
Know your Shales: Analysis of Mass Transport Deposits in the Deepwater Gulf of Mexico Using Non-Conductive Mud High-Resolution Borehole Images

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GCAGS Explore & Discover Article #00202*

http://www.gcags.org/exploreanddiscover/2017/00202_kumar_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 an oral presentation at the 67th Annual GCAGS Convention and 64th Annual GCSSEPM Meeting in San Antonio, Texas, November 1–3, 2017.

ABSTRACT

Every aspect of exploration in the deepwater Gulf of Mexico is fraught with hurdles. Fortunately, technological advances can provide much needed solutions to encountered challenges. For sub-seismic scale geological interpretation in wells drilled with oil-based mud, new high-resolution large-coverage borehole imager technology now allows geoscientists an up-close look at the wellbore geology.

The clarity of the sedimentary features seen in the new borehole images is a much needed enabler in sand depositional environment studies. Concomitantly, this clarity also reveals much information about the deepwater Gulf of Mexico shales. As might be expected, large footage of the shales encountered is composed of the quiet, low energy, thinly laminated shale. The new borehole images allow the geologist to see another very important type of shale—those deposited by mass transport processes. Mass transport deposits (MTDs) can have profound implication on reservoir continuity, from erosion of small sections of deposited sands to complete redirection of sand body deposition. Borehole images also empower an understanding of the MTDs present in a well so that typical sand signatures that are really merely of large boulders in an MTD are not considered for completion.

This paper presents a study showcasing details of some deepwater Gulf of Mexico MTDs observed in the new borehole images. Included are examples of various parts of these deposits representing different movement and deposition mechanisms—everything from small debris to large mass movement blocks. The asset geologist now has a powerful tool to understand the impacts of mass transport deposits to the field being developed.