

## **Enhancing Spectral Decomposition to Delineates Subtle Channels – A Case Study From Offshore Nile Delta**

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### **ABSTRACT**

Seismic data is a collection of reflection events from the subsurface. There are diffractions, refractions, and noise, but these are minor considerations when used for oil and gas exploration and reservoir characterization. These subsurface reflection events can overlap, partially or completely, depending on frequency and depth, making some geologic features indistinguishable. However, when seismic data is decomposed into individual frequency components, as done in spectral decomposition, some subsurface events can be distinguished from certain frequency components, such as the channels. Sometimes, it is not just one particular frequency component that reveals the geological features, several frequency components can reveal different parts or aspects of the subsurface features. Color blending is often used to put several frequency components together into one map and let us see them simultaneously. In this case study, we present comparisons between spectral decomposition different volumes over Sequoia field that is one of the Pliocene gas fields offshore Nile Delta. These volumes are representing near-, mid-, far-, and full-angle stacks using different frequency ranges. As predicted, the near-angle stack has higher frequency content than the other angle stacks and even the full-angle stack. Though, the near-angle stack contains a high level of noises compared with the others. We tried to reduce the noises using structural-oriented filters; the difference was minor with few enhancements achieved. The near-angle stack spectral decomposition volume was used to delineate the incised channels and faults inside the main canyon. With the help of the variance volume, the Sequoia's internal architecture becomes very clear. We used the geobody extraction method to export the major and subtle channels to be used in the static model building and the gas initially in place (GIIP) calculation.