Filling in Exploration White Space: Using Geoscience to Constrain Exploration Play Uncertainty

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ABSTRACT

Dealing with vast areas of unknown geology (white space) has been the focus of research and discussion for decades. Essentially two schools of thought have emerged; categorising white space in a rigid risk/uncertainty framework or using a more flexible geological model-based risking approach. This paper looks at both risking methods and establishes which has the least bias when dealing with areas of geological uncertainty. Both matrix and geo-model play risking approaches were undertaken on the same data set with the resulting play risk maps compared. The matrix approaches uses a data-driven constrained risking system with no geological map input. In contrast the geo-model approach first builds a geological map/s (a so called gross depositional environment map or GDE map) and in consultation play risks are assigned according to the geological circumstance at any given map location. The constraints of the matrix approach 'forces' the white space regions to be regarded in an overly negative light with play risks (and thus prospects) typically rendered unattractive for exploration drilling. Conversely regions with data are elevated in preference. This matrix approach thus introduces a data risking bias. Such an approach, fits well in risk adverse environments but it may also have the negative effect that financially advantageous opportunities are overlooked. In contrast a geo-model approach can be employed. Such an approach uses all available data (wireline, core, cuttings, seismic, gravity etc) to piece together a geological model/GDE map. Such GDE maps are based on the data available whereby white space areas are 'filled in' using an understanding of how geological systems are deposited. Once a GDE map is made then play risks (eg. seal, source and reservoir presence) can be assigned to the various geological regions. This geo-model play risking approach can then be made for successive play layers and results can be combined as stacked play maps. In conclusion a geo-model, as opposed to a matrix, approach, allows for play and prospect risks to be decoupled from data density bias allowing for a more balanced approach.