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Please fill in your abstract title.	Separation and Imaging of Diffraction Energy Towards Improved Interpretation of Small Size Geological Features

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Abstract

Extraction of diffraction energy from seismic recorded data and imaging these separately, reveals new and extended insight in detailed interpretation of small size geological features including karsts, channels, caves, faults, fractures etc. In general, diffraction energy is very weak in amplitude and is being masked by much higher amplitude reflection energy. In this abstract, examples are shown on an offshore dataset in which imaging of karsts and other small size deeper pinnacles are extracted and highlighted.

Industry standard search for small size geological features has been through attributes extraction from total wave field migrated data. However if during seismic data processing, seismic signals related to diffraction energy have not been preserved optimally, any kind of method may provide inaccurate information. Therefore following an advanced systematic strategy for data processing in preserving diffraction energy and separating these from total recorded wave field, allows detailed imaging of discontinuities in the earth's subsurface. The examples in this abstract illustrate pre-migration separation of total wave field into spurious reflections and diffractions allowing optimal control of diffraction energy signals.

Some examples are shown on the reprocessing of the total wave field data and comparisons are made with the vintage data. Following a systematic and sequential strategy for imaging diffractions through latest state-of-the art data processing technologies, large amount of karsts have been imaged with extended resolution inside the shallower carbonate platforms. Surface-related, interbed and diffracted multiples have been estimated and suppressed sequentially through advanced pattern-recognition-based subtraction methods. After optimal multiple suppression, latest cutting edge methods for velocity estimations, attenuation compensations and migrations have been applied towards obtaining accurate subsurface images. Also the imaging of diffractions has revealed deeper target carbonate pinnacles and their corresponding edges. The data was acquired over a very complex geology containing thinning and thickening carbonate layers in a shallow water environment, and with all the extensive processing methods, the resulting images are of high resolution matching boundaries of velocities identified through Full Waveform Inversion applications.

With the proposed strategy to separate and image diffraction energy with higher resolutions, an alternative method has been explored that minimizes exploration risk, as subsurface discontinuities can be interpreted with higher detail, accuracy and confidence.