Gaseous mercury in soils over deeply buried sulfide deposits

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The measurement of gaseous mercury in soils over a deep (~90 m) zinc sulfide mineralization was used to evaluate its potential as a mineral exploration technique. The Zn-Pb Santa Maria deposit (Camaquã Basin, RS, Brazil) contains sphalerite and galena as main ore minerals and up to 7 μg/g Hg. Holes at depths of 30 cm and 50 cm were made at preselected sample locations on three soil transects, two of them over the ore body. The Hg in soil pore gas was measured during 30 s, after inserting the hose of a portable Hg analyser in the hole and air purging. The concentrations of Hg in soil pore gas samples were typically low (< 5 ng/L) but significantly higher values were measured in the deeper holes, i.e., up to 18 ng/L. The higher Hg concentrations marked the position of the ore body. Total Hg in soil samples attained 40 ng/g, which also coincides with the mineralization, while median value was 21 ng/g.

Application of DSC and NMR to study the soil organic matter in the Atacama desert

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The study of the organic matter in desert soils makes necessary the development of sensitive methods to detect low percentages of SOM.Differential scanning calorimetry (DSC), together with ^{13}C CPMAS and 2D liquid H NMR was applied to study the SOM composition and structure of different mineral soils collected in the Atacama desert. DSC was very sensitive to study the SOM of those samples in base on their thermal properties. SOM combustion was detected in the DSC curves at C percentages up to 0.5 %. Most of them showed two well defined combustion peaks at temperatures atributed to carbohydrates and aromatic compounds.The heat of combustion obtained by the direct integral of those curves were directly correlated with the C and OM percentages of the soils as found in soils rich in organic matter content. The normalization of the heat of combustion to the OM content of the samples indicated different OM composition in the soils from Atacama. ^{13}C CPMAS NMR spectra indicated the existence of carbohydrates and aromatic compounds too.The aromatic compounds could be assigned to phenols derived from lignin. 2D liquid H NMR showed predominance of the aliphatic compounds when these soils are treated with chloroform.Most of the aliphatic C detected is attributed to Acetyl C and Methyl C in lipids or/and suberin. Nevertheless, the aliphatic fraction of the organic matter was not detected by the DSC and ^{13}C CPMAS NMR. Application of the three methods gives accurate information about the OM composition in these soils. It seems the carbohydrates and aromatic compounds are the main constituents in these mineral soils. Aliphatic C takes part of the general OM composition too but at lower percentages and it is necessary the specific extraction to be detected.