

Discover **RECON**

True 3D Geological Interpretation

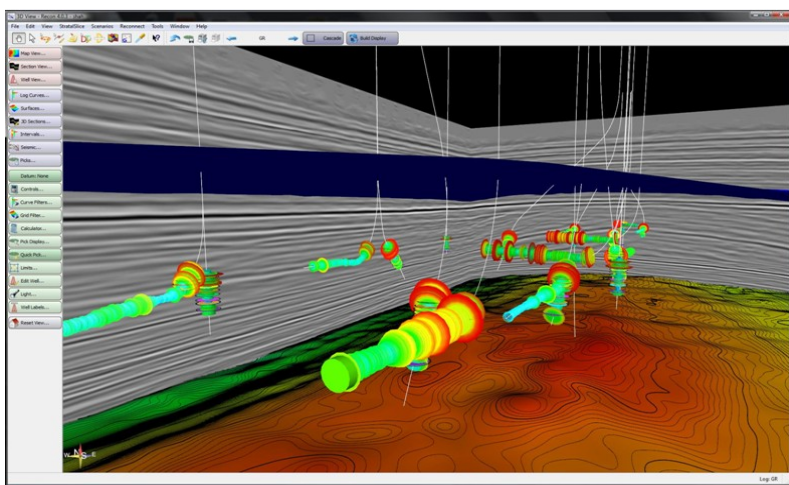
Powered by

Cascade Technology™

Efficient, Accurate Interpretation in Unconventional Plays

Developing unconventional resources has greatly benefited from recent technology breakthroughs. Horizontal drilling and hydraulic fracturing revolutionized U.S. shale gas production and other unconventional plays. Additionally, the ability to accurately and efficiently interpret real time data has enabled the geologist to optimize the placement of a well to penetrate the most prolific intervals of a reservoir.

Recon® provides the most advanced, intuitive and cost effective tools to meet these demanding interpretation challenges. The optimized horizontal well displays and interpretation workflows combined with the unique automated updatability workflows in Recon deliver unprecedented efficiency gains addressing your unconventional interpretation needs from basin wide exploration to real time interpretation of horizontal wells.



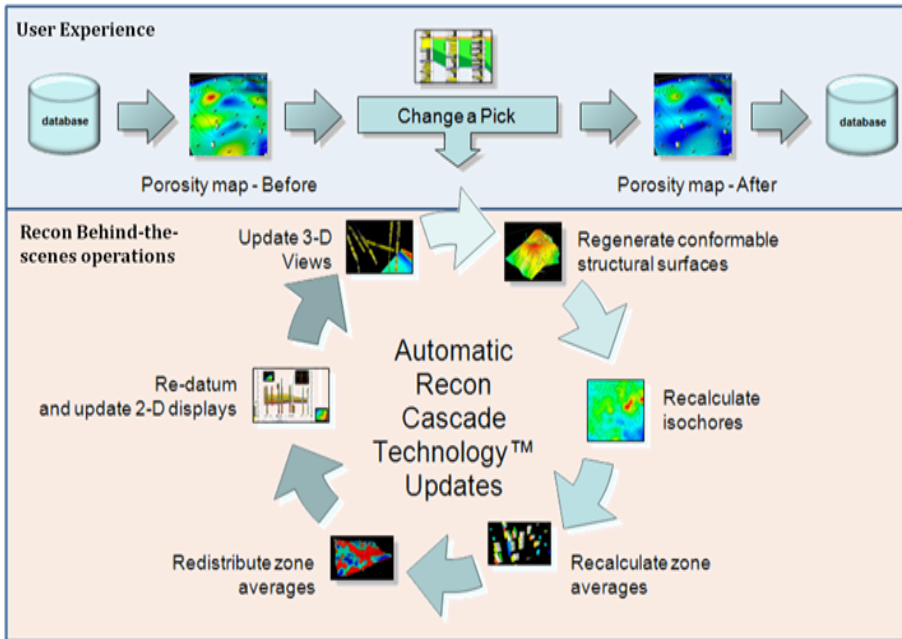
Recon allows you to interpret well logs directly in 3D instead of just a cross section at a time. Using Recon's 3D interpretation environment you will be able to work the way you think. By combining the integrated 2D and 3D tools you will substantially reduce your well log interpretation cycle-time which leads to faster decisions.

"Our asset team recorded 40% efficiency improvement in our geological interpretation workflows. Not only did we complete our interpretations faster, we felt the results were also more accurate, thus directly contributing to our company's bottom line."

Maximize Interpretation Productivity

The power of Recon lies within its game-changing Cascade Technology®. Recon integrates well log and seismic data to offer a truly dynamic 3D geological interpretation environment. With Cascade Technology, any change to the interpretation automatically updates the subsurface model honoring any user defined stratigraphic and structural rules. Immediate feedback is provided in its highly interactive 3D, section, map and well views visualization environment allowing geoscientists to focus on making well informed decisions instead of struggling to make the software achieve their needs. It is this Cascade technology that allows geoscientists to test "what if" scenarios with ease and make more robust interpretations. Interpretations that used to take days or weeks are now achieved in a matter of minutes or hours.

RECON Cascade Technology®

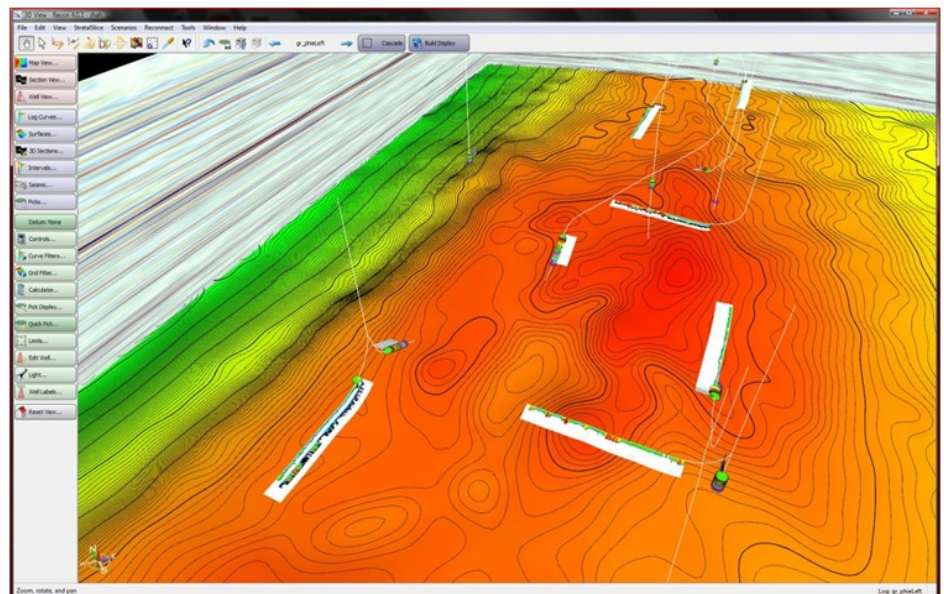


Cascade Technology - Geologist decides to change a pick for a key surface in a well while displaying a property map of porosity distribution. When the pick is changed the structure map is updated and will honor any conformability rules defined for that surface such as tying a seismic event to corresponding well picks. All of the bounding stratigraphic surfaces in the framework are rebuilt and all the thickness maps between the geologic surfaces are regenerated. The zone averages or property distributions are recalculated and all of the interpreted data is redisplayed in 3D, section and map views automatically. This all happens in real-time and occurred when the geoscientist changed a single pick.

Efficient Horizontal Well Interpretation

Recon is especially suited to environments where horizontal wells are being drilled in between existing vertical wells. Geoscientists can make multiple picks on the same well path for the same marker horizon and display interval data at the same time. Because the picks are Cascade enabled, all the surfaces are updated as the interpretation is made. This means new markers are predictive ahead of the bit in an Interpret While Drilling scenario. Recon enables the user to quickly step through the isochores of these beds and find inconsistent picks or interpretation and see how changes to marker picks affect the isochores.

Recon allows you to visualize large amounts of data quickly using Recon's integrated 3D and 2D interpretation environment. Easily resolve complex geological interpretation problems that 2D-based software can't handle. Recon can display and correlate hundreds of horizontal wells directly in 3D, significantly simplifying the geological interpretations involving complex well trajectories.

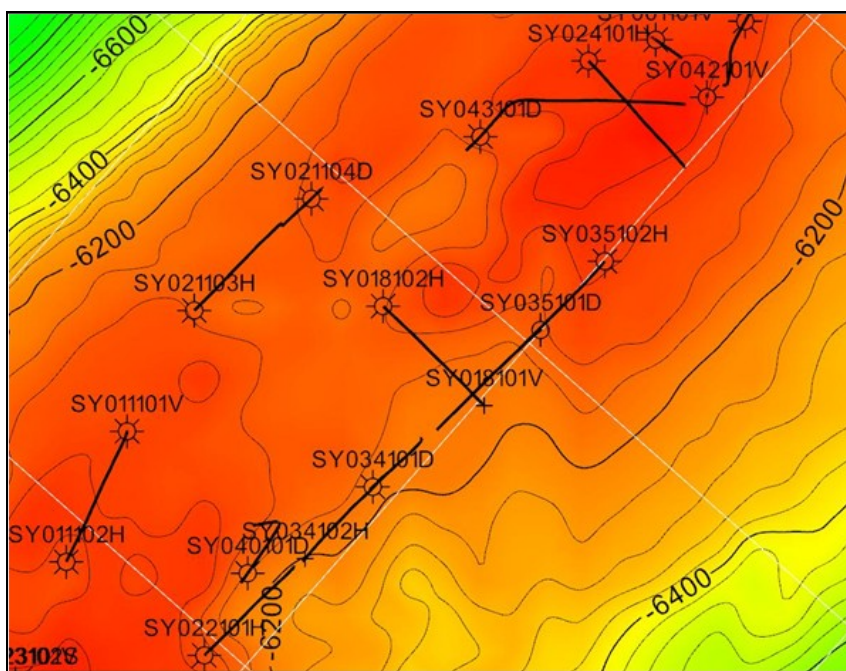


Recon Features

Efficient, Automated Correlation and Mapping

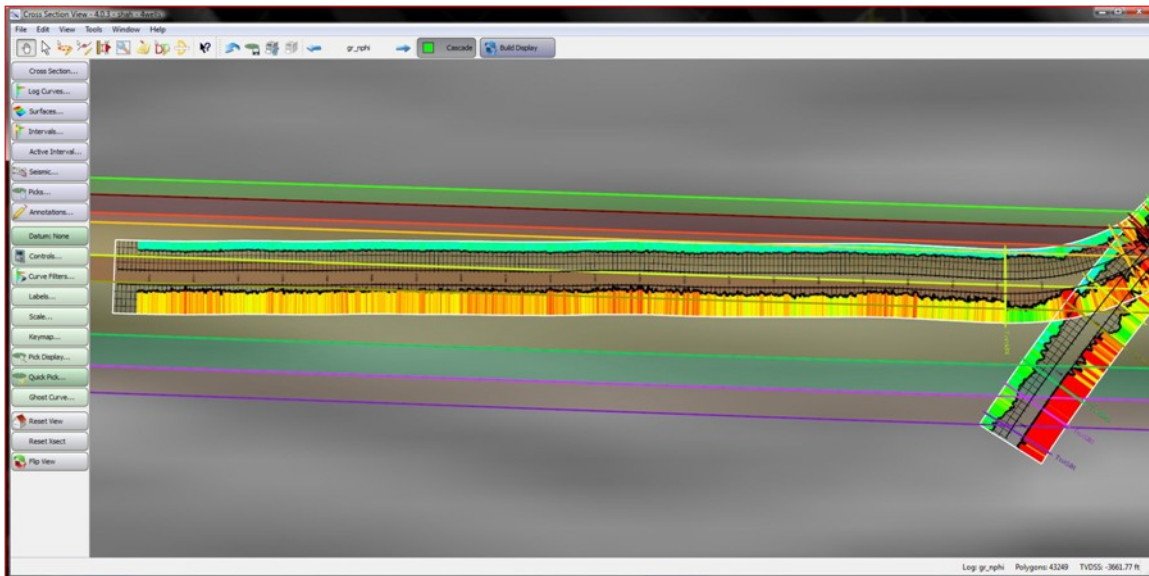
- ✓ Interpretation in 3D window with cascade updating of 2D section and map view automatically and in real time.
- ✓ Excellent handling of very large data sets (10K-100K wells) with smart data management
- ✓ Dynamic cross section - drag correlation ready section across map view and project wells onto section in 2D and 3D views with projection buffer. No need to create individual cross sections to show wells in section view.
- ✓ Recon generates a 3D pick surface as soon as one or more picks exist for a given marker. Picks are automatically back-interpolated where wells intersect the surface but lack an existing interpretation which allows for better datuming and more efficient correlation.
- ✓ Flexible ghost curves for correlation
- ✓ Seismic integration- load SEG Y data easily into recon and view in 3D, 2D section or map view.
- ✓ Stratigraphic column construction with conformability and truncation rules. Stratigraphic Column governs the construction of the stratigraphic framework and is honored during automated cascade updates.
- ✓ Interwell picks - data points can easily added to geologic interpretation based on non-well information. Examples are seismic interpretation, zero-thickness line on isopach, outcrop analog info, surface geologic map information. All can be added in 3D, 2D section or base map view and saved back to 3rd party databases as point sets.
- ✓ Easy customized well templates and log aliasing
- ✓ One mouse click to datum on a surface
- ✓ One mouse click to switch between fixed spacing and distance spacing in 2D section
- ✓ TST sections with TST values shown in section view
- ✓ Zone average thickness maps created automatically from well data and/or third party maps. Able to refine zone average maps vertically based on a distance (i.e., zone average every 5 ft based on well data).
- ✓ Well log calculator for petrophysical work
- ✓ Interval data display and correlation
- ✓ Easy scalable hardcopy

Dynamic Map Displays - All stratigraphic and fault data available to generate surfaces are automatically managed in the surfaces dialogue which makes it easy to reorder the data as needed into a stratigraphic or other user defined sequence. Generating a map in any view only takes a single mouse click to step up or down in your sequence and generate the same map for the next surface.



Horizontal Well Interpretation and Interpretation While Drilling

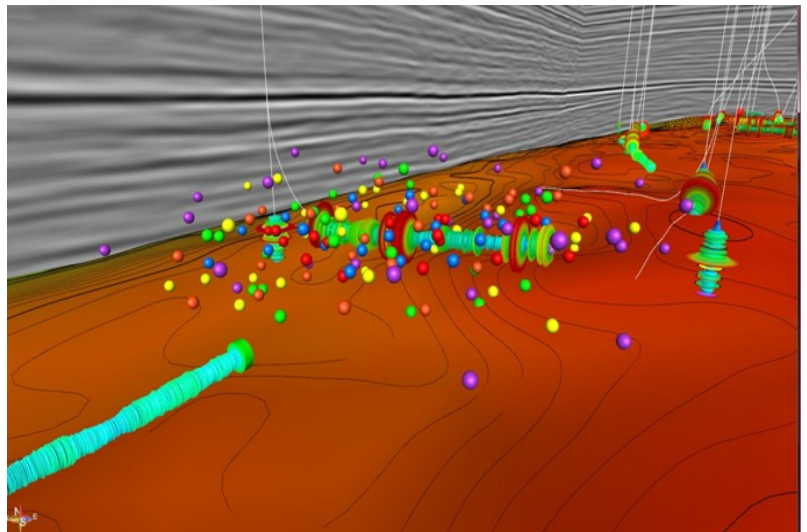
- ✓ Easily make multiple picks for the same marker on a lateral well.
- ✓ Horizontal well displayed in correct depth in section view and 3D view.
- ✓ 3D view good for rationalizing new horizontal well picks against existing and often older picks from adjacent vertical wells for same horizon.
- ✓ Surfaces updated (regrid) automatically in real time as new picks are added. Entire stratigraphic framework is updated according to stratigraphic column.
- ✓ Predictive ahead of bit when wells are updated while drilling.



The advantage of Recon's geological interpretation environment is combining 3D views with cross section and map views to give the geoscientist the most comprehensive picture of the subsurface. Recon's dynamic cross sections stay live, making it easy to quickly and easily visualize and interpret the structure and stratigraphy throughout your project area.

Infill Drilling

- ✓ Use dynamic well section tool to efficiently evaluate infill drilling locations and spacing.
- ✓ Left behind pay - dynamic section with amplitude attribute can be used to generate prospects from left behind pay in mature fields.
- ✓ Drill target identifier tool allows geologists to quickly put a planned well in the geologic interpretation to send to engineers.



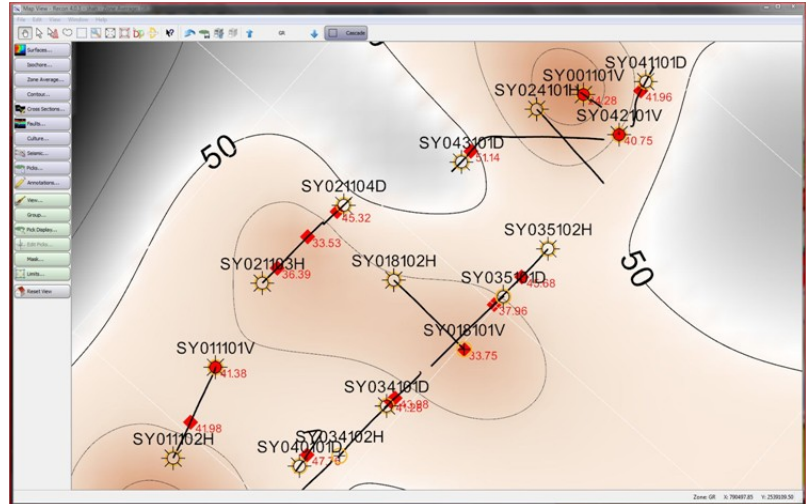
Successful development of unconventional reservoirs requires a better understanding of the fracture geometry and trying to improving the reservoirs stimulated volume which is typically achieved through microseismic monitoring and mapping.

Efficient Exploration/Exploitation Prospect Generation

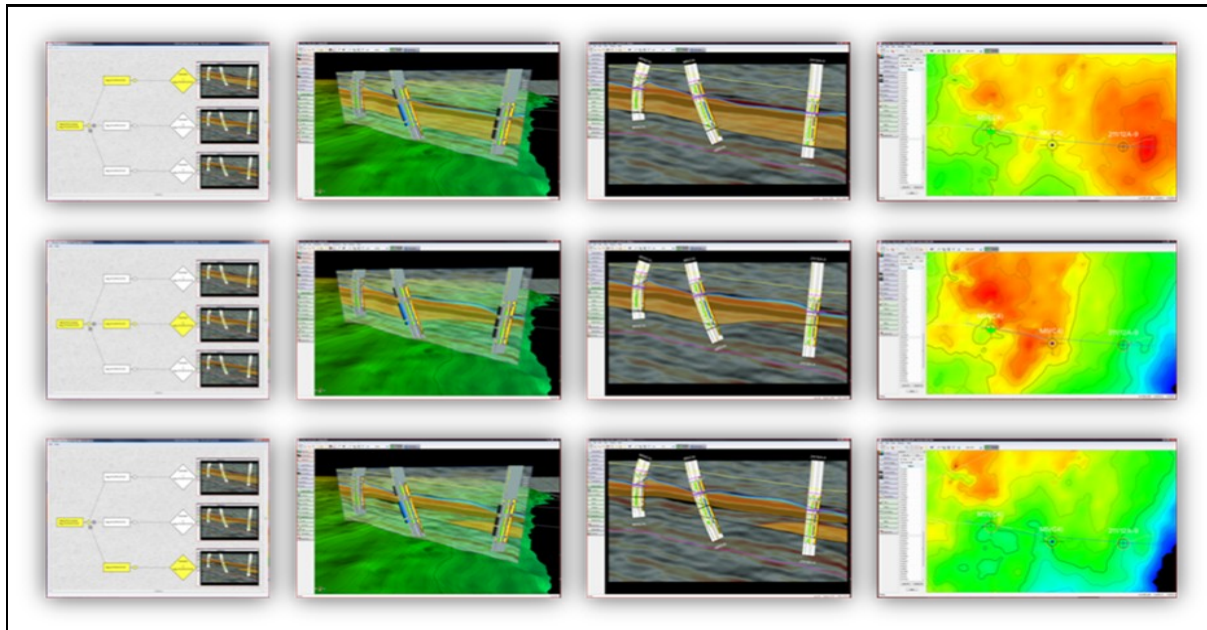
- ✓ Integrated land and geology in 3D & 2D for more accurate subsurface understanding.
- ✓ Regional scale mapping for new prospect identification (large dataset performance).
- ✓ Rapid and accurate correlation and mapping of structural and stratigraphic prospects aided by workflow automation.
- ✓ Well target identification and preliminary well planning.

Integration:

- ✓ OpenSpirit connection
- ✓ Petrel data plug-in
- ✓ Direct OpenWorks links
- ✓ Easy ASCII loading and data mining tools



Automated workflows and Cascade Technology combine to make viewing a series of attribute maps a quick and easy, interactive process.



RECON Geologic Scenario Manager allows geoscientists to run and assess multiple interpretation versions "on the fly" enabling the capture and deterministic analysis of geological uncertainty to produce a superior understanding of the subsurface.