

# GMR

Multi-Channel Surface NMR  
for Aquifer Imaging and Characterization



**VISTA CLARA** INC.  
NMR Geophysics

Pioneered with an emphasis on multi-channel capability, GMR is recognized as the state-of-the-art in surface-NMR technology, delivering non-invasive imaging of groundwater with unparalleled power, speed, and precision.

### Direct Imaging of Groundwater

The GMR system provides unambiguous detection of groundwater because the measured signal is generated by hydrogen in fluids. By probing the NMR properties of the subsurface, GMR provides quantitative images of water content as well as estimates of hydrogeologic parameters, including specific yield and permeability. Using GMR, it is possible to obtain detailed aquifer characterization before ever drilling a well.

### Multi-Channel Hardware that Delivers

Built from the ground up to capture the advantage of a multi-channel processing, sophisticated GMR hardware provides unmatched performance and superior results. Features including the highest power output, the fastest switching, and the most flexible multi-channel architecture†, translate directly into enhanced imaging capabilities with detection of deeper, shorter, and smaller NMR signals. Cutting-edge electronics are packaged in a modular design with an emphasis on portability and safety.

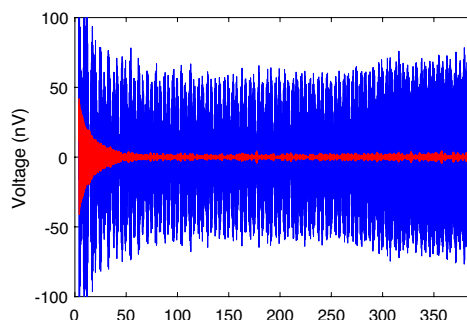


### Advanced Simple-to-Use Software

The GMR software package provides a user-friendly interface accessing patented algorithms to that exploit GMR's multi-channel design for adaptive noise cancellation† and 2D imaging†. Acquisition and processing software enables real-time monitoring of data quality, while interpretation software includes tools to determine multi-exponential decay time distributions, and to estimate aquifer properties including bound/mobile water content and relative permeability.

### Superior Design, Superior Data

In blue, noisy data before adaptive noise cancellation†; In red, data after noise cancellation reveal extremely short signals that are recorded with GMR's ultra fast detection.



## GMR Applications:

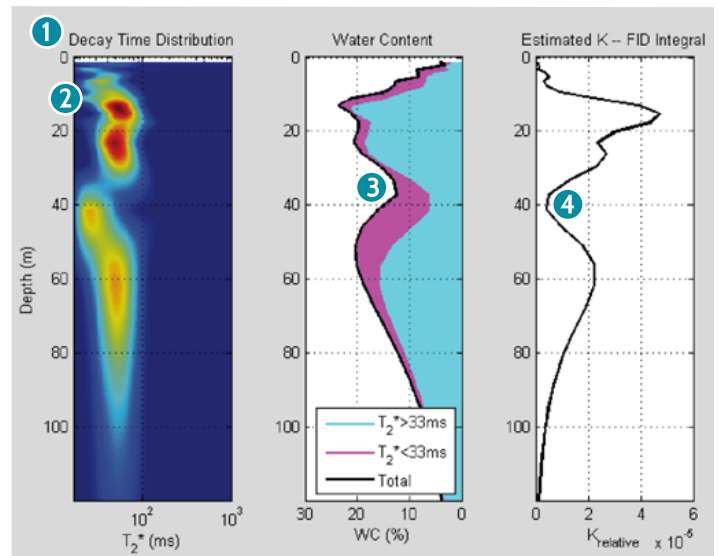
- Groundwater exploration and well site selection
- Delineation of aquifer and aquiclude geometry
- Detection of water-filled fracture zones, voids or preferential flow paths
- Characterization of aquifer properties for groundwater modeling
- Vadose zone characterization for environmental and geotechnical projects

## GMR Measurements Provide:

- Non-invasive imaging of groundwater to depths of 150 meters\*
- Quantitative determination of water content and NMR relaxation times
- Estimates of bound water volume and specific yield
- Relative or calibrated estimates of permeability



## A Virtual Pump Test without the Well



### 1 A Detailed View

The  $T_2^*$  distribution of water is related to pore size

### 2 Precise Detection

Short & small signals from silts or capillary water are detected

### 3 High Resolution

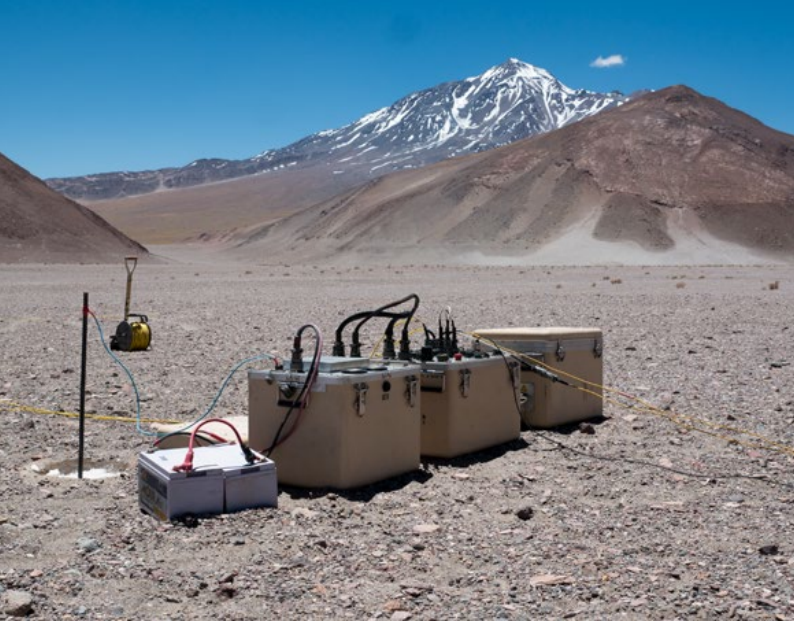
All-linear processing<sup>†</sup> yields optimal resolution of NMR signals

### 4 Permeability Estimation

Relative permeability estimation even for conditions of low-SNR

<sup>†</sup>Protected by US Patent 7,466,128; 7,986,143; 8,451,004 B2; 8,581,587; USRE43264 E1 Additional patents pending

\* Depth of investigation depends on loop size, subsurface electrical resistivity, and site conditions.



VISTA CLARA develops and manufactures advanced nuclear magnetic resonance (NMR) technologies for groundwater, mining, and environmental investigations. In addition to instrument sales, we provide equipment rentals and expert field services to diverse markets around the globe.

