



Landfills as sources of trace gases involved in global change phenomena and in air quality issues

M. Maione (1), J. Arduini (1), A. Berloni (1), B. Capaccioni (2), F. Mangani (1), G. Mangani (1), L. Pirillo (2), F. Tatano (1)

(1)University of Urbino, Institute of Chemical Sciences, Italy, (2) University of Urbino, Institute of Volcanology and Geochemistry, Italy (michela@uniurb.it / fax 0039 0722 303310 / phone 0039 0722 303316)

Landfill gas is produced by the natural biological decomposition of organic material contained in wastes deposited in landfills. This denomination generically indicates a gas mixture made of methane (60%) and carbon dioxide (40%). These gases are produced until most of the organic material in the waste is degraded. Emissions from municipal landfill sites are therefore potentially harmful for both local and global air quality, being the global emissions of an important greenhouse gas such as methane, estimated to be between 20 and 70 Tg/yr. Moreover, in a recent study carried out in Massachusetts, landfills have been shown to be a major source of anthropogenic halogenated greenhouse gases such as chlorofluorocarbons (CFCs) and their hydrogenated substitutes (HCFCs). These long-living species are emitted into the atmosphere as a consequence of leakage occurring in landfills where chlorine containing equipment and material have been dumped. Moreover, landfill gas often contains volatile organic compounds (VOCs) affecting air quality on local scale, being odorous, explosive, flammable and potentially toxic. In this study, municipal landfills of different age located in Tuscany (Central Italy) have been investigated. Grab samples, collected in glass ampoules (volume 100 mL) have been analysed in gas chromatography with flame ionisation detection for methane measurements. Samples collected in passivated stainless steel canisters (850 mL) have been analysed in gas chromatography-mass spectrometry (GC-MS) for halocarbons measurements. GC-MS, preceded by Solid Phase Microextraction (SPME) has been employed for VOC analysis. Furthermore, fluxes from the landfill surface were measured by means of a flux chamber. This approach allows to estimate emissions of those compounds of interest from landfills.