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Please fill in your manuscript title.	Drillcam Integrated System For Drilling Applications	
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Abstract

Objectives/Scope:

As the number of drilled wells continues to increase, drilling automation and optimization to guide drilling in real time is becoming more necessary. Seismic-while-drilling may enable better predictions ahead of the bit of high-pressure zones, fractures and cavities, coring points, target depths, and geosteering in high-quality reservoir zones for optimum drilling decisions and cost reduction. As an application of seismic-while-drilling (SWD), DrillCAM integrated real-time system is presented.

Methods, Procedures, Process:

Drilling automation and optimization require a step change in sensing capabilities. Key sensing components of DrillCAM are wireless surface geophones, rig sensors and downhole sensors that are continuously recording data together from surface to the target depth. For imaging ahead and around the bit, both rig and downhole sensors can serve as pilot data for the surface geophone records. They also capture key data that can be used for drilling dynamics data characterization of drill-string and BHA vibrations.

Results, Observations, Conclusions:

Continuous high-frequency data from such vibration sensors is emerging as the new norm in sensing instead of intermittent “burst” records that were typical before. Fast telemetry is becoming available to deliver this data close to real time. Complex near-surface geology significantly impacts the uncertainty of surface seismic data leading to less reliable depth predictions from the surface. Seismic data acquired while drilling these shallow complex sections can fill the “near-surface data gap” and significantly improve positioning accuracy. Moreover, predictions ahead of the bit of over pressured and fractured zones can also be done more accurately for effective mitigation. In addition, data can be safely and confidently acquired in shallow sections that are not normally logged due to the large hole size or multiple casing strings present. Similarly, while drilling data can save time and cost of acquiring post-drilling borehole seismic for deeper sections. We show a carefully designed field data acquisition experiment using the drill bit as a downhole seismic source and a large number of seismic receivers at the surface. The wireless receivers are arranged in flexible geometries that adapt to the seismic source/drill bit depth.

Novel/Additive Information:

DrillCAM aims to create and integrate a suite of such surface and downhole measurements for geophysical and drilling purposes. Key aspects of this technology include utilizing very dense wireless receiver networks, adaptive survey geometry, advanced imaging algorithms to enhance the signal-to-noise ratio, and large high-performance computational resources that can be deployed in the field. These factors are instrumental to achieve successful recording and imaging of seismic data ahead of the bit in real-time.