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## New Lightning Attribute Volumes Compared to the Texas Bureau of Economic Geology (BEG) Stratton 3D Seismic Survey

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[http://www.gcags.org/exploreanddiscover/2016/00063\\_haggar\\_et\\_al.pdf](http://www.gcags.org/exploreanddiscover/2016/00063_haggar_et_al.pdf)

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### EXTENDED ABSTRACT

Stratton Field is in the northwestern corner of Kleberg County and the southwestern corner of Nueces County, Texas. This study looks at the area of the publicly released seismic data and its surroundings as it relates to the Vicksburg/Frio trends. Stratton Field production is derived from complex thin fluvial reservoirs dissected into compartments by meanders or by diagenesis. In this regard, Stratton is typical of the Frio gas trend in South Texas. By contrast, fault defined reservoirs dominate in the Vicksburg section (Hardage et al., 1964; Smith, 2016).

We have 10 years of archived lightning strike data available for this study area, extending from January 1, 1998, through December 31, 2007. The lightning strike data were provided by Vaisala, Inc. Lightning data have been continuously recorded since 1998; however, these data were part of an available dataset from an earlier reconnaissance of South Texas prior to the development of volume attributes. We revisited this lightning dataset when we acquired information on the Stratton Field. Lightning strikes occur virtually everywhere, and because historical data are licensed and available for cleaning, processing, and analysis, the analysis expands out from the Stratton 3D seismic covering an area approximately 65 mi by 32.5 mi.

In this study, new developments in rock property and lightning attribute volumes derived from lightning strike databases are compared to 3D seismic and well data in South Texas. As reported previously, lightning strikes are primarily controlled by earth currents which are guided by geology (Haggar et al., 2014). Details in apparent resistivity and apparent permittivity rock property volumes calculated from lightning databases have been expanded with new lightning attribute volumes. These new volumes include density, rise-time, peak current, peak-to-zero, energy, frequency, symmetry, and total wavelet time, as well as volumes relating lightning strikes to lunar and solar controlled earth tides. In a broad sense, just as horizontal slices through seismic volumes show fault trends, some of the lightning attributes show patterns aligning or breaking along mapped fault lines, unconformities, and/or sedimentary boundaries. Vertical sections through the data show similar, though lower frequency, relationships to faults as seismic data, though some attributes image the faults and changes in lithology better than oth-

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ers. In general, apparent resistivity is the primary volume used for correlation, with other lightning attribute volumes provide additional support or insight into the interpretation.

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