Complex urban geochemical analysis of attic dust samples in an industrial area, Ajka, Hungary

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Recent studies suggest that airborne pollutants can be efficiently studied by the means of attic dust analysis. At Ajka region (Hungary), emissions from mining, coal-fired power plants and alumina industry have left the legacy of contamination. The major objective of this research was to study the geochemical behaviour and distribution of toxic elements in attic dust and to identify contamination source using geochemical, statistical and mineralogical methods. The sampling strategy followed a grid-based stratified random sampling design and 30 samples were collected in 27 houses within the 64 km2 project area. The total concentrations of the major and toxic elements (As, Pb, Cd, Cu, Ni and Zn) were measured with ICP-OES and Hg content was analyzed with AAS. Phase analyses of the samples were carried out by the means of scanning electron microscopy (SEM) coupled with energy dispersive spectroscopy (EDS) and X-Ray diffraction (XRD) methods. Results show that the studied attic dust at the Ajka urban area was contaminated mostly by Hg, Pb and Zn with concentrations ranging between 0.1-2 mg/kg, 42.5-881 mg/kg and 90.2-954 mg/kg, respectively. The most frequently identified mineralogical phases were quartz, carbonate, gypsum and Fe- and Al-bearing phases. Based on the SEM and the ICP-OES results, the Power Plant can be considered as the most influential industrial contamination source in the studied urban area.

Halogenated anthropogenic trace gases: The atmospheric imprint and the search for new tracers

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The atmospheric burden of anthropogenic long-lived trace gases has produced powerful transient tracers of fluid motion and time-dependent processes in aquatic systems (e.g. CFCs, SF6). However, for the CFCs, the Montreal Protocol regulations have lead to reduced emissions and to atmospheric trend reversal. The resulting ambiguity in the transient signals and the eventual disappearance from the atmosphere launches a search for new tracers. Under this view we present records of atmospheric halogenated trace gases, mainly from the Advanced Global Atmospheric Gases Experiment (AGAGE). Quasi-continuous in-situ measure-ments of more than 50 compounds are made at several stations around the globe. The measurements track the global atmospheric back-ground as well as signals of regional pollution such as the Asian out-flow. The records are completed back in time using air archives such as air stored in canisters and polar firn. The measurements include the major ozone-depletion gases, which are regulated by the Montreal Protocol, and their replacements, most of which are powerful greenhouse gases that are regulated within the framework of the Kyoto Protocol. Chlorofluorocarbons (CFCs) have been replaced by hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs). These trends toward the use of less stable substances is advantageous from the climate perspective but poses difficulties when used as aquatic tracers. Perfluorocarbons (PFCs, e.g. CF4), which are extremely stable atmospheric compounds (lifetimes are 1000nds of years) are another group of potential new tracers. In addition to inertness in air and water, there are numerous additional requirements for the usefulness as tracer, such as atmospheric abundance, history and trend, solubility, and sensitivity to current measurement techniques.

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