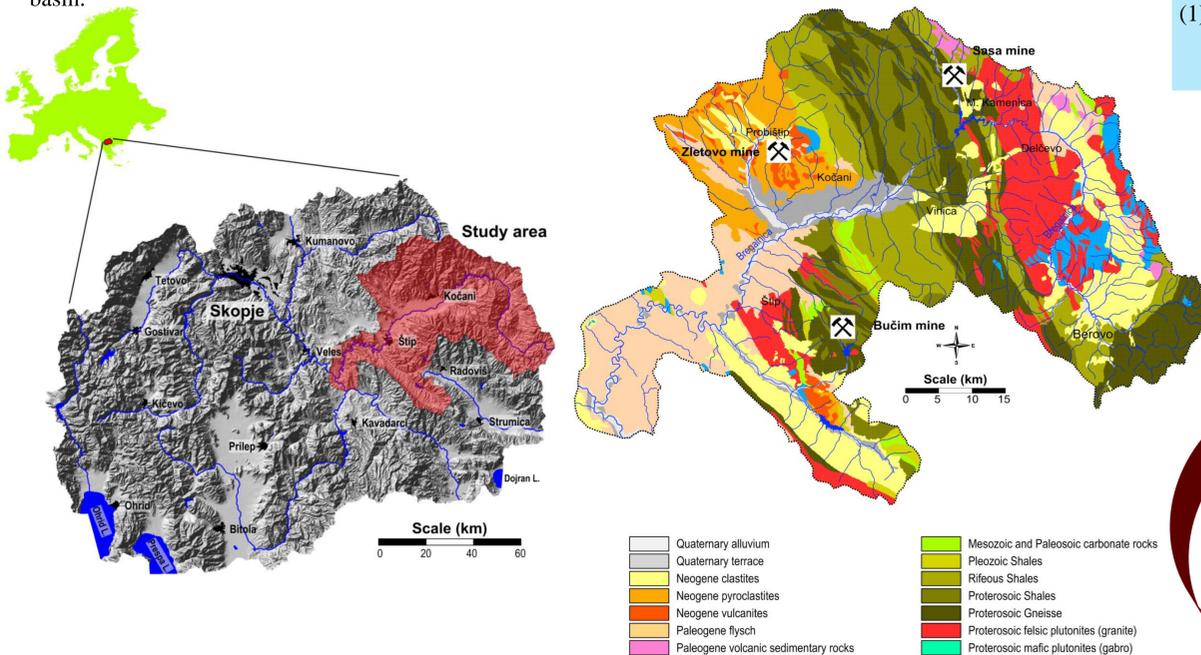
Analytical procedures

SOIL AND DUST PRETREATMENT:

- (1) The soil and dust samples were subjected to cleaning and homogenization, in a drying room at 40°C, to a constantly dry mass. Then the samples were passed through a 2 mm sieve and finally were homogenized by grinding in a porcelain mortar until reaching a final size of the particles of 125 µm.
- (2) For digestion of attic dust and soil samples, open wet digestion with mixture of acids was applied (ISO 14869-1:2001) [1]

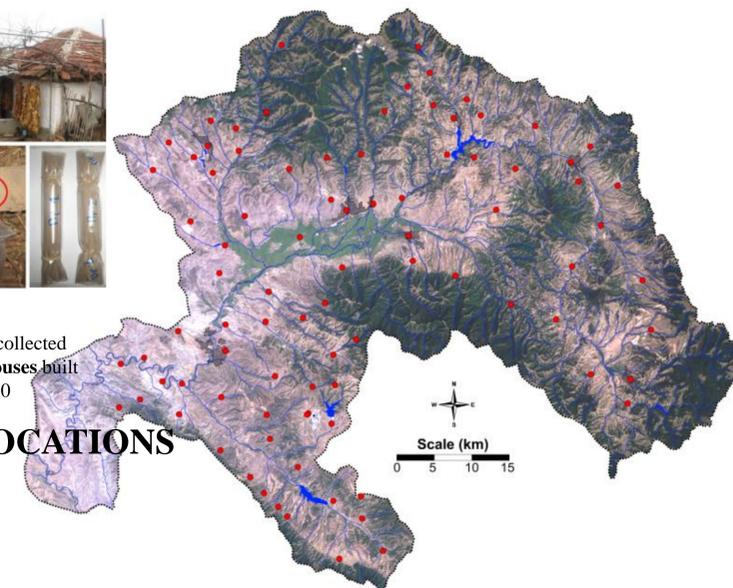
INSTRUMENTATION:

- (1) SCIEX Perkin Elmer Elan DRC II (Canada) inductively coupled plasma mass spectrometer (ICP-MS, with quadrupole as single detector) was used for measurement of the elements concentration.



ATTIC DUST samples were collected from the attics from total 84 houses built between 1920 and 1970

SAMPLING LOCATIONS



DATA SUMMARY/RESULTS

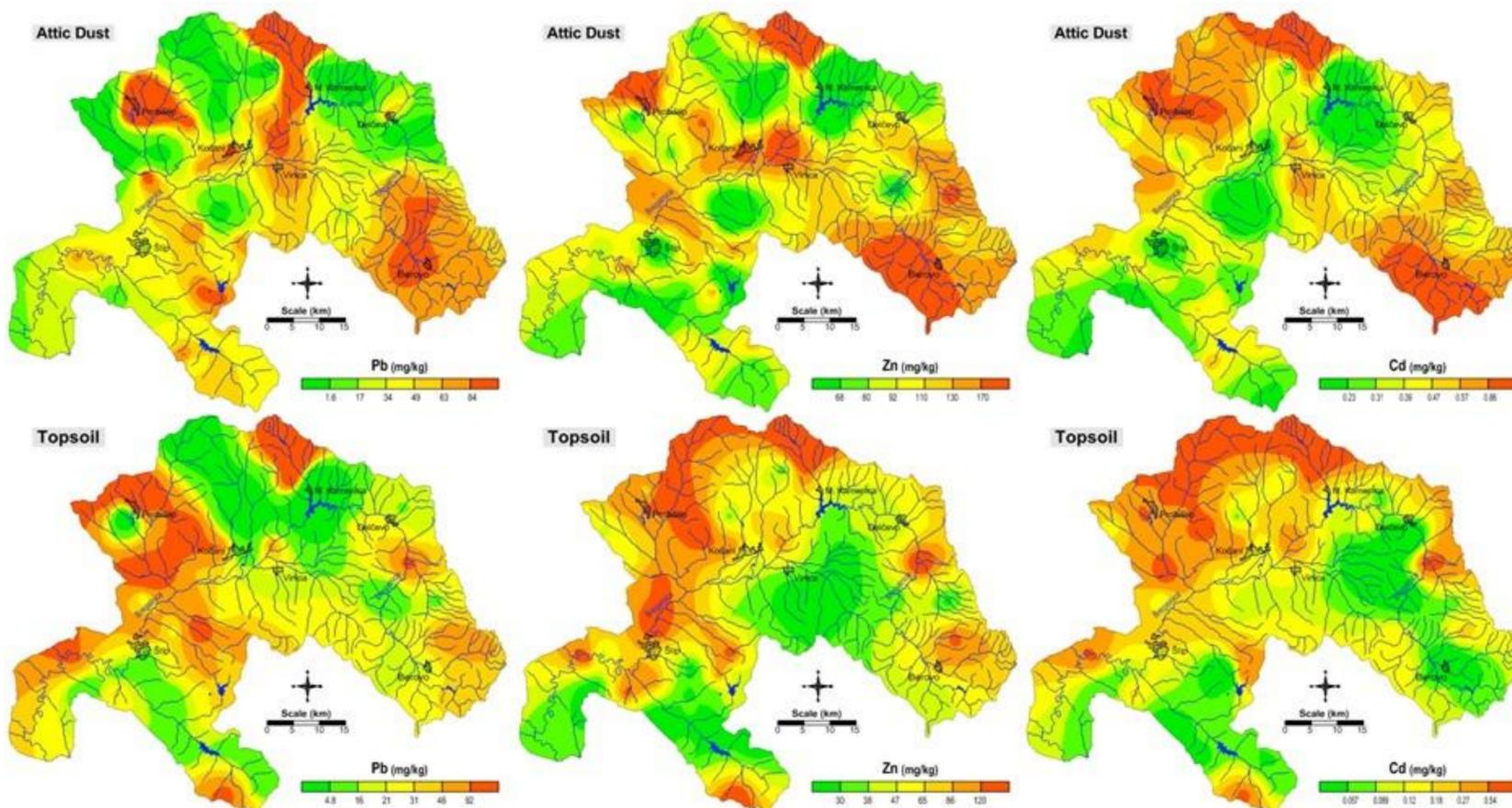


Table 1 Data summary for elements contents in attic dust samples (D) and topsoil samples (T); N=168, values given in mg/kg

Element	Median	Min	Max
Cd (D)	0.43	0.054	25
Cd (T)	0.13	0.005	9.0
Pb (D)	51	0.005	3900
Pb (T)	22	0.005	1200
Zn (D)	99	26	3200
Zn (T)	53	18	590

CONCLUSIONS

■ The anthropogenic affects on the air pollution was marked with dominance of these elements contents.

■ Enriched contents of Cd, Pb and Zn were also determined in areas with dominant occurrence of the very old Rifeous shales.

■ These elements distribution also presents a very unique association that despite the heterogeneity relays on natural phenomena of tracking the deposition in areas of Proterozoic gneisses; related to the distribution of fine particles associated with carbonate-silicate volcanic rocks.

■ Intensive poly-metallic dust depositions were determined only in the surroundings of the localities where the hydrothermal extractions are implemented.

■ Long-time deposition can be considered as pollution indexes for these hot spots.

■ Cd, Pb and Zn deposition that riches to 25, 3900, and 3200 mg/kg, respectively, can be considered as VERY HAZARDOUSLY!!!

Table 2. Element distribution according to dominant geological formation in the area (median values are given, N=84)

Element	Unit	River terraces (Q)	River Sediment (Ng)	Pyroclastite (Ng)	Flysch (Pg)	Schists (Pz)	Schists (R)	Schists (Pt)	Gneisses (Pt)	Granite (Pt)
Cd	mg/kg	0.42	0.45	0.44	0.52	0.33	1.5	0.28	0.25	0.31
Pb	mg/kg	54	83	48	18	30	110	55	22	12
Zn	mg/kg	110	130	98	110	90	220	86	72	88

[1] ISO 14869-1 (2001) Soil quality: Dissolution for the determination of total element content - Part 1: Dissolution with hydrofluoric and perchloric acids. International Organization for Standardization, Geneva, Switzerland