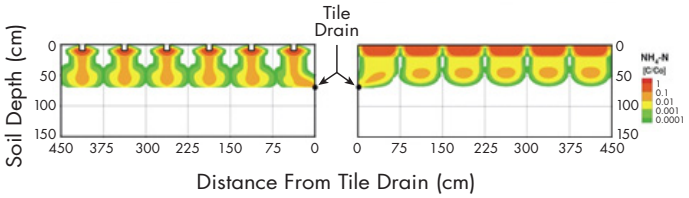
HydroGeoSphere Modeling for Agriculture & Forestry

Aquanty operates real-time and on-demand HydroGeoSphere-based hydrologic forecasting platforms to help a wide variety of stakeholders understand and predict current and future water resources. Our user-friendly technology is enhancing landscape management, drought and flood risk assessment, and understanding of climate change impacts across economically crucial areas of Canada. From national-scale hydroclimatological analysis to field-scale soil-moisture and chemical leaching prediction, **HydroGeoSphere** simulation technology is a valuable tool for government agencies, agricultural stakeholder groups, watershed managers, and others to understand and manage water quantity and quality.



Benefits

- **Increase operational efficiency**
- **Optimize water usage**
- **Adapt to climate change**
- **Mitigate flood/drought risk**
- **Build resilient agroecosystems**
- **Evaluate impact of BMPs on water quality**

Special Projects

- **The MFGA-Aquanty Forecast Tool:** Real-time hydrologic forecasting for decision-support around water movement, soil health, climate risk assessment & mitigation in the Assiniboine River Basin (with the Manitoba Forage and Grassland Association)
- **HGSRT Deployment in the South Nation River Watershed:** Real-time hydrologic forecasting for flood and drought, low-water response planning, climate change scenario analysis and evaluation of best management practices on agroecosystem health.
- **Evaluating Nutrient Runoff/Leaching:** Developed simulation framework to evaluate liquid swine manure movement through shallow soils based on different application methods (broadcast vs injection), drainage regimes (free draining vs controlled tile drains), soil types and seasonal conditions.

Key Features

- **Optimize water usage and save money** by forecasting soil moisture and irrigation needs with Aquanty's unique **Modelling on Demand** technology. This approach towards optimizing water use can reduce operational costs and improve productivity.
- **Adapt to climate change and mitigate water stress** by understanding long-term climate trends, flood and drought risks, and land use change impacts while helping to **build resilient agroecosystems**.
- **Policy and planning support** available across Canada; review watershed hydrology indicators for over 1300 river basins covering continental Canada.
- **Improved understanding** of nutrient and pesticide runoff and transport through all portions of the hydrologic cycle; evaluate the impact of **BEST management practices**, land drainage activities, and agrichemicals with state-of-the-art HydroGeoSphere models.
- **Incorporate local knowledge** into real-time forecasts based specifically on known crop history, management practices, and soil conditions.

FURTHER READING

Effect of topographic slope on the export of nitrate in humid catchments: a 3D model study.
In Hydrology and Earth System Sciences, 2022.
Impacts of Climate Change and Different Crop Rotation Scenarios on Groundwater Nitrate Concentrations in a Sandy Aquifer. *In Sustainability, 2020.*
Simulating seasonal variations of tile drainage discharge in an agricultural catchment.
In Water Resources Research, 2017.
Evaluating Climate Change Impacts on Soil Moisture and Groundwater Resources Within a Lake-Affected Region.
In Water Resources Research, 2019.

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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