SoilRemediation: a software tool for managing, visualizing and analyzing environmental data and for assessing site and soil contaminations

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Contaminated sites have become a common concern of all industrial countries. This is particularly true in Europe and North America where generations of industry have followed one another, leaving behind many contaminated lands. Whether environmental, health, social or economical issues are to be addressed, remediation of contaminated soils remains the only solution to eliminate contamination hazards (sources) and to allow safe access or reuse of these areas. Cleanup or risk standards must be attained, which fully condition the volume of contaminated soils to dig out or process, hence the remediation costs.

Geostatistics provides suitable methods for modeling soil contaminations, from which contaminated soil volumes and attached uncertainties can be estimated and delineated more accurately. Dedicated geostatistical approaches and techniques are required, however, to take into account appropriately the following specificities of soil contamination and remediation data.

- Multiple (up to 15 or more) correlated contaminants are to be considered all together.
- Contaminant grade distributions are generally highly skewed and may contain a high proportion (peak) of under detection-limit data, thus leading to data analysis issues.
- Contrasted but correlated soil contaminations may be found in different soil layers or types (facies), thus requiring that correlated variables (contaminant grades) be estimated or (geostatistically) simulated together, but in separate soil domains.
- Specific post-processing tools are needed to classify soils as contaminated or safe against risk-based regulatory thresholds that are contaminant-dependent and may vary from one zone to another or with depth depending on site redevelopment choices (dwelling, offices, gardens, car parks, etc.).
- Decision-making tools are required to manage uncertainties for remediation strategy purposes.

SoilRemediation® is a software tool that implements such a suitable geostatistical approach dedicated to contaminated sites and soils. It also provides appropriate tools for storing, managing, analyzing and visualizing environmental and contamination data in all soil, water and air media.

SoilRemediation® has been developed as a plugin and workflow in Gocad®, a powerful geological modeling software originally developed to provide modeling solutions to the petroleum and mining industries. As an environmental application of Gocad®, SoilRemediation® aims at making cutting-edge graphics and modeling technology easily available to environmental professionals.

The talk will present the different data analysis, modeling and risk assessment steps of the approach (workflow) and will illustrate its use on actual case studies.