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Potential for Large, Late Jurassic Reef Development along the Wiggins Arch, Eastern Gulf Coast

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The Wiggins Arch, during the Late Jurassic, with its abrupt shelf edge along the northern rim, provided an excellent setting for extensive fringing reef development during the Kimmerigian through Tithonian marine transgressions. The northern edge of the Wiggins platform rose steeply out of the expansive Mississippi Interior Salt Basin where a long wave fetch and prevailing NW-NE winds could have provided abundant energy and nutrient supply to the growing reef communities.

Reprocessed, multi-vintage seismic data across this Jurassic shelf-break exhibit classic reef and reef flank stratal geometries: (1) steeply dipping basinal clinoforms or fore-reef talus, (2) gently dipping, backstepping beds onto the shelf, (3) an abrupt termination or offlap of basinal and shelfal parallel reflectors at reef margins, (4) a conspicuous dimming and homogenization of reflectors within the reef, (5) stacked and coalescing dome-shaped reflectors and pockets of flat-lying sediments (moats and windows) within the reef mass, (6) reef association with local paleostructure, (7) structural drape over the reef mass, (8) a significant thinning of younger beds across the reef, and (9) on some lines of reef mass appears thicker than adjacent coeval, differently compacted shelf and slope facies.

Seismic modeling, inversion and interval velocity extraction independently suggest an acoustically slower and less dense reef mass, more porous than the surrounding sediments. Acoustic impedance contrasts within the reef core are significantly lower than those of the tightly cemented back-reef shelf sand and those of the compacted basinal carbonate muds.

Conventional core and sample material from nearby back-reef wells exhibits a nearly 1,100-foot interval of diverse and robust coral, algal sponge, and other Jurassic reef building detritus.

However, the real significance of this possible fringing reef occurrence is the overall size of the individual reef complexes. Some of these potential reservoirs measure more than 12 square miles in areal extent and up to 1,300 feet in thickness.