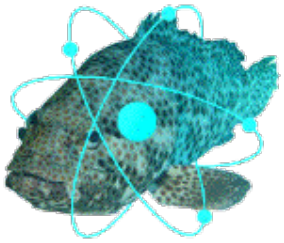

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# Heavy metals and radioactive nuclide concentrations in mosses in Greece

*Wednesday 30 May 2018 14:00 (30 minutes)*

During the 2015/2016 moss survey, ninety-five (95) samples of Hypnum cupressiforme Hedw., were collected in the region of Northern Greece during the end of summer 2016, covering a regular grid of 30 km x 30 km. The samples collected from different altitudes, from 30 m to 1450 m above the mean sea level. The regions from where samples were collected were open regions in most of the sampling sites, avoiding possible contact of mosses with surface water.

All samples were analyzed to the content of heavy metals (using INAA) and of natural and artificial radionuclides (using low energy gamma ray measurements). Studying the concentrations of heavy metals in mosses in the region of Northern Greece, provide information about the air quality, the identification of possible local pollution sources and transboundary transport of heavy metals, and finally assessing possible health risks in the region of investigation.

The concentrations of 33 elements were determined in all moss samples by using INAA performed in Frank Laboratory of Neutron Physics, Joint Institute for Nuclear Research, Dubna, Russia (Frontasyeva 2011; Pavlov et al., 2014). The concentration of Zn is higher in the region close to the Bulgarian boarders, indicating the transboundary transfer of Zn from the zinc-lead smelter in the region of Kardzhali in Bulgaria. Higher concentrations of Al and V are observed in regions where there are metal industries and in regions close to coal fired power plants and lignite mining. Areas with manufacturing industries, as well as electricity and heat production activities, present also a rise in concentrations of As, Cr and Ni elements.

Mosses can be used as a sampling medium for monitoring of radionuclide deposition. All 95 moss samples were analyzed for activity concentration of 137Cs, 7Be, 210Pb and 40K. 7Be concentrations ranged from 69 to 1280 Bq kg-1, and the concentrations of 137Cs ranged from 0 to 425 Bq kg-1. The concentrations of 210Pb were between 147 and 1920 Bq kg-1 and for 40K were between 120 and 750 Bq kg-1. Differences have been observed in the activity concentrations between the mosses collected from ground surface, rocks, branches and near roots (Figure 2). 7Be and 210Pb activity concentrations are higher in moss samples from the ground surface and rocks than those near roots. 137Cs and 40K concentrations are higher in mosses collected near roots.

This study has shown that the relatively cheap moss method can be used to determine regional differences and temporal changes in the atmospheric deposition of several elements. This enables the effectiveness of emission-reduction measures to be assessed.

**Authors:** IOANNIDOU, ALEXANDRA (Aristotle University of Thessaloniki); Mrs BETSOU, Chrysoula (Aristotle University of Thessaloniki Greece); Mrs TSAKIRI, Evdoxia (Aristotle University of Thessaloniki); Dr FRONTASYEVA, Marina (Frank Laboratory of Neutron Physics, Joint Institute for Nuclear Research, Russian Federation, ); Dr KAZAKIS , Nerantzis (Aristotle University of Thessaloniki)

**Presenter:** IOANNIDOU, ALEXANDRA (Aristotle University of Thessaloniki)

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