Age and Chronostratigraphic Relationship between the Norphlet Formation and the Louann Salt in Southwestern Texas: Regional Implications for the Gulf of Mexico

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Abstract

Reliable ages for the Norphlet Formation and underlying Louann Salt have been difficult to determine due to a lack of age-diagnostic fossils. Previously published ages were inferred based on stratigraphic positions and ages of the overlying Lower Smackover and underlying Eagle Mills formations, which also lack age-diagnostic fossils at their contacts with the Norphlet and Louann. Chronostratigraphic interpretations of the Louann-Norphlet transition inferred a significant hiatus between the two units (possibly as much as 9 m.y.); however, lithologic evidence for long-duration exposure of the Louann is problematic. New U–Pb detrital zircon radiometric data from the Cities Service Peeler Ranch–1 'A' and Skelly Oil Bertha Winkler–1 wells, Atascosa County, SW Texas, and the Hockley salt diapir, Harris County, SE Texas, yield the first maximum depositional age (MDA) estimate of 165.15 ± 1.5 Ma (late Bathonian) for the Norphlet in South Texas, older than previously published ages for the Norphlet. Conventional cores through the Norphlet-Louann contact in the Cities well show that the Norphlet–Louann contact in SW Texas is interbedded and therefore conformable. A late Bathonian age for the Norphlet is consistent with a Bajocian-Bathonian age for the Louann underlying the Cities well, and a Bajocian age for the Louann in other parts of the Gulf of Mexico Basin. Omission surfaces observed within the Norphlet in the Cities well may represent a single or multiple hiatuses. When combined with detrital zircon provenance data, these relationships suggest that 1.5–5 m.y. of deposition may be missing from within the Norphlet, rather than between the Norphlet and the Louann. The conformable nature of the Norphlet–Louann contact preserved in the Cities well may only be a characteristic of its proximal location within the Dilworth Salt Basin of SW Texas. Alternatively, this relationship may also extend to other parts of the Gulf of Mexico.