Trace element monitoring in the vicinity of a solid waste disposal

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Solid Waste Environmental Monitoring Program

A continuous monitoring of trace elements in the vicinity of the Municipal Solid Waste Processing Plant (CTRSU) built in an industrialized area, near Lisbon, Portugal, was performed from 1999 to 2002 (Spring; Autumn). Analytical control was done in surface water and sediments of the Tagus estuary, and soils (0-10 cm; 10-20 cm depth) and vegetation (*Olea europaea*; *Conyza*) collected in the surrounding area. Filters from the chimney were also analysed. Chemical analysis was done by neutron activation analysis and atomic absorption spectrometry. Sb, Sn, Se, Mo, Co, B, Th and U were obtained for water and sediments and in addition to those Zn, V, Pb, Hg, Mn, Cd, Cu, As, Cr, Ni, La, Ce, Sm, Eu, Tb and Lu were determined for soils and vegetation.

Discussion of Results

Elemental concentrations obtained for surface water are under detection limits, except for B and U. Normalization relatively to the mean sea water composition enhances seasonal variation although values are consistently lower than for sea water. Sediments and soils (normalized to Sc) don't present a seasonal behavior. A clear enrichment of Hg, As, Co and Mn has occurred in sediments in the 2002 campaign. Soils composition is correlated with parent rock nature; Mn, Zn, Sb, V, Pb, Ni, B and Co are enriched at topsoils; Cr, Sn and Co present an increasing tendency with time. A positive correlation between the soils and filter deposited particles was observed for Mn, Co, Zn, Cr, Th and U. In vegetation, calculated enrichement factors enhance an increasing tendency in Mn, Zn, Hg, Cu, Sb, Se and B.

Final Remarks

Signficant variations and enrichments of some elements were observed particularly in soils and vegetation, reflecting the environment in which the waste disposal under monitoring is included. The results obtained can point to a contaminated scenario, but the evaluation of the incennerator pollution contribution is difficult to make, since the unit is located in a very industrialized area.

The relationships between groundwater discharge and the Lower Jordan River

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A study of the Lower Jordan River, between Israel and Jordan, reveals that groundwater discharge into the river water is a major process that controls the river water salinity. Integration of the geochemical (e.g., Br/Cl) and isotopic ($\delta^{34}S$, $^{87}Sr/^{86}Sr$) variations enabled us to quantify the groundwater flux in different sections of the river. We show that the base flow in the northern section is a mixture of saline springs diverted to the river and sewage effluents. In the northern area, the sulfate-rich groundwater flux modifies the river water composition and its contribution can reach up to 80% of the total solute budget of the river. In the southern section of the river, we use the high salinity, SO_4/Cl, and and Br/Cl fingerprints of the different groundwater bodies to identify and to quantify the groundwater flow to the river during different times of the year. The mixing relationships obtained in the geochemical study are used to construct possible management scenarios upon future use of the river and implementation of the Peace Treaty between Israel and Jordan.