

ATOMIC AND NUCLEAR METHODS APPLIED IN THE STUDY OF HEAVY METAL POLLUTION

I. V. POPESCU^{1,6,8,9}, M. Frontasyeva², C. Stihl^{1,6}, A. Ene³, S. Cucu-Man⁴,
R. Todoran⁵, O. Culicov², I. Zinicovscaia², My Trinh², S.S. Pavlov²,
C. Radulescu^{1,6}, A. Chilian^{6,7}, A. Gheboianu⁶, R. Bancuta⁷, Gh. Cimpoca^{1,6,9},
I. Bancuta⁶, I.D. Dulama⁶, L.G. Toma⁶, A. Bucurica⁶, G. Dima^{1,6}, R. Drasovean³,
A. Sion³, S. Condurache-Bota³, R. Buhaceanu⁴, D. Tarcau⁴, D. Todoran⁵

Abstract. *The aim of this study was to assess the air quality in Romania using terrestrial moss, to reveal highly polluted critical regions in the country in order to permanently survey the degree of atmospheric pollution and to contribute to the European moss survey 2010/11 conducted under the auspices of the UNECE ICP Vegetation covering some "white areas" in the map of atmospheric deposition of heavy metals in Europe. Within the bilateral project JINR- Romania, "Nuclear and related analytical techniques for Environmental and Life Sciences", moss samples were collected during the summer/autumn of 2010 at 303 sites in Romania: in the Carpathian Mountains, Transylvanian plateau, and Moldavia province, following internationally accepted guidelines. Nuclear analytical technique Neutron Activation Analysis (NAA, JINR-Dubna, Russia) and Atomic Absorption Spectroscopy (AAS-Valahia University of Targoviste, Romania) were used to determine the concentration of minor and trace elements in moss samples collected in 2010 from Romania. The results for mean, median and geometric mean are compared with those previously obtained in 1990, 1995 and 2000 campaigns and the maps of the distribution of heavy metals were realized. A total of 42 elements (Na, Mg, Al, Cl, K, Ca, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, As, Se, Br, Rb, Sr, Zr, Mo, Ag, Cd, In, Sb, I, Cs, Ba, La, Ce, Sm, Eu, Tb, Hf, Ta, W, Au, Hg, Pb, Th, and U) were determined by NAA (JINR-Dubna) of which three of them (Cu, Cd, Pb) were determined by AAS (Valahia University of Targoviste) Romania [1]. Pearson correlation coefficients (r) were calculated.*

Keywords: air quality, terrestrial moss

¹Valahia University of Targoviste, Faculty of Sciences and Arts, Sciences Department, 2 Carol I St., 130024, Targoviste, Romania.

²Joint Institute for Nuclear Research, Frank Laboratory of Neutron Physics, 141980 Dubna, Moscow Region, Russia.

³Dunarea de Jos University of Galati, Department of Chemistry, Physics and Environment, Faculty of Sciences and Environment, 111 Domneasca St., 800201 Galati, Romania.

⁴Alexandru Ioan Cuza University, Faculty of Chemistry, 11 Carol I St., 700506, Iasi, Romania.

⁵Technical University of Cluj-Napoca, North University Center, 62A Victor Babes St., 430083, Baia Mare, Romania.

⁶Valahia University of Targoviste, Multidisciplinary Research Institute for Sciences and Technologies, 13 Sinaia St., 130004, Targoviste, Romania.

⁷Valahia University of Targoviste, Doctoral School on Engineering Sciences, 35 Lt. Stancu Ion St., 130105, Targoviste, Romania.

⁸"Horia Hulubei" National Institute for Physics and Nuclear Engineering, 30 Reactorului St., P.O.BOX MG-6, Bucharest-Magurele, Romania.

⁹Academy of Romanian Scientists, Romania.
