CONTROL ID: 2614153

TITLE: An Unconventional Exploration Tool for Unconventional Exploration

AUTHORS (FIRST NAME, LAST NAME): Louis J. Berent[1], H. Roice Nelson[1]

INSTITUTIONS (ALL)

1. Dynamic Measurement, LLC, Houston, TX, United States

ABSTRACT BODY:

Abstract Body: The surface of the Earth in the U.S. is struck by lightning approximately 25 x 10^6 times each year. A typical thunderstorm in South Texas could deliver 5-10,000 cloud-to-ground lightning strikes. Each time lightning strikes in the U.S. the time, location, type of strike & the electrical properties & attributes associated with each strike is recorded & entered into a massive database. Until recently, the primary purpose of this private database was to provide insurance companies with lightning reports to verify their customer's lightning damage claims. That changed several years ago when a meteorologist, geophysicist & a frightened duck hunter who was almost struck by lightning, walked into a bar to discuss whether lightning ever struck twice in the same place.

Thus, a new geophysical data type was born, Natural Source Electromagnetics (NSEM). Lightning can & does strike repeatedly in the same place more than once & the location of these cloud-to-ground bolts of lightning are not necessarily attracted to infrastructure, trees or topography. This poster will discuss how lightning strike locations, the type of lightning strikes & the electrical attributes associated with each strike can be influenced by lateral inhomogeneity caused by faults, fractures, mineralization, pore-fluids, & salinity variations.

NSEM has been employed by the petroleum & mining industry for use as a geophysical exploration tool. To date, applications to conventional petroleum exploration have been limited to identifying & mapping subsurface faults & stratigraphic traps, while one validated case study revealed how NSEM would have delivered an 87% drilling success rate

had it been utilized as a reconnaissance tool to generate leads.

validated case study demonstrates NSEM’s ability to duplicate the patented resistivity signature used by the mining industry to locate porphyry copper deposits. NSEM attribute maps delineated hydrothermal alteration zones & in doing so, distinguished between the electrical rock properties of copper & its pyrite halo.

NSEM’s resolution & ability to produce apparent resistivity maps & apparent resistivity time/depth slices, provides the unconventional exploration community with an independent dataset that can be easily tied to seismic/subsurface data. NSEM can thus help map sweet spots across unconventional fairways. An exploration model developed by the BEG will be used to demonstrate NSEM's potential contribution to mapping sweet spots in the Maverick Basin.