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# Editorial: The state-of-art techniques of seismic imaging for the deep and ultra-deep hydrocarbon reservoirs

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Editorial on the Research Topic
The state-of- art techniques of seismic imaging for the deep and ultra-deep hydrocarbon reservoirs

At present, oil and gas resources that are relatively simple to explore have been extensively developed. Deep and ultra-deep hydrocarbon becomes one of the most important exploration targets. Under high-temperature and high-pressure conditions, deep oil and gas reservoirs have different hydrocarbon sources, accumulation mechanisms, geophysical and geochemical characteristics from conventional shallow-to-intermediate reservoirs. Seismic data from deep and ultra-deep strata have weak amplitudes, low signal-to-noise ratio, and bad resolution. These issues make it difficult for geophysicists to build accurate subsurface velocity models and produce high-quality images.

The Research Topic "*The State-of-Art Techniques of Seismic Imaging for the Deep and Ultra-deep Hydrocarbon Reservoirs*" aims to receive the Frontier research and application for deep and ultra-deep oil/gas exploration using seismic techniques, toward a better understanding of deep and ultra-deep petroleum systems. Twelve manuscripts have been accepted so far, covering seismic acquisition, modeling, imaging, inversion, and interpretation. For example, optimized acquisition systems have been proposed to improve the quality of full-waveform inversion and reverse-time migration for deep reservoirs. Accurate numerical modeling methods combined with high-performance computation have been developed to simulate seismic propagations in land exploration areas. Advanced migration approaches, including least-squares migration, attenuation compensation, scattering imaging and Gaussian beam migration for VSP surveys, have been presented to improve image quality for deep targets. Robust hydrocarbon prediction algorithms have been proposed to improve the accuracy of reservoir

characterization for land low-signal-to-noise data. These developments provide new ideas for deep and ultra-deep seismic exploration.

## Author contributions

JY and JH collaborate to write this editorial.

## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Publisher's note