WATER RESOURCES

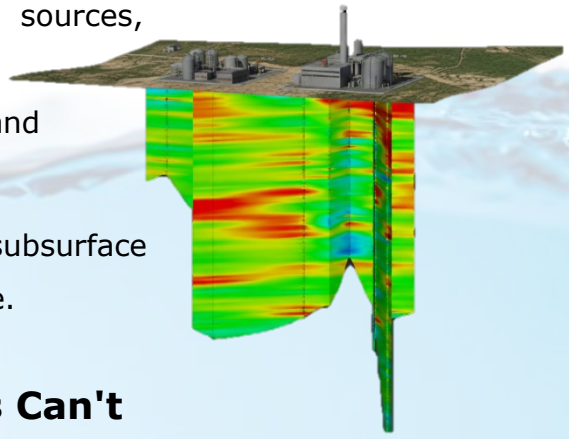
Unlock the Full Potential of Your Groundwater Resources

Columbia Technologies and Vista Clara bring proven, advanced subsurface characterization solutions to optimize your water resource exploration and management—allowing you to make informed decisions, reduce project risks, and achieve long-term water sustainability with confidence.

Why Now? Brazil's Water Infrastructure Revolution

Brazil's landmark sanitation law (Law No. 14.026/2020) is transforming the nation's Water and wastewater landscape. With mandates for 99% potable water access and 90% sewage treatment by 2033, utilities, concessionaires, and engineering firms are investing billions to expand and modernize infrastructure across every state.

Your challenge: Identify reliable groundwater sources, optimize well placement, and design cost-effective systems—all while managing geological uncertainty and tight project timelines.



Our solution: NMR technology provides the subsurface intelligence you need to move forward with confidence.

The NMR Advantage: See What Others Can't

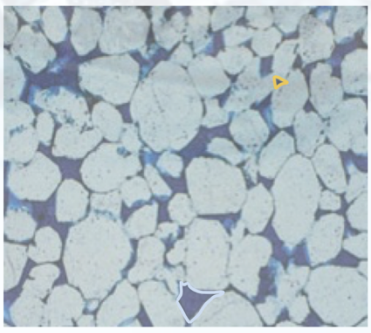
Nuclear Magnetic Resonance directly detects hydrogen in subsurface water molecules, delivering quantitative measurements that traditional geophysical methods cannot match.

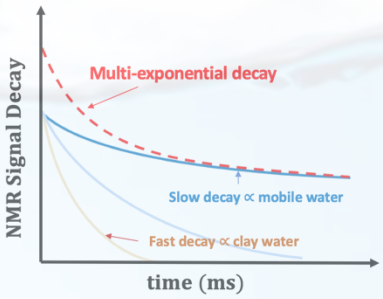
Magnetic Resonance Technology

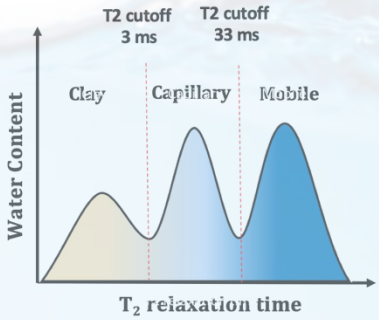
Magnetic Resonance Technology is a non-invasive method that detects and measures hydrogen atoms in materials. Magnetic resonance uses electromagnetic pulses to excite hydrogen protons, which then emit measurable signals when returning to their natural state. This technology—proven in medical imaging as MRI—provides direct, quantitative information about water content, location, and flow characteristics in subsurface environments for groundwater exploration, aquifer assessment, contaminated site characterization, and water resource management.

Geologic materials contain a variety of pore sizes. The NMR signal has a multiexponential decay that reflects the pore size distribution. Water in small pores have a faster relaxation time. Water in large pores have a long relaxation time.

Hydrogeologic Properties from NMR

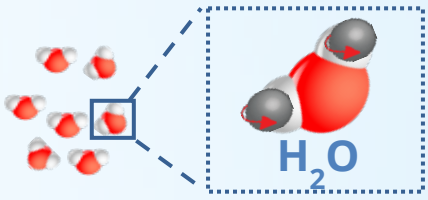






Directly Measured Properties:
- Volumetric Water Content
- Total Porosity (if fully saturated)
- Relative pore size distribution

Quantitatively Estimated Properties:
- Effective (mobile) porosity
- Bound porosity
- Hydraulic conductivity



COLUMBIA TECHNOLOGIES

MAGNETIC RESONANCE GEOPHYSICS
WATER MANAGEMENT APPLICATIONS

What Makes NMR Different?

- **Direct water measurement** – No interpretation guesswork; NMR measures actual water content
- **Distinguishes mobile vs. bound water** – Calculate hydraulic conductivity and transmissivity on-site.
- **Non-invasive profiling** – Characterize aquifers before drilling, reducing exploratory costs
- **Flexible deployment** – Surface systems (GMR), Javelin borehole logging tools (2" to 18"), and Dart direct push tools for any project scale.

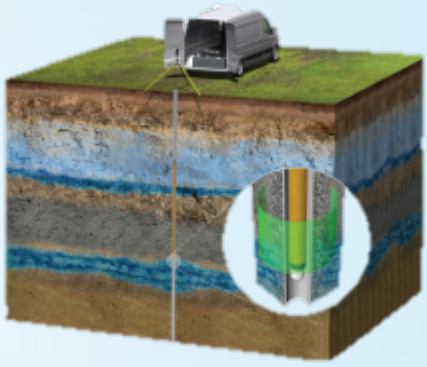
From shallow sediments to deep fractured bedrock, Vista Clara's NMR systems deliver the subsurface data that drives successful outcomes.

What Can NMR Do for Your Project?

Water Supply Development

- Identify high-yield aquifer zones for new wells
- Optimize well-field layouts and pumping strategies
- Reduce drilling risk and exploratory costs

Aquifer Storage & Recovery (ASR)



- Assess storage capacity and injection feasibility
- Support regulatory permitting with defensible data

Conjunctive Use & Basin Management

- Integrate surface and groundwater resource planning
- Quantify recharge zones and aquifer connectivity
- Strengthen supply resilience during drought periods

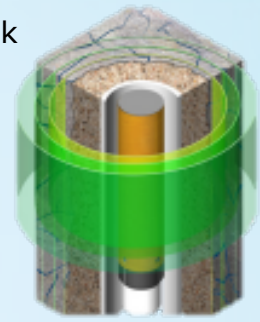
Private Sector Solutions

Water security is no longer just a public policy issue—it's a business imperative. Industries in energy, manufacturing, and technology are investing in sustainable water strategies to meet their ESG goals, ensure operational continuity, and mitigate environmental risks.

NMR geophysics provides reliable in situ measurements of critical hydrogeologic parameters, supporting the accurate modeling of subsurface conditions and enabling the optimization of water management strategies for enhanced sustainability.

NMR GEOPHYSICS APLICATIONS INCLUDE:

- **Utilities** — Securing Tomorrow's Supply with Aquifer Storage and Recovery (ASR)
- **Data Centers** – Establish "Independent groundwater baseline and non-impact evidence for stakeholders."
- **Agriculture** — Protect freshwater and manage recharge - Grow Smarter, Save Water
- **Bioenergy & the Sugarcane Industry** — Smart Water for Sustainable Ethanol
- **Foods and Beverages** – Optimize well fields and water management expenses
- **Steel/Metals** Cut pumping energy via targeted screens in high-k layers
- **Pulp & Paper** – Bankable sustainable-yield for license renewals
- **Chemical& Petrochem** (Process water/Cooling)



We deliver:

- **"Water you can measure."-** Unlike resistivity and EM that *infer* Water from conductivity, NMR measures it—putting numbers on storage and flow potential.
- Reliable data for long-term water supply planning and management.
- Better data – Better modeling – More Sustainable Solutions

COLUMBIA TECHNOLOGIES

MAGNETIC RESONANCE GEOPHYSICS
WATER MANAGEMENT APPLICATIONS

PARTNERSHIP APPROACH: INTEGRATED SOLUTIONS, PROVEN RESULTS

Vista Clara's NMR technology seamlessly integrates with conventional hydrogeologic and geophysical methods—enhancing project value for clients and meeting the highest regulatory standards.

Our commitment:

- Collaborative project execution
- Transparent data interpretation and reporting
- Solutions aligned with Brazil's evolving Water and environmental priorities

Ready to Move Forward?

Whether you're expanding water supply, assessing ASR feasibility, managing basin resources, or ad
Technologies and Vista Clara provide the subsurface intelligence that transforms uncertainty into c

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