

# Acquisition Trial of Deep Smart DAS Uphole with High-Productivity Drilling and Fiber-Optic Cable Deployment

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## Abstract

**OBJECTIVES/SCOPE:** Uphole surveying is crucial for building and calibrating near-surface velocity models. Imaging, especially low-relief structures when complex near surface is present, demands accurate characterization and calibration of seismic velocity from surface.

**METHODS, PROCEDURES, PROCESS:** Large risk, challenging productivity, and higher cost have affected seismic uphole acquisition leading to decreased usage. However, the growing popularity of depth imaging on land and increasing accuracy requirements for depth conversion in the case of the low-relief structures require upholes for building and calibrating velocity depth models for the near surface. Uphole information can significantly reduce exploration and delineation risk by avoiding dry and unnecessary deep wells. In addition, upholes substantially lessen turnaround time for velocity model building and imaging.

**RESULTS, OBSERVATIONS, CONCLUSIONS:** This trial tested a dual rotary technique immune to lost circulation and unconsolidated sediments. Drilling results exceeded our expectations and confirmed that the challenges above could be successfully addressed. In addition, deep 300 m upholes could become a new norm. We believe this drilling technology will solve a 60 plus-year problem of efficient seismic uphole acquisition. We have further shown that dual rotary allows essential improvement in fiber installation and cementation procedures when acquiring smart DAS upholes. Specifically, fiber cables strapped to the outside of the grouting pipe could be lowered inside the protective outer casing, substantially cutting the risk of hole collapse. Fiber cable is cemented to the ground level while the shallow outer drill casing is evacuated.

**NOVEL/ADDITIVE INFORMATION:** On-demand smart DAS upholes can be pre-drilled and instrumented with fiber. The dedicated near-surface crew could acquire on-demand smart DAS upholes at critical prospects with increased near-surface uncertainty. The DAS survey delivers densely sampled (~1-2 m) reliable waveforms from surface to total depth with a single shot. Compared to geophone surveys, acquisition time is reduced from several hours to several minutes. Smart DAS uphole opens the opportunity to efficiently acquire multi-shot walkaway and walkaround surveys or 2D source carpets around the uphole. Smart DAS upholes can also be simultaneously recorded during conventional surface seismic acquisition and used for near-surface and deeper imaging.