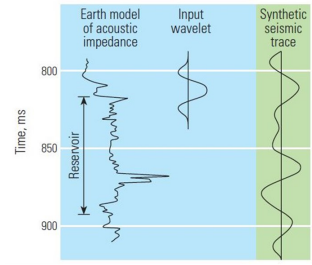


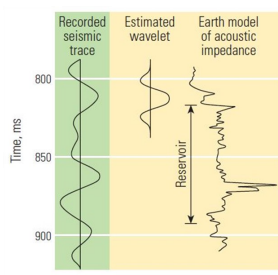
POST-STACK DETERMINISTIC AND STOCHASTIC INVERSIONS

## Post-stack Deterministic and Stochastic Inversions

**Post-stack Inversion improves lithology detection as the inverted seismic data better correlates with logs and can predict porosity.**



Seismic Inversion is a process to convert the seismic data to Elastic Logs. (Sonic, Density, Shear sonic).

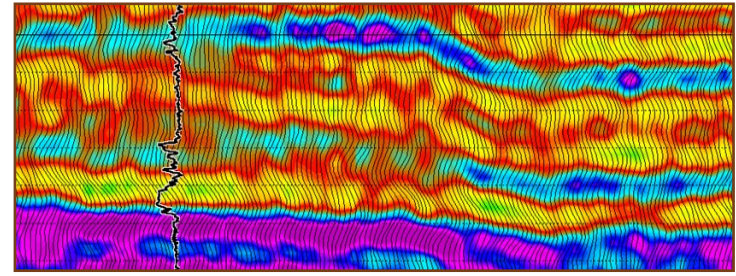


Compressional velocity, Shear velocity and density can then be converted to sand/shale ratios, porosity or other related properties

### Post-stack Model Based Deterministic Inversion

AI inversion is performed on the basis of Sparse-spike, L1 Norm or Eigen-value inversion using kriged P-impedance background volume as the low-frequency constraint.

Post-stack Inversion is the most common quantitative geophysical application in reservoir characterization. Following is an example from Canada – shoreface sandstones.



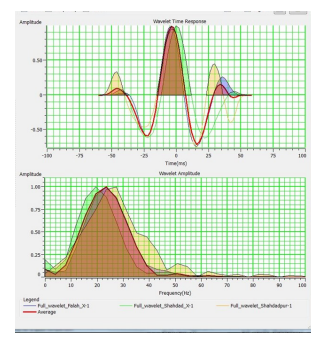
Using AI and log property attribute relationships as input, our output sections can be scaled to porosity or could be used to differentiate between sands and shales. The key to a good inversion is to get the data to zero-phase and carry out a good log property modeling to understand relationship between lithology and AI.

### Low Frequency Background Model (AI) Generation

P-wave impedance logs are sub sampled into a micro-layer model whose boundaries are defined by the key reservoir horizons. Log properties are then converted to background impedance sections for use as a low-frequency constraint in the inversion. The number of layers and their style (parallel to top, parallel to base, proportional) is determined by stratigraphy and fluctuations in log properties.

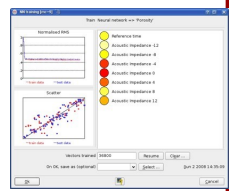
### Wavelet Extraction

Representative wavelet of the seismic data is to be estimated in order to remove the wavelet effects and convert seismic into Acoustic Impedance Volume. Testing numerous methods give robust wavelet that truly represents the data.

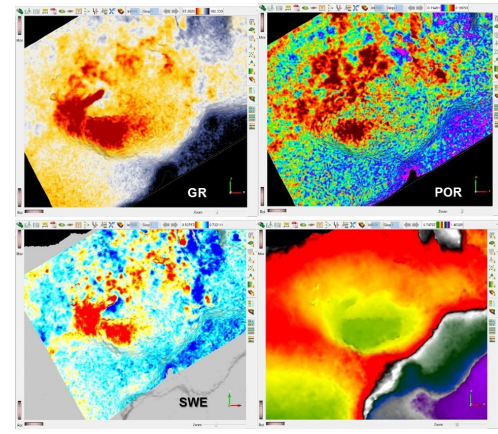
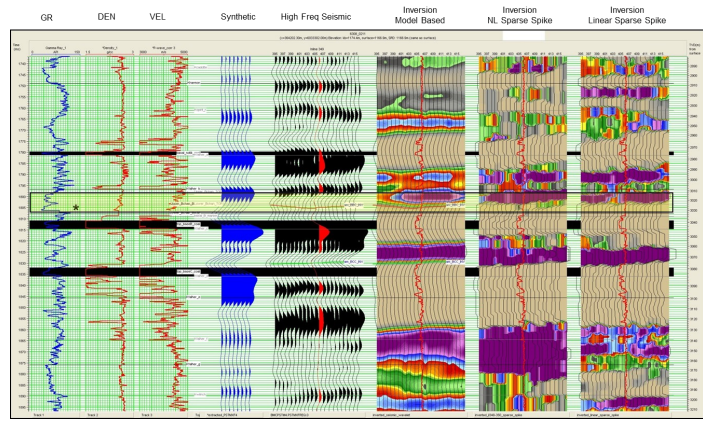


### Neural Network Inversion

Through the process of Neural Networks Property Prediction Inversion and other seismic attributes can be used to invert to the rock properties. The process is quite robust in creating refined rock properties maps than can be achieved through various linear relationships.

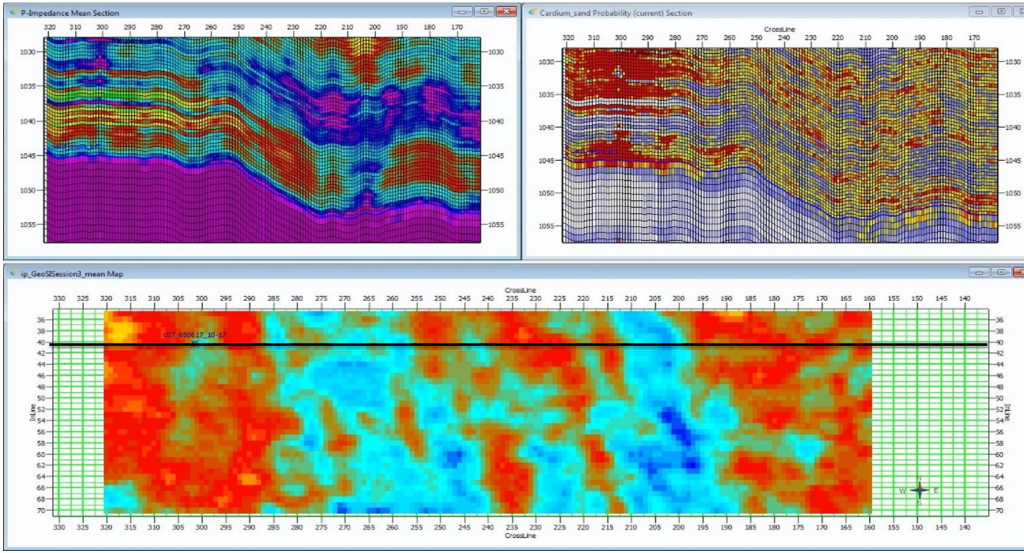


### Inversion Analysis



# POST-STACK DETERMINISTIC & STOCHASTIC INVERSIONS

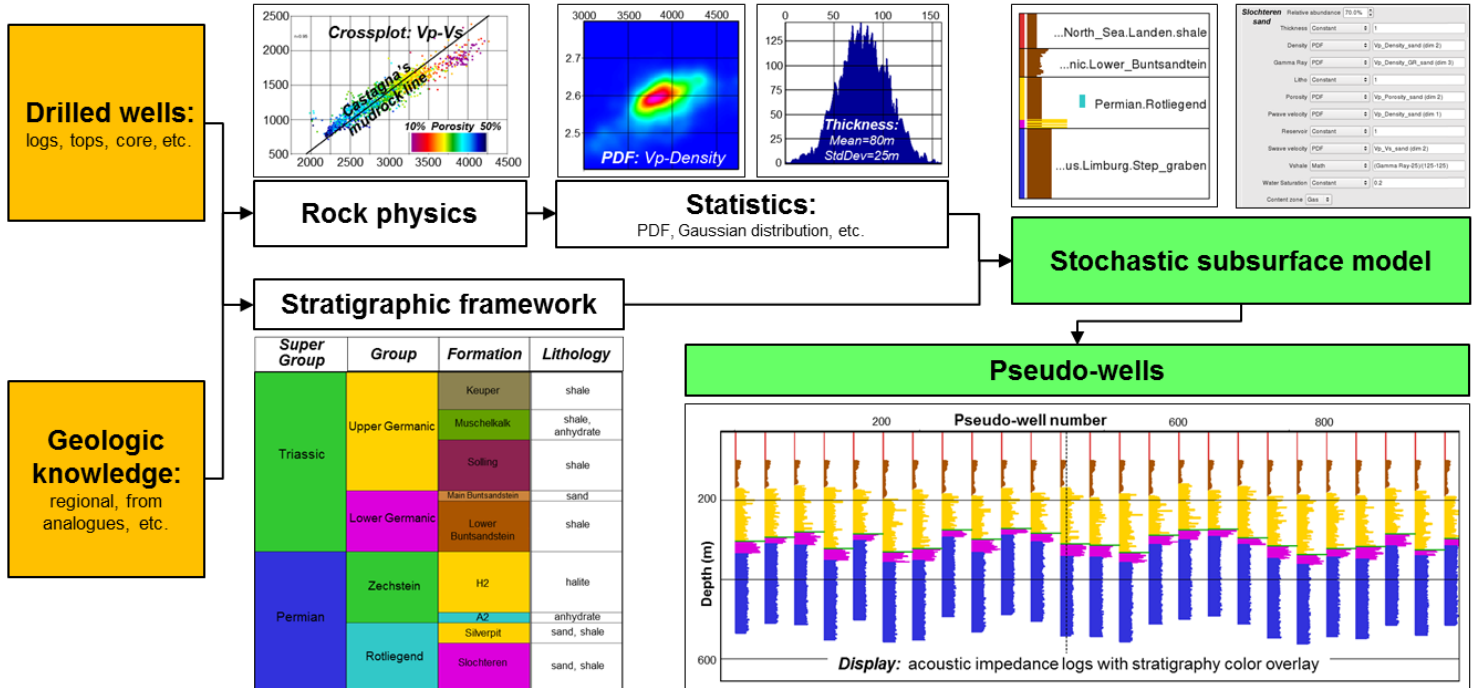
## Post Stack Stochastic Inversion



Stochastic Inversion takes the deterministic inversion a step further by generating a series of results that match the data. These all inversions closely honour input and thus can be shown as distribution. Once we assign range of a specific property as facies than the probability of that property can be assigned. Opposite illustration (left) shows the p10 scenario of porosity distribution. The concept can be extended to any property and thus becomes a very important tool in re-source estimates.

## HIT Cube (New Stochastic Inversion Workflow)

The HitCube is a stochastic inversion process. It assigns a spatial location to the simulated pseudo-wells such that rock properties can be computed from the tied models. The objective is indeed to predict reservoir properties with their relative uncertainties.



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