

## **ABSTRACT**

# **IMPLICATIONS OF ALLOCHTHOGENIC META-IGNEOUS AND CARBONATE BLOCKS IN EL PAPALOTE EVAPORITE DIAPIR, LA POPA BASIN, NUEVO LEON, MEXICO**

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El Papalote evaporite diapir is exposed in La Popa basin, located approximately 100 km northwest of Monterey in northeastern Mexico. The elliptical diapir has a surface exposure of 4-5 km<sup>2</sup>. Surrounding the diapir are vertical limestone lentils which were deposited as lenses on the sides and top of the diapir as it formed during the Late Cretaceous. Contained within the diapir are large blocks (200m diameter) of greenschist facies metaplutonic (monzonite, biotite-diorite), metavolcanic (basalt, andesite) and carbonate (mudstone, packstone, wackestone) rock. Based on rock textures and geochemical analysis, the meta-igneous blocks are divided into four main groups: high Nb metavolcanic (59-80 ppm), intermediate metavolcanic Nb (43-45 ppm), low Nb metavolcanic (25-36 ppm), and metaplutonic samples. Relatively high Nb and Ta concentrations and low La/Ta ratios in all groups suggest that the meta-igneous blocks were initially emplaced during Jurassic (?) continental rifting in northern Mexico. Fluids warmed by heat flow in the rift and/or contact with intrusions circulated through the igneous rock, creating greenschist facies conditions (T =350°C), as evidenced by the mineral assemblages epidote-chlorite-actinolite-albite and serpentinite-brucite. <sup>40</sup>Ar/<sup>39</sup>Ar radiometric dating of biotite in the metaplutonic blocks yielded ages of 145.6 and 146.5 Ma, which may represent the end of high heat flow in the rift, and cessation

of rifting in the Chihuahua trough. During the Early Cretaceous, the blocks were entrained and transported in the evaporite of El Papalote diapir. Numerical models show that it is possible to entrain blocks in the diapir from the salt/basement interface and transport them to the surface.

During Maastrichtian time, the diapir grew episodically, producing and deforming the surrounding strata, and flowing laterally over the lentils. Many of the carbonate blocks are lithologically like the surrounding limestone lentils; however, the majority do not resemble units that crop out in La Popa basin, suggesting that they were also entrained from the subsurface section.