

Automated calibration of models

Overview:

The BasinMod Calibrator is a statistical optimization/inversion software program included with BasinMod 1-D. It allows simultaneous, fast, automated calibration of a large number of models to measured data such as BHTs, maturity (%Ro), pressure, porosity, and permeability. Optimization/inversion is an advanced technique widely used in science and engineering to efficiently and effectively calibrate a model to measured data. With the large numbers of wells and associated geophysical log data available today, computerized optimization has the potential to become a valuable tool for petroleum system model calibration.

The Calibrator utilizes an adaptive simulated annealing (ASA) algorithm to identify the optimized values of user-specified model parameters such that the model outputs most closely match the measured data. Possible parameter selections include lithologic parameters (e.g. initial porosity, compaction factors), thermal parameters (e.g. thermal conductivity, heat flow), stratigraphic parameters (i.e., eroded section), and diagenesis parameters (e.g. quartz grain size, initial volume fraction of smectite). The error calculation quantifies the deviation between model outputs and measured data.

The Calibrator provides error response plots as well as the optimized model parameter values. The Calibrator sensitivity results enable the user to determine if additional data is required as well as the relative importance of various parameters to producing accurate models.

Product Features:

- Save models automatically with the optimized parameters.
- Display the minimum error for each well on a BasinView map.
- Customize error calculation with normalization and weighting factors.
- Export parameter error values to view in Microsoft Excel, Surfer, or another graphing program.
- Change the graphic properties (e.g. background color, line width, line style) of the plots.
- Calculate uncertainties associated with the optimized values.

Maturity vs. Depth plot
before Calibrator

Maturity vs. Depth plot
after Calibrator

Parameter vs. Error Plots