Please fill in the name of the event you are preparing this manuscript for.	2020 International Petroleum Technology Conference
Please fill in your 5-digit IPTC manuscript number.	IPTC-19793
Please fill in your manuscript title.	Fullwave Sonic Analysis for Reservoir Characterization - Maximizing the Value of Acoustic Data

Please fill in your author name(s) and company affiliation.

Given Name	Surname	Company
Chris B.	Ayadiuno	Saudi Aramco
Xuekai	Sun	Saudi Aramco
Wei	Li	Saudi Aramco

Abstract

Objectives/Scope:
Fullwave sonic (FWS) data is important for formation evaluation and seismic interpretation. Velocity and porosity are some of the properties that can be derived from such data. Though readily available, FWS data is generally put to limited use due to lack of requisite workflows and costly softwares required to analyze such data. To maximize the benefits derived from FWS data, we developed an integrated user-interface and workflows for near-wellbore petrophysical and geological properties analysis.

Methods, Procedures, Process:
Several workflows, separated into three main steps, are important for processing and analyzing fullwave sonic data to extract petrophysical and geological properties near the wellbore. Firstly, we discuss data handling, which consists of field data format conversion from DLIS to SEGY. Secondly, a simple processing workflow, which employs interactive velocity-time analysis (VTA) technique, for improving signal to noise ratio of the FWS data is presented. Thirdly, a reformulated higher-order normalized differential energy (NDE) methodology that applies nonstationary shaping regularization, and allows velocity change among adjacent channels for improved results, is used for characterizing reservoir properties.

Results, Observations, Conclusions:
Waveform data analysis can provide reservoir property information such as porosity, amplitude, velocity, fracture, anisotropy, dispersion and fluid-types of the near-wellbore region. Test results from proposed workflows, have shown that (1) fractured zones can be located by reduction or decay of acoustic energy; (2) by using a sequential, window-based sampling approach, one can achieve a depth of investigation of up to 1.50 meters into the formation, which is a key improvement over image logs; (3) estimating anisotropy from cross-dipole data can provide fracture location and azimuth; and (4) azimuthal monopole data can be used to estimate slowness changes up to 30 inches into the formation, which can provide a proxy for drilling related rock-mechanical alterations.

Novel/Additive Information:
This paper highlights successful development of an integrated platform and new workflows for analyzing FWS data for near-wellbore petrophysical and geological properties; thereby, enabling geoscientists and engineers to maximize the value of fullwave sonic data, reduce uncertainties in reservoir properties and improve the quality of decision-making at lower cost.