tNavigator®

Integrated static & dynamic modelling from reservoir to surface networks

Technology Overview

Rock Flow Dynamics

tNavigator, developed by **Rock Flow Dynamics,** is a high-performance tool for integrated static and dynamic modelling from reservoir to surface networks. tNavigator has been in development for 14 years, releasing 4 software updates per year. Our team includes 45 support engineers in 20 offices across 15 countries and 90 software engineers supporting our development. The tNavigator community has 200+ commercial clients in 32 countries and 80+ universities in 28 countries.

Why choose tNavigator?

A **one-stop comprehensive reservoir management solution** that leverages modern computing architecture to deliver **superior speed, scalability & ease-of-use.**

tNavigator solves tough problems - quickly, reliably and robustly. Large & small models; conventional & unconventional; offshore & onshore; black oil, compositional or thermal.

A **single environment** for: seismic, geology, geomechanics, reservoir engineering, PVT, wellbore and surface network modelling. No time wasted or data lost moving between applications.

Delivers fully-coupled, fully-implicit simulations of **reservoir and surface network systems.** This means more reliable production forecasts, delivered quicker.

Takes **full account of uncertainty** throughout your system, for better optimisation of production and improved history matching.

Adapts to your environment. It is a multiplatform application written in C++/ CUDA. It runs on laptops, workstations and HPC clusters, with or without GPUs. A cloud-based solution with full graphical user interface capabilities and cloud-side post-processing via remote desktop is also available.

tNavigator's impressive scalability derives from **parallel technology** that takes full advantage of multi-core CPU and GPU processing units. The domain decomposition between computational threads for shared and distributed memory systems, as well as load balancing is done automatically. Reservoir engineers can focus on **improving production**, tNavigator takes care of the computing architecture.

tNavigator offers a wide range of tools to allow geoscientists to fulfil their **static modelling workflows** including: seismic interpretation, well correlation, a structural modelling application, facies and petrophysical modelling and volumetric calculations. tNavigator has **Python based workflows,** allowing the user to complete routine operations in an automated and timely manor. The tools open up a newly collaborative environment for Geoscientists to understand current fields and prospects and make concise geological decisions.

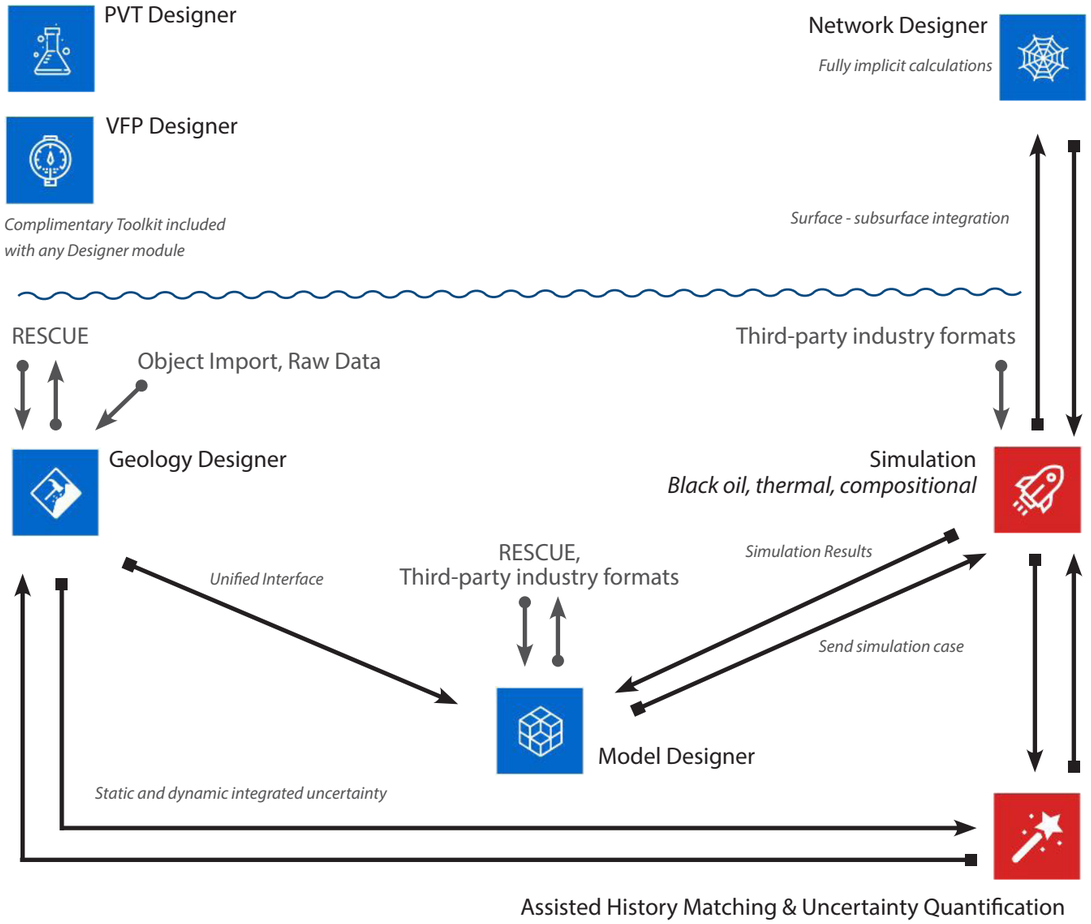
tNavigator®
Rock Flow Dynamics

Fully Integrated Solution for Reservoir Engineers & Geoscientists

tNavigator is a software package offered as a single executable, allowing the user to build static and dynamic reservoir models, run dynamic simulations, calculate PVT properties of fluids, build surface network models, calculate lifting tables and perform extended uncertainty analysis as a part of one integrated workflow. All the parts of the workflow share a common proprietary internal data storage system, super-scalable parallel numerical engine (tested up to 10240 CPU and 35840 GPU cores with model sizes exceeding 1 billion active grid blocks), data I/O mechanism and graphical user interface.

tNavigator supports third party data input formats. The format converters are embedded into the executable and provide on-the-fly conversion of input data decks into the internal data storage system.

tNavigator licensing is enabled for local and network environments. Local licenses are provided for standalone workstations and laptops and require a USB dongle and corresponding license file. Network licenses for LAN and WAN networks are provided by a license server installed on Linux or Windows computer systems (physical or virtual). The license server requires access to a USB dongle and its license file. The license server is designed for high-load and could provide usage statistics for FlexNet® and OpenIT® monitoring systems.



Workflow Based Integration

tNavigator technology offers the following functional modules:

- **Geology Designer** for data interpretation and building static reservoir models
- **Model Designer** for pre-processing and building dynamic reservoir models
- **PVT Designer*** for interpretation of gas and fluid laboratory experiments
- **VFP Designer*** for well bore and multisegmented well simulations
- **Network Designer** for building, visualisation, performance analysis of surface networks
- **Simulation** engines:
  - Black oil
  - Compositional
  - Thermal compositional
- **Simulation Results Graphical User Interface** for runtime monitoring and results post-processing
- **Assisted History Matching** for automated history matching and uncertainty analysis

** **PVT** and **VFP Designers** are included in Geology Designer, Model Designer or Network Designer package and do not require separate licenses.*

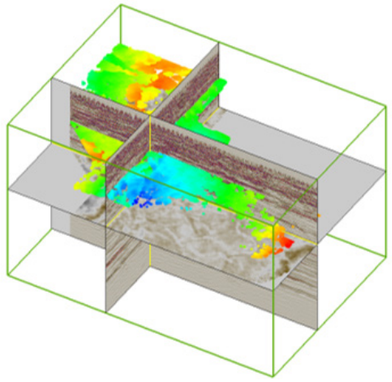
All of the Designer modules in tNavigator support Python based workflows. This allows users to record and replay sequences of functional steps for: input data interpretation, building static models, dynamic simulations, post-processing of results, uncertainty analysis or history matching. Workflows can also be used for connecting various modules of tNavigator, calling external user scripts and third-party software like Excel®.

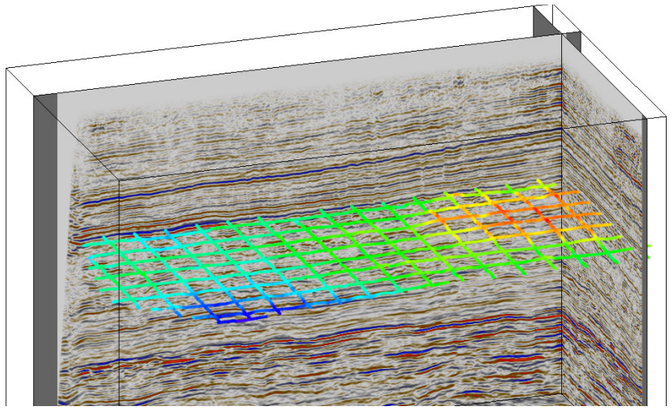
For example, one could set up an arbitrary user defined workflow, which would include step-by step building of a structural model in Geology Designer followed by snapping seismic surfaces to match markers, grid generation, upscaling, SGS property interpolation and dynamic model initialisation with static and dynamic uncertainty variables. This static-to-simulation workflow can be run from the Assisted History Matching module and provide comprehensive sensitivity analysis of simulation results with respect to variations of static and dynamic parameters.

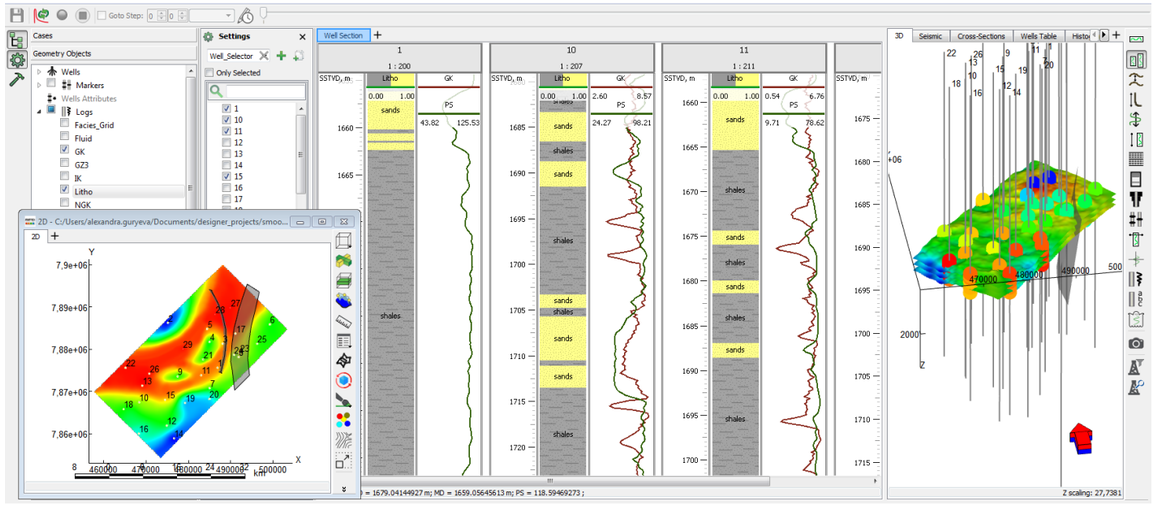
Black oil, Compositional and Thermal Compositional are full physics finite difference simulators with upstream flux approximation, molar densities, and pressure used as principal variables. All simulators use general mesh formulation and support fully unstructured grids including non-neighbourhood connections, layers with pinchouts and thin layers. Corner point and general block corners input formats for the model grid are supported. Multiple local grid refinements and grid coarsening are allowed. Support for naturally fractured reservoirs is provided via dual porosity dual permeability (DPDP) mechanisms. tNavigator supports trajectory (X, Y, Z) and grid (I, J, K) defined wells of arbitrary shapes and supports multi-lateral wells, ICDs, connection based fractures, and multisegmented wells. Simulation of BHP, THP, hierarchical group controls and control by rates is supported. At each time step, the coupling between the well and the reservoir is resolved by solving a fully implicit well equation that takes into account possible crossflow between well connections. The resulting system of non-linear equations built by Fully Implicit (FI) or Adaptive Implicit (AIM) method is resolved using Newton's method. The simulation results can be exported to standard UNRST/UNSMRY binaries and RSM files. The simulators don't require any other external software tools and can be used within integrated static, dynamic, and uncertainty workflows available in tNavigator. tNavigator can also adapt to existing corporate workflows by integrating with legacy third-party tools.

tNavigator® Rock Flow Dynamics

Geology Designer *allows the user to build a static model from scratch.*







Key Features

- Load and edit interpreted seismic surfaces, well trajectories, logs and well picks, facies properties, rock properties, petrophysical information, point sets and other objects. Formats exported from some legacy third-party tools can be loaded to Geology Designer.
- 2D and 3D seismic: import of SEG-Y format in time or depth, creation and visualisation of in-lines, cross-lines and time-slices. Seismic interpretation: time/depth law import. Display of wells, well logs and markers on the Seismic tab (2D).
- Synthetics: calculation to create a synthetic velocity curve, synthetic acoustic impedance, reflection coefficient and interval velocity curves to compare with the seismic data.
- Seismic attributes computation: coherence, instantaneous frequency, amplitude, phase.
- Support for coordinate reference systems by country or EPSG codes.
- 2D and 3D visualisation, histograms, crossplots, vertical proportion curves.
- Well correlation window allows the user to work with many wells at the same time. Automatic and manual well correlation is capable of handling hundreds of wells at the same time. Ability to work with several ghost curves at the same time.
- Faults: loading faults in standard formats, faults creation via polygons, fault editing, build a 3D grid with faults.
- Structural modelling, local grid editing.
- Facies analysis, variograms, property interpolation: least-squares, inverse distance weighing (IDW), kriging, co-kriging, Gaussian simulation (SGS) and multi-point statistic simulation.
- Fluid-in-place in 2D and 3D.
- Calculator to work with all project objects.
- Python based workflows.
- Geosteering.
- All of the calculations are accelerated with parallel algorithms run on all available cores of the hardware.

Integration

The combination of modules Geology Designer, Model Designer, PVT Designer, VFP Designer, Simulator (black oil, compositional or thermal), Assisted History Matching and Uncertainty provides the capability to create static and dynamic models in one graphical interface, run simulations, analyse results and carry out assisted history matching and uncertainty analysis.

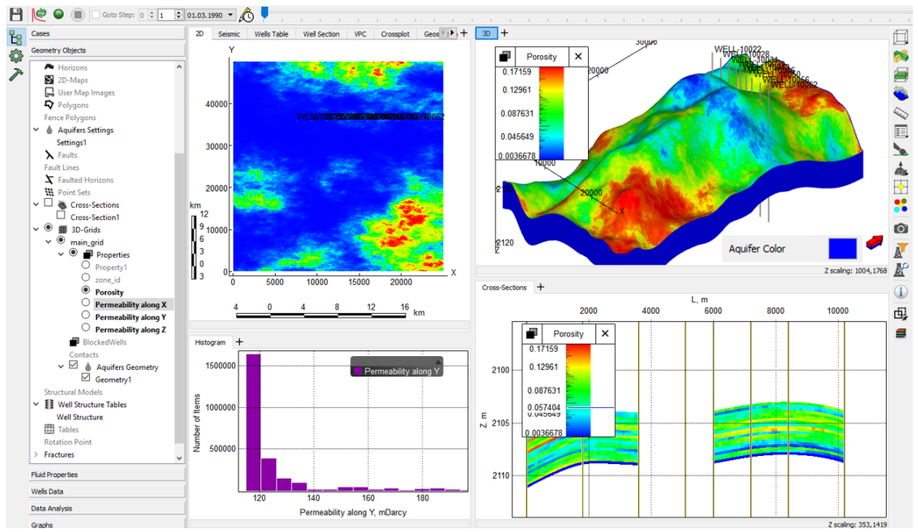
Combined with the Assisted History Matching & Uncertainty package, the Geology Designer allows the user to capture static uncertainties with full ranges and distributions, offering the ability to carry out a sensitivity and uncertainty analysis on your geological grid, without the need to build a full hydrodynamic model.

tNavigator® Rock Flow Dynamics

Model Designer (pre/post-processor) *allows the user to create a dynamic model and perform local editing, updating and maintenance of the simulation model.*

Key Features

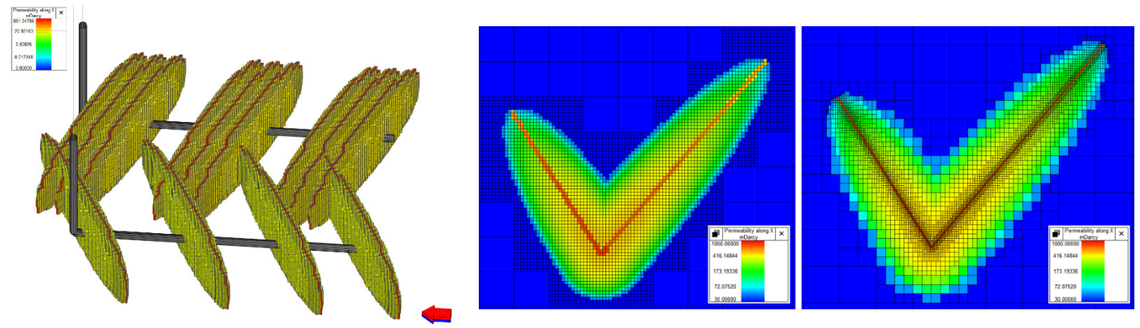
- Loading grid in standard formats, loading RESCUE files.
- Start from existing dynamic model. Property editing, PVT, RP, well production data update.
- Relative permeabilities (Corey and LET correlation, import).
- PVT and EOS: Integration with the PVT Designer.
- VFP tables: Integration with the VFP Designer.
- Rock properties.
- Equilibrium and non-equilibrium initialization.
- Property calculator, local grid editing, aquifers.
- Load and edit well history and events in table form. Pre-defined rules for tables recalculation. Integration with data bases via Python scripts.
- Development Strategy: well groups, limits and control modes, groups limits, economical limits and other rules for wells, well filters.
- Field development planning, restart and forecast scenarios, handling of multiple simulation cases in one Model Designer project.
- 2D and 3D visualisation, histograms, crossplots, graphs.
- Python based workflows.
- All of the calculations are accelerated with parallel algorithms run on all available cores of the hardware.



Model Designer for Unconventional Reservoirs

Model Designer enables users to design and simulate multi-stage hydraulic fracture configuration with virtually unlimited complexity.

- Fractures with arbitrary geometry can be modelled with no restrictions on the number of fracture stages and fracture clusters; nor on the angles of fracture-to-fracture, fracture-to-well, fracture-to-grid relative orientations.
- Various rock properties (porosity, permeability, net-to-gross ratio) and reservoir regions (saturation, rock compaction, PVT) can be initialized and changed in time via schedule section separately for fracture and non-fracture zones within stimulated rock volume (SRV).
- Fractures and SRV zones are defined through one or several Templates with parameters included in the Assisted History Matching and Uncertainty Quantification workflow.
- Multiple fractures can merge and split from each other. A new type of adaptive logarithmic LGRs can be used to ensure effective unstructured gridding around fracture paths.
- Fracture properties for multiple wells can be input into the project via Fracture Table that enables handling large data arrays.
- Incorporation of frac propagation results from third party software (GOHFER®, StimPlan™, etc.).
- Dual porosity/Dual Permeability, Coal Bed Methane and other options are available.
- Assessment of the fracture parameters' impact on production (uncertainty analysis via workflow).



Integration

The combination of modules Geology Designer, Model Designer, PVT Designer, VFP Designer, Simulator (black oil, compositional or thermal), Assisted History Matching and Uncertainty provides the capability to create static and dynamic models in one graphical interface, run simulations, analyse results and carry out assisted history matching and uncertainty analysis.

tNavigator® Rock Flow Dynamics

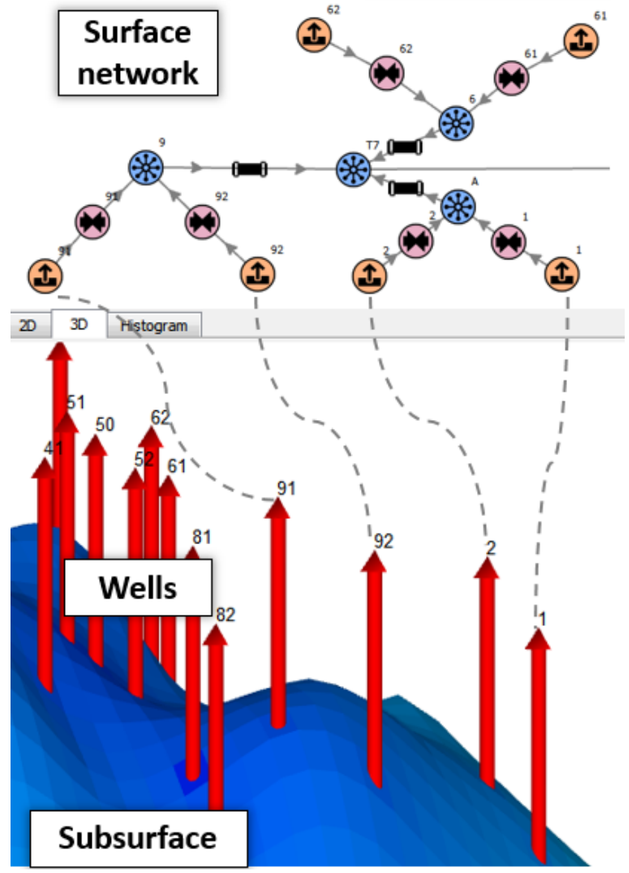
Network Designer ***allows the user to create and calculate the surface network both separately and in a fully coupled way together with the subsurface model. Network Designer is integrated with PVT Designer, VFP Designer, Model Designer, Geology Designer and Simulator.***

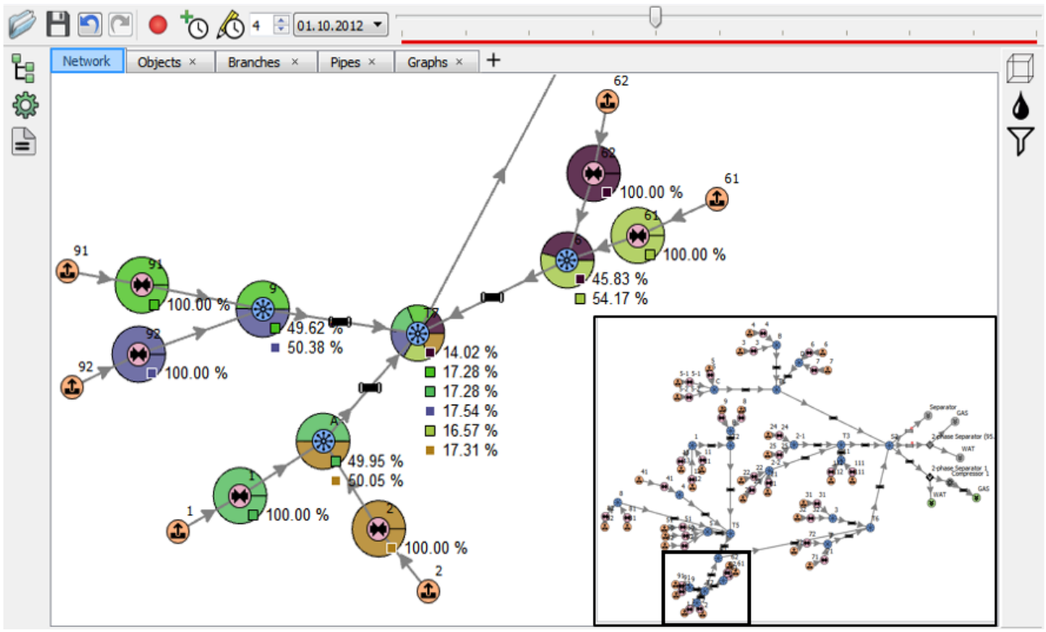
Key Features

- Create and edit a surface network. Standard Elements Library is available and contains: well, injector, source, link, pipe, joint, pump, choke, compressor, 2-phase and 3-phase separators, sink. Objects that specify upper/lower limits of phase rates and pressure for wells and groups of wells are available: automatic chokes, automatic pumps, limits.
- Steady-state calculation of the surface network to model flow, pressure & temperature under boundary conditions.
- Control of network correctness: detection of network's parts, where a flow is absent, before running calculation; detection inconsistency of heights of pipe end-points at pipe joints; control of sufficiency of the number of boundary conditions (pressure, mass flow rate); control of setting equipment characteristics required for calculations.
- Integration with PVT Designer provides unified fluid properties. PVT models: black oil, compositional and temperature effects.
- Integration with VFP Designer provides VFP and IPR tables. Hydrostatic and dynamic pressure losses calculations: different correlations, temperature effects; Burial configuration effects.
- Integration with Model Designer. When importing a model with network into the Model Designer a Network Designer project will be automatically created and available for further editing.
- Integration with Simulator. Fully implicit coupling surface with subsurface and wells is provided.
- Various tools to analyse and visualise results in graphical interface are available: Bubble maps, Contribution charts etc.
- Unified Graphical user interface (GUI) provides a synchronised visualisation for integrated modelling.
- All of the calculations are accelerated with parallel algorithms run on all available cores of the hardware.

Integration

At each time step a fully coupled calculation of subsurface (reservoir) with the surface network, taking account of well constraints, is provided by full integration of Network Designer, PVT Designer, VFP Designer and Simulator.



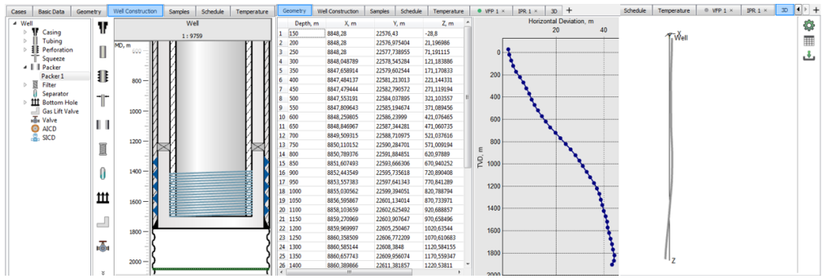


tNavigator® Rock Flow Dynamics

VFP (Well) Designer *allows the user to create a well or pipeline model for calculation of lifting tables.*

Key Features

- Create and edit well geometry and construction.
- Well geometry. Load a well trajectory in standard formats: Well Path/Deviation, LAS, GWTD, etc. Copy and paste of trajectory points from a text file or a spreadsheet. Manual editing of a trajectory. Well geometry visualisation (TVD and Deviation Survey) in 3D.
- Load and visualise LAS in 3D.
- Dogleg Severity visualisation allows specification of the maximum value of trajectory deviation in degrees per 30m. A well trajectory is coloured depending on its deviation level.
- Well construction specification. Casing, tubing, perforation, squeeze, packer etc. Inflow control devices (ICD): AICD (autonomous) and SICD (spiral). Visualisation of devices along well trajectory. Manual drag-and-drop addition and editing of properties of well construction objects. Creation and import of custom object catalogues.
- Selection of parameters of well construction objects as variables for matching experimental data (pressure drop measurements).
- Multilateral well: load and edit trajectories and construction of branches.
- Multisegment well.
- Pressure drop calculations. Different correlation types are available: Beggs & Brill, Hagedorn & Brown, Orkiszewski, Gray and others. Different correlations for vertical, deviated and horizontal parts of the wellbore can be specified. Friction and Hydrostatic component multiplier can be specified.
- Calculation of lifting (VFP) tables.
- Normalisation of VFP tables.
- Entering experimental data (pressure drop measurements). Visualisation of results along with the created VFP tables. Matching of tables by selected measured parameters and variables (network component settings, Friction and Hydrostatic components).
- Creation of IPR table. Available IPR models for gas and liquid: Back pressure, Vogel, Fetkovitch, Jones, Well-PI, Well Test data.
- All the calculations are accelerated with parallel algorithms run on all available cores of the hardware.



Integration

Full integration between VFP Designer and other tNavigator modules allows the user to calculate a separate surface network as well as surface coupled with subsurface.

Integration with PVT Designer provides unified fluid properties and PVT models: black oil, compositional and temperature effects. Integration with Network Designer provides a well model (well trajectory, construction, VFP tables etc.). In Model Designer each well corresponds to a project of VFP Designer.

PVT Designer *allows the user to create fluid models (PVT, EOS).*

Key Features

- Black oil, compositional and thermal variants.
- Components library, enter user components, calculate component properties via correlations.
- Saturation pressure curve, Phase envelope.
- Hydrates formation and the effect of inhibitors.
- Consideration of non-equilibrium thermodynamic processes.
- Supported lab Experiments: CCE, DLE, CVD, Swelling test, Grading test, Separator test.
- Enter Samples (laboratory data). Run Regression (Matching) – Match points of experiments data (samples) for black oil and compositional models. Set weights for sample points and for experiments independently, Quality check.
- Lumping (create pseudo-components). Use Matching for lumping.
- Splitting of the undefined ‘plus’ fraction.
- Blending compositions together and decontamination (subtracting a known admixture).
- Initialization data. Grading test: composition with respect to depth.
- Create PVT, export PVT tables to create black oil model.
- EOS. Export EOS data to create compositional model.
- Thermal flash (K-values).
- Create PVT tables via correlations for black oil cases.

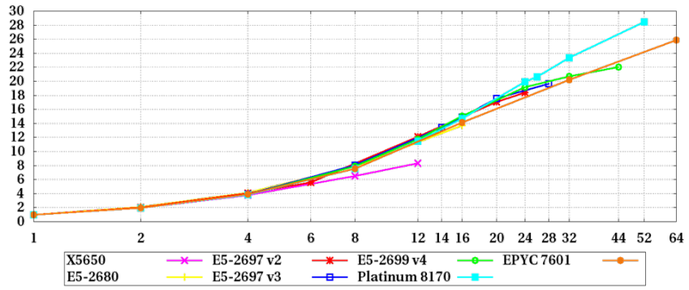
tNavigator® Rock Flow Dynamics

Black Oil Simulator

typical use cases include simulations of light oil and gas production. It supports all industry standard functionality including live oil, dead oil, and wet gas. This module can be used with the Graphical User Interface (GUI) or separately as a console version on a workstation or HPC cluster. Input data from some third party data formats are supported.

Key Features

- General mesh formulation (NNC, LGR and coarsening, faults, pinchouts, etc.), corner point, generalised corner point, unstructured grids.
- Dual porosity, dual permeability.
- 3-phase relative permeabilities with end-point scaling, gravity, capillary effects, saturation, PVT, equilibrium regions.
- API tracking, gravity drainage, nano-polymer flooding, desalination.
- Tracer analysis, waterflood optimisation, aquifers, waters with different salinities.
- Polymers, surfactants, ASP injection, BrightWater® polymers.
- Hysteresis, diffusion, adsorption, desorption.
- Extensive support of hydraulic fractures.
- Multisegment wells, group controls, aquifers including constant flux, Fetkovich, Carter-Tracy, numerical. Extended surface network option.
- Temperature extension of black oil to model the injection of cold or hot water.
- D-factor, GPP controls, VFP lifting tables and correlation functions, ACTIONs, auto-drilling, support of user defined variables, arrays, extended arithmetic.
- Fully implicit and adaptive implicit algorithms.
- Reservoir coupling.
- CPU+GPU processors for faster calculation.



The simulation speed-up shown as a function of cores plotted for a workstation with dual physical CPUs.

Integration

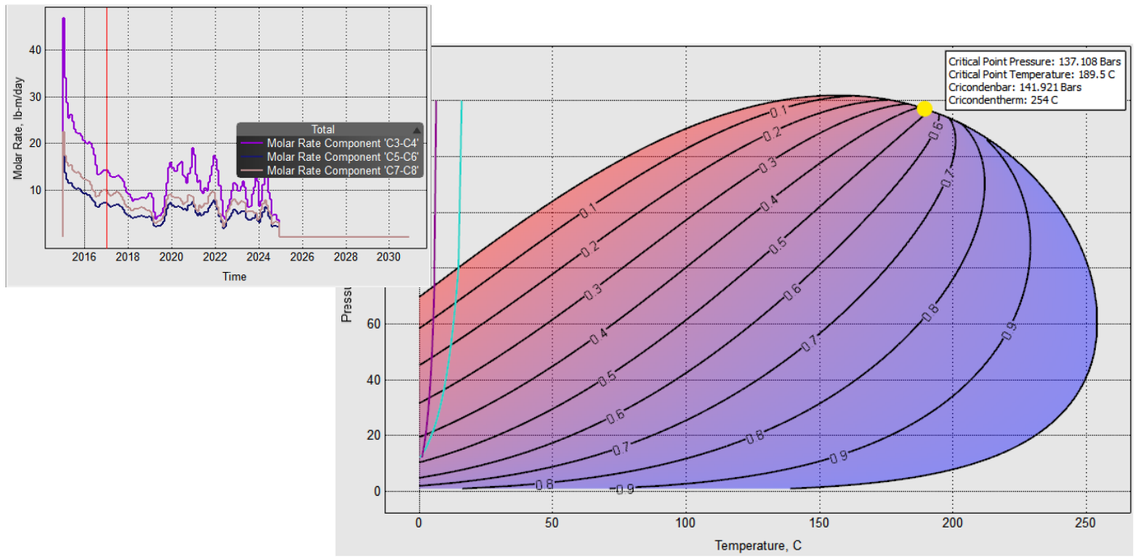
Integration available with Model Designer, Network Designer and VFP Designer.

Compositional Simulator

allows the user to simulate compositional models, where PVT properties of oil and gas phases are fitted to an equation of state (EOS), as a mixture of components. Input data from some third party input decks are supported. This module can be used with Graphical Interface module or separately as a console version on a workstation or a cluster.

Key Features

- Multiple EOS (Peng-Robinson, Redlich-Kwong, Soave-Redlich-Kwong) regions.
- Simulation of non-equilibrium thermodynamic processes.
- Using CPU+GPU processors, clusters for faster calculation.
- CO_2 injection, cycling water-gas injection.
- Molecular diffusion, adsorption and desorption, coal bed methane (CBM).
- Relative permeability scaling with respect to composition.
- Special treatment for oil and gas relative permeabilities near the critical point.
- Distribution of CO_2 and H_2S in water phase.
- Velocity dependent relative permeabilities.
- Gas plants, gas fuel, sales and re-injection, multi-stage separators.
- Gas Daily Contracted Quantity (DCQ) for gas field model.
- Mixture injection (multicomponent and multiphase – WAG).
- Production and injection surface networks.
- Segments of multisegment wells that represent sub-critical valves.
- Pressure maintenance regions.
- Reservoir coupling.



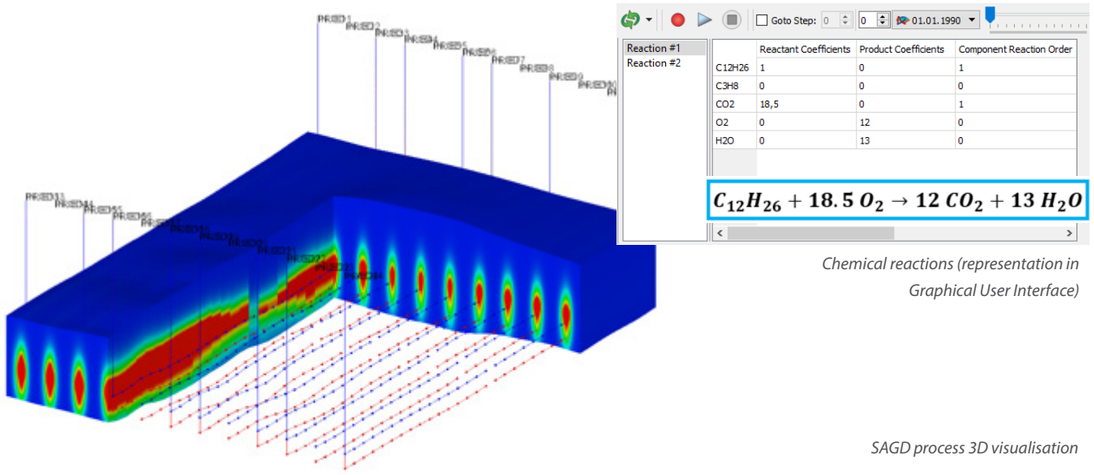
tNavigator® Rock Flow Dynamics

Thermal Compositional Simulator

includes temperature in compositional simulations and is typically used for hot water and steam injection simulations. Input data from some third party thermal decks are supported. This module can be used with Graphical Interface module or separately as a console version on the workstation or cluster.

Key Features

- K-values for hydrocarbon components via tables or via correlation formulas (surface).
- Four phases: oil (hydrocarbon components), gas (hydrocarbon components, water), water and the solid phase. Phase transitions: evaporation, condensation, dissolution, combustion, modelling of chemical reactions.
- Support for solid phase and chemical reactions for in-situ combustion process.
- Equilibrium and non-equilibrium initialization.
- Porosity dependence on temperature and pressure.
- Liquid phases individual component densities, viscosities as functions of temperature and pressure.
- Enthalpies of hydrocarbon components and rock as functions of temperature.
- Relative permeabilities scaling with respect to composition and temperature.
- Analytical, semi-analytical and numerical aquifers.
- Analytical model of heat exchange with the environment.
- Thermal conductivity dependence on conductivities of mobile phases, solid phases and rock.
- Electrical heaters.
- Dual porosity, dual permeability options.
- Steam injection, mixture injection, multicomponent and multiphase streams, WAG.
- Steam Assisted Gravity Drainage technology (SAGD).
- CPU+GPU processors for faster calculation.
- Reservoir coupling.



Chemical reactions (representation in Graphical User Interface)

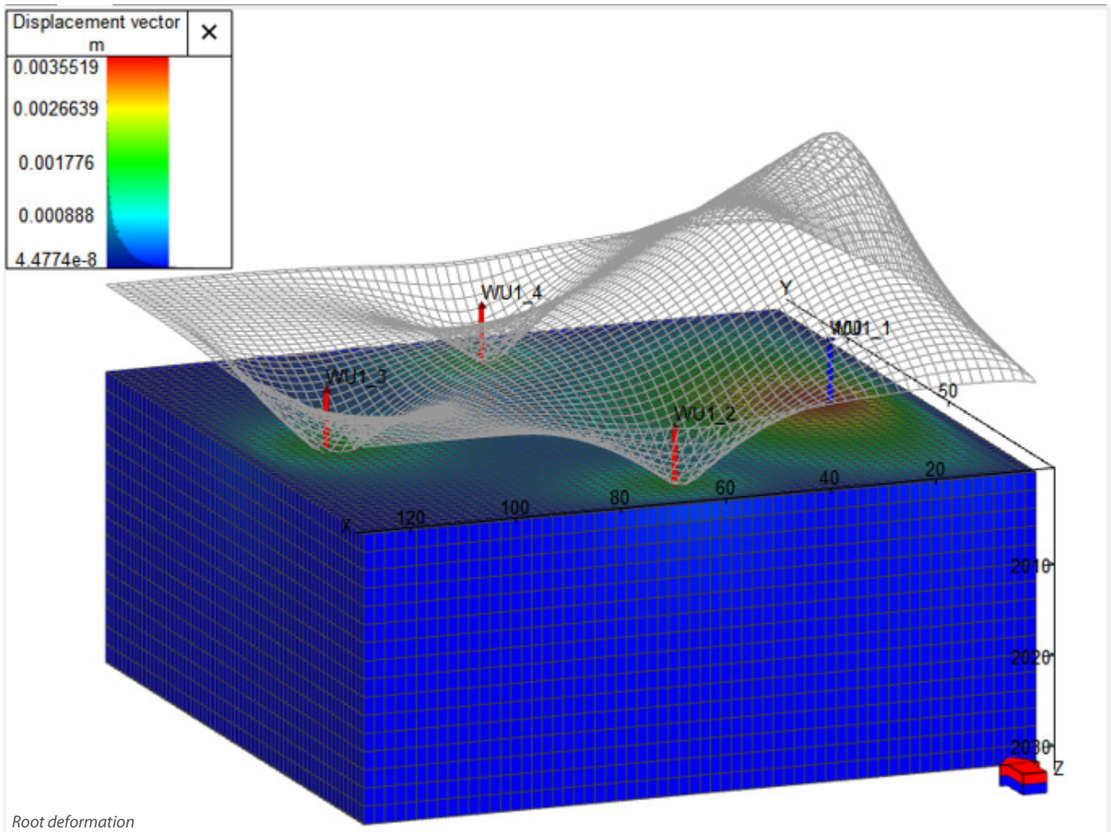
SAGD process 3D visualisation

Fully Coupled Geomechanics Simulation

tNavigator uses a joint system of coupled equations to describe filtration processes on the reservoir and geomechanical effects on the unified grid.

Key Features

- The same model grid is used for reservoir dynamic and geomechanic simulations (block centres for reservoir simulations, block corners for geomechanics).
- Joint system of coupled equations is solved numerically in a parallel way: geomechanics (only CPU cores), reservoir dynamics (CPU and GPU cores).
- All model types (black oil, thermal, compositional) are supported.
- Young's modulus, Poisson constant, boundary condition for stress, boundary condition for displacement.
- Modelling of geomechanical effects via hysteresis rock compaction data tables.
- Mohr-Coulomb failure criterion is used for analysis of stress state and predict the potential rock fault. Possible fracture directions.



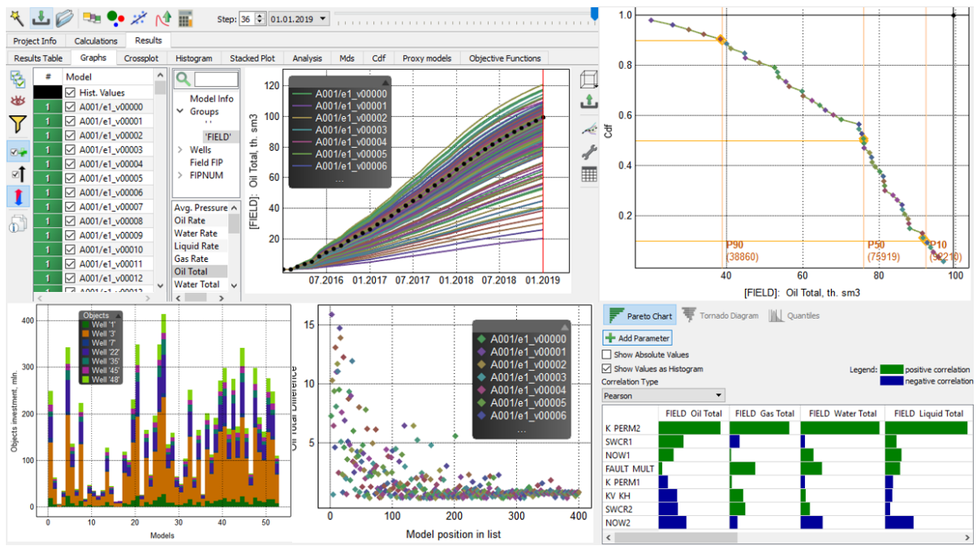
Root deformation

tNavigator® Rock Flow Dynamics

Assisted History Matching (AHM) and Uncertainty Analysis *module allows the user to treat any parameter in tNavigator as a variable with a range of uncertainty or as an arithmetic expression. The module includes a Graphical Interface for run control (workstation or cluster) and runtime statistical analysis of the simulation results.*

Key Features

- Experimental design: tornado, Latin hypercube, grid search, Plackett-Burman, Monte-Carlo.
- Optimisation algorithms: differential evolution, Single and Multi-objective Particle Swarm optimisation (SOPSO and MOPSO), simplex method (Nelder-Mead), response surface (Proxy models can be calculated and exported).
- 3D discrete cosine transform (DCT) algorithm.
- Arbitrary objective function, RFT/MDT incorporation, NPV optimisation, UDQ objective function, user-defined functions defined via Python scripts.
- Graphical Interface: graphs, tables, histograms, cross-plots to compare model variants.
- Analytics: Stacked plots, Pareto charts (Pearson and Spearman correlations), multidimensional scaling (MDS), clusterisation, table of coefficients R2.
- P10, P50, P90 and other quantiles.
- Forecast optimisation, optimisation of well position and trajectory.
- Incorporation of workflows from Geology Designer or/and Model Designer.
- Workflows editable in Python scripts.
- Integrated with Job Queue.
- Calculations on workstation or cluster - mouse control of cluster calculation and remote Graphical Interface.

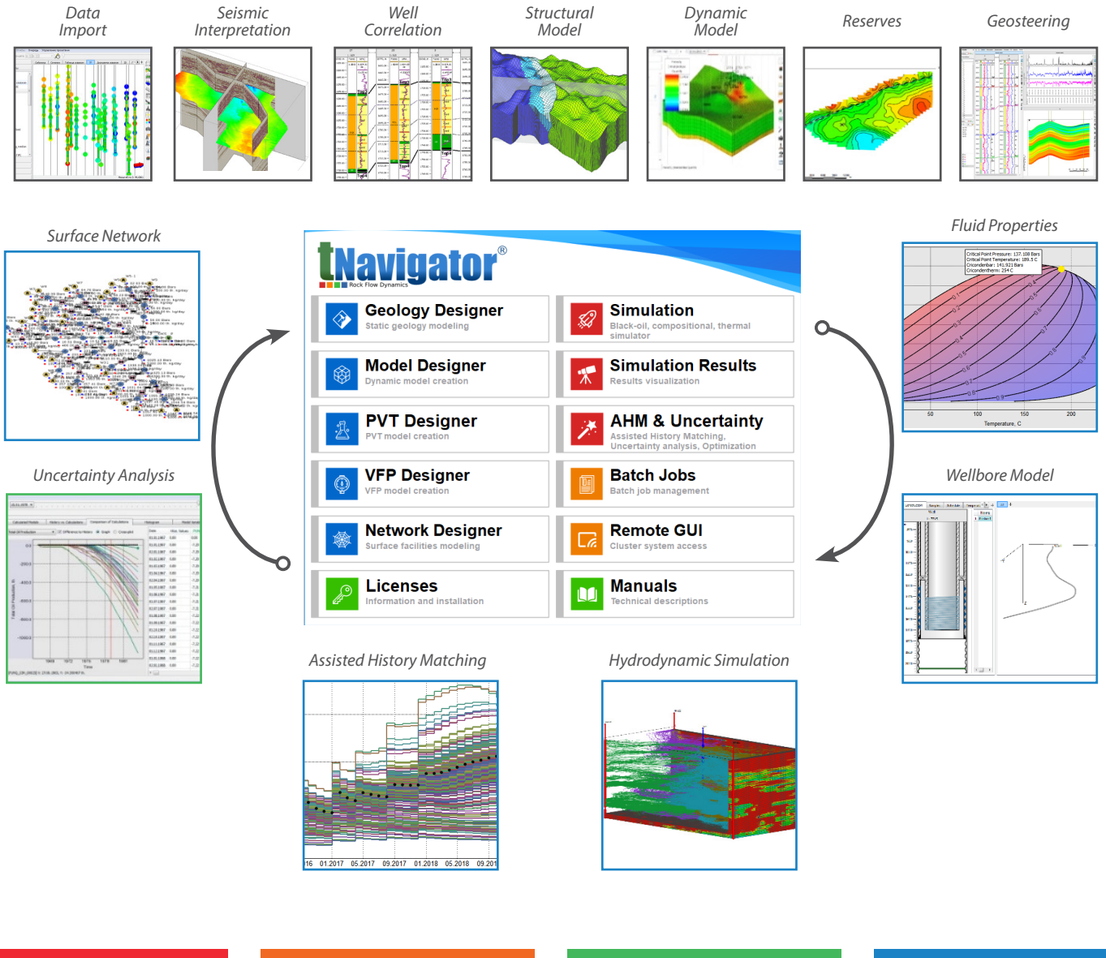


Integration

The combination of modules Geology Designer, Model Designer, PVT Designer, VFP Designer, Simulator (black oil, compositional or thermal), AHM and Uncertainty Analysis provides the possibility to create static and dynamic models in one graphical interface, run simulations, analyse results and carry out assisted history matching and uncertainty analysis.

Fully Integrated Modelling

Assisted History Matching module provides comprehensive sensitivity analysis of simulation results with respect to variations of static and dynamic parameters defined by workflow. The workflow may include step-by step building of a structural model in Geology Designer followed by snapping seismic surfaces to match markers, grid generation, upscaling, SGS property interpolation and dynamic model initialization with static and dynamic uncertainty variables.



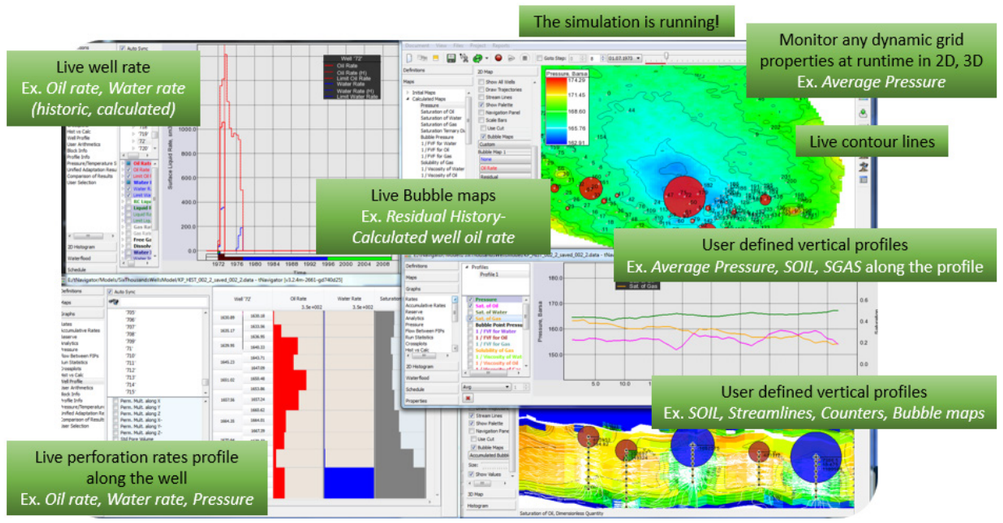
tNavigator® Rock Flow Dynamics

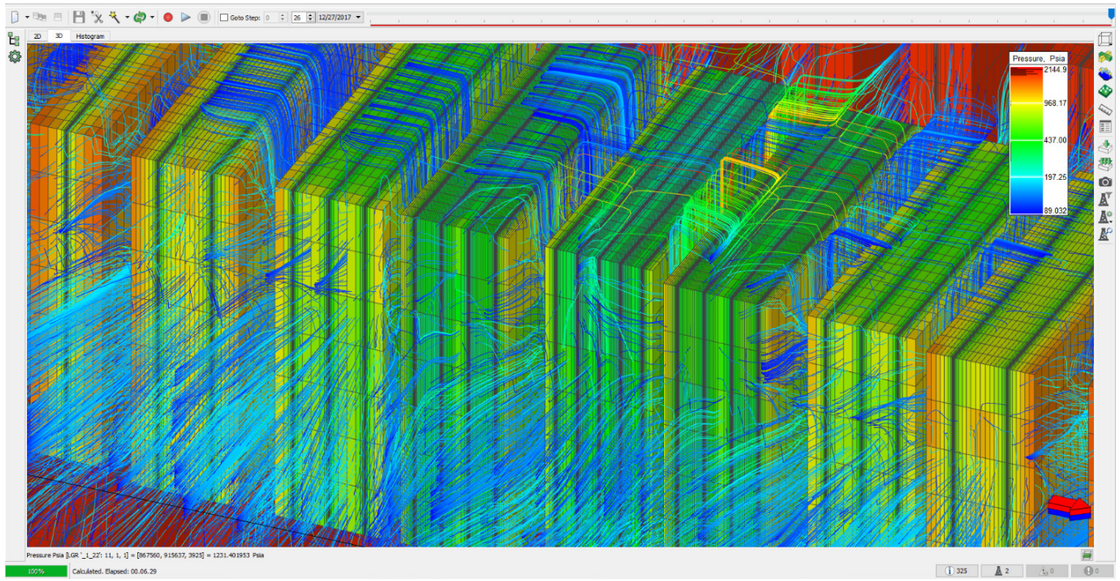
Graphical User Interface (GUI): *in tNavigator, run-control monitoring and simulation result post-processing are done using a single multi-window graphical interface.*

The tNavigator GUI is a universal data analysis and visualisation module. It can be used standalone for viewing existing simulation results generated by tNavigator and third party binaries or integrated with a tNavigator simulation engine to provide interactive run control and instant results monitoring at calculated time steps. The distribution of initial and calculated model grid properties can be viewed as 2D and 3D views, cross-sections, well fences and 1D or 2D histograms. Calculated and historic production data at the field (when available), group, well, perforation levels can be viewed as graphs, cross-plots, summary tables, bubble maps, contours, and profiles along well trajectories. The interface allows loading of LAS data, trajectories and comparison with dynamic well profiles. At each time step, the calculated pressure in the grid blocks is used to generate 2D and 3D streamlines. The streamlines are used to calculate injector-producer allocation factors summarized in the form of a drainage table or visualised as 2D drainage network. The 2D map of any grid property can be overlaid by a set of contour lines.

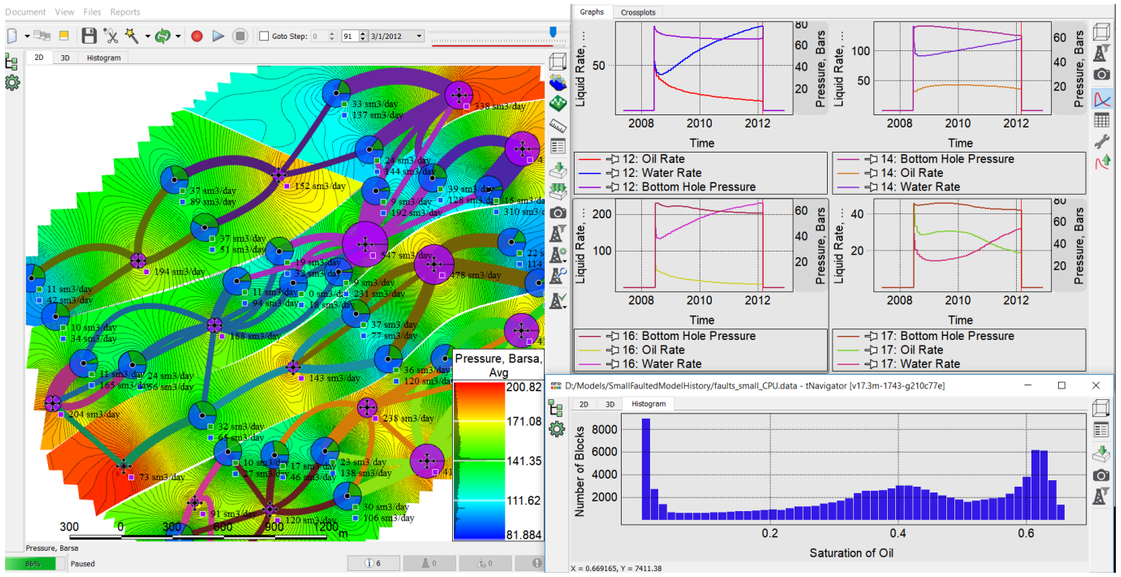
Key Features

- Mouse control simulation: start, pause, restart.
- Visualisation of 2D and 3D dynamic maps and graphs during calculation.
- Graph templates, bubble maps, contours, cross-plots, 1D, 2D histograms, well profiles, reports.
- Graph calculator to create user graphs via Python scripts.
- Waterflood optimisation: interactive tracers, streamlines, drainage graphs and coloured tables.
- Sector modelling: automatic split and merge.
- Advanced property calculator: build any grid properties and filters to analyse data.
- A remote Graphical User Interface is available to control calculations running on a cluster.





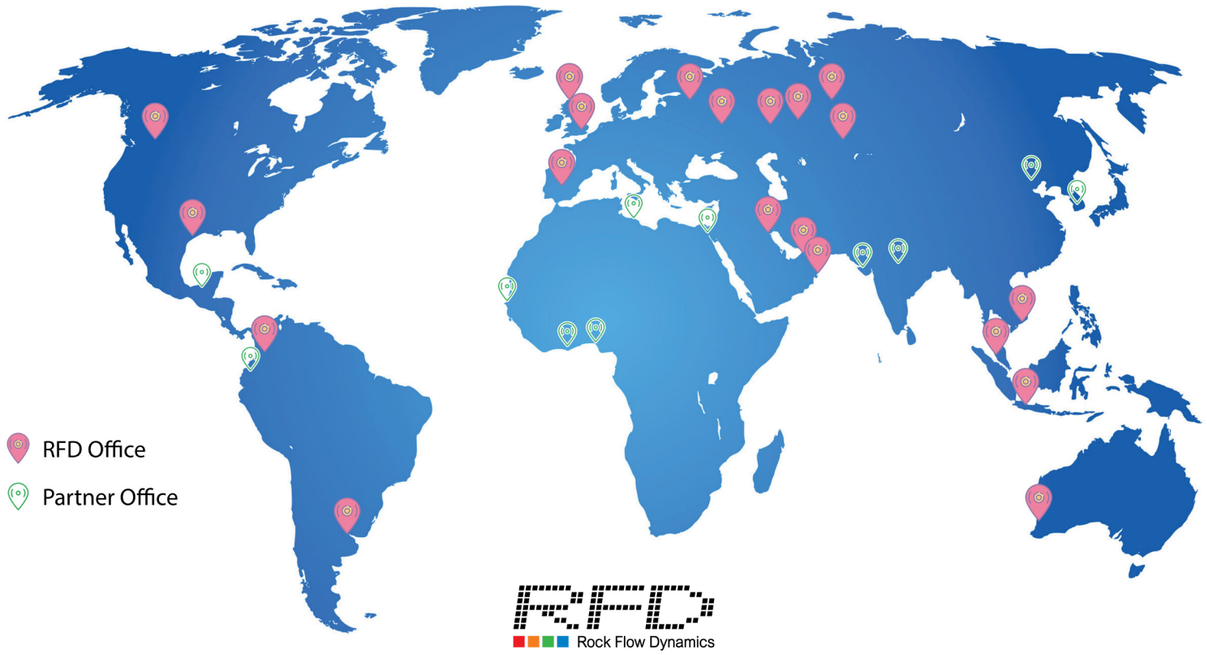
Simulation of multi-stage, multi-cluster fracture dynamics with 3D streamlines overlaid plotted for shale reservoir.



Runtime visualisation of drainage matrix, contours, bubble maps and injection allocation factors, production graphs template for multiple wells, and 1D histogram of oil saturation distribution.

tNavigator®
Rock Flow Dynamics

FIND US IN
20 OFFICES ACROSS 15 COUNTRIES



RFD Office

Partner Office

RFD
Rock Flow Dynamics

Russia	*Moscow, UFA, Tyumen, Almetyevsk, St. Petersburg*
United Kingdom	*Aberdeen, London*
Spain	*Madrid*
USA	*Houston*
Canada	*Calgary*
Argentina	*Buenos Aires*
Colombia	*Bogota*
Kuwait	*Kuwait City*
Oman	*Muscat*
UAE	*Abu Dhabi*
Australia	*Perth*
Indonesia	*Jakarta*
Malaysia	*Kuala Lumpur*
Vietnam	*Ho Chi Minh City*
Khazakstan	*Astana*

Global Support Team:
tNavigator@rfdyn.com

www.rfdyn.com

Sales Enquiries:
RFDsales@rfdyn.com

tNavigator®

www.rfdyn.com

tNavigator@rfdyn.com

Rock Flow Dynamics