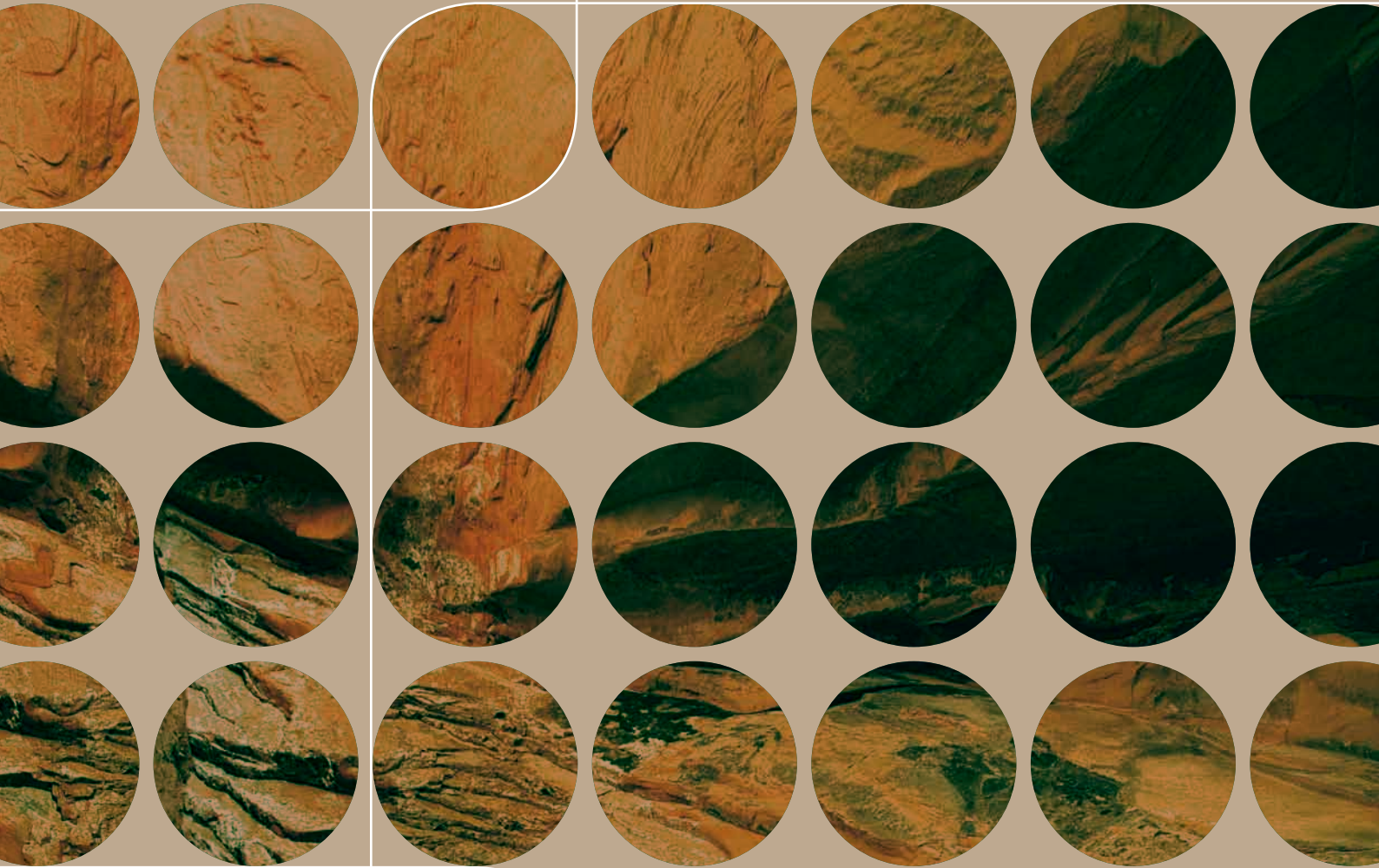


# GeoSpec2 core analysis



*The Business of Science®*



# GeoSpec2 A Design Breakthrough

**GeoSpec2** represents an exciting new approach to core analysis by NMR

This brochure describes the **GeoSpec2** – a unique and powerful combination of integrated, innovative NMR hardware and software, designed to offer the widest possible range of performance and capabilities to core analysts. The **GeoSpec2** has been jointly developed by Oxford Instruments and Green Imaging Technologies – the world leaders in hardware and software for NMR core analysis.

**GeoSpec2** hardware configurations range from 2MHz to 12MHz operating frequency, and cover sample sizes from standard 1" or 1.5" plugs up to full size (6") cores. Pulsed field gradients are available as an option for measurements based on diffusion or imaging, and all versions are compatible with overburden cells offered by third party manufacturers.

A primary goal of **GeoSpec2** is to make NMR core analysis measurements accessible to non-NMR experts. To this end, various levels of software capability are matched with and integrated into the hardware options to enable **GeoSpec2** users to be productive whatever the level of their NMR knowledge.

Entry level **GeoSpec2** systems come complete with LithoMetrix™ software which carries out the more routine functions such as T<sub>1</sub> and T<sub>2</sub>-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 is matched with greater software capability including hydrogen index, permeability and fluid typing by 2-D data mapping.

Top of the range **GeoSpec2** systems include GIT's patented capillary pressure (Pc) measurement package, GIT-CAP™, which 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.

All **GeoSpec2** systems include Oxford Instruments' revolutionary Q-Sense signal enhancement technology which allows measurements to be made up to four times faster, with echo spacings (TE) several times shorter, than in previous instruments. Short echo spacings are essential for measurements on tight rocks and shales, which have a high proportion of small pores. This allows for the correct representation of the pore size distribution and provides accurate porosity measurements.

**GeoSpec2** advances both performance and flexibility in NMR core analysis

## Improved Performance

- Signal to Noise doubled compared to previous generation instruments – lets you collect better data in the same time, or collect your data four times faster.
- Better data for tight rocks – improved measurement of fluids in smaller pore spaces, by substantially decreasing acquisition times and allowing very short echo times.
- Fastest, most accurate capillary pressure measurement on the market – the patented GIT-CAP measurement is 5 times faster than the traditional special centrifuge method, while providing 10 times more data points, without destroying the core.

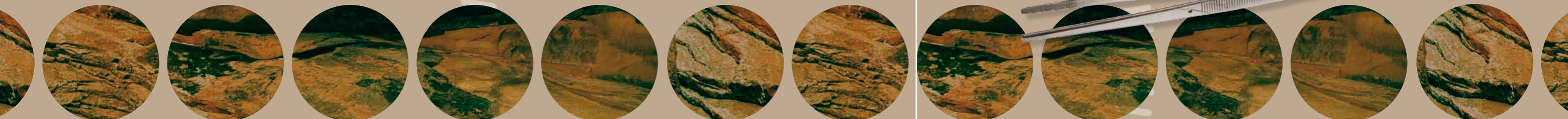
## Modularity throughout the system

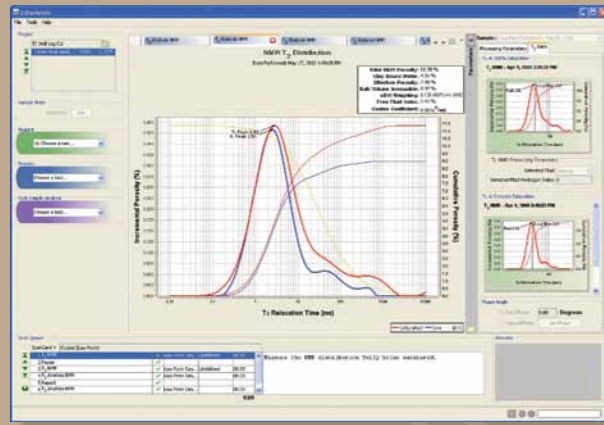
- Core sizes from 1" to 6".
- Magnets from 2 MHz for optimum well log calibration to 12 MHz for the best diffusion and imaging experiments.
- 1-D, 2-D, and 3-D gradients for diffusion studies.
- High performance, modular electronics, with a range of options for various performance levels.
- Multi-level software, matching capability to requirements, from new user to advanced research.



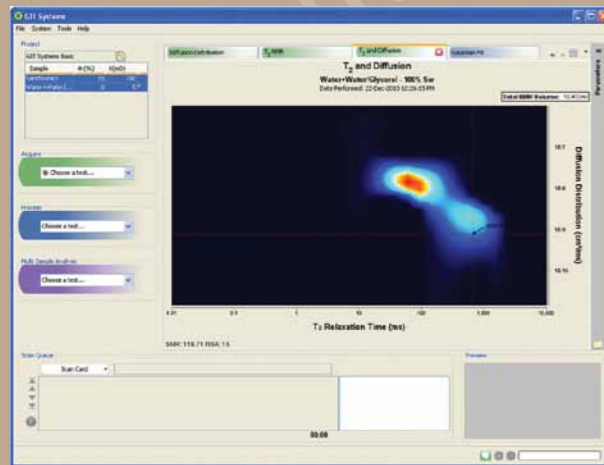
**Make your special core analysis routine... Get more from your core!**

Complete Cutting Edge Solutions from the Industry Leaders

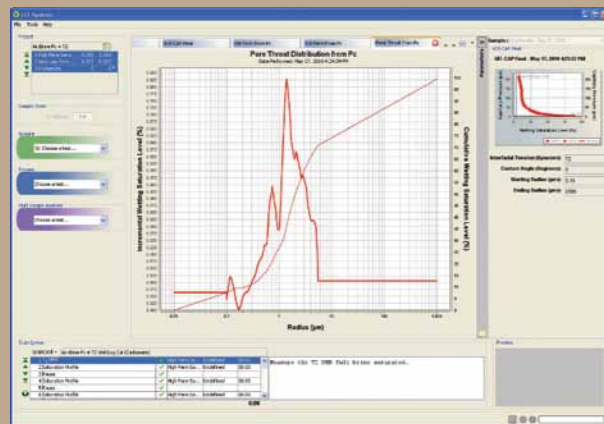




During the  $T_2$  distribution measurement, BVI, FFI, CBW and other fluid mobility parameters are measured.

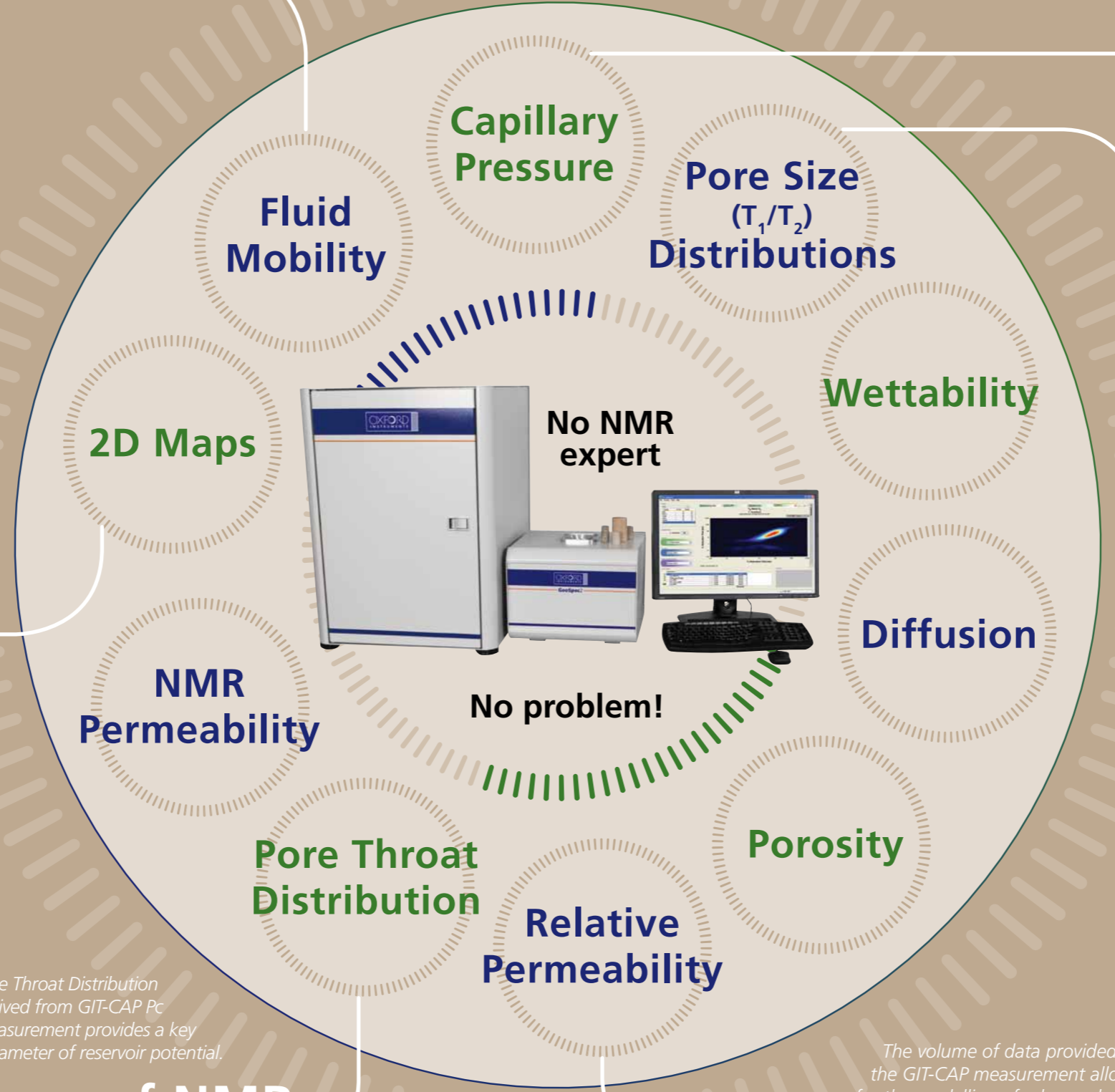


Mapping of Diffusion distribution with  $T_2$  relaxation times, utilizing **GeoSpec2's** gradient option, can be used for fluid typing.



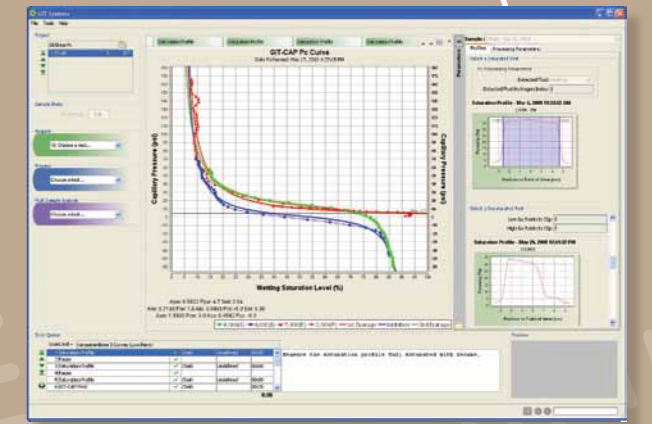
Pore Throat Distribution derived from GIT-CAP Pc measurement provides a key parameter of reservoir potential.

# Harness the power of NMR

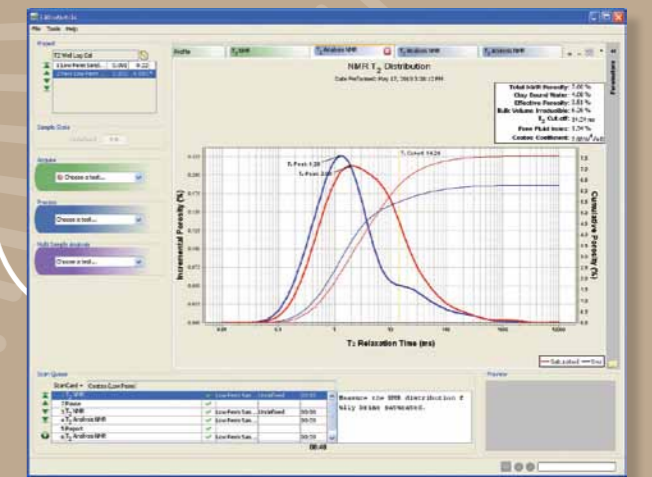


No NMR expert

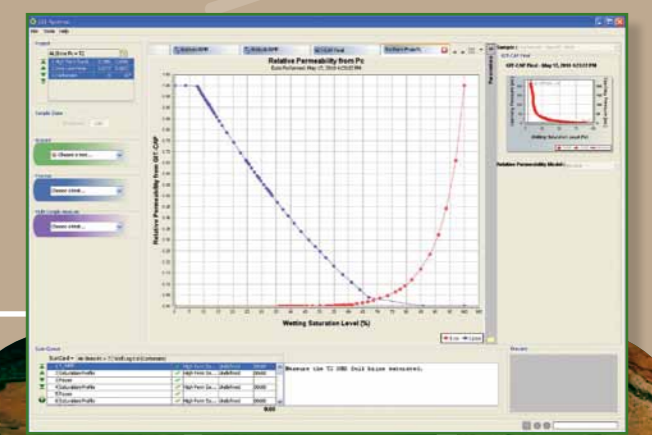
No problem!



Patented GIT-CAP Capillary Pressure measurement is 5x faster and provides 10x more data and is exclusive to **GeoSpec2**.



Pore Size Distributions from  $T_2$  NMR measurements, are made more accurate with **GeoSpec2's** higher signal to noise ratios and industry-leading short echo times.



The volume of data provided by the GIT-CAP measurement allows for the modelling of advanced core properties such as Relative Permeability.



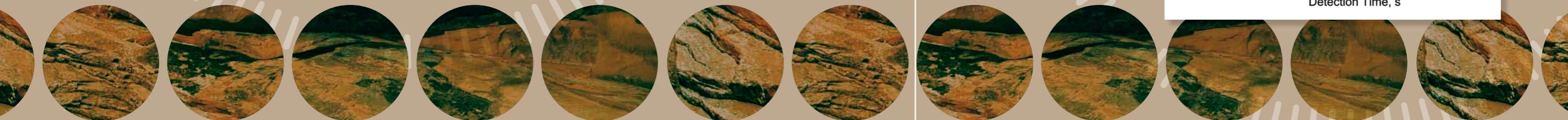
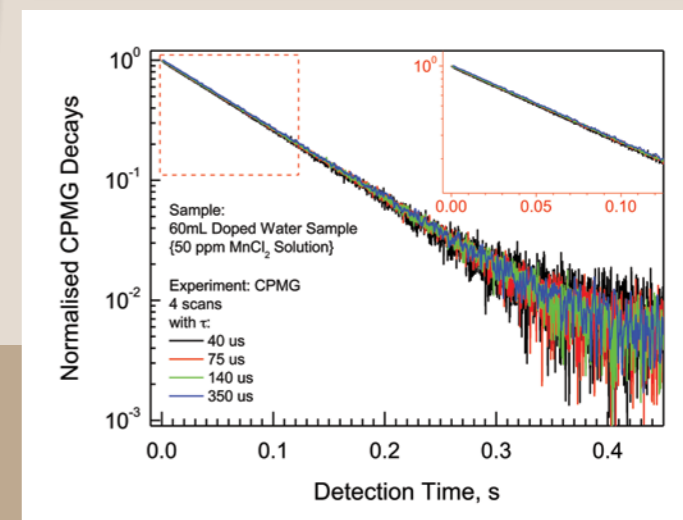
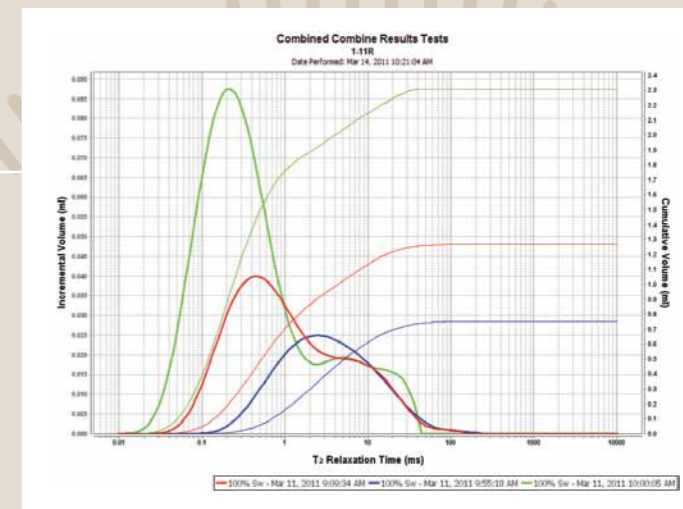
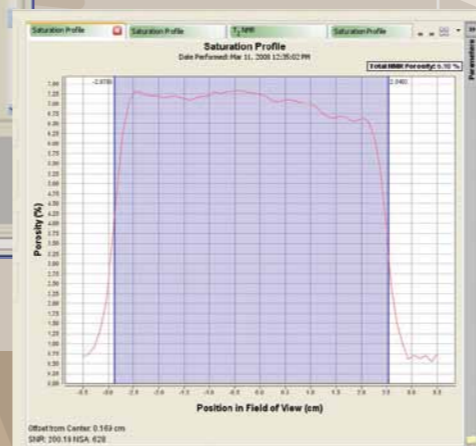
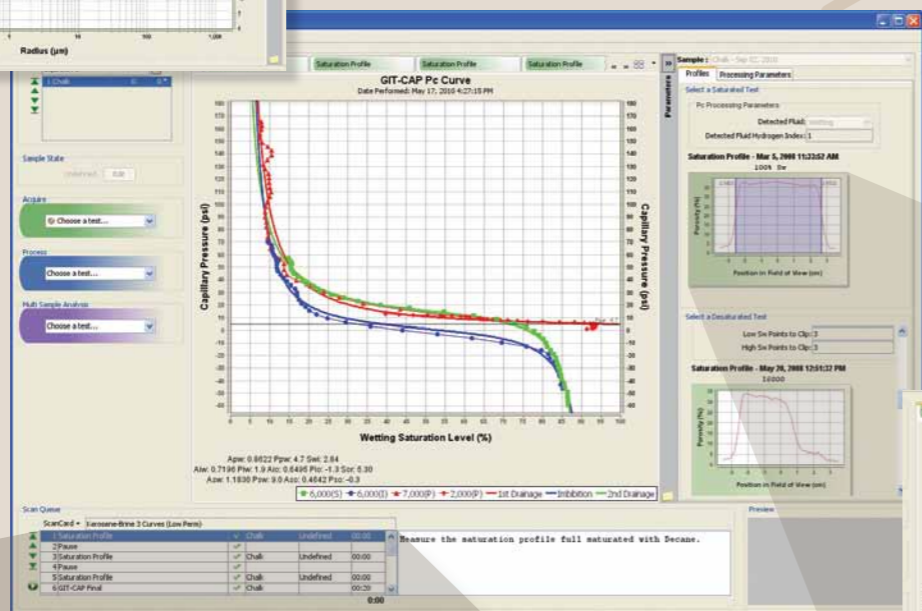
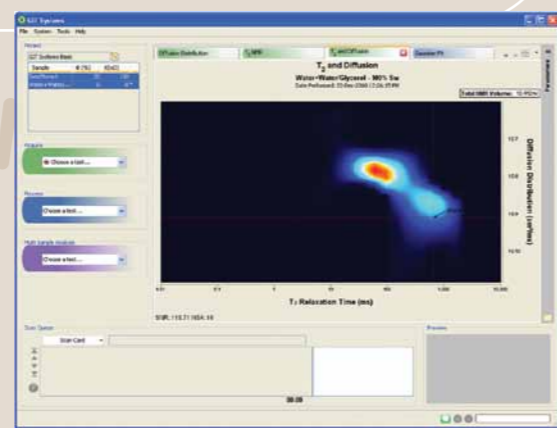
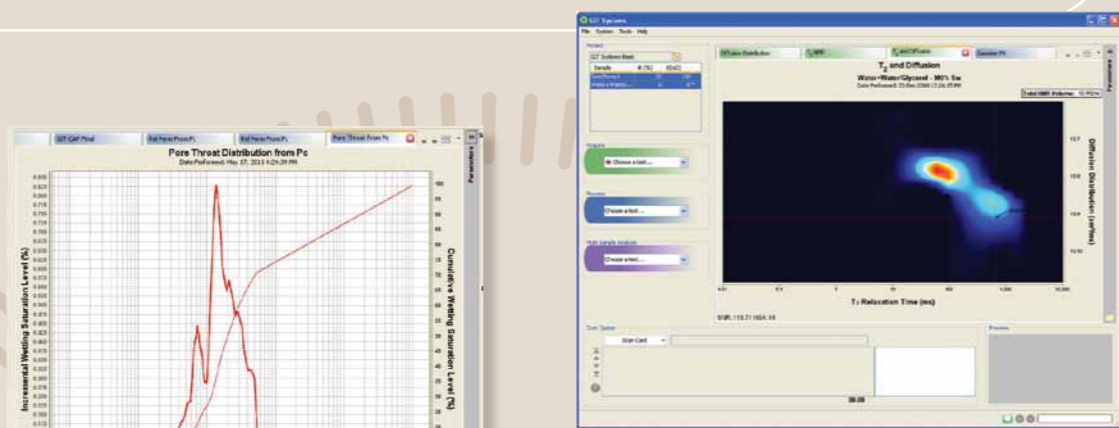
**GeoSpec2** features the LithoMetrix™ and GIT Systems software packages, which take full advantage of the industry leading performance of the **GeoSpec2** instrument. Each package is available in Basic and Advanced versions, with LithoMetrix™ providing well log calibration and basic NMR analysis functions, and GIT Systems taking advantage of the Pulsed Field Gradients option to provide advanced analyses such as capillary pressure and diffusion.

Green Imaging Technologies holds more than 10 patents related to the protocols, techniques and functionalities available in our software. A patent summary is provided on our website, [www.greenimaging.com](http://www.greenimaging.com)

## The heart of the **GeoSpec2** advantage is the **Q-Sense Signal Enhancement Technology**, which features:

- Improved Signal to Noise for faster analysis.
- Improved sensitivity for measurements on very low porosity rocks.
- Shorter echo times to characterise tightly bound rocks and give more accurate porosity values.
- Low susceptibility to probe detuning for improved ease of use.
- External power dissipation for reduced thermal effects.
- Improved power handling capability for better 180° pulses.
- Built-in calibration feature for better accuracy over a wide range of conductive rocks.

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



## 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 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 more than 15 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 1,900 staff worldwide and a listing on the London Stock Exchange (OXIG).

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### Green Imaging Technologies

Green Imaging Technologies is committed to providing innovative solutions for lab-based analysis of rock core via Nuclear Magnetic Resonance (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 characterization.

Beginning with a patented capillary pressure measurement technique in 2005, GIT has the goal of making NMR core analysis more accessible and expanding the analysis that can be done with NMR. 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 be the industry leader in NMR core analysis.

For more information: [info@greenimaging.com](mailto:info@greenimaging.com)  
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