



Rapid methods for classification and quantitative assessment of petroleum hydrocarbons pollution in soil samples using reflectance spectroscopy.

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Petroleum hydrocarbons (PHC) are one of the most significant environmental polluter (for both soil and water) mainly due to its mass production and use (13.26 million cubic meters of crude oil per day). The commonly used method for PHC determination in soil samples is by PHC extraction from the soil sample using 1,1,2-Trichlorotrifluoroethane (Freon 113) and afterwards determining the total PHC (TPH) by FTIR. This method is expensive and time consuming; in addition the use of Freon 113 was recently prohibited by the EPA. Therefore, there is a great need for alternative methods which are environmental friendly and can rapidly detect low concentrations of petroleum hydrocarbon in soils. The adoption of this approach to evaluate PHC contamination in soils is obvious and a few works have partially demonstrated this application.

This study focused on using defused spectral analysis across the VNIR-SWIR region (400-2500 nm) to directly determine PHC in soil samples especially at low concentrations. We used artificially contaminated soil samples (diesel and fuel) that were analyzed by both the common method (extraction with Freon 113) and spectrally. Several statistical models were tested for predicting TPH in soils for a large concentration range (100 - 10000 ppm). More than one hundred field contaminated soil samples have been collected and analyzed in the same manner. Preliminary combined generic models are being tested, for in situ use for quantifying TPH in soils at high precisions levels, as well as identifying fuel type in the soil medium with great success. Our results show that PHC contamination in soils can be evaluated generically in situ, rapidly, accurately, and cost effectively.