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## Using 3D Seismic Data for Visualization of Depositional Systems— Integrating Seismic Stratigraphy and Seismic Geomorphology

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### ABSTRACT

3D seismic data can play a vital role in hydrocarbon exploration and development, especially with regard to mitigating risk associated with presence of reservoir, source, and seal facies. Such data can afford direct imaging of depositional elements, which can then be analyzed by applying seismic stratigraphic and seismic geomorphologic principles to yield predictions of lithologic distribution, insights to compartmentalization, and identification of stratigraphic trapping possibilities. Benefits can be direct, whereby depositional elements at exploration depths can be identified and interpreted, or they can be indirect, whereby shallow-buried depositional systems can be clearly imaged and provide analogs to deeper exploration or development targets.

The key to successful application of this approach lies in the integration of section-view (stratigraphic) with plan-view (geomorphologic) images. Iterative analyses of such images are critical to success. In order to maximize the recognition of depositional systems, the user must be familiar with as wide a variety of meaningful geologic patterns both in section and in plan view. Examples of imaged depositional elements from both shallow- and deeply-buried sections are presented. Deepwater deposits, in particular, have benefited greatly from analyses of 3D seismic data. The understanding of the stratigraphic and geomorphologic evolution of these deposits has increased by orders of magnitude since the advent of 3D seismic-based analyses. In high-cost deepwater exploration settings, insights derived from such analyses are critical to reduce risk with regard to reservoir presence and reservoir compartmentalization to ensure economic success. Depositional elements in settings such as shoreface, shelf, estuarine, and fluvial, as well as in carbonate environments also benefit greatly from 3D seismic analyses.