Advantages of Risk Assessment Coupled with Quantitative Petroleum Systems Modeling in Increasing the Exploration Success

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The exploration risk assessment is based on primary quantitative parameters, such as (p1) reservoir, (p2) seal, (p3) geometry, (p4) source rock/maturation, (p5) migration, and (p6) timing. These parameters, when analyzed from the perspective of the petroleum systems approach comprise the elements (p1, p2, and p4) and processes (p3, p5 & p6). For risk assessment purposes, the interaction of the numeric values assumed for each of these parameters generates a “key” number which will form the basis for all the subsequent economic evaluation of a prospect or lead. It is therefore, of primary importance that all these values must correspond to detail and accurate geologic analyses. The investigation of p1, p2, and p4 are usually performed based on data derived from the geologic analysis of rocks and fluids. Geologic techniques are applied on this data to better assessing the rock characteristics and controls, such as diagenesis, pore distribution, seal capacities, source rock richness, etc. The remaining three parameters, p3, p5 and p6 depends entirely on the 3D dynamic analysis of the area of interest, and are therefore linked to the geologic processes of the petroleum systems approach. These three parameters correspond to half of the final “key” risk assessment number. As the analyses of these three parameters are profoundly enhanced when integrated with well calibrated quantitative petroleum systems models they became a major and objective control of risk assessment studies. The coupling between the analysis of the risk parameters (p1…p6) and the analysis of the petroleum systems elements and processes is therefore, of paramount importance to improve exploration risk assessments.