HampsonRussell MapPredict

Map-Based Geostatistical Analysis and Predictions

Formerly known as ISMap, **MapPredict** is a map-based geostatistical software that integrates well, seismic and attribute data into accurate, detailed maps. Comprehensive and easy to use, it generates maps using both sparse data measured at isolated wellbores and dense data measured on a survey grid.

Map-Based Geostatistics

Combine seismic and log data geostatistically to produce optimum maps of target attributes, complete with reliability estimates. Analyze your data for both errors and trends, produce optimal maps from sparse datasets, improve the fit between two related sets of the same parameter, simulate any number of possible map results and make quantitative predictions about their probability of occurrence. **MapPredict** integrates both standard geostatistical features (such as variogram modeling, kriging, cokriging and conditional simulation) and unique **Emerge** multi-linear regression and neural network workflows. With **MapPredict** you can find the relationships between combinations of seismic attribute slices and map-based well values such as hydrocarbon production.

Key Benefits

- A complete suite of geostatistical algorithms, including kriging, cokriging, kriging with external drift (KED), and conditional simulation
- Features not found in other geostatistical packages, such as the **Emerge** multi-linear regression and neural networks algorithms, can be utilized to create optimally weighted sums of maps
- A complete set of map operations, such as gridding, contouring and mathematical operations between maps
- Especially suited to finding the relationships between combinations of seismic attribute slices and map-based well values such as hydrocarbon production

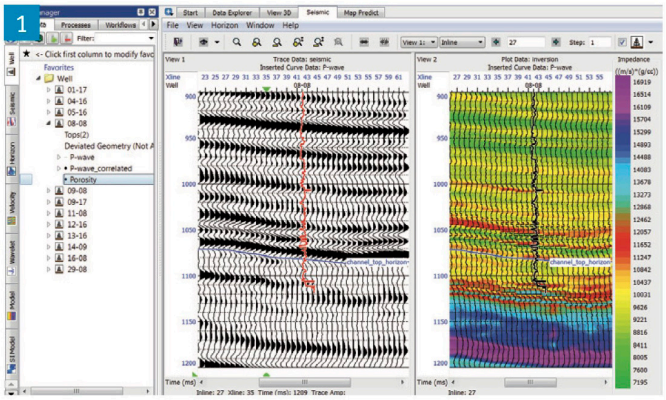

Fig. 1 Example continued on next page ...

Key Features

- Data loading, display and analysis are fully integrated with the **HampsonRussell Geoview** suite
- Fast access to ASCII-formatted maps and well log point data
- Detailed access to seismic volumes and well log databases
- Variogram modeling, including multiple structures and anisotropy
- Sparse data mapping using the kriging method
- Integration of sparse and gridded data together, using the cokriging and kriging with external drift (KED) methods
- Probabilistic estimates using conditional simulation
- Map creation from multiple data sets using the **Emerge** algorithm
- Map gridding and contouring
- Supports horizontal wells

For example, Figure 1 shows twelve wells that have been read into Geoview. Left panel shows list; center and right panels display the associated stacked and inverted seismic volumes. These well logs and volumes can be used in MapPredict or any other HampsonRussell application.

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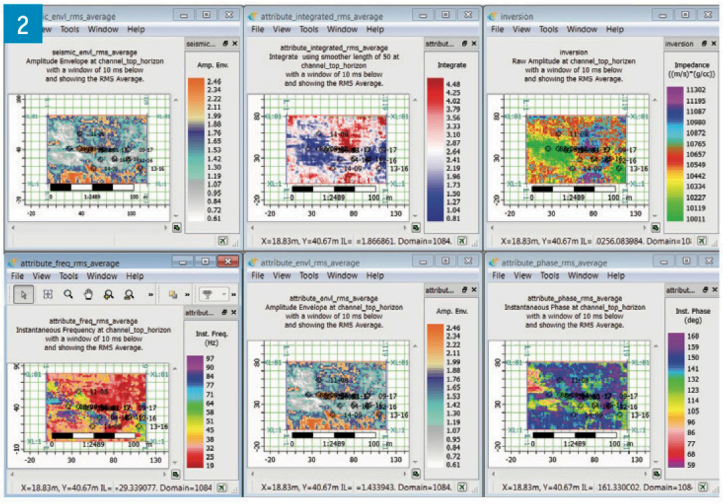
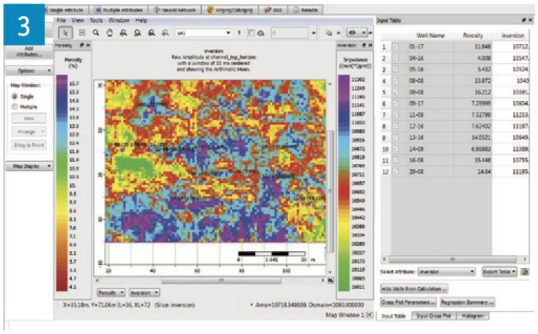
In Figure 2, using a 10 ms window below the horizon indicated on the previous seismic displays, we used the Slice option to create the six data slices shown below:



In Figure 3, we started **MapPredict** and displayed the average porosity between two selected tops from the twelve wells. We also included a data slice taken from the inverted seismic volume.



We can then create various displays, such as a crossplot of well and seismic values or the seismic variogram as illustrated in Figures 4 & 5.

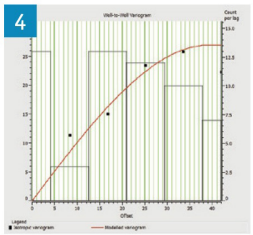


Fig. 4 Well-to-well variogram plot.

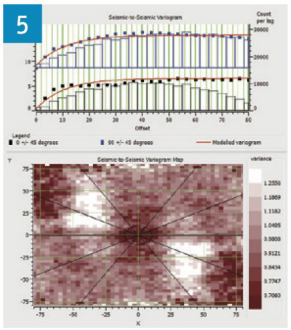


Fig. 5 Seismic-to-seismic variogram analysis.

Using variograms of the well and seismic data, we can apply geostatistical operations such as kriging, cokriging, kriging with external drift (KED) and conditional simulation to the input data and create optimal maps.

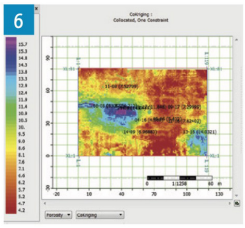


Fig. 6 Porosity map as a result of cokriging the well values with the inversion slice.

MapPredict can also be used to create a linearly weighted sum of the maps shown previously, using the **Emerge** multi-linear regression algorithm to find the best fit to the well data. We can then apply cokriging with the well data to this new map. Notice the improvement in the definition of the high-porosity channel shown on the left-hand side of the map (Figure 7).

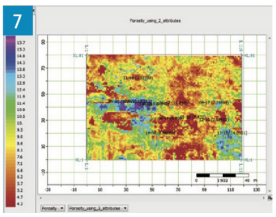


Fig. 7 Porosity prediction using Emerge multi-linear regression with two attributes.

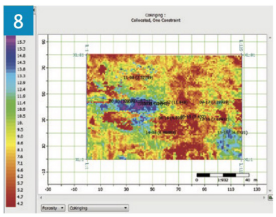


Fig. 8 Improved porosity map by applying colocated cokriging to the Emerge result.

Finally, we can produce a conditional simulation of probability estimates for the optimum drilling locations.

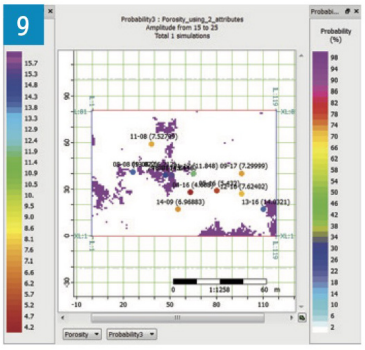


Fig. 9 Probability map highlighting estimated sandstone porosities that are higher than 15 percent.