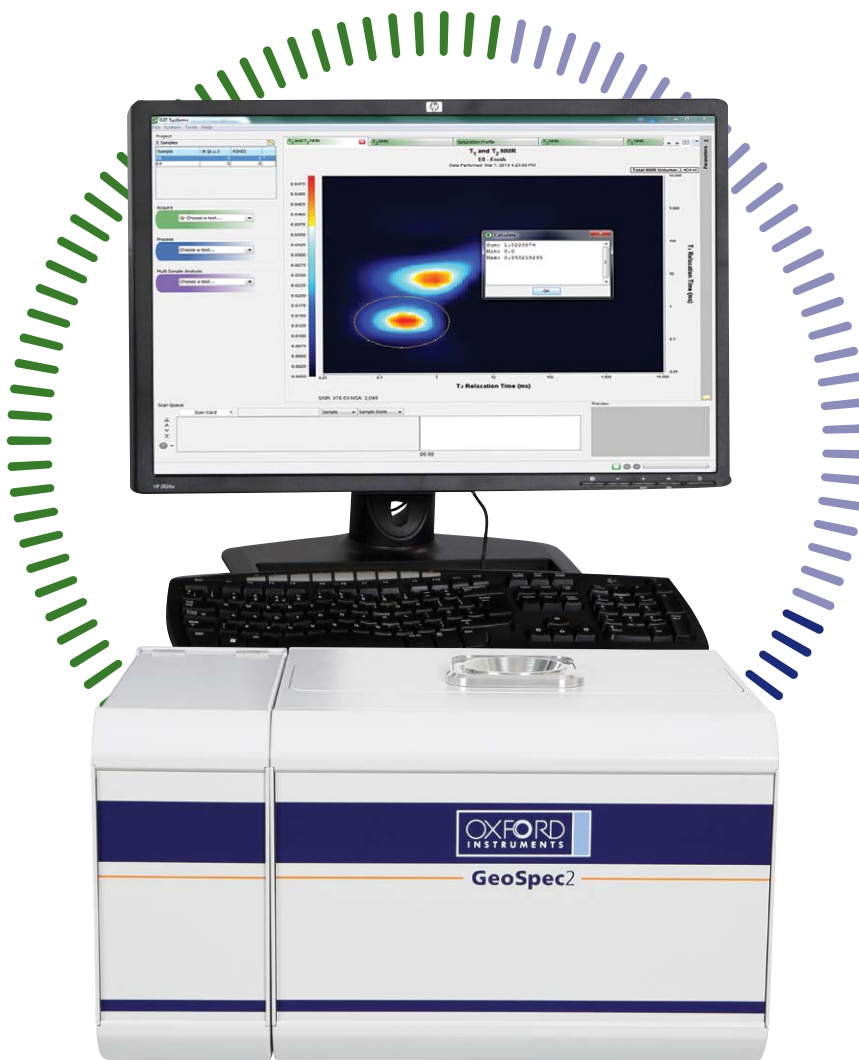


# GeoSpec2 Core Analysis



# A Design Evolution

**GeoSpec** core analysers provide cutting edge solutions for the core analyst.

Petroleum engineers constantly strive for a better understanding of their reservoirs, which requires extensive and reliable data. GeoSpec NMR core analysers provide measured and modeled data directly from the fluids in the rocks to complement other technologies and help solve the reservoir puzzle.

The **GeoSpec** range of instruments is the result of a successful long-term collaboration between Oxford Instruments and Green Imaging Technologies (GIT), the world leaders in hardware and software for NMR core analysis. First introduced in the mid-1990s, the **GeoSpec** now has well over 100 installations worldwide in oil companies, service companies and academia.

The **GeoSpec** range includes instruments from 2MHz to 23MHz operating frequency, handling samples from ½ to 2 inches diameter, with integrated software and accessories to suit all users from routine core analysis to advanced petrophysics research.

Entry level **GeoSpec** systems come complete with **LithoMetrix™** software which carries out routine measurements such as  $T_1$ - and  $T_2$ -based pore size distributions, porosity, and fluid mobility measurements such as Free Fluid Index (FFI), Bound Volume Irreducible (BVI) and Clay Bound Water (CBW).

Higher performance hardware incorporating pulsed field gradients is matched with greater software capability including measurement of hydrogen index, diffusion, and fluid typing by 2D data mapping.

Top of the range **GeoSpec** systems include saturation profiles, spatially-resolved  $T_2$  distributions, and GIT's patented capillary pressure (Pc) measurement package, GIT-CAP™. GIT-CAP allows users to obtain Pc measurements 5 times faster, while getting up to 10 times as many data points per scan, compared to traditional measurement techniques.

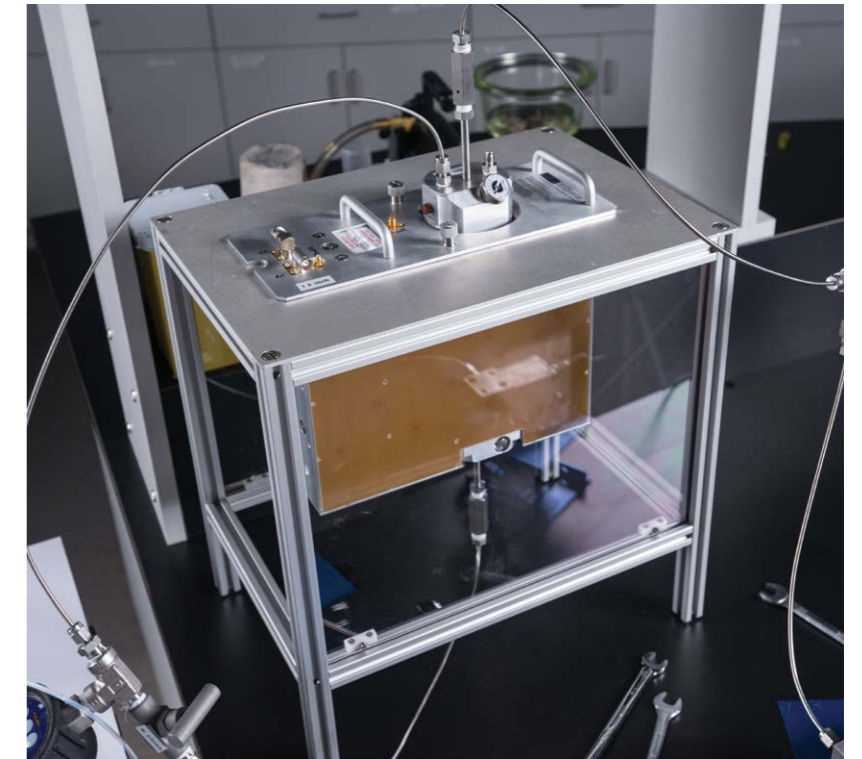


## P5 and P10 cells for overburden studies

- Up to 10,000psi and 100°C
- Maintain pressure outside the instrument
- Many enhanced safety features

With the optional P5 and P10 Cells for overburden studies, users can perform analysis on samples at up to 10,000 psi of pressure and at temperatures to 100°C.

All **GeoSpec** systems include Oxford Instruments' revolutionary Q-Sense signal enhancement technology, which provides industry-leading short echo spacings (essential for measurements on tight rocks and shales, which have a high proportion of small pores) while maintaining high signal to noise ratios (SNR). This unique combination allows measurements to be made up to four times faster, with echo spacings several times shorter, than in previous instruments. Q-Sense also allows successive measurements to be made on cores of varying salinity, without the need to retune the probe between samples.

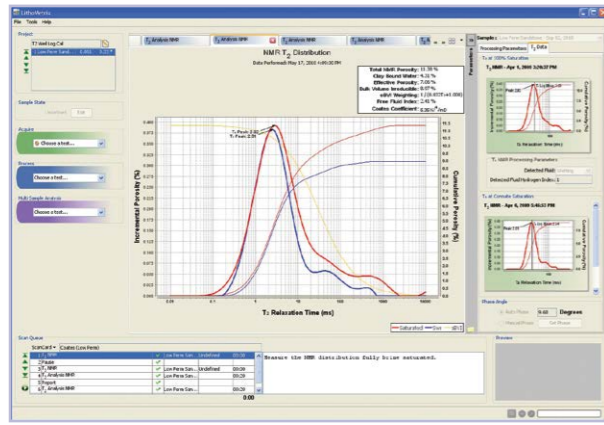


## Complete Cutting Edge Solutions from the Industry Leaders

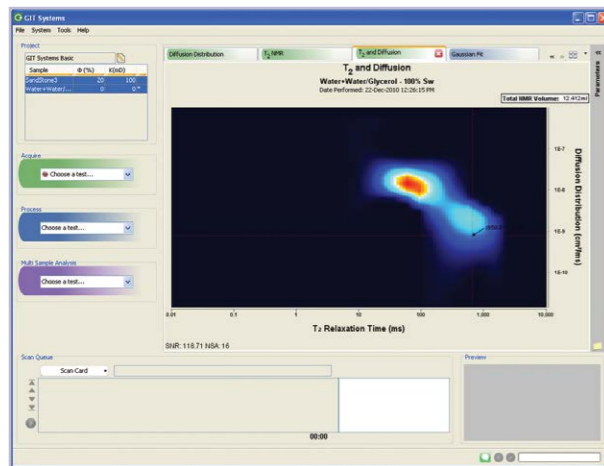
### The GeoSpec Advantage

- High SNR lets you get more from your sample and collect better data in less time.
- High sensitivity for measurements on low porosity rocks.
- External probe power dissipation for reduced thermal effects and high duty cycles.
- See tight pore networks – Q-Sense signal enhancement means seeing extremely small pores, down to 1 nanometer.
- Fastest, most accurate and data rich capillary pressure measurement available (GIT-CAP).
- 1D and 2D gradients open up advanced petrophysical studies. 3D gradients allow 3D imaging (MRI) of core samples.
- 2MHz models for optimum well log calibration; 12MHz and 23MHz models for greater sensitivity with low porosity samples.
- Sample size from ½" diameter to 2" diameter.
- Overburden studies up to 10,000psi and 100°C, using dedicated cell with multiple levels of safety features.





During the  $T_2$  distribution measurement, BVI, FFI, CBW and other fluid mobility parameters are measured.



Mapping of Diffusion distribution with  $T_2$  relaxation times, utilising GeoSpec's gradient option, can be used for fluid typing.

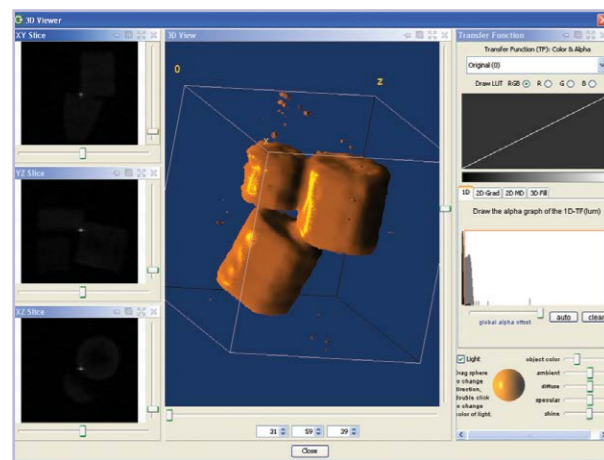
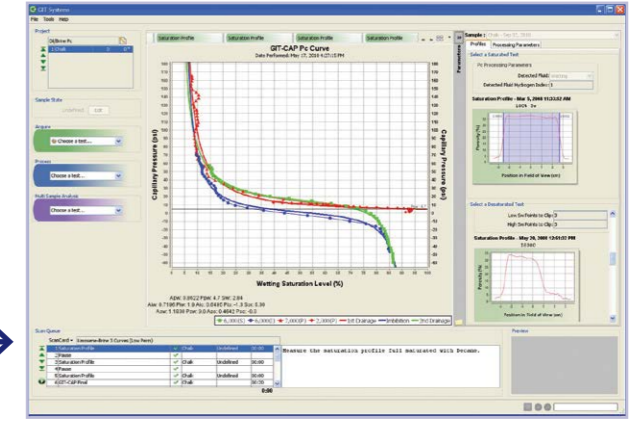
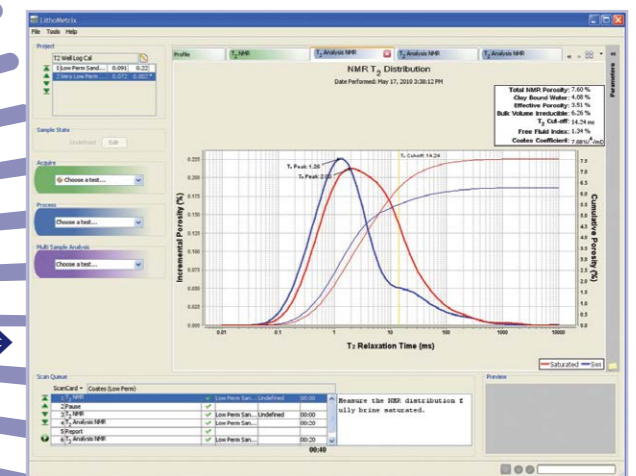


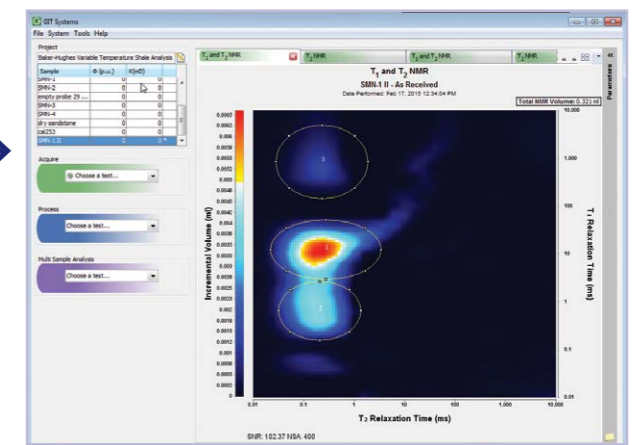
Image the fluids within the pore network in three dimensions.



Patented GIT-CAP Capillary Pressure measurement is 5x faster and provides 10x more data and is exclusive to GeoSpec.



Pore Size Distributions from  $T_2$  NMR measurements, are made more accurate with GeoSpec's higher signal to noise ratios and industry-leading short echo times.



2D maps help differentiate the populations of different fluid types.



Harness the power of NMR



## Software that works for you

All **GeoSpec** rock core analysers come complete with **LithoMetrix** software, which acts as the user interface and performs all instrument management and basic core analysis functions. LithoMetrix can be upgraded to **GIT Systems** to add more advanced measurements such as 2D maps, diffusion studies, capillary pressure and saturation profiles. Users of **GeoSpec** instruments equipped with 3D gradients can maximise the performance of the instrument using the **GIT Systems 3D Imaging** software.

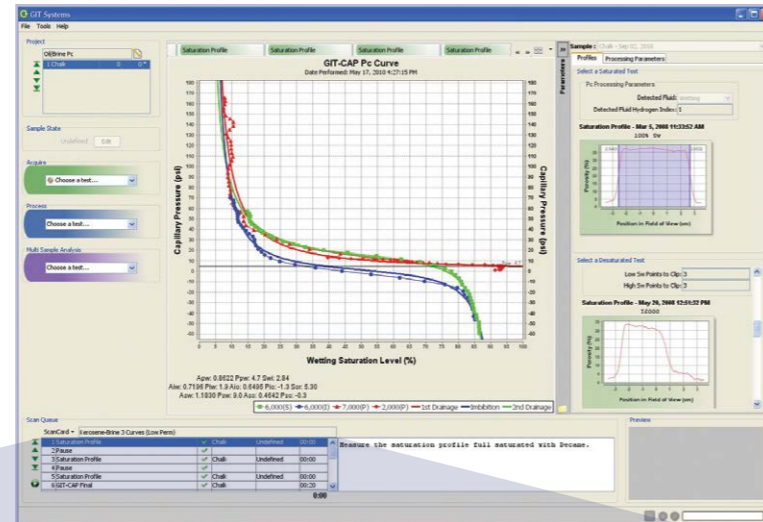
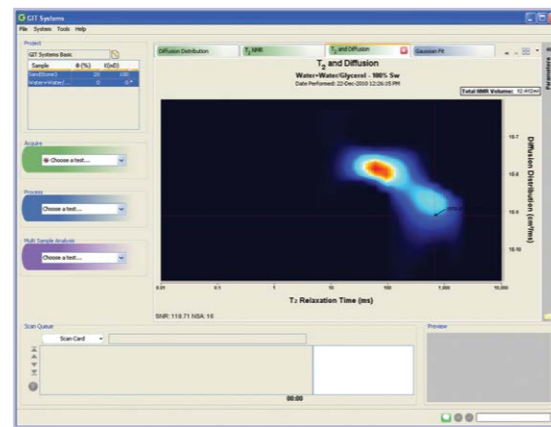
- Intuitive user interface, designed in collaboration with professional core analysts.
- Diagnostic aids, easy calibration tools, and instrument performance database.
- Routine measurements pre-packaged with automatic calculations.
- Project and sample results database maintained automatically.
- "Scan cards" allow multiple measurements to be set up in advance, to run unattended.
- Software used, tested and continually improved in our own commercial core laboratory.
- Multi level software means it can be tailored to meet users specific needs.
- **GIT App Builder** designed to allow advanced users to build, test and deploy their own pulse sequences.



## GIT App Builder

development tool is included in the **GIT Systems** product line

- Provides a full development environment.
- Design, develop and test pulse sequences.
- Includes sample pulse sequences.
- Allows advanced users to develop new sequences and deploy them to **GIT Systems**.



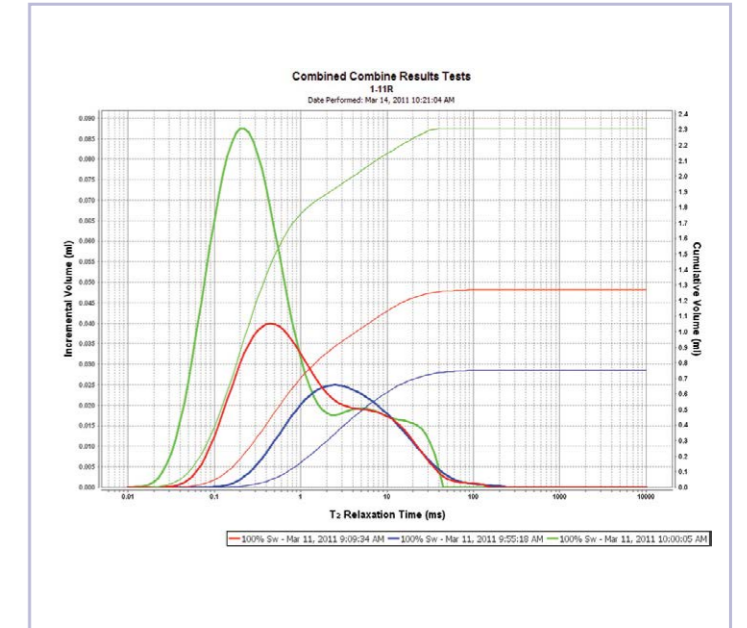
GIT Systems provides advanced core analysis in an easy to use interface

ScanCard - Kerosene-Brine 3 Curves (Low Perm)					
1	Saturation Profile	✓	Chalk	Undefined	00:00
2	Pause	✓	Chalk	Undefined	00:00
3	Saturation Profile	✓	Chalk	Undefined	00:00
4	Pause	✓	Chalk	Undefined	00:00
5	Saturation Profile	✓	Chalk	Undefined	00:00
6	GIT-CAP Final	✓	Chalk	Undefined	00:20



## Industry leading performance

- Collect better data in less time with high SNR.
- Q-Sense signal enhancement allows measurements in extremely small pores ( $\geq 1$  nanometer).
- Fastest, most accurate and data rich capillary pressure (GIT-CAP) measurement available.
- Perform overburden studies safely on conventional and unconventional samples.



Shorter Taus reveal more porosity

## Flexible configurations for any application

Configure the system to your application

- Sample size from 1/2" diameter to 2" diameter.
- Magnets from the standard 2MHz up to 23MHz for faster measurements or measurements requiring extremely short echo spacing.
- 1D and 2D gradients for advanced petrophysical studies, and 3D gradients for 3D imaging of core samples.
- A range of electronics can be tailored to meet the needs of individual applications.
- Multi level software allows users to match their application needs with software capabilities.



A range of probes is available to handle different core diameters



## Global Support

The Oxford Instruments – Green Imaging Technologies partnership has experience of supplying systems all over the world, with instruments installed on 6 continents. Our hardware and software is developed, built and tested in-house.

We have our own core analysis laboratory, providing a service specialising in difficult rocks, which can be used to validate your own results or act as a backup to your own production lab. We have support bases in the UK, the USA, Canada, and China, as well as a network of partners and resellers with global reach. No matter where you are located, our global support network can provide prompt, personal service.

## Oxford Instruments Magnetic Resonance

For almost 30 years, Oxford Instruments has been the industry standard for NMR instrumentation for core analysis. With over a hundred installations, Oxford Instruments truly understands the needs of core analysts, whether they be in oil companies, oilfield service companies or academia.

Innovation has been the driving force behind Oxford Instruments' growth and success ever since the business spun out from the University of Oxford over 50 years ago. It is now a global company with over 1,300 staff worldwide and a listing on the London Stock Exchange (OXIG).

## Green Imaging Technologies

Green Imaging Technologies (GIT) is the world-leader in developing innovative solutions for lab-based rock analysis using NMR. GIT's products and services offer fast, accurate, non-destructive analysis of rock core samples used by the oil and gas industry in exploration and reservoir characterisation.

Over the last decade, GIT's product offerings have evolved and expanded to include a full suite of routine and advanced core analysis tools. A culture of continual innovation has driven the company to become the industry leader in NMR core analysis. From prediction to production, GIT provides the solution.



For more information visit: [nmr.oxinst.com/geospec](http://nmr.oxinst.com/geospec)

### Oxford Instruments Magnetic Resonance

For more information:

✉ [magres@oxinst.com](mailto:magres@oxinst.com)

🌐 [nmr.oxinst.com/geospec](http://nmr.oxinst.com/geospec)

### Green Imaging Technologies

For more information:

✉ [info@greenimaging.com](mailto:info@greenimaging.com)

🌐 [www.greenimaging.com](http://www.greenimaging.com)



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