Please fill in the name of the event you are preparing this abstract for.	International Petroleum Technology Conference
Please fill in your 5-digit IPTC manuscript number and IPTC Control number.	IPTC-19220-MS 19IPTC-P-2556-IPTC
Please fill in your abstract title.	The Successful Application of Synthetic Seismic Amplitude Modelling in Defining a Stratigraphic Trap Play Concept Around a Structural High in the Eastern Rub' Al-Khali Basin, Saudi Arabia

Please fill in your author name(s) and company affiliation.

Given Name	Surname	Company
Juan	Zunino	Saudi Aramco
Rudi	Lubbe	Saudi Aramco
David	Mackertich	Saudi Aramco
Khalid	Mahmoud	Saudi Aramco

Abstract

The eastern area of the Rub' al-Khali basin represents a rich hydrocarbon province with several active petroleum systems. A broad NNE-SSW trending anticline, located within the eastern Rub' al-Khali Basin is surrounded by smaller, tighter, subparallel anticlines, formed in response to Late Cretaceous reactivation of deep-seated Paleozoic lineaments, associated with emplacement of the Oman Ophiolites to ENE. The high underwent repeated phases of structural instability during the Turonian and Maastrichtian, which is evident by the occurrence of several unconformities. The inversion and erosion reached an acme in the early Danian, which resulted in the formation of Base Tertiary Unconformity (BTU), which cuts out Upper and Lower Cretaceous formations over the crest of the high.

The *BTU* is a prominent erosional event ideal for the generation of stratigraphic trap play concepts. This event eroded the older underlying reservoirs of the Albian-Cenomanian sequence and is directly overlain by a 30-feet thick Middle to Late Paleocene mudstone interval known as the Shammar shale. This regionally extensive mudstone forms a good top seal, with the potential of forming truncation traps over Late Cretaceous highs observed within the area of interest.

The area of interest is covered by a 3D seismic survey. The *BTU* is a strong reflection event in time and can be mapped with a high degree of confidence. The Albian-Cenomanian reservoirs, directly underlying the BTU unconformity, are contaminated with internal multiples, which makes the definition of the traps challenging.

The lateral amplitude behavior of the unconformable surfaces are dependent on the geological units directly underlying the unconformities. A synthetic forward modelling study has been undertaken to understand the amplitude behavior of the BTU across the area of interest. The model has been constructed using the petro-acoustic properties obtained from numerous wells, which penetrated the Albian-Cenomanian succession.

This work will demonstrate how synthetic forward modelled amplitude studies can be successfully utilized to markedly reduce drilling risks associated with geological uncertainties in areas with low seismic imaging quality. High resolution elastic wireline data were used to model prestack synthetic seismic gathers at all the well locations. 3D, synthetic, prestack seismic reflectivity models were then constructed and guided by the conceptual geological understanding of the area and the observed seismic structural interpretation. The modelling aided in the quantification of the expected seismic amplitudes across the area and helped with mapping and de-risking the stratigraphic play. The workflow can be extended not only to stratigraphic traps but to any area where the seismic data is of poor quality.