Please fill in the name of the event you are preparing this manuscript for.	International Petroleum Technology Conference 2021
Please fill in your 5-digit IPTC manuscript number.	21IPTC-P-3662-IPTC IPTC-21499-Abstract
Please fill in your manuscript title.	Systematic Solutions In Seismic Imaging And The Understanding Of Carbonate Platforms Internal Architecture: Pushing The Limits Of Deeper Exploration Opportunities

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

Given Name	Surname	Company
Riaz	Alai	PETRONAS Carigali Sdn. Bhd.
Afiq	Mokhtar	PETRONAS Carigali Sdn. Bhd.
Nurul Nadzirah	Abd Rahman	PETRONAS Carigali Sdn. Bhd.
Christopher Lee	Slind	PETRONAS Carigali Sdn. Bhd.
Eric	Andersen	PETRONAS Carigali Sdn. Bhd.
Leonardo Humberto	Piccoli	PETRONAS Carigali Sdn. Bhd.

Abstract

Objectives/Scope

Simplified approaches in imaging internal structures of carbonates and their heterogeneities have hindered reliable understanding of their prospectivity characters to a significant level. As observed in current carbonate geological settings, series of processes such as karstification, extensive dolomitization and cementation among others have introduced complex heterogeneities that need to be honored in seismic imaging. Smooth velocity approximations within carbonate bodies will disperse and mask their needed imaging of internal structures critical for accurate volumetric calculations.

Methods, Procedures, Process

Imaging of deeper pre-carbonate structures has been impacting the exploration activities in Asia Pacific blocks for the last few decades. Imaging challenges have been complicated due to presence of shallow gas clouds and thin gas layers in shallower water environments. This specific complex geology has created a series of interrelated imaging challenges, that need to be resolved systematically from shallow to deep layering. In the process of imaging internal structures, effective signal restoration of broader bandwidth is key towards success as it allows cascaded estimation of noise and multiples followed by their optimal suppression.

Results, Observations, Conclusions

Separation of total wave field into specular reflections and diffractions has opened advanced demultiple schemes, addressing effectively diffracted multiples. With important and effective signal restoration, presence of interbed multiples has been exposed, allowing their necessary removal. Latest and advanced velocity model building schemes including introduction of negative delta anisotropic corrections during imaging has significantly added to the exposure of internal structures. Improved seismic signal resolution through diffraction imaging characteristics, has allowed identification of sweetspots (being swarms of karst) for optimal well planning. This identification has been further derisked through attribute analyses, and their comparisons with production data. Furthermore, diffraction imaging has exposed other small-size geological features like faults and channels, that can be used as derisking tool complementing the findings through attribute analyses. In addition, multi-domain diffraction imaging has been performed for refined imaging of carbonate steep flanks providing better understanding of the buildups and carbonate bodies. With refined imaging of carbonate internal structures through detailed velocity analysis within carbonate bodies, novel opportunities have been created to push the limits of imaging carbonate base and pre-carbonate structures more effectively. Detailed estimations of absorption properties and their

compensation with latest imaging algorithms has further restored the imaging deficiencies.

Novel/Additive Information:

In this systematic and sequential strategy in pushing the limits of deeper exploration opportunities, imaging and understanding of carbonate platforms internal architecture is critical and essential. This underlines the importance and detailed attentions to preprocessing efforts in separated wave fields, specialized demultiple (surface, interbed and diffracted) and refined velocity model building. The produced adequate dataset is a qualified pilot candidate in improving volumetric range estimations through machine learning in further aiding and complementing geological understanding.