QUANTICO
ENERGY SOLUTIONS

A DATA SCIENCE PLATFORM FOR SUBSURFACE GEOSCIENCE AND DRILLING INTELLIGENCE

WHO ARE WE?

Quantico Energy Solutions is the world's leading artificial intelligence company in the areas of reservoir and wellbore characterization. Our AI software suite brings earth properties into high resolution and real-time. Additional analytics leverage the subsurface understanding to help drilling and completion engineers make the most well-informed decisions.

Today, Quantico Energy Solutions serves the world's largest oil and gas companies. From onshore West Texas to pre-salt Brazil to the Middle East, our customers rely on the next generation of AI tools to drive operational excellence, cost efficiency, safety and environmental sustainability.

CONTACT US

Headquartered in Houston, Texas, Quantico Energy Solutions serves oil and gas companies across the world.

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OUR PRODUCTS AND SERVICES

QEARTH

QEarth uses machine learning to construct high resolution earth models of virtually any property including pore pressure, fracture gradient, unconfined compressive strength. With the addition of logging while drilling or QLog data, QEarth updates the earth model in real-time – autonomously without human intervention.

QLOG

QLog provides a suite of synthetic logs including shear, compressional, density and neutron. As a post-drilling or real-time service, this solution can help reduce the operational hazards of logging and eliminates the need for nuclear or acoustic tools in the borehole. With QLog, logging becomes a more cost effective, safer and sustainable process.

QDRILL

QDrill recommends the optimal drilling parameters – all in real-time. The formation properties can be delivered at the bit or ahead of the bit to give drilling engineers the necessary lead time to make properly informed decisions.

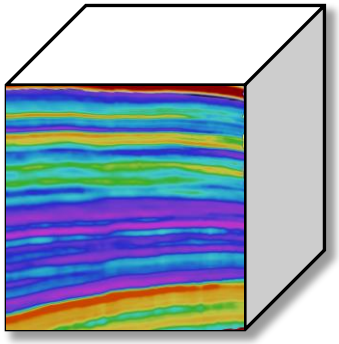
QFRAC

Using the primary logs from QLog, additional geomechanical properties including Poisson's Ratio, Young's Modulus, Brittleness, and Minimum Horizontal Stress can be derived. These properties can be used to derive stress profiles, model frac treatments and optimize completion design.

QEARTH

WHAT IS QEARTH?

QEarth uses machine learning to construct high resolution earth models of virtually any property including pore pressure, fracture gradient, unconfined compressive strength. With the addition of logging while drilling or QLog data, QEarth updates the earth model in real-time – autonomously without human intervention.



TECHNOLOGY HIGHLIGHTS

Web Application The same tools used by Quantico's experts for years are not available to your team in an easily accessible web application that is fully cloud integrated.

Automated Feature Engineering QEarth automatically structures interpretative, seismic-based, and recorded geological data into contextual data to allow the underlying neural network to learn the relationships between the seismic wavelet and the rock property of interest.

Hyperparameter Optimization By testing a wide range of network parameters and architectures, users can experiment with thousands of permutations and select the optimum designs for their data.

Customizable Neural Networks For the more advanced users, QEarth allows for the customization of neural network architectures. Users can specify the number of layers, neurons per layer, activation functions, learning rates, and more.

QEarth Node Canvas The node canvas is where users build and execute their machine learning workflows. Starting with data ingestion, users can fully customize and track their data across an intuitive workspace.

FPGA Accelerated Simulation Field-programmable gate arrays give QEarth a 12x advantage over the competition.

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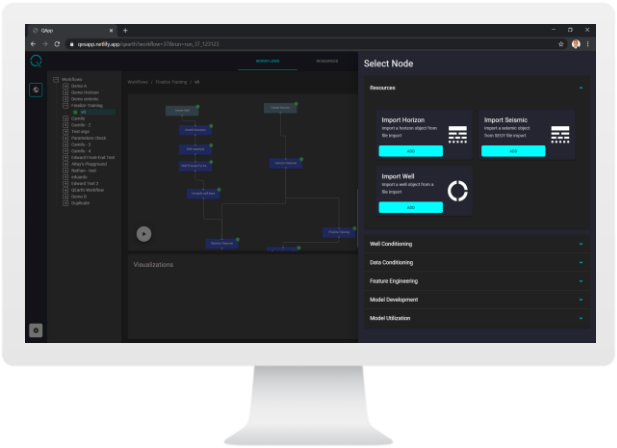
QEARTH WEB APP

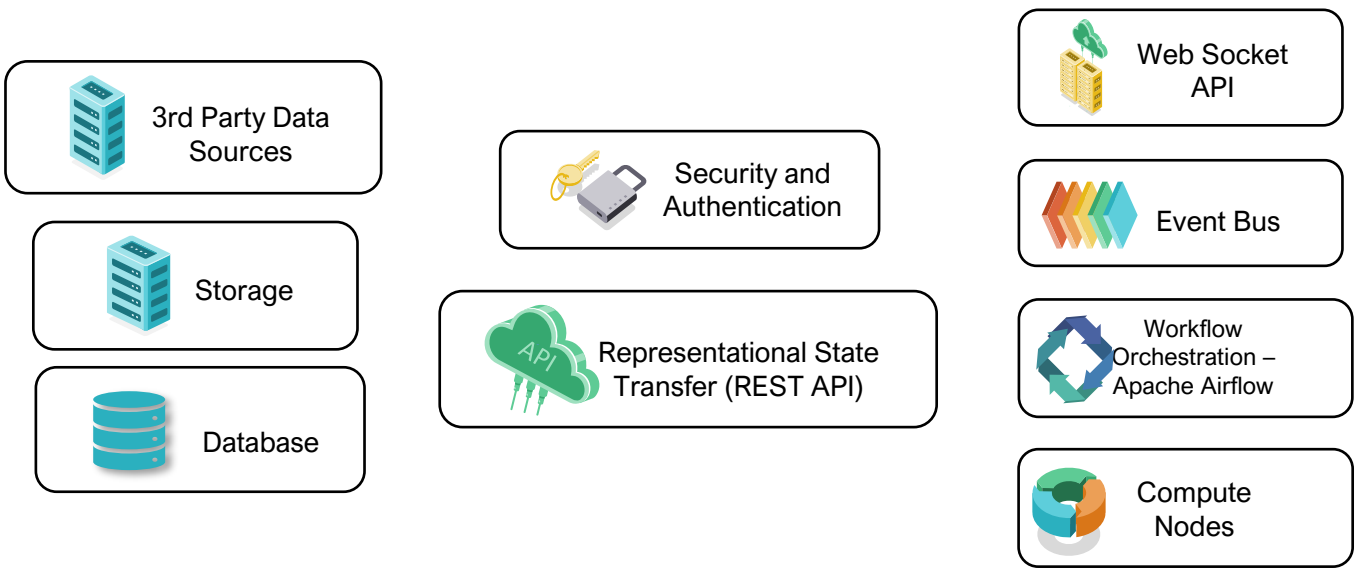
Virtually any property that can be logged or measured in a wellbore can be delivered as a property volume through QEarth. The true power of QEarth comes from the closed-loop automation that allows it to transform drilling data and logged rock properties into contextual earth models for drilling and geoscience applications.



This automation will soon be in your hands. In 2021, Quantico will release a cloud-based web application. With an intuitive and powerful node-based user interface – you can retrieve insights from your subsurface data with unmatched resolution and fidelity.

SECURITY & PERFORMANCE

Our software architecture meets industry standards of efficiency, security and scalability. With a fully cloud-based backend, QEarth Web App will be able to scale to your enterprises' needs and handle workloads of all sizes.



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Higher Resolution Earth Models for Hydrocarbon Exploration

QEARTH
CASE STUDY

CHALLENGES

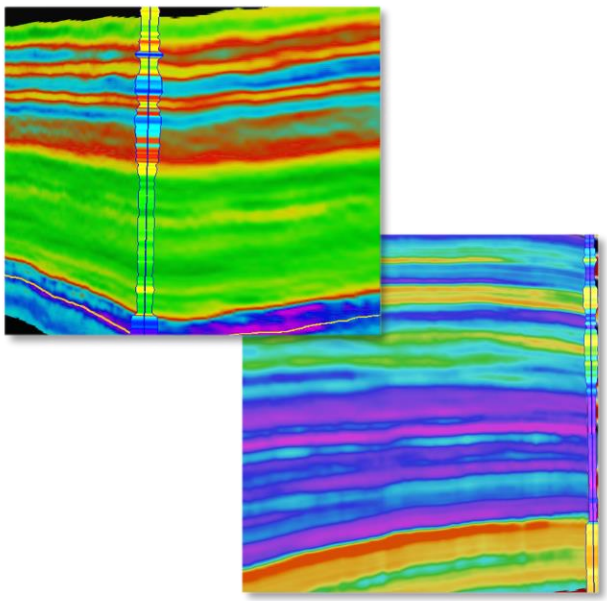
Land seismic data is notoriously noisy which presents a significant challenge when trying to resolve geological features that are below seismic resolution. For the typical QI specialist this hinders their ability to accurately perform their reservoir characterization analysis.

APPROACH

Bring in QEarth In this case study, the goal was to predict acoustic impedance in a 3,000ft interval with two specific key performance indicators (KPIs) in mind: time-to-solution and resolution. After basic data conditioning and automated feature engineering, our analyst trained and simulated 20 neural networks. The neural networks were then "ensembled" to reduce bias and model variance which helped combat both overfitting and "noise" in the system.

SHOWCASE

The results speak for themselves. To the right, you see blind well tests comparing the logged values and the QEarth predictions. This approach achieved a 4x resolution boost compared to seismic. The entire 100sqmi 3,000ft interval was delivered in less than 1 week.



Key Highlights:

- 4x Resolution Boost (10-15ft)
- Thin bed nearer to Nyquist Resolution
- Time to solution reduced from 3 weeks to 1 week.

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Overcoming Subsalt Challenges in the Gulf of Mexico

QEARTH
CASE STUDY

CHALLENGES

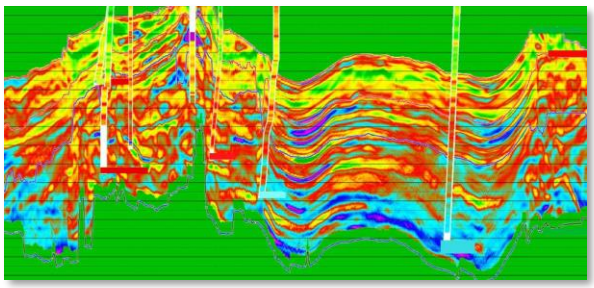
One of the principal challenges in subsalt exploration relates to the lack of seismic resolution. Since vertical seismic resolution is determined by the seismic wavelet, many approaches have been developed by researchers over the years to increase the resolving power of the seismic wavelet. Such approaches include deconvolution and zero-phasing, bandwidth extension, spectral extrapolation, wavelet scaling, etc. Regrettably, these approaches rarely achieve more than a doubling of the resolving capability of the enhanced wavelet.

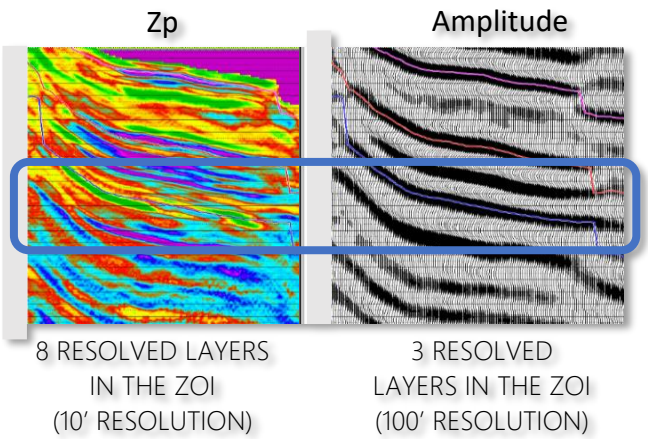
The targeted oil-bearing formations in the project area are the Lower Tertiary Wilcox reservoirs in the Gulf of Mexico which are characterized as turbidite channel and toe-of-slope fan systems (Zarra, 2007)

APPROACH

Bring in QEarth To address this challenge of insufficient resolution, Quantico's QEarth artificial intelligence approach is applied. By increasing the sampling of the seismic trace to near-well log sample rate and eliminating constraints imposed by the seismic wavelet, QEarth is able to achieve significant increases in seismic resolution. This is demonstrated in the figure below where the input seismic amplitude data exhibits a resolution of 100ft. contrasted with the QEarth result that delivered a ten-fold increase in resolution providing significant insights into the subsalt stratigraphy.

SHOWCASE





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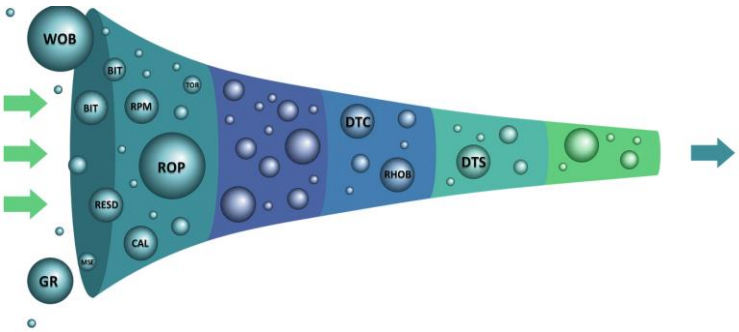
QLOG

QLog has been applied to hundreds of onshore unconventional wells to guide engineered completions strategies and offshore deepwater wells, in both pre-salt and post-salt settings where the outputs are used for pore pressure and fracture gradient (PPFG) and other high-end geomechanical and geophysical analysis.



QUICK FACTS

- QLog, requires, as input, only Gamma ray and the drilling dynamics data (as received by the drilling engineers) to predict DTC, DTS and RHOB. Thin bed nearer to Nyquist Resolution
- QLog is run in look-back mode and remotely in real-time (QLogRT) via a WITSML data-feed from the rig as the well is being drilled. No staff are required on the rig and no special costly tools or nuclear and acoustic sources in the well. This results in significant HSE benefits.
- QLog is 60%-80% cheaper than deploying LWD, wireline or Thrubit logging tools.
- QLog can be used to replace or complement conventional sonic and density tools. Often used as a backup in case of tool malfunctions or poor hole logging conditions (especially RHOB) or for generating a real-time suite of logs rather than waiting for the logs to be processed by the logging contractor.
- QLog can be used to high-grade wells that were not logged in the overburden. This could add significant value to an Operator's well database by providing elastic data from top-to-bottom, not just within the reservoir zone. A valuable tool for geomechanical, geological, petrophysical and geophysical analysis in the shallow section and elsewhere.

Gulf Mexico Real-Time Drilling Application of QLog

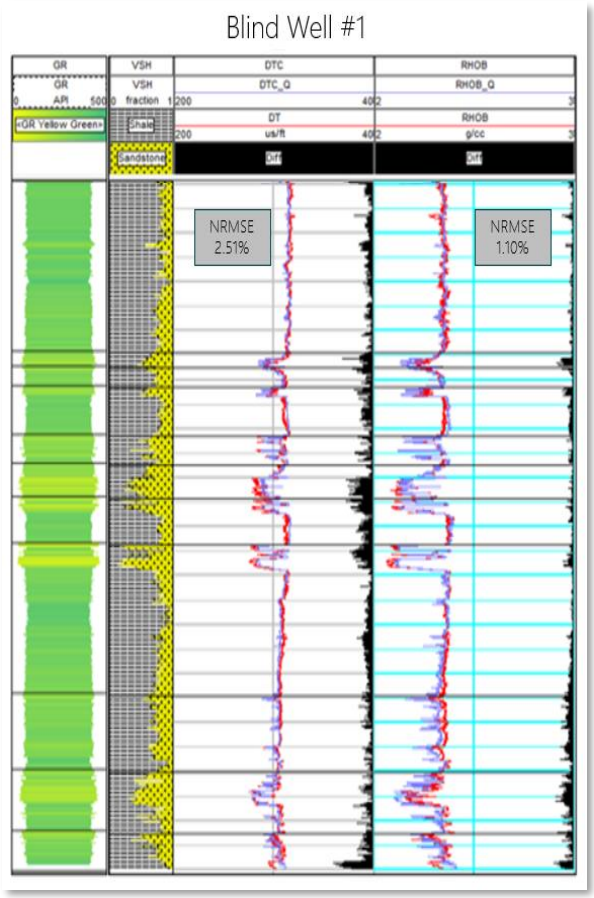
QLOG CASE STUDY

CHALLENGES

A client, drilling offshore Gulf of Mexico, chose not to run nuclear sources or acoustic tools due to concerns about cost and operational risk. However, the client still wanted bulk density, compressional and shear velocity information while drilling due to the anticipated difficult directional path and the likely presence of possibly depleted sands. The history of the field in question showed many mechanical bypasses due to wellbore instability issues.

APPROACH

Bring in QLog A proof-of-concept study was undertaken that involved the use of eleven offset wells to train an artificial neural network. Two of the wells were withheld as "blind" tests and were not included in the training dataset. The results of the POC for one of the wells are shown to the right. Blind Well #1 from left-to-right depicts: Gamma Ray, Volume of Shale, Compressional Sonic and Density. The measured log data are red; the simulated QLogs are blue. Note the high level of accuracy expressed as a normalized RMS error (NRMSE) metric



SHOWCASE

Following the successful completion of the "blind test" validation on two wells, QLogRT was deployed and indeed, a depleted sand below the expected TD of the well was identified, that, if encountered while running conventional wireline logs, could have led to the possible loss of the wellbore along with the need to cement-in the nuclear source.

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Reducing CO2 Footprint and Costs of Onshore Well Logging

QLOG CASE STUDY

CHALLENGES

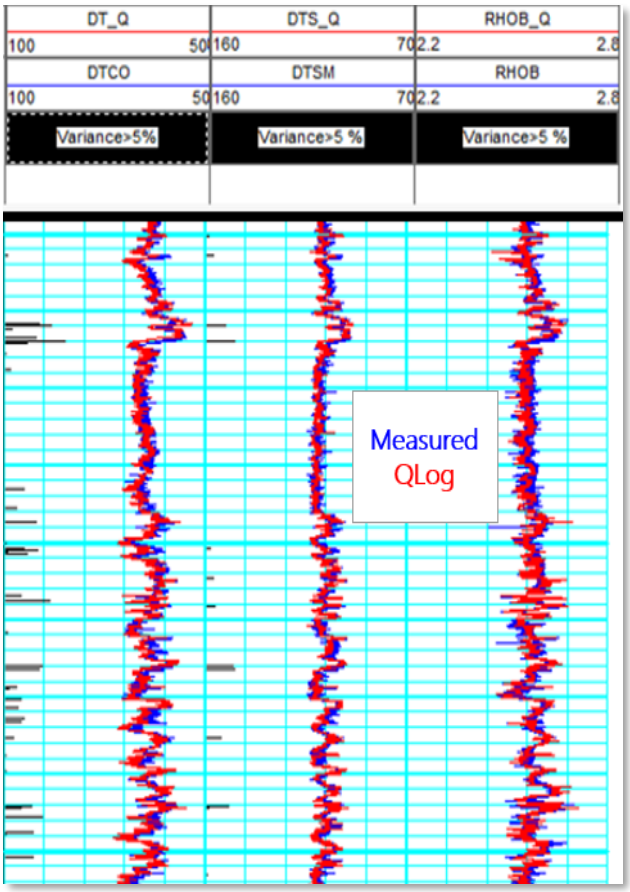
A client, drilling onshore in the Permian Basin, was exploring ways to cut operational costs without compromising HSE considerations or sacrificing quality and, additionally, was driven by shareholder demand to reduce the company's carbon footprint across its entire enterprise.

Given Quantico's significant experience with synthetic logging in the Basin, the client elected to award Quantico with a multi-well project to deliver compressional and shear sonics and density for each horizontal well for use in geomechanical studies and as inputs to QFrac to design an engineered completions strategy for the Wolfcamp formation.

APPROACH

Bring in QLog Using measured data provided by the client, Quantico established that a nearby machine learning training model, selected from its database would produce optimal results. Quantico took delivery of the gamma ray and drilling dynamics data (such as WOB, Torque, ROP, ROR, SPP, etc

The data were then passed through the trained neural network to simulate the three formation evaluation logs synchronously. The results of one of the wells is shown to the right. From left-to-right are displayed Gamma Ray, Measured Depth, Compressional Sonic, Shear Sonic, and Density. The measured log data are blue; the simulated QLogs are red.



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