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Please fill in your abstract title.	Drillcam: A Fully Integrated Real-time System to Image and Predict Ahead and Around the Bit

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Abstract

As the number of new exploration and development wells continues to increase over time, guiding the bit while drilling in real time is becoming one of the most requested technologies. Once successfully implemented, it will enable accurate prediction of high-pressure zones, cavities, and fractures, coring points, target depths, and geosteering in high-quality reservoir zones to optimize drilling decisions and reduce costs.

In this paper, we present a fully integrated real-time system to map and predict ahead of the bit and geosteer in high-quality reservoir zones. We call this technology DrillCam. Recent enabling technological advances were made in seismic sensor sensitivity, high-channel count surveying, signal enhancement and imaging algorithms, as well as portable high-performance computational resources that are easily deployable to the field. Such technological advances open a whole new set of possibilities for real-time drill bit guidance and navigation. One key enabler for DrillCam is the use of wireless seismic receivers. Compared to conventional cable geophones and cableless nodal systems, wireless receivers can provide real-time recording and transmission without the need for extra equipment for data retrieval, flexible receiver spacing and areal coverage. This, in turn, results in a lightweight system for easy mobilization and ultralow power consumption for extended battery life.

We show successful 3D numerical tests using the drill bit as a downhole source and dense surface receiver with detailed analysis highlighting the effects of the acquisition geometry design, signal-to-noise ratio, and velocity model on the final image quality. The first acquired DrillCam field data using a permanent buried receiver network showed promising results in detecting the drilling-related signal.