

## **The Presence of Rare Earth or Critical Minerals in the Louann Salt, Gulf of Mexico**

**Jamie Singer<sup>1</sup> and Julie Bloxson<sup>1</sup>**

<sup>1</sup>Stephen F. Austin State University, Nacogdoches, Texas

### **Abstract**

The Jurassic breakup of Pangea provided the start of the Gulf of Mexico (GOM) during continental rifting. In the eastern part of the GOM, the Louann Salt is massive and bedded halite with minor amounts of other salts, anhydrite, and siliciclastics. Elsewhere, similar salt beds, such as the Zechstein salts in Europe, are sources of critical minerals, providing an analog for other potential uses for the Louann Salt. Furthermore, rare earth minerals within the extensive salt bodies in the southeast section of the Gulf of Mexico have been reported. This study aims to analyze the geochemical composition within the Louann Salt in the offshore Gulf of Mexico, with implications for deposition, diagenesis, suture zone characterization, and exploration of rare and critical earth elements.

This study uses cutting from three wells drilled in the deepwater Gulf of Mexico. X-ray fluorescence spectrometry was conducted on crushed, sieved, and packed samples to determine the bulk and trace composition. X-ray powder diffraction on ~50 samples was used to determine bulk mineralogy. Scanning electron microscopy was used to determine composition and surface topography. The geochemical data were then compared to the well logs and integrated into 3D seismic across the study area in Kingdom Suite software.

The Louann Salt is primarily halite, with lesser amounts of anhydrite and carbonate minerals. The suture zone contains primarily halite coated with fine-grain quartz, hematite, and clay minerals. This contrast in mineralogy leads to a spike in the gamma ray logs and density contrasts between the overlying and underlying “pure salt” bodies compared to the suture zone. The suture zone can also be identified on the seismic because of the density contrast and mapped across the study area. Furthermore, there appear to be relatively abundant concentrations of several critical minerals within the Louann.