**Jason® Workbench**

Multi-Attribute Well Interpolator

# Multi-Attribute Well Interpolator

### Build Better Low Frequency Models

The **Multiple Attribute Well Interpolator** (**MAWI**) adds geologically consistent detail to reservoir models by using external trends to drive interpolation of lateral changes beyond well control.

## Multi-Attribute Well Interpolator

When performing seismic inversion, an accurate Low Frequency Model (LFM) is important to place the seismic-band information in the correct geologic context. **MAWI** improves the modeling of lateral variations in geology by interpolating well log data guided by attribute horizons commonly derived from the seismic information.

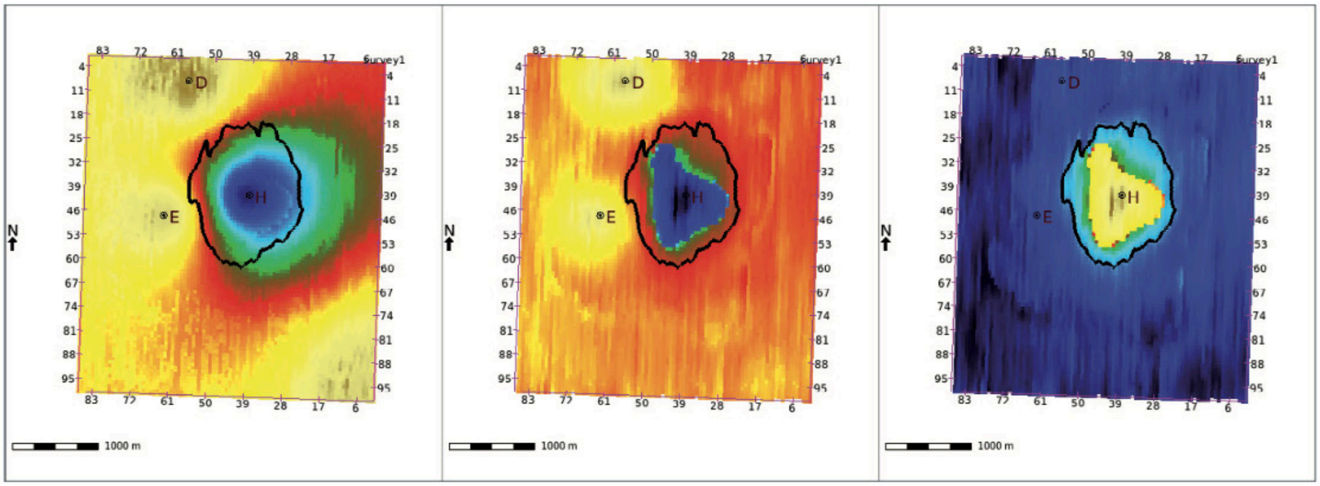
In **MAWI**, correlations are sought between multiple attribute horizons and well log data. These correlations at the wells are used to build a best-fit pseudo well at each trace, based on the relative contribution of the attributes at the trace location. The **MAWI** model is designed for each layer but optimized for each micro-layer in the stratigraphic model (for instance build with **EarthModel®**). The **MAWI** model can then be used as a low frequency input to CSSI inversion to generate a result that is more geologically consistent.

Inclusion of a quality low frequency model allows geoscientists to determine absolute rock properties upon which reservoir engineers can rely when defining and executing drilling programs.

## Process Parameters

There are several parameters available to constrain the interpolation:

- Attribute misfit norm—controls the impact of well log outliers
- Stabilization threshold—controls the limits of the lateral variation of interpolated values
- Low pass filter—determines the band within which log-attribute correlations are determined
- Uncertainty analysis—includes optional uncertainty analysis to determine the effects of uncertainties of the input attributes on the final LFM model




*Devonian Reef example. The time thickness of the reef structure is shown on the right. The black contour represents the 30ms-thickness of the reef structure. P-impedance log data from the three wells shown on the maps (two off-reef and one on-reef) is interpolated using a simple interpolation (left picture) or using* ***MAWI*** *with the time-thickness horizon as attribute (middle picture). The interpolated maps display the average P impedance in the reservoir.* ***MAWI*** *adds geologically consistent detail to reservoir models by using external trends to drive interpolation of lateral changes beyond well control.*

# Jason® Workbench

## Multi-Attribute Well Interpolator

### Workflow

The first step is to select the attributes you want to use as guidance for the interpolation. These attributes must correlate physically with the well log property you want to interpolate (for instance P impedance). Based on their origin, the attributes can be divided into two different groups:

- **Structure-dependent:** these attributes are usually derived from interpreted horizons and are used to account for lateral variations inside the layer during the interpolation as well as to constrain the interpolation for different morphologies. Typical attributes are:
  - Interpreted time-horizons which delineate the interfaces to reveal lateral variations on top of the layer
  - Layer thickness - to separate between structures having different thicknesses
  - Geometric attributes extracted from the interpreted horizons - to separate the different geological morphologies
- **Amplitude-dependent:** these attributes are used to guide the interpolation based on the lateral variations in the seismic data. You can use such attributes to interpolate well properties which are directly related to the seismic such as: velocity, impedance, density, porosity, etc. Typical attributes are:
  - Mean velocity inside the reservoir layer extracted from the seismic velocity cube
  - RMS seismic at the top interface extracted from the seismic data
  - Band-pass results from a first pass CSSI inversion extracted at the reservoir level

The attributes are then assigned on a layer-by-layer basis. At each micro-layer, attribute weights define the correlation between the well logs and the attribute horizons. The weights are optimized using a multi- variable linear regression method. The interpolation is done along layers of a stratigraphic model, using the attribute horizons for guidance and respecting faults and stratigraphy.

Various process parameters are available to constrain the interpolation. An optional final log misfit removal step ensures that the MAWI model matches the original well log information.

Finally, the **MAWI** model can be used as low frequency input to InverTracePlus and RockTrace inversions to generate a result that is more geologically consistent.

### Quality Control

Data QC is imperative to ensure that the interpolation is well understood and matches known data. **MAWI** provides readily available QC information that includes:

- Reports describing for each log type and layer setting, which wells and attribute horizons were used in a given micro-layer and how much of the surface in the micro-layer was covered by the predicted well log values
- Graphs of weights of each horizon attribute for every micro layer
- Output uncertainty information

**A better, faster, more complete workflow within GeoSoftware -** The GeoSoftware environment provides an integrated framework for delivery of multi-user seamless cross product workflows.