

Quantitative Assessment of Hydrocarbon Charge Risk in Exploration New Ventures - Are We Fooling Ourselves?

Schoellkopf, Noelle B.¹ (1) Earth Sciences - Exploration & New Ventures, Chevron Energy Technology Co., San Ramon, CA.

Greater computing power and more complex basin and petroleum systems modeling software have increased expectations for quantitative prospect predictions ahead of drilling. Exploration decisions rest on the assumption that sufficient petroleum volumes (generally expressed as probabilistic distributions) of the appropriate phase and quality are present. How reliable are our estimates, and are we favoring easily quantifiable parameters at the expense of more qualitative, but perhaps more critical, geologic parameters affecting hydrocarbon charge?

Basin modeling software includes tools to statistically vary model input parameters, such as fetch area, depth, source thickness, total organic carbon (TOC), hydrogen index (HI), temperature gradient or heat flow, and consider the impact on fluid phase and volumes. We can rank these parameters, but we should be aware of pitfalls. The underlying geologic assumptions may account for the greatest uncertainty in new basin areas, where data are sparse and models remain poorly calibrated. Modeling tools must be flexible enough to allow multiple working hypotheses within the project timeframe.

Integration of the basin and petroleum systems modeler into the project team, with shared knowledge of regional geohistory and tectonics, stratigraphy and source rock depositional models, can provide an advantage in weighing alternative geologic scenarios and hydrocarbon charge risk.