

The Layered Evaporite Sequence (LES) in the Saudi Arabian Red Sea

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ABSTRACT

The Mansiyah Formation is a Middle Miocene, evaporite sequence that primarily consists of halite. It is typically seismically transparent with a high velocity. Internal seismic reflectors can sometimes be observed within the Mansiyah section. These seismic events are referred to as the Layered Evaporites Sequence (LES). The LES is composed of interbedded clastic sediments and evaporites, with a seismic velocity that is slower than halite but faster than typical sediment. Geometrically, the LES resembles a sedimentary minibasin on seismic data when relatively extensive over an area. It can also be observed as discontinuous events on seismic data, suspended in the transparent halite, where it is occasionally dismissed as seismic noise or as “artifacts”. In parts of the study area, where close to a large sediment supply, the LES also shows evidence of brittle deformation on seismic data, interbedded with other layers that have experienced ductile deformation. The section also shows visible lateral thinning and thickening.

When composed of halite, the Mansiyah section has a significantly high, homogeneous resistivity on controlled source electromagnetic (CSEM) data and magnetotelluric (MT) surveys. The LES section displays strong anisotropy in its apparent resistivity.

The purpose of this presentation is to describe the LES and highlight its exploration significance. The LES has been well imaged with 3D seismic data, and has been penetrated by wells. It is now known to contain coarse clastics that were deposited with the evaporitic sequence. Well logs through the section are used to produce synthetics that are subsequently compared to surface seismic data, to test the seismic character of the discontinuous sections of the LES.