



Research platform MOSAIC (model-driven site assessment, information & control)

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A detailed knowledge of subsurface structures (including geometry and relevant parameters) and processes is an important prerequisite for the understanding and the solution of different environmental and hydrogeological problems. Problem examples include - but are not limited to - the management of water resources, the management of contaminated megasites, and the geotechnical evaluation of building ground.

Commonly, boreholes and geophysical surface measurements are used for subsurface investigations. In case of boreholes, information can be obtained from cores and geophysical logging. Typically, borehole data have high vertical resolutions, but suffer from a lack of information in lateral directions between the boreholes. This gap can be bridged by the application of geophysical surface measurements which can provide horizontally continuous information. However, due to physical reasons, the vertical resolution of surface methods decreases with depth. A further possibility for the exploration of sites is the use of Direct Push (DP) technology (also known as “cone penetration testing” or “direct drive technology”). This technology refers to a growing family of tools used for performing subsurface investigation by pushing and/or hammering small-diameter hollow steel rods into the ground allowing the acquisition of vertical profiles with a high resolution up to depth of 50 m. For a satisfying geological and/or geotechnical, and cost-effective exploration of the subsurface, a combination of the different methods is necessary.

With the aim to combine the different methods for a problem-oriented, rapid site characterization, the UFZ Centre for Environmental Research creates the new research platform MOSAIC (Model-Driven Site Assessment, Information & Control). The platform comprises a mobile and modular data acquisition and evaluation unit for

adaptive and modeling-based field investigations. It contains vehicles equipped with direct push probing devices in combination with geophysical measuring techniques, borehole logging, hydrogeological and geotechnical equipment as well as a GIS-based data visualization and communication unit. MOSAIC should be applicable for a high resolution 3D characterization of the shallow subsurface (approx. 50 m deep) of sites with a size of up to square kilometers. With this aim and instrumentation, MO-SAIC offers new possibilities for research on exploration and monitoring techniques. Examples are the combination of methods with different spatial resolution and dimension of investigation, development, and evaluation of adaptive problem-oriented site investigation strategies as well as of new exploration/monitoring methods, optimization of environmental monitoring networks, and the development of effective methods for the determination of site specific rock parameter relationships.