VANDERBILT
School *of* Engineering

DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING

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"APPLICATION OF PB ISOTOPES FOR TRACING ANTHROPOGENIC CONTAMINATION"

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ABSTRACT

Lead (Pb), a highly toxic element, has been introduced into the environment through a variety of anthropogenic activities. Common sources of Pb and other metals such as Cu and Zn in surface soils and sediments in urban and industrial environments include: deposition of dust and aerosol particles from smelting activities; fossil fuel combustion; paints and other decorative materials; corrosion of metal structures; technogenic materials incorporated in the soil or in dusts; contaminants from former and current industrial, agricultural, or horticultural use of the land; deposition of solid or liquid wastes onto soils; and bonfires and accidental fires.

Environmental metal contamination has been occurring since ancient times until today. Since the beginning of the industrial revolution heavy metals, which are by-products of many industrial processes and transportation, have been increasingly entering the environment at ever increasing loads. Heavy metals that are discharged from anthropogenic sources may find their way into terrestrial and marine environments and into the food web. Total Pb concentration is not necessarily a good measure of its potential health risk, and speciation controls potential bioavailability and toxicity. Lead was significantly introduced to the global environment by leaded petrol combustion, which was replaced by unleaded petrol in the US in the 1970s, in Europe in the 1980s, and in Israel during the 1990s. Natural and various anthropogenic sources have distinct Pb isotope ratios, hence enabling to trace anthropogenic contamination to the environment.

BIOGRAPHY

Nadya Teutsch is currently in charge of coal ash monitoring and research at the Geographical Survey of Israel (GSI) and has been with GSI since 2009. She received her B. Sc., M.Sc., and PhD at the Hebrew University of Jerusalem. After receiving her PhD, she was a postdoc at the Swiss Federal Institute of Technology with her research focusing on developing iron isotopic chemistry separation and measurements by MC-ICPMS, applying the method in lake water and groundwater research. Her research interests include metal contamination in the environment, environmental aspects of coal fly ash utilization, methods development in analytical and isotopic geochemistry, and iron isotope composition in sapropels. Her main projects and grants include environmental assessment of agricultural use of fly ash using Leaching Environmental Assessment Framework (LEAF) as well as high resolution iron speciation and transition metal isotope study of late Pleistocene sapropels.