FracMan®

Fractured and Unconventional Reservoirs

GOLDER

Optimizing Well Performance

FracMan is the only Discrete Fracture Network (DFN) model that fully captures the anisotropy and connectivity of the fracture system, providing a clear advantage over conventional modeling approaches. FracMan is a 3-dimensional, total asset tool, scalable to full field applications. Its robust visual capabilities for reservoir analysis have set the standard in the market for 30 years and have helped our clients cost effectively enhance production in both new and mature assets.

Whether you are involved in exploration, prospect appraisal, refracturing, full field model development, or addressing specific local issues, FracMan helps you integrate all of your available data to make the best development decisions.

FracMan software allows you to visualize your fracture system, test your conceptual understanding, compare completion technologies, determine the best strategies, and quantify risks and uncertainties. FracMan is the tool you need to understand complex reservoirs and develop a smarter drilling and completion program.

How Can FracMan® Help You?

Your reservoir's fracture network makes a significant impact upon performance and success. FracMan makes it easy to test the relationship of fractures to structure, reservoir properties, seismicity and flow and to quickly determine the effect on EUR and production rates. FracMan helps you to accomplish the following:

- Predict Well Performance
- Optimize Well and Frac Spacing
- Determine Well Sequencing
- Minimize Water Cut
- Predict Proppant Placement
- Optimize Completions
- Improve Wellbore Stabilization
- Economically Increase Well Production

The power to understand and characterize properties of your reservoir, predict future behaviors, and to improve performance.

Fracture picks
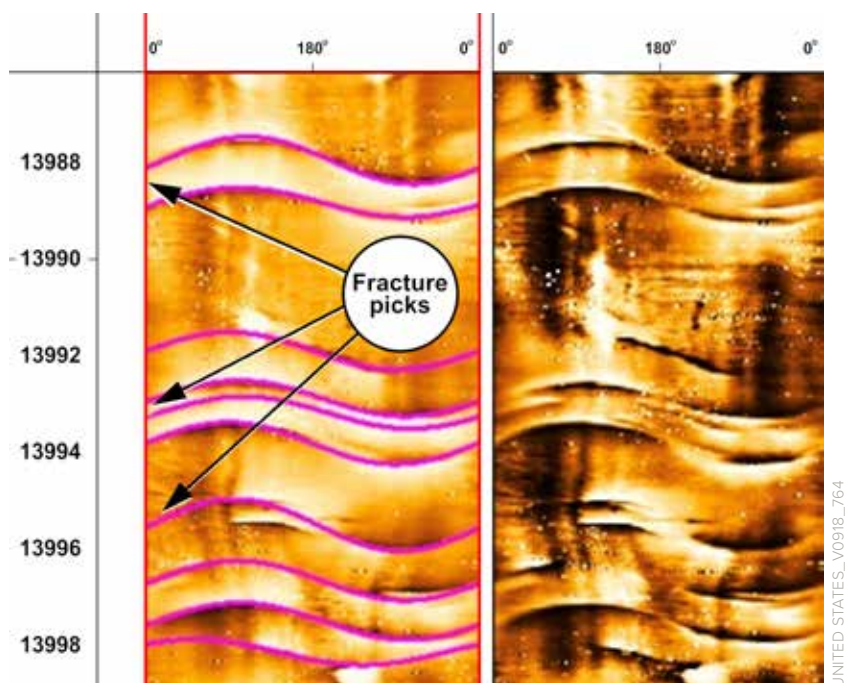
Well Image Log Interpretation

Well image log interpretation provides an in-depth understanding of the geological setting of the reservoir penetrated by an exploration or development well. The findings from these analyses provide an appreciation of the in-situ stress, structural, and stratigraphic information, and can be used to help optimize the completion of future development wells. In extreme geological environments, the detailed understanding of structural features is indispensable for successful hydrocarbon exploration and development. The benefits of this highly sophisticated analysis are:

- New well trajectory planning
- Well completion – well orientation, spacing, and producing intervals
- Well stimulation – hydraulic fracturing
- Production Improvements – EOR, injection wells

Production Well BT3
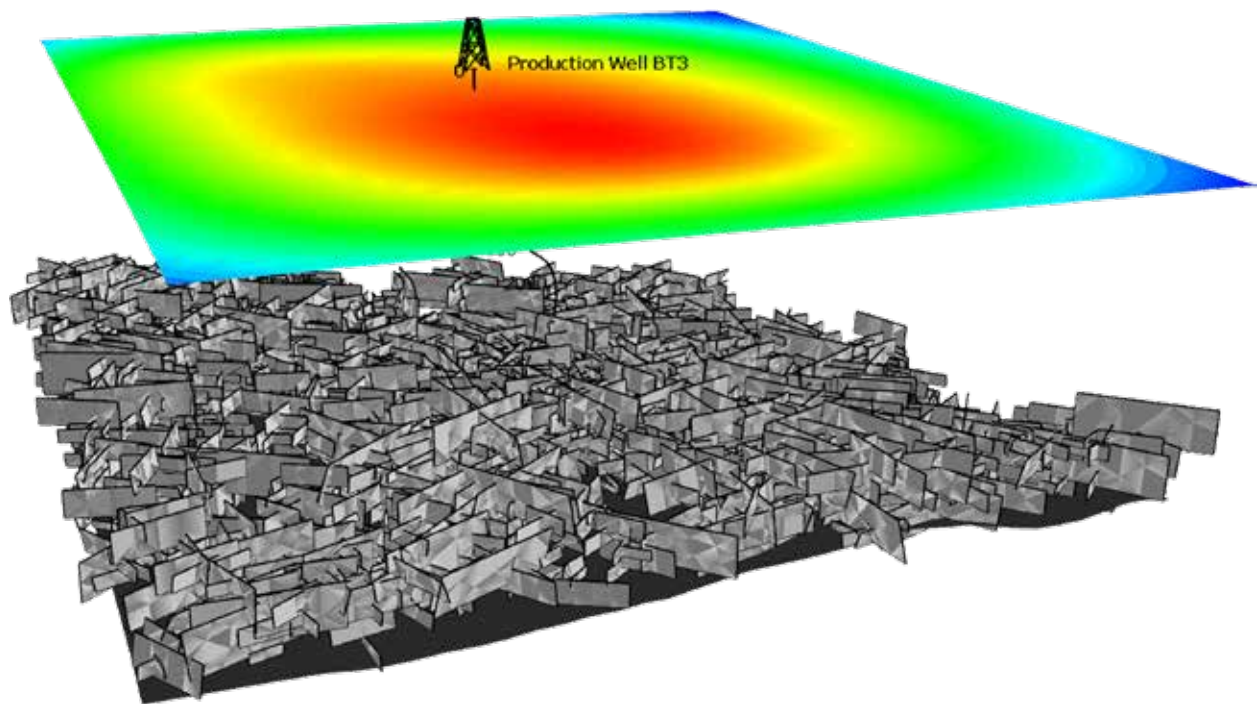
Reservoir Geomechanics

Rocks have a wide range of stiffness and strength and are exposed to variable stresses during drilling, completion, and production. Interpreting the geomechanics will help you avoid and minimize the risks, thus reducing costs. Golder's geomechanics services include:

- Hydraulic Fracture Stress Interpretation
- In-situ and Critical Stress Analysis
- Coupled Stress-Hydrodynamic Analysis
- Sand Production Management
- Well and Cap Rock Integrity Assessment
- Compaction Subsidence Heave Investigation
- Wellbore Stability Analysis
- Underground Gas Storage (UGS)
- Reservoir Subsidence Analysis
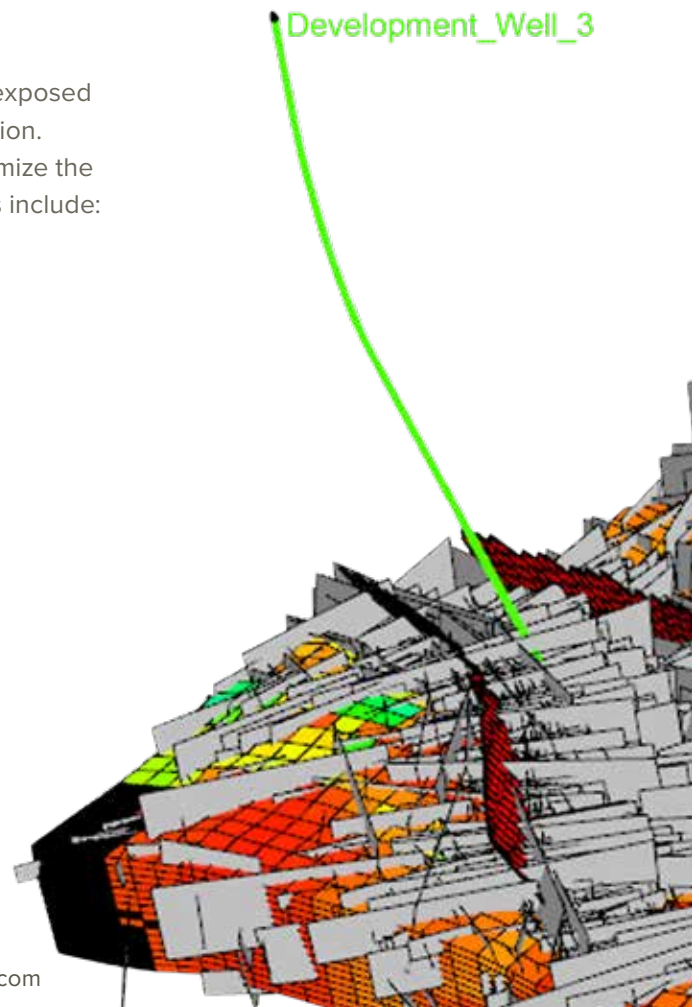
Development_Well_3

FracMan® Fractured Reservoir Analysis

Our team uses Golder's proprietary FracMan® fractured reservoir analysis tool to better understand and improve production levels. FracMan® will also facilitate smarter development strategies, reduce uncertainty and identify environmental risk. Static and dynamic reservoir models become living models that facilitate decision making.

- Discrete Fracture Network (DFN) static modeling
- Fractured rock geomechanics, including hydraulic fracture stimulation, wellbore stability, and caprock integrity
- Porosity, anisotropy, & heterogeneity analysis
- Fracture statistical, geostatistical, and fractal analysis
- Reservoir volumetrics

- Well test design, interpretation, and simulation, including Production Logging Test (PLT) and Drillstem Test (DST) analysis and interpretation
- Well location, completion, and trajectory optimization
- Upscaling of fracture permeability (matrix/fracture)
- Multi-porosity DFN Dynamic Simulation
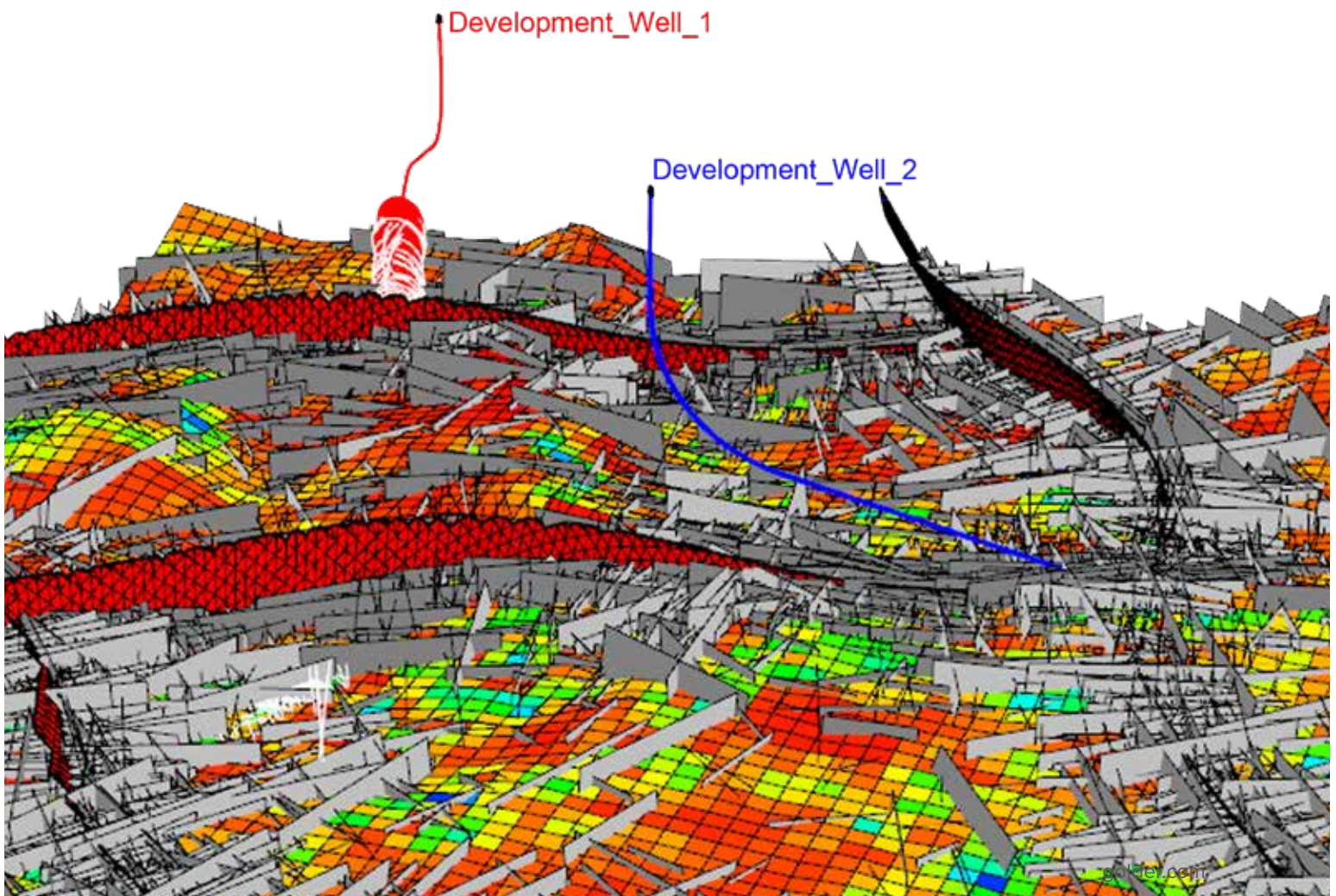
Exploration and Development Services

Our focus is to help clients realize the full potential of their wells – reservoir optimization is what it's all about. Golder has extensive experience in hydrocarbon basins, working and guiding oil and gas clients to make better investment decisions throughout the full reservoir life cycle. Our in-depth and practical knowledge of your industry and expertise in development means we understand the technical and commercial challenges you face when developing your reservoirs. Our integrated approach enables clients to discover the potential of their reservoirs, understand the rock properties and make faster, informed decisions, and improve their return on investment (ROI). We know how to solve your problems.

- Golder's innovative technologies and services will
- Improve decision making through better
- Reservoir characterization
- Help reduce operational risks by completing

- Reservoir geomechanics analyses
- Improve production by achieving maximum
- Contact with the reservoir
- Develop better hydraulic fracture
- Stimulation strategies

Golder's multi-disciplined team will use our comprehensive sub-surface reservoir knowledge to help you maximize your ultimate recovery. Our impartial advice and guidance enables you to make better investment decisions throughout the life cycle and improve your ROI.

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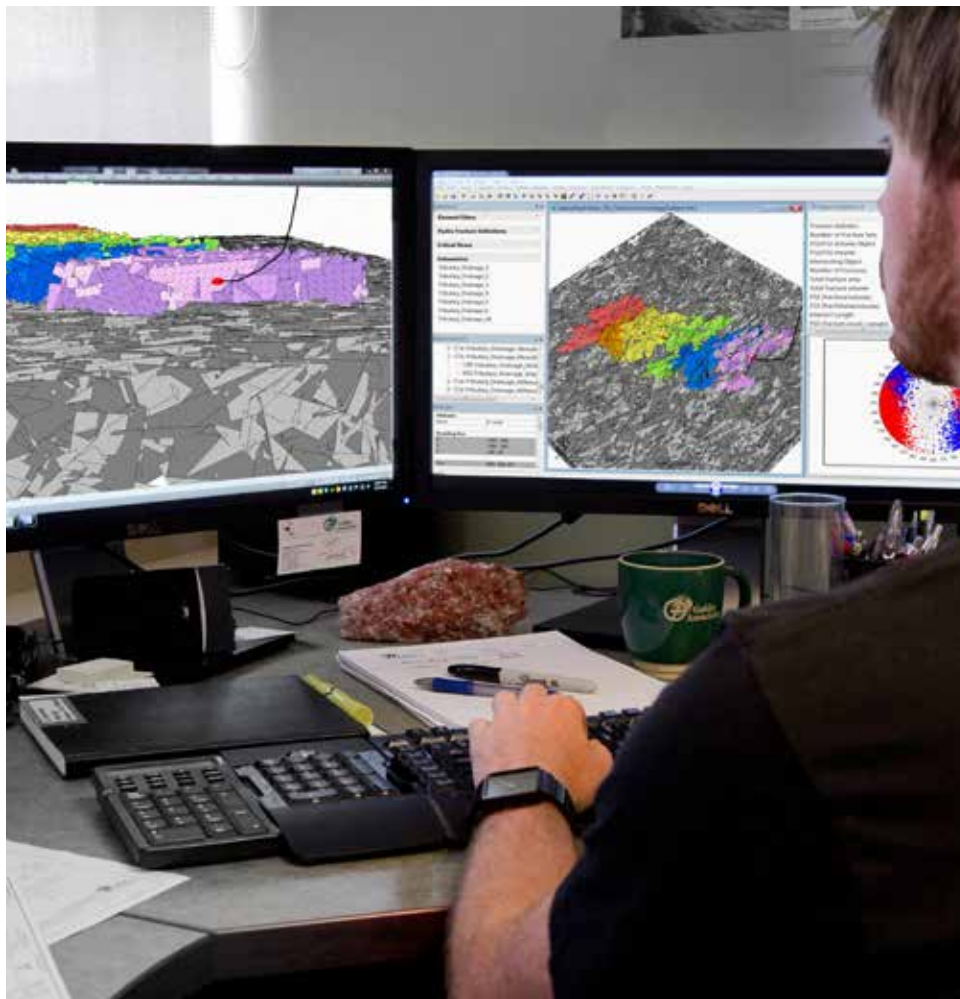
Reservoir Engineering

Golder's core strength is our ability to incorporate the various technical inputs from geophysicists, geologists, and petrophysicists to build a picture of the reservoir potential and predict future performance. We have experts in reservoir simulation as well as the core skills of reservoir fluid characterization and well test analysis.

- Modern Transient Production Analysis
- Determination of production mechanism and performance evaluation
- Volumetric Estimation using both deterministic and probabilistic approaches
- Hydrocarbons in place and Uncertainty quantification (probabilistic methods)
- Phase Behavior (PVT) analysis, including fluid properties evaluation and black oil and compositional simulation input
- EOR/Improved Oil Recovery (IOR) including production diagnosis, Water-flooding optimization, Gas flooding and Water-alternating-gas (WAG) injection, and Chemical/polymer flooding
- Sector simulation
- Full field history matching and simulation

Financial Due Diligence

Our approach will enhance the purchaser's understanding of the target business as well as helping identify and understand critical success factors. Our technical due diligence enables clearer understanding and will help identify potential legacy issues.

- Competent Person's Reports (CPR)
- Independent reserves/resources audits
- Assessments for internal company management use
- Due Diligence asset investigations
- Multi-disciplinary teams for data room evaluations

Generate Greater Return on Your Investment

Our team of experts can work with you through the full field life cycle, from prospect evaluation, to well and reservoir studies, exploration, appraisal, development, production, and abandonment. This includes working with you in a variety of complex and challenging environments, including both onshore and offshore deep water assets.

At Golder, we deliver solutions that will improve your investment decisions, optimize well placement, refine completion and stimulation design, and enhance ultimate recovery. Using our strength and origins in geotechnical engineering and rock mechanics, together with our knowledge and experience in the oil and gas industry, we use a winning combination of technology, reservoir insight, and technical capability to optimize your development costs and help you achieve greater ROI.
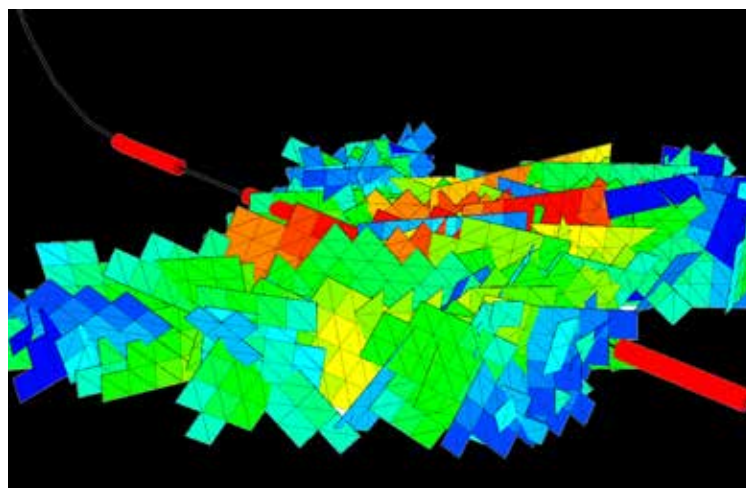
Petroleum Geology

Understanding how to read the story told by the earth beneath our feet to find oil and natural gas is a key step in the development process. Our team of petroleum geologists enable a better understanding, and can identify in greater detail, where oil might be found, as well as the best ways to retrieve oil. Golder specializes in petroleum geology at all stages of hydrocarbon exploration and development, from the initial evaluation of a basin to the enhancement of production from a mature field.

- Structural core logging and interpretation
- Data analysis and review
- Reservoir geology and structural geology
- Petrophysics
- Geological Modelling

Geological Areas of Expertise include: shale gas, oil shale, basement reservoirs, fractured carbonates, volcanics, and coal-bed methane/coal seam gas.
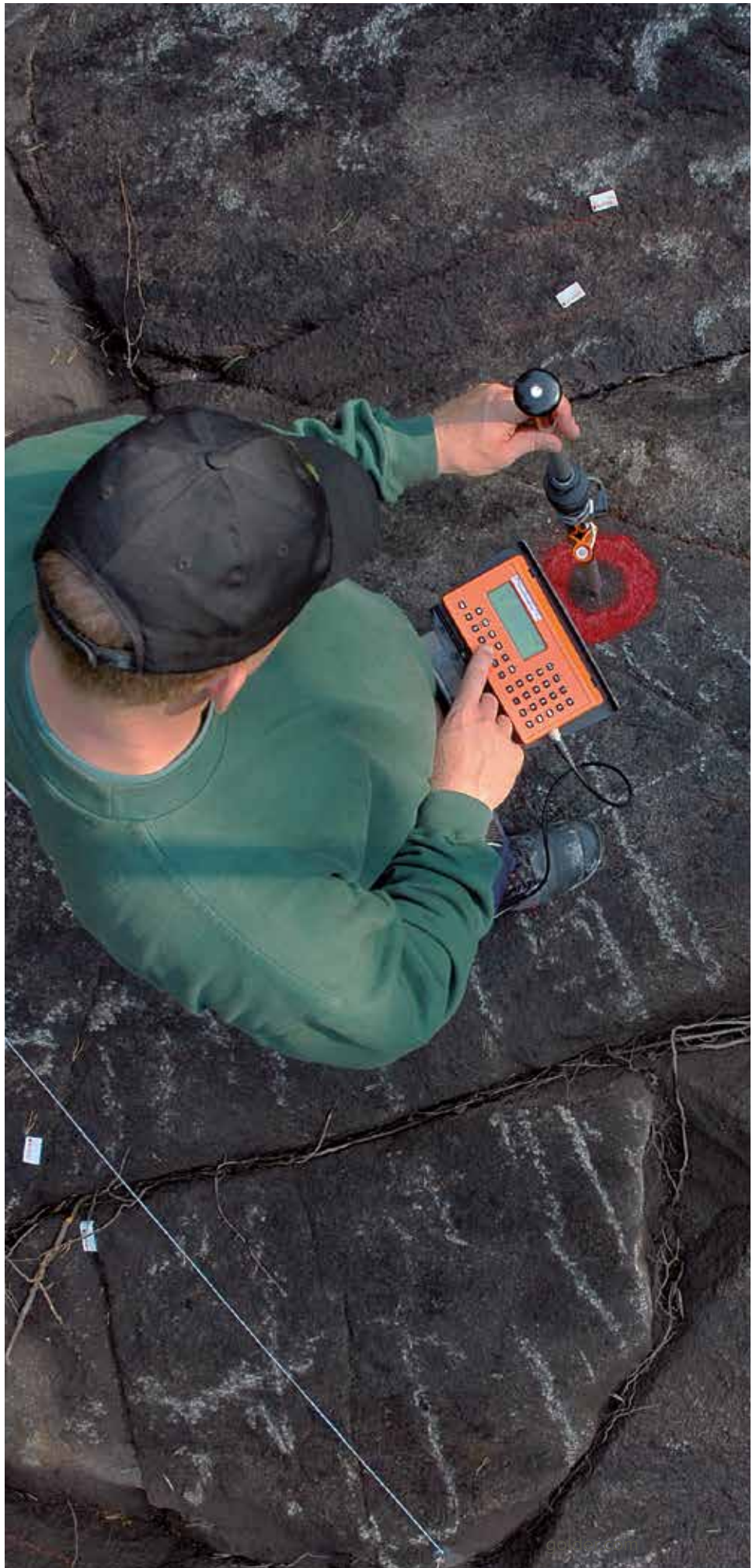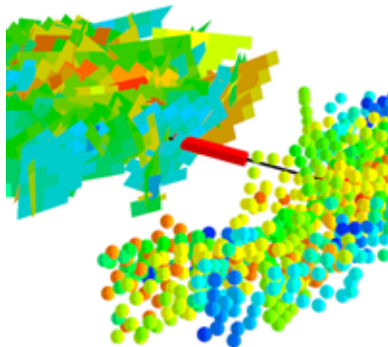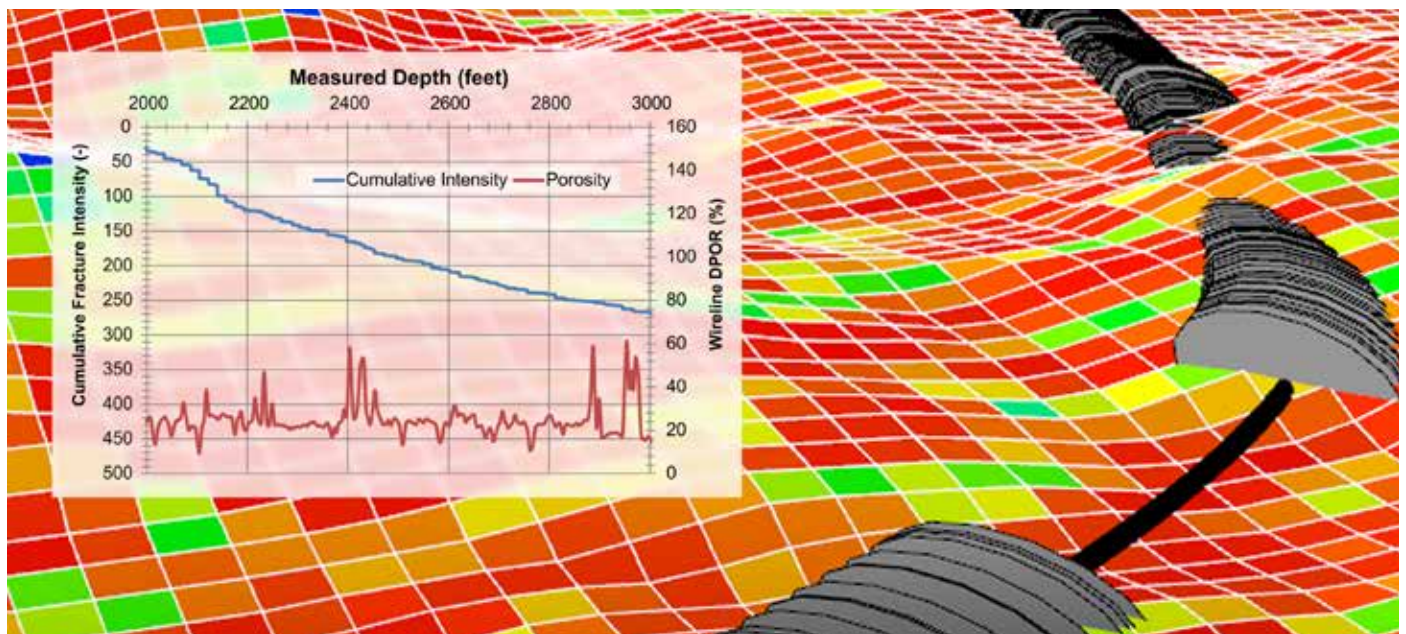
Geophysics

Our specialist in-house staff team with GlobalGeophysical® and TaskFronterra® to complete geophysical processing, focused on natural fractures.

Using geophysical techniques we can help form a better understanding of the subsurface.

Our multidisciplinary team of experts offer you the optimal approach to understanding the reservoir. Using available geophysical data to visualize the reservoir, we provide advanced interpretation to reduce uncertainty.

- Vertical Seismic Profiling (VSP) analysis & interpretation
- Microseismic survey interpretation
- Identification of fractures and faults from seismic
- Fracture intensity and orientation conditioning
- Attribute analysis
- Microgravity analysis
- Image Log Analysis
- Geomechanics and In-situ Stress

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