# Embracing the power of UHR3D for shallow hazard site surveys for offshore drilling and construction

*Sougata Halder*, Kristian B. Brandsegg, Allan McKay, Gunhild Myhr, TGS*

## INTRODUCTION & OBJECTIVE

The Bureau of Ocean Energy Management (BOEM) requires lessees and operators to provide an assessment of all seafloor features, subsurface geology, man-made features, and conditions that may adversely affect the operational and/or environmental integrity of a proposed drilling operation. Oil and gas operators are responsible for identifying, analyzing and mitigating shallow hazards ahead of their drilling operations. Conventional seismic data might not have the required illumination, especially in the shallow water environment, requiring a separate high-resolution site survey dataset to perform this analysis. The guidelines from International Association of Oil and Gas Producers (IOGP) recommend using 3D site survey dataset with sufficient resolution of the seabed and shallow section to allow accurate analysis to perform these geohazard assessments.

## SHALLOW HAZARD SITE SURVEY

We propose 3D Ultra-High-Resolution (UHR3D) seismic acquisition, combined with optimized imaging workflows for maximizing resolution of seismic reflectivity for identifying and analyzing shallow hazards in 3D for derisking geological conditions for offshore drilling and construction.

UHR3D seismic surveys have been established as a proven technology for identifying shallow hazards and for guiding geotechnical sampling for development planning. We will present how combination of dense source/receiver geometry, advanced imaging algorithms, and high-frequency bandwidth yield a step-change in resolution and detailed coverage in 3D, compared to traditional 2D Seismic, for site surveys.

We demonstrate how the UHR3D configuration with broad bandwidth and high-capacity streamer spreads, integrated with our full integrity processing and interpretation approach, enhance an interpreter's ability to produce high quality subsurface insights through visualization and mapping of geohazards, such as, shallow gas pockets, faults, shallow water flow and sediment instability zones. Identification of these geohazards is critical for rig and well placement and better engineering design, pipeline routing for risk mitigation to support safe and efficient field development planning and construction. Further, simultaneous acquisition of bathymetry, Side Scan Sonar, Sub-Bottom Profiler, and Magnetometer data with UHR3D in a single survey from a robust acquisition platform (Figure 1) provides high-resolution 3D coverage for illuminating seabed to shallow subsurface for the entire lease areas.

## CONCLUSION

We show how an integrated acquisition survey design provides higher resolution, spatially complete, and far more reliable imaging of the near surface, allowing engineers and geoscientists to confidently interpret features on the scale of a few meters for derisking drilling operations to meet the international guidelines for site surveys. This enables safer drilling operations and better engineering decisions for oil and gas operations. It also offers shorter development timeline for wind farm development and robust baseline survey for characterization and monitoring of subsurface carbon storage.

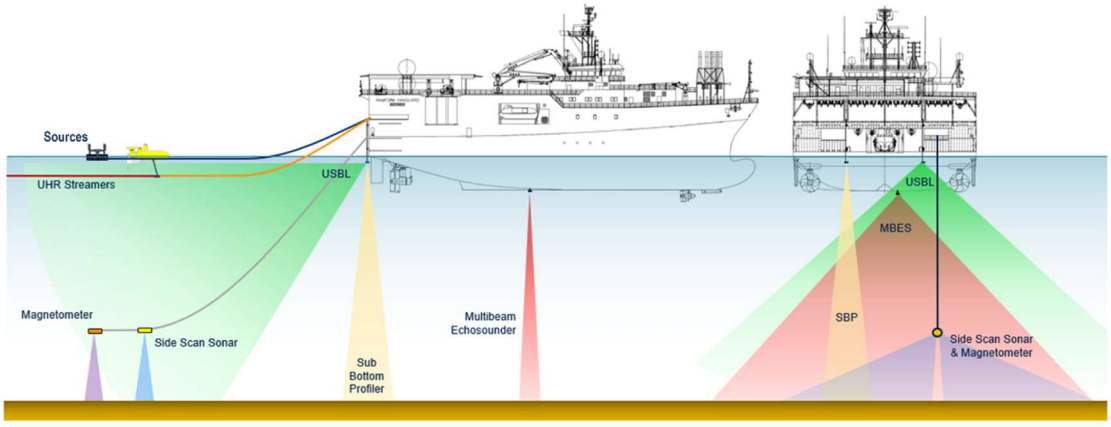


Figure 1. Schematic diagram of integrated geophysical and hydrographic survey.