AAPG Annual Meeting
March 10-13, 2002
Houston, Texas

Peter J. Ortoleva[1], Kagan Tuncay[2], Anthony J. Park[1], John Comer[3] (1) Lab. for Computational Geodynamics, Indiana University, Bloomington, IN (2) Utrecht University, 3508 TA Utrecht, Netherlands (3) Indiana Geological Survey, Bloomington, IN

Model Automated Informatics (MAI): Integration of Basin Simulation and Data

A key challenge of basin simulation is the need to reconstruct the overall basin history (sedimentation, basement heat flux, large scale tectonics). As basin data is generally indirect, this reconstruction is labor intensive and typically subject to individual bias. Furthermore, the data is often fraught with error. Therefore the history reconstruction, and consequently the prediction, have an uncertainty that must be assessed for risk analysis.

In this DOE and industry supported project, we are integrating basin modeling with a wide variety of data types and quality via an automated procedure. In this Model Automated Informatics (MAI) approach, our Basin RTM simulator is used to construct a functional differential equation for the overall basin context history and the associated uncertainty. This equation is solved numerically and then used to predict the most probable state of the subsurface (porosity, fluid content, in situ stress, fracture network spatial distribution) and the associated uncertainties. The comprehensiveness of the set of processes in Basin RTM (multi-phase flow, kerogen reactions, incremental stress rheology, fracture network statistical dynamics, etc.) allows for the simultaneous integration of a wide spectrum of data types (seismic, well logs, core analysis, geochemistry, etc.)

Examples from the Piceance Basin are used to show the practicality of the approach for natural gas exploration and field development. As basin datasets are constantly being upgraded, the automation of our MAI approach (e.g., new data in and basin prediction and risk assessment out) makes our procedure a revolutionary step forward in basin modeling-assisted E&P optimization.