
Application of Electro seismic Technology for Direct Hydrocarbon Detection in Conventional Reservoirs—A Case History

David L. McCabe¹, Alan J. Katz¹, Arthur H. Thomson², and Robert W. England³

¹ES Xplore, LLC, 1807 Ross Ave., Ste. 255, Dallas, Texas 75201

²Consultant, 13602 Peachwood Ct., Houston, Texas 77077

³Consultant, 3604 Immel Dr., Flower Mound, Texas 75022

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EXTENDED ABSTRACT

As exploration geologists and geophysicists, we are constantly looking for ways to reduce risk in the prospects we develop. The presence or absence of hydrocarbons within a conventional reservoir is a key risk. An emerging technology utilizes the physical phenomenon, occurring in a hydrocarbon bearing reservoir, where an electromagnetic field creates relative rock-fluid motion and a resulting pressure gradient in the grain space. The pressure gradient reacts against the grain matrix to generate a compressional seismic wave that can be measured and used to directly detect those hydrocarbons. Hydrocarbon, mobile-fluid saturation, significantly increases the electromagnetic-to-seismic conversion amplitude. The science, called electroseismics, is not new as it was established in the 1930s and later expanded by a major oil company starting over 30 years ago (Thompson et al., 2007). What is new is the use of a passive source instead of one that is man-made: electromagnetic pulses, generated by worldwide lightning discharges, supply the electromagnetic source.

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