High-Resolution Hyperspectral Imaging Technology: Implications for Thin-Bedded Reservoir Characterization

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GCAGS Explore & Discover Article #00201*
http://www.gcags.org/exploreanddiscover/2017/00201_kosanke_et_al.pdf
Posted October 30, 2017.

*Article based on a full paper published in the *GCAGS Transactions* (see footnote reference below), which is available as part of the entire 2017 *GCAGS Transactions* volume via the GCAGS Bookstore at the Bureau of Economic Geology (www.beg.utexas.edu) or as an individual document via AAPG Datapages, Inc. (www.datapages.com), and delivered as a poster presentation at the 67th Annual GCAGS Convention and 64th Annual GCSSEPM Meeting in San Antonio, Texas, November 1–3, 2017.

ABSTRACT

Hyperspectral core imaging provides detailed, high-resolution mineralogic and textural information of a cored interval that can be used to refine stratigraphic models, explain petrophysical responses, and guide selection of plug locations for conventional and special core analysis. Originally developed for the mining industry, hyperspectral imaging (HI) uses a combination of short-wave infrared light (SWIR), visible near-infrared light (VNIR) and long-wave infrared light (LWIR) to create a visual 'map' of the minerals in a core that respond to light.

Utilizing hyperspectral short-wave and long-wave imaging technologies on whole conventional core from the Permian Basin, we show the textural relationships of the minerals in the core. Produced digital HI mineral data is imported as curves to display mineralogical variations with depth alongside our petrophysical logs.

Open hole wireline properties are associated with interpreted mineralogical assemblages from hyperspectral scanning, rock typing model with mineralogical associations overlays, and co-location of petrophysical properties to provide for a better understanding of mineralogical-to-petrophysical links. This is used to illustrate how hyperspectral imaging, applied as an integrative tool, aids in geological and petrophysical quantification and property 'up-scaling' from microns to depositional system understandings.

Originally published as: Kosanke, T. H., S. E. Perry, and R. Lopez , 2017, High-resolution hyperspectral imaging technology: Implications for thin-bedded reservoir characterization: Gulf Coast Association of Geological Societies Transactions, v. 67, p. 187–193.