

A View from Space - Latest Remote Sensing Technology for Supporting Exploration and Related Applications

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ABSTRACT

As petroleum resources become increasingly mature in their exploration and development, there will be a growing interest in the potential for undiscovered resources. An objective, process-based, resource assessment in under-explored or frontier basin, is a challenging task, but in data-rich areas, this task becomes comparatively easier, due to the better understanding of petroleum system elements within mature basins. This paper demonstrates a “state-of-the-art”, multidimensional, petroleum system- based methodology for resource assessment. Petroleum system modeling is an essential part of exploration that contributes to volumetric and risk assessment at basin, play, and prospect scales. This is a key technology that can integrate and process all of the available geologic data to assess the resource potential, and enable hydrocarbon properties of oil versus gas potential to be understood and predicted, for both conventional and unconventional petroleum resources.

Petroleum resource assessments (Yet-To-Find (YTF) resource assessments) are used to quantify discovered and undiscovered petroleum volumes (oil and gas), that are technically and economically recoverable within a certain time frame. It is therefore essential to standardize methods and tools for resource assessments based on scientifically-sound and industry-standard geoscientific analyses, to document the procedures that are used, and to ensure that the analysis is complete and relevant to support present and future petroleum exploration activities.

This standardized methodology generates combined common risk segment maps from petroleum system element maps, which includes dynamic charge, reservoir and seal risks. One of the most important elements of this methodology, is the ability to audit and revise the assessment, as new data can be readily incorporated and play risk maps updated, because data and interpretations are available in an integrated environment. The application of the above methodology is presented for the Cretaceous petroleum system in Saudi Arabia. The Cretaceous petroleum system contains prolific source rock which is responsible for many Cretaceous hydrocarbon pools. The source rock is part of the conventional as well as the unconventional petroleum system in the study area. The petroleum system modeling was conducted as part of the conventional and unconventional resource assessment of the area.