
Gravitational Study of the Hastings Salt Dome and Associated Faults in Brazoria and Galveston Counties, Texas

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GCAGS Explore & Discover Article #00157*

http://www.gcags.org/exploreanddiscover/2016/00157_okocha_and_brown.pdf

Posted September 13, 2016.

*Abstract published in the *GCAGS Transactions* (see footnote reference below) and delivered as a poster presentation at the 66th Annual GCAGS Convention and 63rd Annual GCSSEPM Meeting in Corpus Christi, Texas, September 18–20, 2016.

ABSTRACT

Salt domes are important geological structures due to their role in hydrocarbon exploration purposes, and also their effect on overlying sediments in the subsurface. Over five hundred salt domes exist in the U.S. Gulf Coast region and the Hastings Salt Dome, being the focus of this study, is one of the many salt domes identified. Gravity surveying is a passive geophysical method of investigating structural features based on differences in rock densities within the subsurface. This is carried out by using a gravimeter, which is an instrument used to measure variations in gravitational pulls over the surface of the earth. Over 350 gravity data will be collected across the study area using CG-5 Scintrex Gravimeter. The geographical coordinate for each gravity stations will be obtained using the NOMAD handheld computer. Gravity data spacing interval will be every quarter of a mile along accessible roads within the study area. Magnetic dataset will be obtained from PACES portal and this will be used in conjunction with the gravity data collected from the field. Lidar data over the study area will also be used to build a digital elevation model, in which elevation information for each gravity data point can be determined. Well data information will be used to determine the shape and structure of the Hastings Salt Dome, depth to top of the rock salt formation, and to observe for fault planes and their sense of displacement relative to its surrounding rocks. The outcome of this study will aid in understanding the geomorphology of the Hastings Salt Dome and its environs. Data processing will be carried out using the Geosoft OASIS montaj software. The gravity readings collected within the study area will be used to create a Bouguer anomaly map after necessary corrections have been applied, and this will be tied to regional geology interpretation. This research is expected to also determine the position and extent of the Hasting Salt Dome with respect to the surrounding rocks.

Originally published as: Okocha, F. C., and W. A. Brown, 2016, Gravitational study of the Hastings Salt Dome and associated faults in Brazoria and Galveston counties, Texas: Gulf Coast Association of Geological Societies Transactions, v. 66, p. 1033.