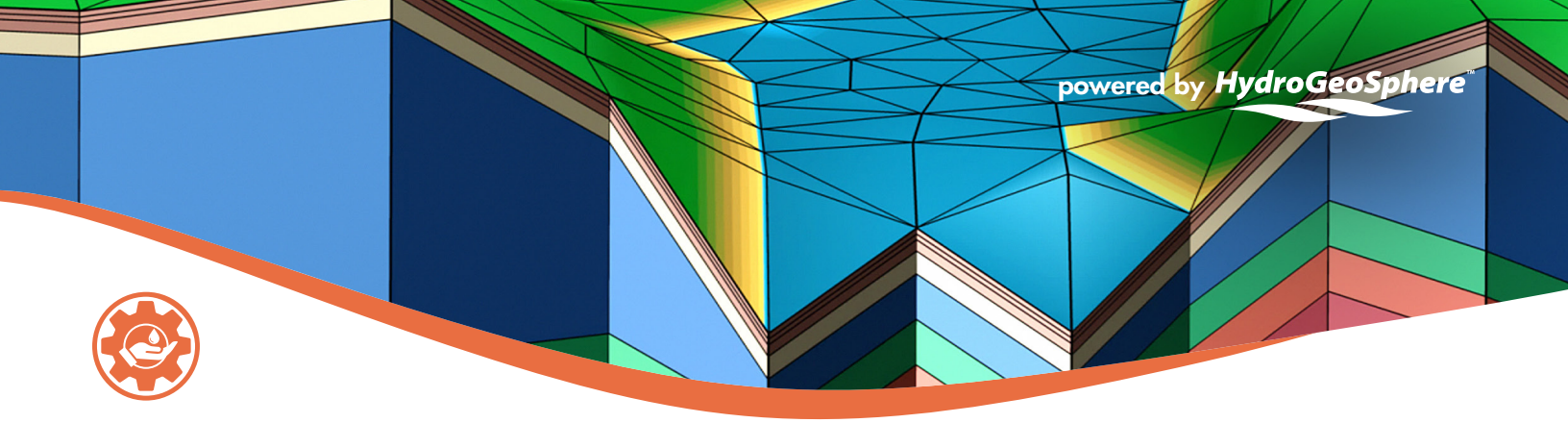
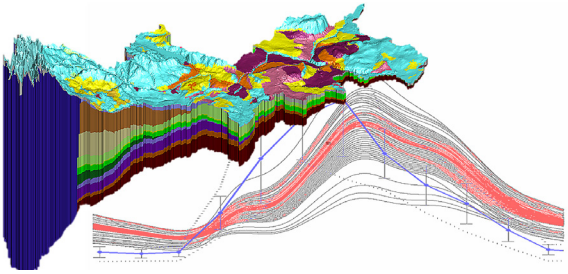


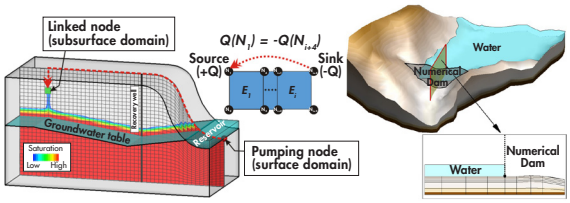
Embracing the Future: The Integrated Approach to Hydrologic Modelling in Water Resources Engineering

Traditional water resources engineering has often relied on compartmentalized models that address specific aspects of the hydrological cycle. However, as we navigate through an era marked by unprecedented environmental challenges and the increasing complexity of water systems, it has become evident that a more comprehensive and integrated strategy is required. Fortunately, simulation tools like **HydroGeoSphere (HGS)** have been rapidly improving, and in the evolving landscape of water resources engineering an integrated approach to hydrologic modelling has emerged as the way of the future!

Benefits

- **Improved understanding of hydrologic systems**
- **Increase operational efficiency**
- **Promote interdisciplinary collaboration**
- **Enhanced decision support**
- **Minimize uncertainty**
- **Expand your service offerings**
- **Provide exceptional client support**





Boundary condition linking

Dam and reservoir management

Applications

- Flood plain mapping and risk analysis
- Contaminant plume migration and source identification
- Municipal water supply planning, utility operations
- Climate change risk assessment and resilience planning
- Real-time hydrologic forecasting & decision support systems
- Evaluate land-use scenarios & best management practices for watershed health

Key Features

- Fully-integrated hydrologic modelling offers a wide range of operational benefits for consulting firms: **increased operational efficiency & promote interdisciplinary collaboration** by removing the need for distinct surface/groundwater teams/models.
- Provide **enhanced decision support** to your clients via HGSRT – our real-time hydrologic forecasting service – and **expand your service offerings**.
- **Improved understanding of hydrologic systems** by integrating surface water and groundwater into a unified, tightly-coupled model which supports explicit exchange of water between domains; use the **Hydraulic Mixing Cell functionality** to track the origin and fate of any "tagged" water source within the model (easily disaggregate baseflow, overland flow and direct precipitation).
- **Minimize uncertainty** inherent in empirical modelling techniques by relying on HydroGeoSphere's physics-based approach to hydrologic modelling.
- **Provide exceptional client support** through polygon tracking which provides precise reporting of lateral and vertical surface and subsurface water flows through areas of any scale, providing you with localized and granular model outputs to support your clients.

FURTHER READING

HydroGeoSphere: A Fully Integrated, Physically Based Hydrological Model. *Groundwater, 2012.*

Hydrological sustainability of in-pit reclaimed oil sands landforms under climate change. *Frontiers in Environmental Science, 2022.*

Evaluating Domestic Well Vulnerability to Contamination From Unconventional Oil and Gas Development Sites. *In Water Resources Research, 2020.*

Integrated surface-subsurface water and solute modeling of a reclaimed in-pit oil sands mine: Effects of ground freezing and thawing. *In Journal of Hydrology: Regional Studies, 2022.*

Backward Probability Model for Identifying Multiple Contaminant Source Zones Under Transient Variably Saturated Flow Conditions. *In Water Resources Research, 2020.*

Aquanty – World-Class Water Resources Science and Technology

Aquanty specializes in predictive analytics, simulation and forecasting, and research services. Our technology and services are deployed globally across a broad range of industrial sectors including; agriculture, oil and gas, mining, watershed management, contaminant remediation, and nuclear storage and disposal. Aquanty's scientists are recognized as leading international experts in integrated climate, groundwater & surface water modelling. Our mission is to deliver holistic water resource and climate solutions to support informed decision making for our clients in a rapidly changing world.

HydroGeoSphere™

The world's most powerful hydrologic modelling platform

- **Fully integrated surface and groundwater simulations** provide a holistic understanding of complex and interconnected watershed dynamics for water resources management.
- **Reactive solute and thermal energy transport** capabilities give you the tools to predict contaminant fate and travel time probability statistics for source identification.
- **Advanced numerical methods** to support simulations of unprecedented scale and complexity; fully-implicit coupling for all domains provides for a robust, mass conserved solution.
- **A physics-based approach** to hydrology greatly reduces the inherent uncertainty of empirical modelling techniques and provides the most robust approach to simulating the effects of climate change.

HGS REAL TIME

Reliable hydrologic forecasting powered by HydroGeoSphere

- **Multi-objective hydrologic forecasting** for flood, drought, base-flow, soil moisture, surface water and groundwater.
- **Enhanced decision support** for water resources management based on a holistic, integrated approach to watershed hydrology.
- **Synergize operational data sources** including near-real-time field observations and remote sensing products with meteorological predictions to produce reliable forecasts.
- **Cloud-computing architecture** supports ensemble of weather forecast scenarios, forecast outputs analyzed and reported in a probabilistic framework.

HydroGeoHub™

Aquanty's web architecture puts earth system modelling within reach of every person

- **Unify data management and analytics** for an integrated understanding of hydrology, geology, meteorology and climatology.
- **White label web infrastructure** to deliver best-in-class hydrologic modelling and decision support to your clients.
- **Flexible and extensible** architecture to handle any data pipeline world-wide, putting the right information in front of the right people at the right time.
- **Analytical tools and custom workflows** to simplify your unique operational requirements.

Modelling On Demand™

Automatic web-based simulations for decision support and scenario analysis

- **Time saving through automation:** models constructed at the click of a button using comprehensive geological data framework producing results in minutes for rapid decision support.
- **Flexible and agile** model inputs allow you to adapt to changing requirements. When needs evolve, models can be created or modified as necessary, enabling quick responses to dynamic situations.
- **Globally scalable, versatile and ready to deploy** for field-scale soil moisture forecasting and pesticide/nutrient runoff and fate; watershed-based customizable scenario analysis and climate change assessment.

Proud Partner of the Canada1Water initiative

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