

## Abstract

### Uncertainty in Using Stratigraphic Models for Exploration - How Latitude Introduces Variability in Sedimentary Systems

<sup>1</sup>Fratlicelli, C.M., <sup>2</sup>Martinius, A.W., <sup>3</sup>Markwick, P. and <sup>4</sup>Suter, J.R.

<sup>1</sup>Noble Energy Inc;

<sup>2</sup>Statoil;

<sup>3</sup>Getech;

<sup>4</sup>ConocoPhillips

Current facies models, produced from decades of research on temperate & tropical systems are heavily biased towards low latitude analogs. These have been successfully applied in both mature and frontier basin exploration settings. However, with increasing exploration interest in high latitudes, especially the Arctic, it is timely to examine in more detail process variability at different latitudes, and determine how facies models should be modified (or not) to include that variability. Inherent to facies models are a series of processes built on our overall understanding of sedimentary systems. By ignoring that certain processes gain or diminish in importance with changing latitude, these models, and our application of them introduce a hidden bias towards low latitude systems. As a result, using these familiar concepts and models in high latitude systems can introduce errors that are often not accounted for. Numerous processes have been shown to be amplified and/or diminished at higher latitudes, producing variances in stratigraphic architecture from more familiar depositional “norms”. For example, Coriolis effects are stronger at high latitudes, whereas tidal forces are weaker. Extremes of seasonality at higher latitudes result in temperature and insolation effects on fauna and flora, as well as short runoff seasons and strong fluvial discharge seasonality. Some important high latitudes processes such as ice melt algal blooms have no temperate or tropical equivalent and are thus unaccounted for in established models. These differences can and do impact numerous play elements including reservoir, source, and seal quality & distribution. The main goal of this presentation is to outline the depositional variability between high and lower latitude systems, demonstrate how such variability affects hydrocarbon play elements, and provide the needed basis for refining the established stratigraphic and sedimentary concepts, methods, and tools for use in high latitude basins.