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Gas Hydrate Exploration and Exploitation: The recent advances and the road-ahead

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Summary

The introduction of gas hydrates in the shallow unconsolidated sediments tends to enhance both the stiffness and rigidity of the hosting rocks. Gas hydrate drilling worldwide has indicated that the increases in the stiffness and rigidity are somewhat proportional to the concentration of gas hydrates in the porous space of the sediments. This provides basis for the gas hydrate characterization and quantification using seismic information.

Rock properties at shallow depth, within the gas hydrates stability zone, vary largely due to heterogeneity and strong influence of compaction. Because of the lack of good-quality well data in this zone, our seismic predictions use analogue models based on geologic interpretation, seismic inversion, and the basic principles of rock physics. In the past, we developed an integrated, seismic-based, five-step workflow (Dai et al., 2009; Dutta and Dai, 2007) to delineate and quantify gas hydrates in the deepwater Gulf of Mexico. Since then, the process has been validated and improved through multiple gas hydrate characterization studies in Gulf of Mexico.

In this presentation, we will review the development of the technology, and demonstrate its application, using multiple examples from different regions in the Gulf of Mexico. Based on our models for gas hydrate exploration, 13 wells were drilled in the deepwater GOM (in water depths ranging from ~ 3000 ft to over 6,000 ft) and the model was verified. WE will also discuss various scenarios related to exploitation of Gas hydrate for resource.

References

Nader C. Dutta and Jianchun Dai, 2009. Exploration for gas hydrates in marine environment using seismic inversion and rock physics principles; The Leading Edge, PP 792 – 802

Dutta, N. and Dai J., 2007. Seismic Detection of Hydrates in Gulf of Mexico, Fire in the Ice, Spring/Summer, 2007, Methane Hydrate Newsletter, NETL p. 8-11