Into the new millennium: Perspectives on the next five years of basin simulation modeling

[1]HARBAUGH, J.W., [2]WATNEY, W.L., and [3]RANKEY, E.C. [1]Stanford University, Stanford, CA USA 94305, [2]Kansas Geological Survey, Lawrence, KS 66047 USA; [3]Exxon Production Research, Houston, TX 77027.

This paper summarizes the state of the art of basin simulation, makes forecasts on the future direction of basin simulation modeling, and suggests some short-term research major steps. Advances in modeling must utilize improved methods to evaluate models. Model evaluation includes analysis of input parameters and assumptions, algorithms that drive the simulation, and output. Assessing suitability of model application and success are requisite to quantifying model reliability. Model testing and explicit comparison should also be utilized help to structure and to focus continued improvements of simulations.

Basin simulation faces many near-term challenges and opportunities, including several broad topics: defining key parameters in deposit modeling; using large data sets; understanding complex and diverse sedimentary systems; large scale modeling, including whole earth models, 3-D and 4-D models; incorporating uncertainty into input, computation, and results; evaluating goodness of fit of output and real data; assessing complex coupled systems; including sediment composition, porosity, permeability, and seismic characteristics into basin modeling; scales, scaling up and down; and enhanced procedures to compare model reliability and performance and validation of models. Opportunities in application include use of basin modeling as guide/input/constraints for aquifer and petroleum reservoir simulation models (e.g. as soft data); develop better predictive models for distribution of petroleum reservoir, source, seal; use to integrate data and test play models (e.g., play concept, well data, seismic all should be included); and evaluate process-response relationships in global change.

Papers presented in this symposium address many of these topi discussing advances, why needed, and where headed.