

PetroMod 2015 Options

Additional options for PetroMod petroleum systems modeling software

PetroMod* petroleum systems modeling software combines seismic, well, and geological interpretation to model the evolution of a sedimentary basin. Simulations in PetroMod software help to predict pressures and temperatures, as well as assess if, and how, a reservoir has been charged with hydrocarbons. The simulations also predict the timing of hydrocarbon generation, migration routes, quantities, and hydrocarbon type in the subsurface and at surface conditions.

PetroMod software provides a standardized user interface across the entire 1D, 2D, and 3D modeling workflows. The same simulator is used with all technical features and tools available and identical in all dimensions, ensuring full compatibility.

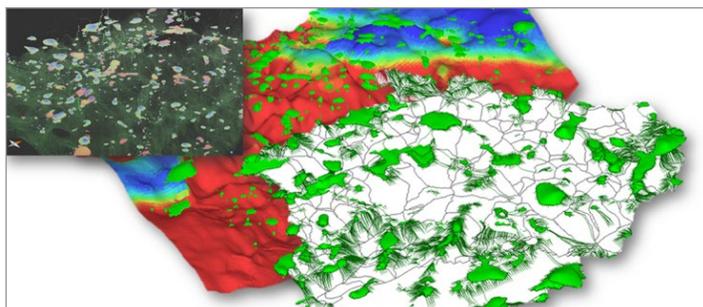
Advanced Migration option

PetroMod software's oil and gas migration modeling technology is the most advanced commercially available tool. It is also the only commercial system with full PVT-controlled modeling of n-component/three-phase relationships during the entire migration process.

The 2D and 3D advanced migration modeling technology uses flash calculations throughout the entire model and its geological history. This delivers an improved understanding and prediction of petroleum properties and oil versus gas probability assessments.

Source rock tracking is possible in both 2D and 3D migration modeling. Multiple source units can be defined, each with its own kinetics, and multiple components can be generated and tracked separately throughout the entire migration process. Geoscientists gain an improved understanding of complex petroleum systems (e.g., the relative risks of charging from different source units or areas).

Source rock tracking enables the evaluation of any number of hydrocarbon components from any number of different source rocks and from secondary cracking processes throughout the entire generation and migration process, and identification of the components in each accumulation.

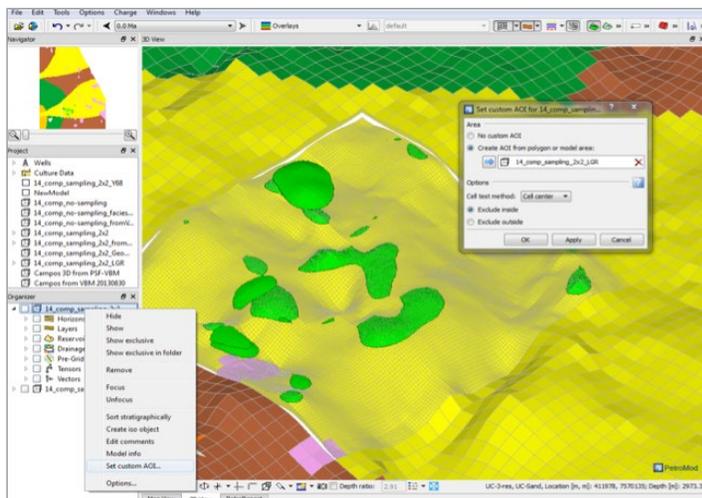


Drainage areas and filling histories in a PetroMod 3D model using the PetroMod Advanced Migration options for invasion percolation and hybrid simulations.

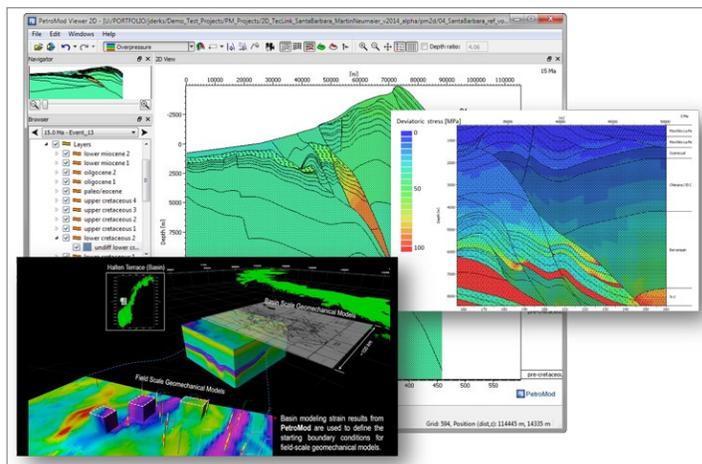
The Advanced Migration option includes:

- Invasion percolation (IP) migration for structurally complex areas and high-resolution modeling based on capillary pressure dependent flow simulation
- Darcy/Flowpath hybrid migration for a full pressure and permeability controlled flow simulation
- Darcy/IP combined method for optimal results in low permeable rocks and realistic high permeable migration pattern

All core and advanced migration simulator components can also be licensed individually to allow customized solutions for individual challenges.



Local grid refinement for more detailed 3D geometry representation.



TecLink 2D and 3D in combination with the fully coupled geomechanical simulator in PetroMod software for compaction and pore pressure prediction in structurally complex areas.

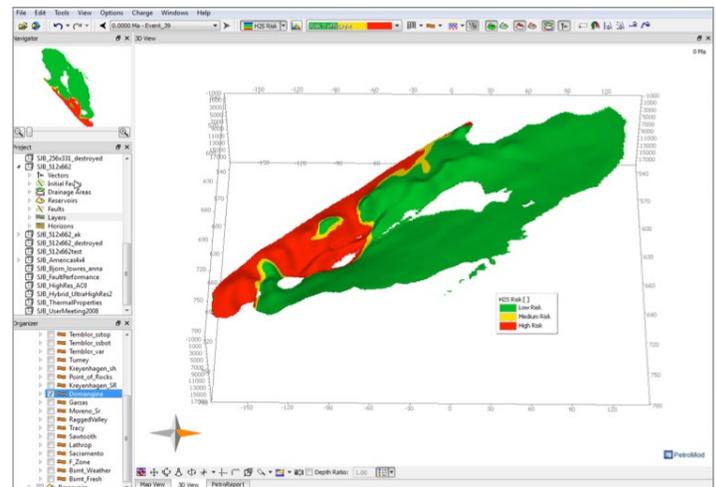
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Structural Geology option

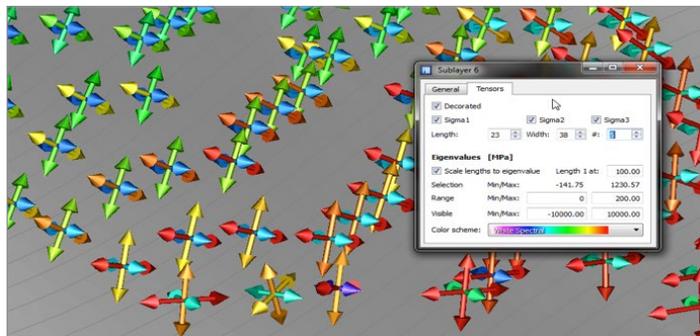
The Structural Geology option in PetroMod software combines all the required functionality for complex geological situations or where a more detailed geomechanical analysis of the stress and strain state in the basin is required.

The TecLink add-on enables construction of petroleum systems models in complex areas with multi-z horizons and a structurally complex geological history in 2D and 3D. PetroMod software is able to construct petroleum systems models from structural restoration solutions—such as the Dynel* 2D restoration and forward modeling tool—and combines the restored sections for full 2D/3D pressure, temperature, and flow simulation.

The most detailed charge information from a petroleum systems analysis in structurally complex areas can be generated by combining PetroMod 2D or 3D core licenses with the Advanced Migration and the Structural Geology options, using invasion percolation for flow simulation on TecLink models.



Risk of hydrogen sulfide generation in a PetroMod 3D model.



Tensor visualization of the main stress orientation in PetroMod software.

The geomechanics functionality of the Structural Geology option includes full 2D/3D stress calculation to improve pressure calculations and to predict the regional stress field through geological time. This is important for the identification of potential seal breach risks, rock fracturing, and for sweet-spot analysis in unconventional play assessments. With the integration of basin-wide stress simulation results, reservoir centric geomechanical solutions in the Petrel* E&P software platform can be better constrained and checked for consistency.

Fluid Risk option

The PetroMod Fluid Risk option combines functionality to assess the risk associated with migration and accumulation of hydrocarbons after expulsion from the source rock. Sulfate reduction can lead to a hydrogen sulphide (H₂S) content within prospects which poses a significant risk for corrosion of equipment but also for safety and environment. Being able to assess the risk of thermogenic sulfate reduction before drilling, in an early stage of exploration, can help to mitigate risk and to rank potential leads.

Long preservation times and shallow, low-temperature accumulations also often impose a risk of biodegradation, leading to the necessity of challenging development and production strategies. The PetroMod Fluid Risk option helps in the understanding of risk associated with such settings and enables the quantification of biodegraded hydrocarbons in a targeted accumulation. This option requires a PetroMod 2D or 3D core. It is recommended to combine this option with the Advanced Migration option.

Advanced Geochemistry option

The Advanced Geochemistry option allows more detailed analysis of generated hydrocarbons and gas hydrate formation. It provides a set of additional 14-component kinetic reactions for analysis of hydrocarbon component distributions in the liquid and vapor phase during migration.

SARA kinetics enables assessment of saturates, asphaltenes, resins, and aromatic hydrocarbons being generated in the source rock. Gas hydrate formation and related effects on pressure and migration can be simulated using the gas-hydrate functionalities.

Uncertainty option

The Uncertainty option enables the definition of uncertainties associated with the simulation input parameters in PetroMod models. Different uncertainty distributions can be assigned to parameters such as heat flow, source rock kinetics, or burial depth to assess the impact of variations on the simulation results. Results of simulations defined with uncertainties can be displayed and analyzed in the viewer applications and PetroRisk tools. PetroMod Uncertainty also includes automated thermal calibration workflows to determine optimum heat flow boundary conditions for PetroMod 3D models.

Specifications

PetroMod software is available on all hardware platforms running Microsoft Windows 7 (64-bit) or Red Hat Enterprise Linux 6.4 (64-bit) operating systems. PetroMod software provides the same interface, functionality, and binary data formats on all platforms with the result that input/output files can be easily transferred within mixed hardware systems.

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