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Dielectric and GPR Studies of Edwards Formation Carbonates in Central Texas

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Albian rudist communities of the Edwards Formation, Fredericksburg Group, occur widely in Central and South-Central Texas. Capped by younger dolostones of the Fredericksburg Group, they form important reservoir analogs for highly productive oil fields in the Middle East. This study is a part of a larger project covering exposures of Albian rudists and associated sequences around Georgetown (Williamson County) in Central Texas.

Dielectric measurements of a few chosen samples of varying clay content were carried out at first under completely dry conditions and then at varying degrees of moisture content. Plots of the real parts show that the more clayey samples exhibit a much greater variation of dielectric values with changing moisture content. Plots of the dielectric losses of the samples show a similar trend – i.e., changes in dielectric losses are more conspicuous for the more clayey samples. These plots indicate that units of varying clay content can be differentiated in the field by a Ground Penetrating Radar (GPR) under well saturated conditions (>50% saturation of total porosity).

Our analysis involve use of 100 and 400 MHz antennae with the Subsurface Interface Radar (SIR-3000) System by GSSI and GPS data to obtain better knowledge of the 3-D architecture and extent of the rudist mounds. This eventually provides a comprehensive characterization of the reservoir geometry and dielectric heterogeneity.

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