

FRACMAN[®]

The Leading Fracture Modeling Software for:

Fractured Reservoir Geology

- ▶ Analysis of Faults and Fractures
- ▶ Fracture Analysis from Geophysics
- ▶ Discrete Fracture Reservoir Modeling
- ▶ Field Scale Fracture Extrapolation
- ▶ Fracture Data Analysis
- ▶ Reservoir Architecture Assessment

Fractured Reservoir Engineering

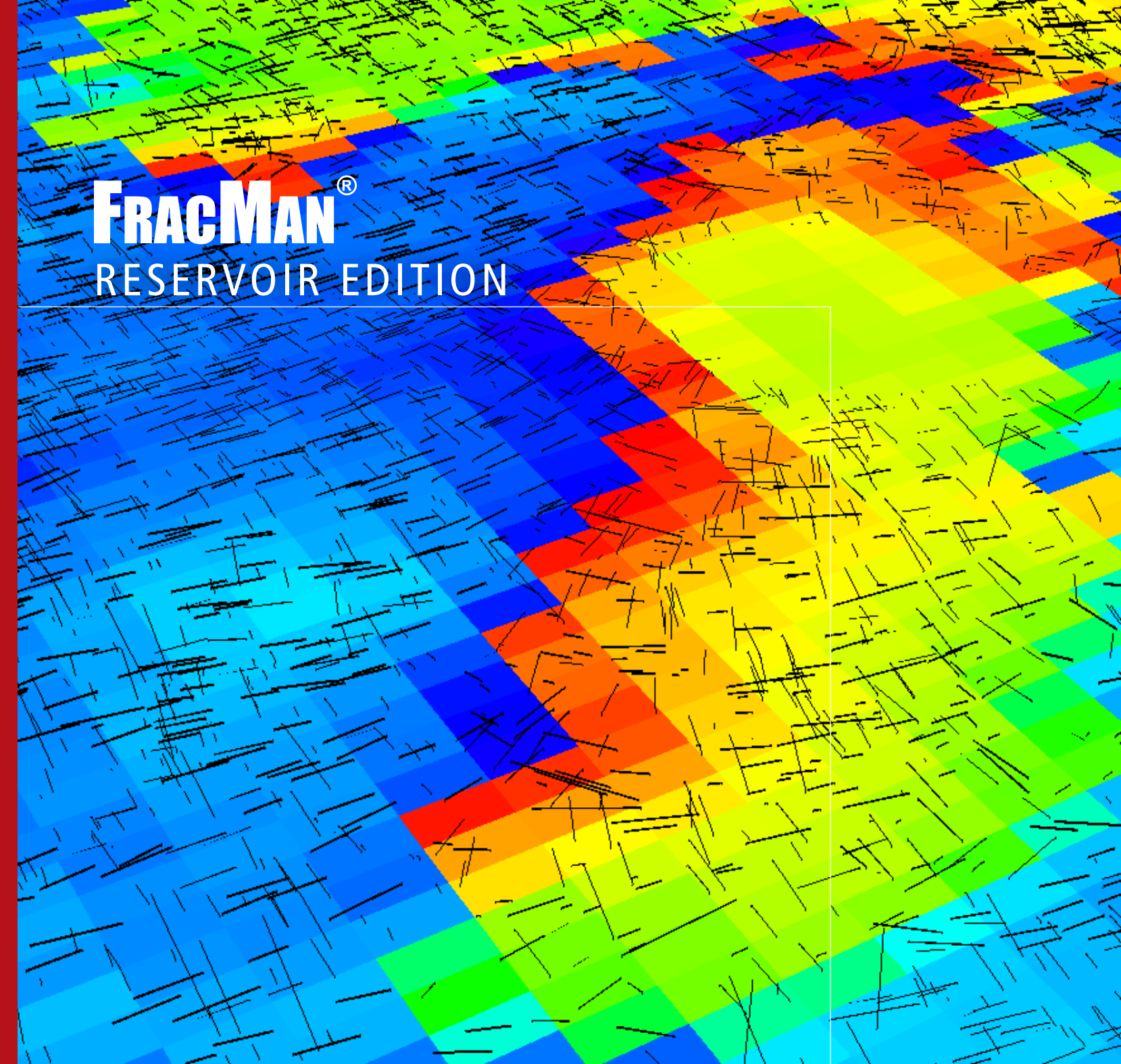
- ▶ Development Strategies
- ▶ Well Trajectory Optimization
- ▶ Upscaling of Fracture Permeability
- ▶ Fracture Porosity Analysis
- ▶ Stress/Permeability Coupling
- ▶ Anisotropy and Heterogeneity
- ▶ Uncertainty Analysis
- ▶ Risk Assessment
- ▶ IOR Strategy Development

Fracture Reservoir Static Modeling

- ▶ Reservoir Volumetrics
- ▶ Tributary Drainage Volumes
- ▶ Compartmentalization Analysis
- ▶ Matrix-Fracture Interaction

Fractured Reservoir Dynamic Modeling

- ▶ True Multiple Porosity/Multiple Permeability Dynamic Simulation
- ▶ Production Test, PLT, and DST Analysis and Interpretation
- ▶ Multiphase Discrete Fracture Network Flow Modeling
- ▶ Calibration and Conditioning to Dynamic Data
- ▶ Dynamic Upscaling



FRACMAN[®] RESERVOIR EDITION

Golder Associates is a premier group of professional services firms operating in the areas of the earth and the environment. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organizational stability. Golder professionals take the time to build an understanding of our clients' needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees who operate from offices located throughout Africa, Asia, Australia, Europe, North America and South America.

Fractured Reservoir Modeling Solutions



▶ USA +1 425 883 0777 Canada +1 604 296 4200 UK/Europe +44 1628 586200

▶ www.fracturedreservoirs.com ▶ fracman@golder.com





Are your fractures giving you problems?

Variable production? Early water breakthrough? Rapid production decline? Uncertain reserves? Meet the challenges of your fractured reservoirs with FracMan, the world's leading fractured reservoir modeling software from Golder Associates.

FracMan Reservoir Edition gives you the benefit of the insights that Golder's geologists, geophysicists and engineers have gained in more than two decades of world-wide experience with fractured reservoirs.

FracMan provides the tools you need to understand the porosity, permeability, and connectivity of your fractured reservoir. FracMan success stories include fractured

clastics and carbonates, basement and volcanic reservoirs, as well as tight gas, oil shales, and other unconventional reservoirs.

FracMan enables you to develop a traceable route between your reservoir fracture data and its use in reservoir modeling. The software helps geologists and reservoir engineers work more closely together, providing a common platform and a common language. Complex geologic concepts are transformed easily to reservoir model parameters, in a clear and consistent manner.

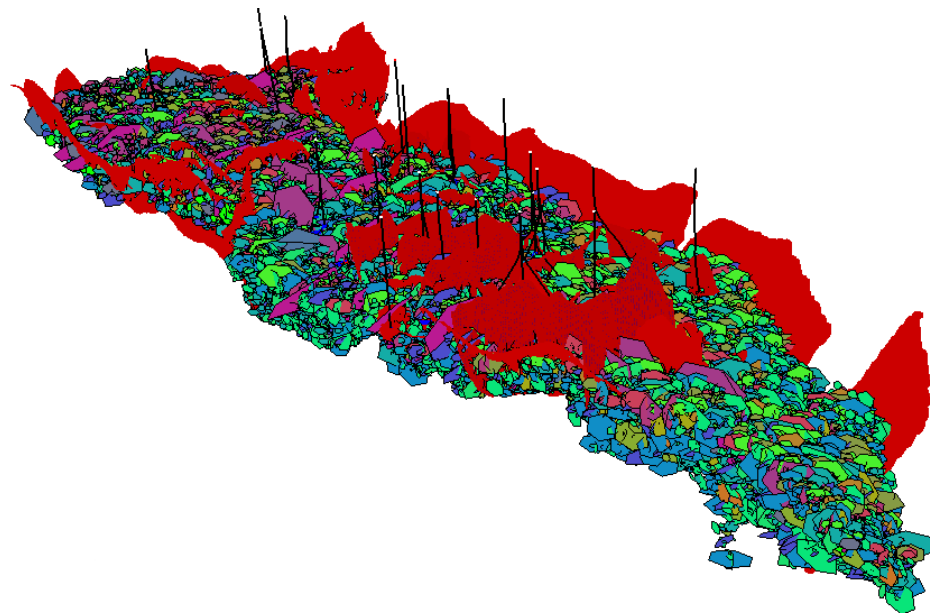
"When a client asks me for options for a fractured reservoir modeling workflow, I give them the 3 "Fs": FracMan, FracMan, FracMan!"

Kevin Isaac, Petros Geoscience

How can FracMan help you?

Whether you are involved in exploration, prospect appraisal, full field model development or addressing specific local issues, FracMan has the tools for developing understanding and insights that will help you make the best development decisions.

Visualize your fracture system, test your conceptual understanding, determine the best strategies, quantify risks and uncertainties. Let FracMan help you close the gap between geology and production behavior.



Full field DFN model

Experience FracMan Workflows

Your reservoir's fracture network makes a significant impact upon performance and success. Discrete Fracture Network (DFN) based work flows available in FracMan offer the only way to capture the anisotropy and connectivity of the fracture system and have a clear advantage over conventional modeling approaches.

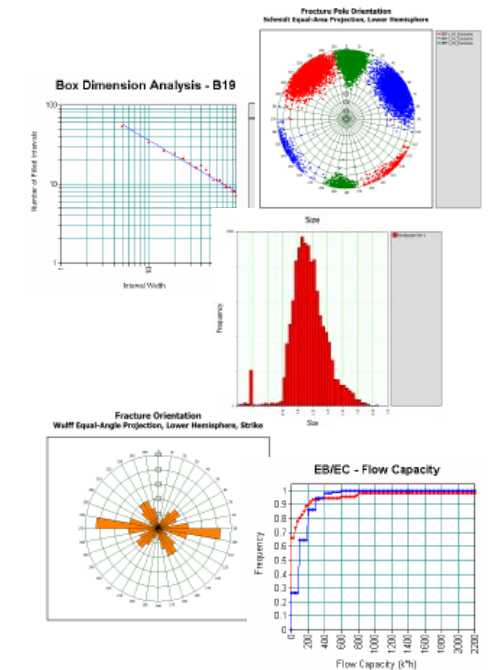
FracMan helps you integrate all of your geological, geophysical and petrophysical, well test and production data in order that you may:

1. quantify the properties of your reservoir's fracture network through a suite of advance analysis tools;
2. generate geologically realistic DFN models based upon a range of properties including seismic attributes, structural modeling, curvature analysis or outcrop data; and
3. validate your models by simulating pressure transient and well interference tests within the DFN model.

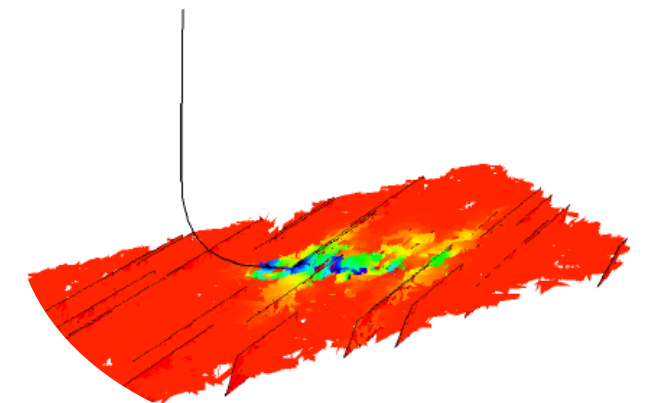
With a calibrated DFN model you can:

1. calculate fracture pore volume, STOIP, probable recovery;
2. plan well paths to optimize production and likely tributary drainage;
3. upscale your DFN model to full field dual porosity reservoir model properties including directional permeability and Sigma factor; and
4. plan EOR or water mitigation strategies.

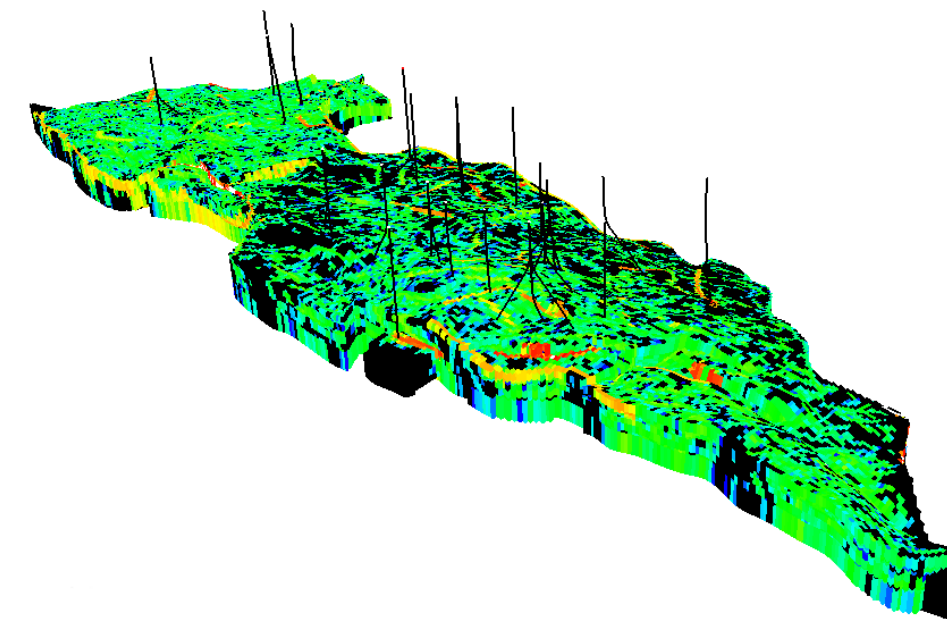
Let FracMan help you take control of your fractured reservoirs!



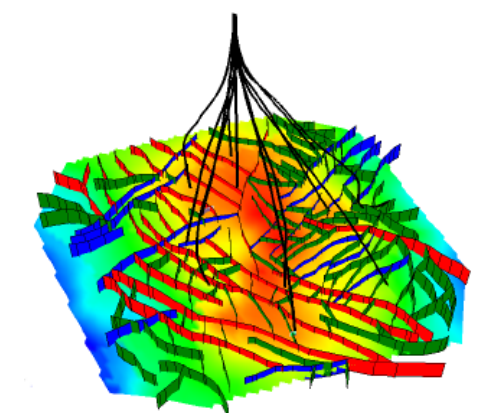
FracMan offers a rich array of fracture analysis tools



Well test simulation through DFN model



Upscaling of DFN model to simulation ready properties



Faulted reservoir model used in well planning