SOLEXPERTS
Swiss Precision Geomonitoring

Focus-information

Geotechnology Hydrogeology Monitoring

Solexperts Hydrogeology

- **Design and manufacturing of groundwater monitoring systems**
- **Automatic groundwater monitoring systems**
- **In-situ testing and instrumentation**
- **Test analysis and interpretation**

Solexperts Hydrogeology Department

Solexperts hydrogeology department started about 15 years ago and was primarily involved in groundwater characterisation of existing and potential hazardous waste sites as well as hydraulic investigations for large construction projects.

The carrying out and interpretation of hydrogeological in-situ tests reaches standards that are internationally well respected. The interdisciplinary teamwork between groundwater hydrologists and engineers along with our own electronic and mechanical workshops enables Solexperts to develop and manufacture advanced test and monitoring systems. Internal production of these systems and their use by our clients and our own engineers and technicians ensure reliable field-proven systems. Our in-house design and manufacturing offers great flexibility for the conception and performance of specialized hydrogeological projects.

Services of Solexperts

Solexperts hydrology department is able to cover a large field of hydrogeological applications because of our specialized knowledge and the use of advance equipment, including:

- Groundwater hydrologic field tests and analysis
- Pneumatic testing in the unsaturated zone
- Hydro-Fracturing and Hydro-Jacking
- Installation and monitoring of customized test systems
- Development and manufacturing of specialized measuring devices
- Automatic groundwater monitoring, including autonomous data loggers

Multiple packer systems

Hydrogeological characterization with double packer systems

In-situ tests with double packer systems are used to estimate the hydraulic parameters (steady-state hydraulic head, transmissivity, permeability, storativity, etc.) of geological formations or engineered barriers.

Applications:

- Hydrologic characterization of waste disposal sites, hazardous waste sites and hydraulic barriers
- Determination of hydraulic permeability between about 10^{-3} to 10^{-12} m/s with depths to maximum of about 2000 m
- Hydrologic assessments for the planning and construction of dams and tunnels
- Optimization of groundwater monitoring and water wells

Large pumping tests

Successful testing generally depends on the use of suitable equipment (e.g. pumps and data acquisition systems). The Solexperts «Hydro-Team» supports you with the planning, performance and analysis of the field tests.

Instrumentation and test performance related to nuclear waste disposal.

The figure shows some of the instrumentation for an engineered barrier system in the Grimsel Test Site (Switzerland)

Tracer Testing

In the unsaturated zone:

- Gas tracer tests with helium and radon for optimization of soil remediation projects

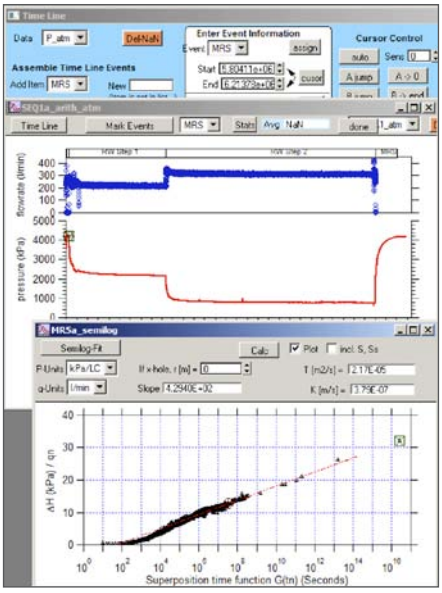
In aquifers:

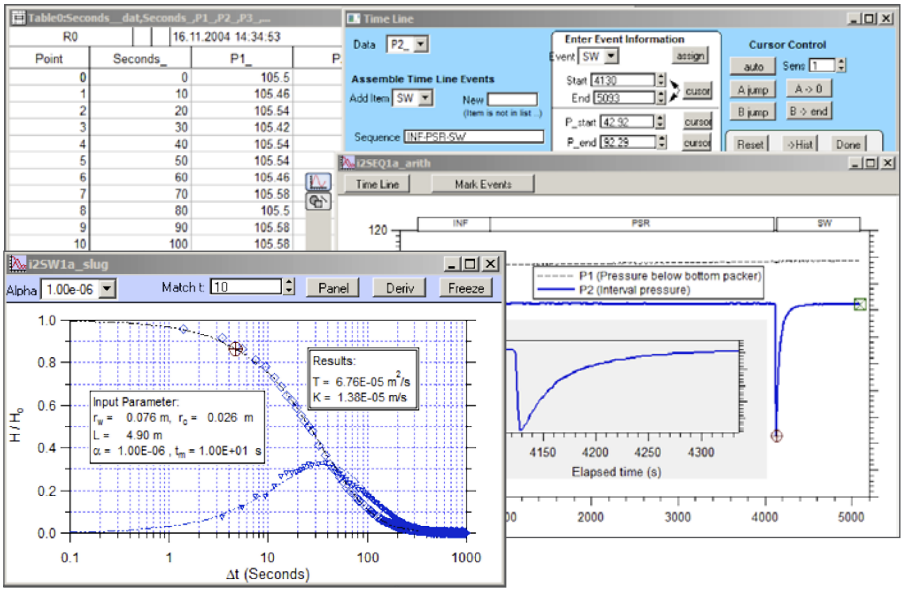
- Definition of transport model input parameters (Darcy velocity, effective porosity, dispersivity)
- Monitoring using advanced systems such as: Laser-Fiberoptic-Fluorimeter for online detection of fluorescence tracers in the boreholes. Measurement devices for online detection of Helium-3/4 tracer in the groundwater

Modern test analysis software

Our engineers have developed specialized software for onsite analysis of the hydraulic test data. This allows the engineer to evaluate the tests in the field and to optimize the testing procedure. For detailed test analyses Solexperts uses software tools that allow for a wide range of boundary conditions and aquifer models.

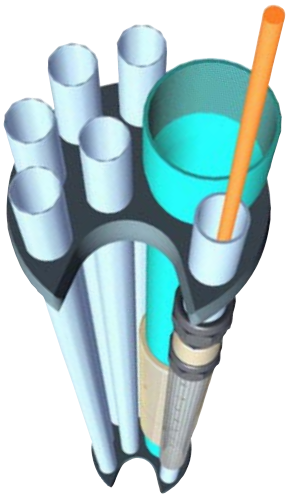
Hydrogeologic interpretation software with differents aquifers models.





Multi-level groundwater measurement systems

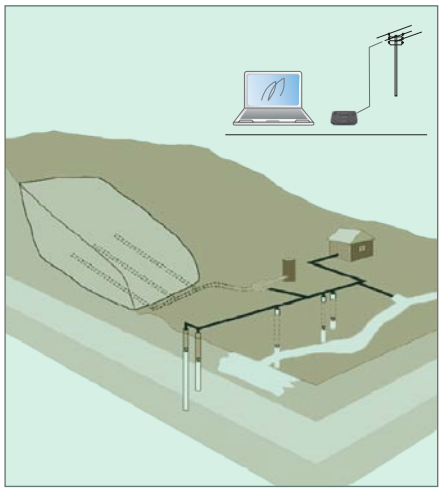
The spatial 3D distribution of hydraulic and hydrogeochemical parameters are needed for the evaluation of contaminant transport, recharge rates, saltwater intrusion, the planning of deep construction projects, etc.
The Solexperts Multi-Port-Samling-System (MPSS) is a tool for 3D groundwater monitoring that allows a borehole to have multi-level observations (multiple observation points at different depths). Because the MPSS multi-level approach is very cost effective a complete 3D monitoring network can be developed using a minimum number of boreholes.
Solexperts offers customized MPSS tools to meet the requirements of a wide range of applications and also support our clients with the installation and maintenance of the systems.



Multi-Level systems

Monitoring with autonomous data loggers

Autonomous data loggers can be used for independent monitoring systems. Battery packs or solar panels are used for the power supply.



Online data acquisition with the Solexperts GeoMonitor

The Solexperts GeoMonitor system provides the automatic data acquisition and monitoring of different types of sensors (pressure, temperature, humidity, soil moisture, flow rates, physical chemical water parameters and tracer concentrations, and others). Up to 1000 sensor parameters can be monitored per GeoMonitor system. Multiple GeoMonitor systems can be connected together for large projects. A single cable is used to connect all the sensors as well as provide power to the sensors. The GeoMonitor alarm functions (lights, fax, etc.) allow unattended monitoring. Additionally, the GeoMonitor system (located in the field) can be controlled from the office and the field data automatically downloaded. Recording rates can be remotely changed, alarms monitored, etc.

Typical applications include:

- Pump tests
- Long-term groundwater monitoring
- Hydrogeological and rock mechanic experiments
- Monitoring of construction sites

Design and manufacturing of measurement devices

Solexperts has many years of experience in the design and manufacturing of hydrogeological and geotechnical measurement devices. Customized measurement devices and monitoring systems can be designed and produced economically in the Solexperts workshops.

Examples are:

- Multiple packer systems with monitoring intervals at customized locations
- Fluid-Logging-System for boreholes with variable angles
- Laser-Fiberoptic-Fluorimeter for online detection of fluorescence tracers
- Online Helium tracer measuring device for use in soil, air and groundwater

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