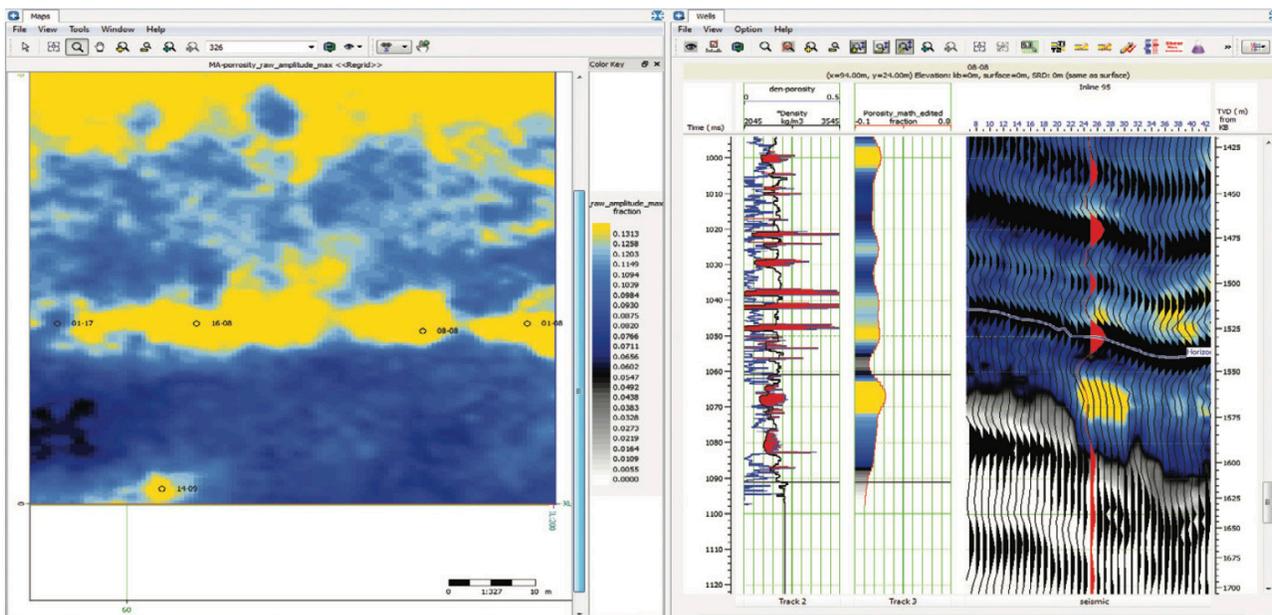


Multi-Attribute Analysis Module

Emerge is a geostatistical, attribute prediction module that predicts property volumes using well logs and attributes from seismic data. The predicted properties can be any available log types: such as porosity, velocity, density, gamma-ray, lithology and water saturation. **Emerge** can also be used to predict missing logs or parts of logs by leveraging existing logs that are common to the available wells.



Porosity map cut from predicted porosity volume, and well log display showing correlation between measured and predicted porosity

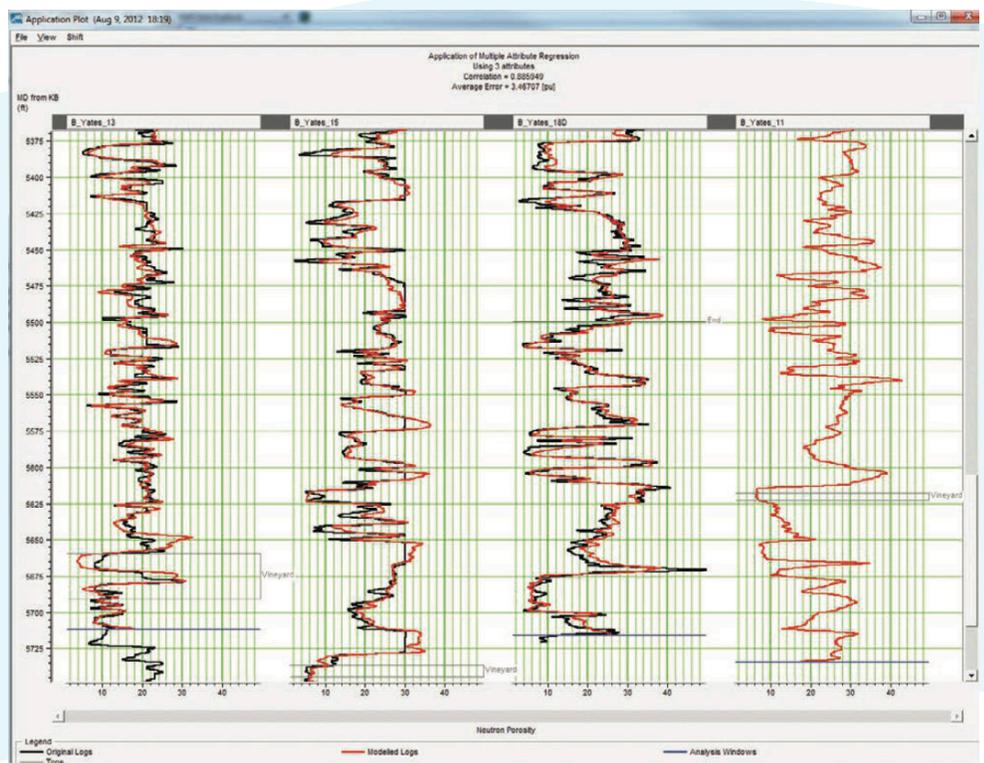
Emerge Attribute Prediction

The **Emerge** module is designed to use seismic attributes and log data as input for volume predictions. This process requires properly conditioned and scaled data which can easily be achieved using the tools available in the **HampsonRussell** suite of software. Once the data is loaded into the project, the **Emerge** Training tool is used to determine multi-linear regression or neural network analysis, in order to identify the underlying transform which connects the log and seismic-derived attribute.

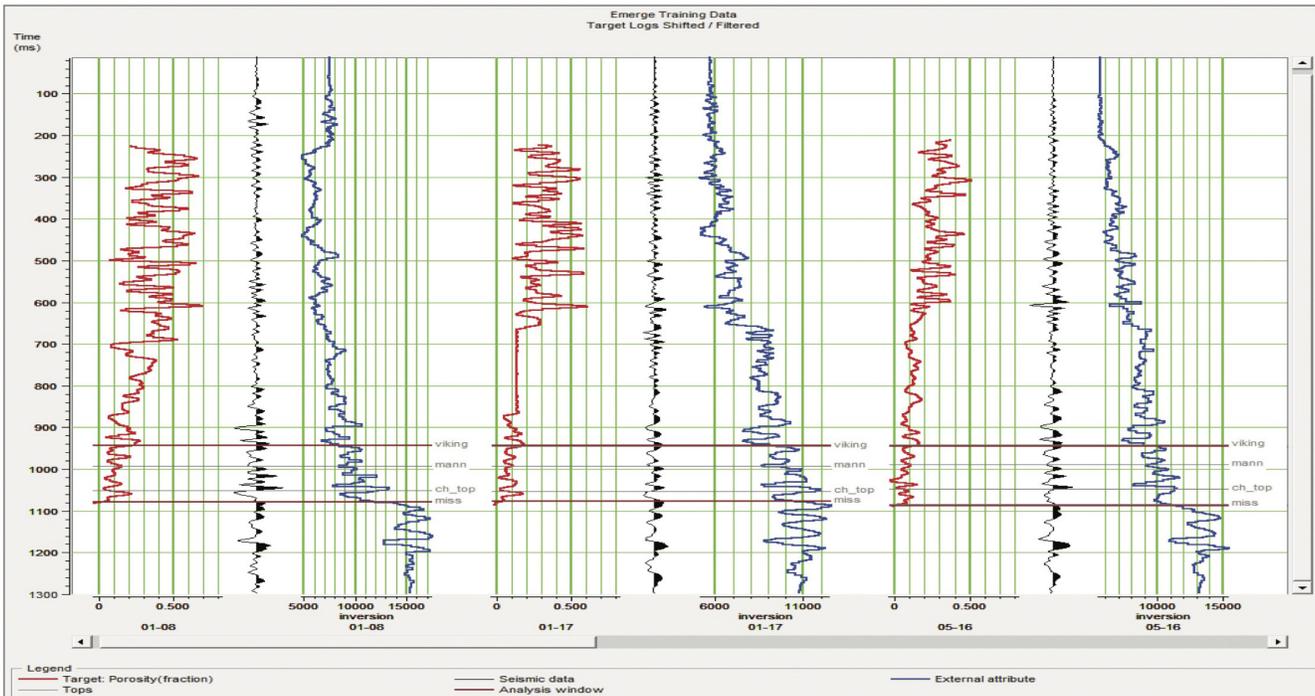
Features

- Filters and normalizes logs
- Crossplots logs and seismic data
- Performs non-linear transforms on logs and seismic data
- Computes seismic attributes internally
- Computes Principal Components
- Utilizes an unlimited number of external seismic volumes
- Predicts volumes of any log type (recorded or computed)
- Performs stepwise multi-linear regression for the rapid selection of useful attributes
- Optional convolutional operator to extend multi-linear regressions
- Automatically validates predictions to avoid over-training
- User-defined blind well testing

Emerge Log Predict uses the same multi-attribute methodology as seismic attribute prediction, but applies it to log data. It can predict missing logs or parts of logs without seismic data, by using existing logs that are common to the wells as the training data set. Then the training result is applied to predict the logs that are missing.

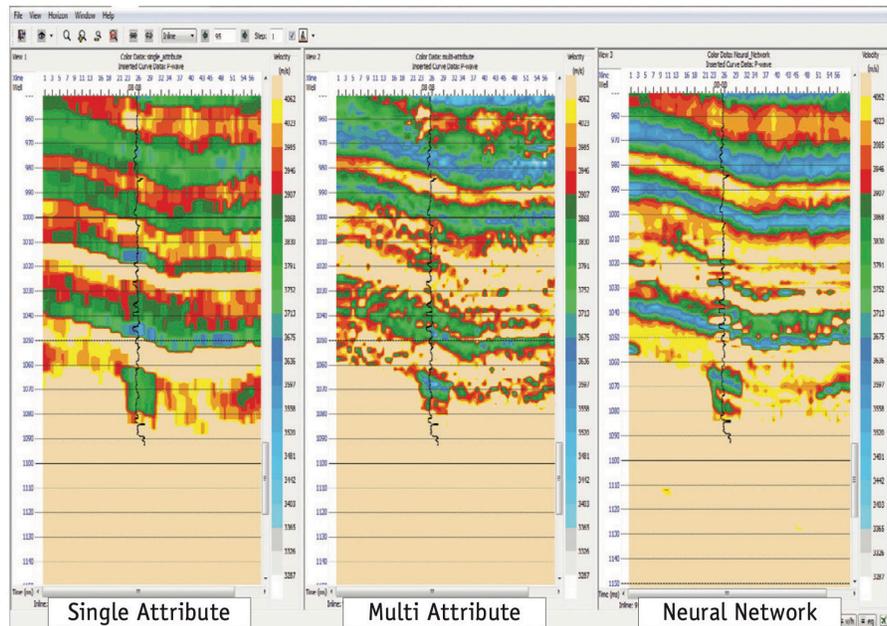


The application of the log prediction is shown above. Note that the black curves are logs that exist within their wells and the red curves are the predicted curves from Emerge. The track on the far right shows a predicted porosity curve where the well has none.



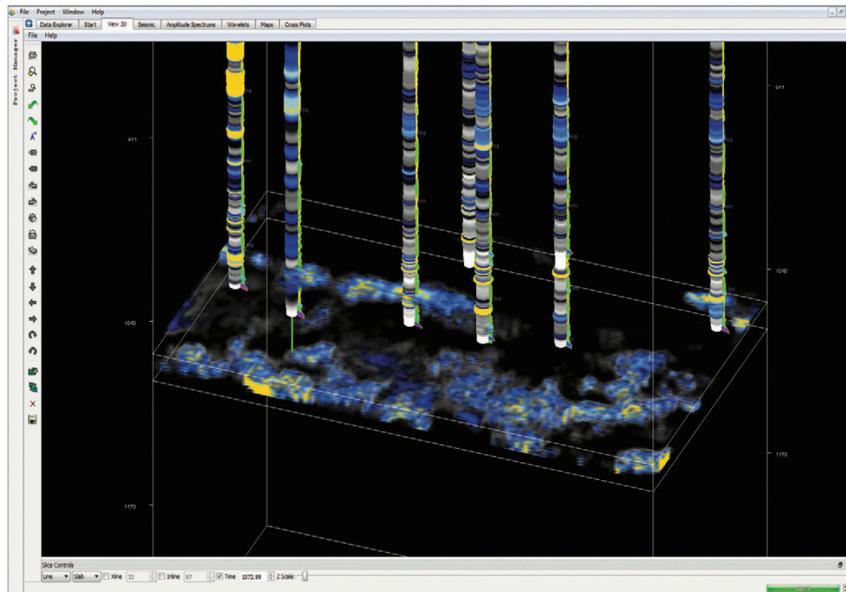
Target Logs (Red) are compared to Raw Seismic (Black) and Seismic Attributes (Blue) in order to optimize the prediction used to compute the output attribute volume.

Emerge determines the optimum order, number and weighting of attributes to combine by performing internal cross-validation. The relationship is then applied to the seismic attributes creating a volume of the target property.



HampsonRussell Emerge Prediction Options

- Single-Attribute Regression
- Multi-Attribute Regression
- Probabilistic Neural Network
- Multi-Layer Feed Forward Neural Network
- Radial Basis Function Neural Network



Inversion Benefits With Emerge

- Ability to predict volumes of any data type
- Internal cross-validation allows all data to be used during training
- Derives a measure of correlation and error at each well used in the training
- Enhanced prediction of missing log data by using multi-log and non-linear combinations
- Non-linear, high-resolution predictions using Neural Networks