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Model Automated Informatics (MAI) Determination of Reservoir Location and Characteristics

The newly developed Model Automated Informatics(MAI) approach for predicting the location and characteristics of reservoirs using a basin model is presented. To do so, many physical/chemical laws and tectonic history information need to be integrated with the present-day data. Many parameters in these physical and chemical laws must be calibrated. Tectonic history is usually determined by subjective assumptions from the available data or experience in other basins. To overcome these difficulties, uncertainties in calibration and history determination are related to uncertainties in seismic and other data through our new MAI approach. In the MAI approach, we construct the entropy as a measure of the uncertainty in the state of the system. A probability for each of the possible tectonic history scenarios is constructed by maximizing the entropy subject to constraints imposed by the available data. The use of extensive data sets to implement MAI requires a comprehensive reactive, transport, and mechanical (RTM) basin model in order to generate the synthetic responses. The minimization of error between the synthetic responses and the observed data is a crucial element in MAI. Multiple parameters in an RTM basin model are calibrated simultaneously using single or multiple data sets. MAI approach greatly enhances the discovery and characterization of reservoir and provides the objective estimation of the risk/uncertainty. Results are obtained from Illinois and Piceance Basins.