



EMERSONTM

Explorer

Time-to-Depth Conversion



Explorer

Efficient time-to-depth conversion and velocity modeling in any geological environment

The Ultimate Velocity Modeling and Conversion Tool

Paradigm™ Explorer™ is the industry's leading time-to-depth conversion, velocity modeling and quality control solution, delivering fast and accurate time-to-depth conversion and precise velocity models in any geological environment.

Explorer provides a wide variety of velocity modeling and depth conversion techniques, ranging from vertical velocity scaling to geostatistical velocity mapping and map migration. By easily and efficiently rationalizing multiple sources of velocity and velocity model data, Explorer reduces depth position uncertainty for seismic data assets in any structural play.

Efficient Velocity Model Building

Velocity models are an essential building block of every geoscience workflow, from depth imaging to interpretation and reservoir characterization, up to well planning. Explorer offers a complete velocity model building solution that enables the creation of velocity models through an easy-to-use, one-window interface, with no loss of the technological advantages that have traditionally characterized the product.

With the ability to perform interactive, on-the-fly previews in 3D space, Explorer provides a simple, flexible, and robust

way to define and QC a velocity model using various velocity sources.

Both layer-based and structure-independent approaches can be implemented when building velocity models for converting time interpretation data to depth. Explorer combines well and seismic velocities in order to create consistent velocity models.

Robust Depth Conversion

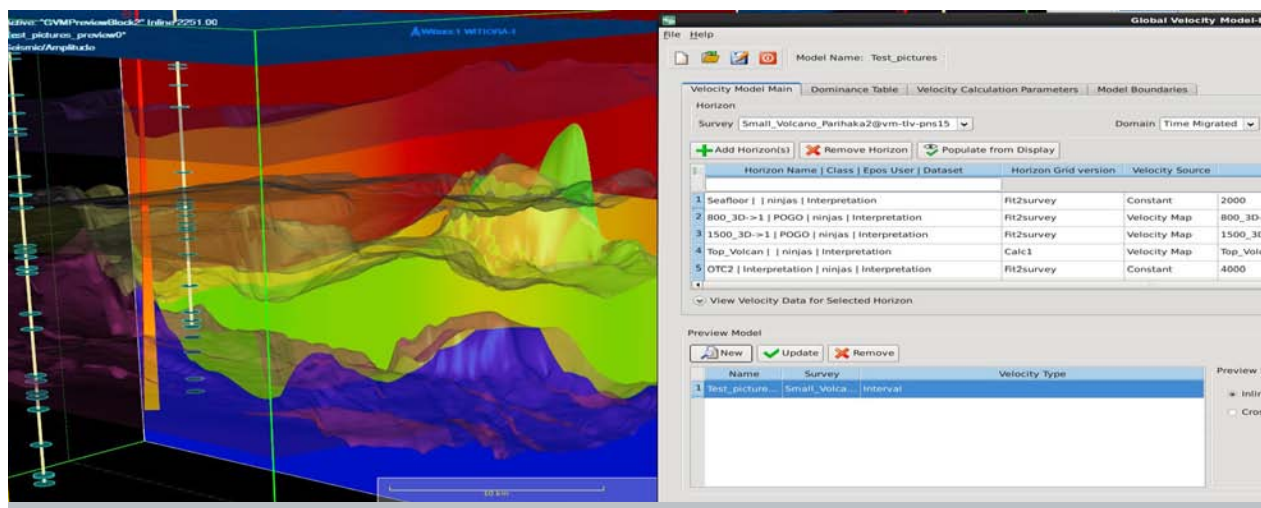
Depending on the complexity of the velocity model, depth conversion can be performed by vertical scaling or ray migration. Interpretation, well, seismic and attribute data can all be scaled from time to depth and from depth to time using the same active velocity model.

Seismic-to-Well Calibration

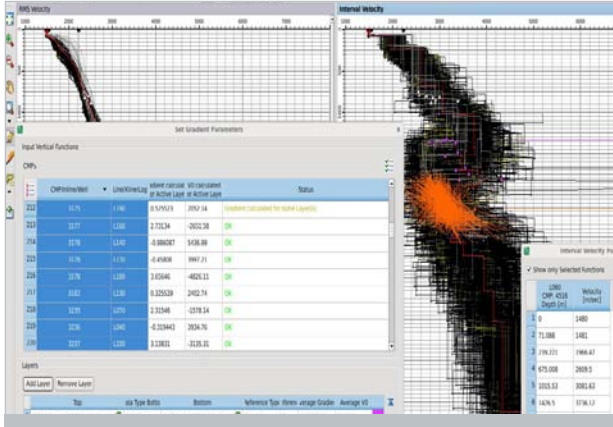
Explorer provides advanced tools for depth calibration of interpretation to well markers:

- **Time-preserving and Well Tie Tomography**

The time-preserving and well tie tomography functionality extends to the poststack domain capabilities that were previously only available with prestack applications. Using Explorer tomography, it is possible to consistently tie the



▲ Preview horizon-based Global Velocity Model from mixed velocity sources in 3D Canvas



▲ Calculate vertical gradient from selected vertical functions, for user-defined gradient layer in Vertical Function windows

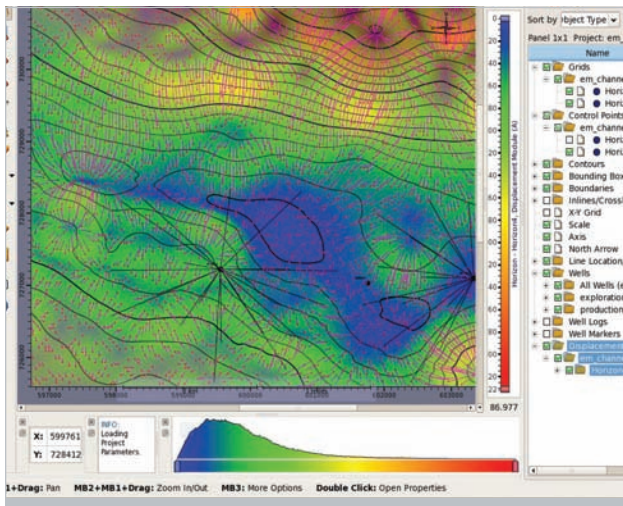
velocity model to wells in a single run. The functionality also enables re-depthing, to systematically improve depth seismic-to-well marker misties.

• **Seismic-to-well Calibration**

The seismic-to-well calibration application can calculate and grid seismic-to-well misties at the well marker location. The adjusted seismic maps can be previewed and saved, if desired.

Uncertainty Analysis

Geostatistical kriging of error maps or sequential Gaussian simulations enables the assessment of depth conversion uncertainties. Error maps and simulation results are used in Confidence Interval and Threshold Analysis applications to produce upper and lower velocity with associated depth map estimates, along with iso-probability maps.



▲ Map migration techniques facilitate quantitative assessment of structural position uncertainty in time migrated interpretations

In our attempt to reduce uncertainty in well placement, velocity model accuracy plays a crucial role in identifying the right spot and “path” for the well. Thanks to the Paradigm expert who worked with us, we were able to incorporate Tomography into our velocity workflow, resulting in a significantly reduced margin of error in terms of time-to-depth conversion. From this effort, three successful wells were drilled “in zone”. Paradigm tomography is now part of our velocity model, helping us place and geosteer wells more accurately.

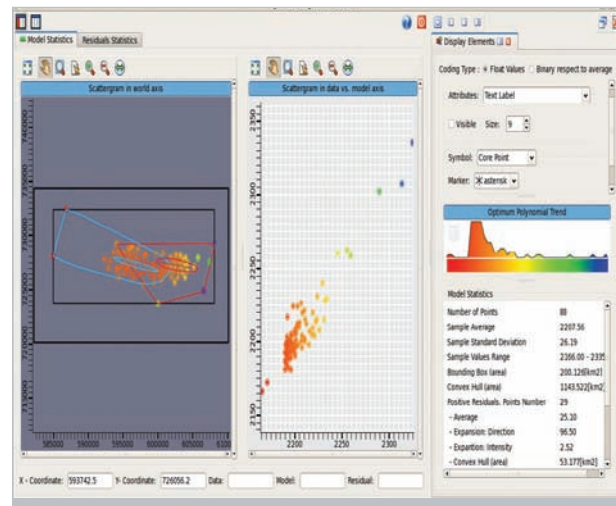
Major independent US oil and gas E&P company

Mapping

Explorer offers comprehensive mapping functionalities, including numerous mapping algorithms, interactive grid editing and grid operation tools, and an advanced user interface that allows flexible map display with overlays such as contours, wells, culture data, faults, etc.

Geostatistical Modeling

The geostatistical toolkit is an add-on module to Explorer which offers alternative methods to deterministic approaches for velocity modeling and mis-tie analysis. A variogram modeling window enables the user to define nested variograms and provides support for geometrical anisotropy.



▲ Comprehensive geostatistical tools allow users to fully analyze the spatial distribution of data and preserve geological trends in velocity models



Features

- Standardized ergonomic user interface
- Time-preserving and well tie tomography
- Interval/average velocity mapping and slicing using well and/or seismic velocities
- 2D/3D multi-survey depth scaling of interpretation, seismic and attribute data
- Vertical function utility:
 - Display and edit velocity & non-velocity functions
 - Transform well and seismic velocities and calculate vertical velocity gradients
- Map migration through image ray or normal incidence ray tracing
- Well mis-tie analysis and adjustment for time, velocity and final depth maps
- Volumetric analysis
- Crossplot for regression analysis of any data type
- User-defined analytical mathematical operations applied to interpretation data.
- Support for 3D and multi-line 2D surveys in the same project
- 3D solid modeling for depth conversion in complex structures
- Extraction of seismic markers from interpretations along well bore paths

Interoperability

All Epos™-based applications enable interoperability with third-party data stores, including:

- RESQML 2.0.1
- OpenWorks® R5000.10
- GeoFrame® 2012
- Petrel* 2017 & 2016
- Recall™ 5.4.2

(*is a mark of Schlumberger)

System specifications

- 64-bit, for x64 architecture processors
- Microsoft® Windows® 7, 8.1, Vista (64-bit)
- Red Hat® Enterprise Linux® 6.8 and subsequent minor releases, 7.1 and subsequent minor releases

The Paradigm Advantage

- The Explorer Global Velocity Modeling application efficiently delivers consistent velocity models throughout the system.
- Extensive workflows combining wells and seismic data assure accurate depth conversion in any structural play.
- Quick delivery of final depth maps that tie wells, honor geologic trends, and are consistent with seismic velocities.
- Quantitative uncertainty estimation and stochastic simulation help assess the risks associated with depth conversion.

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