

Foundered Shelf Edges;

Seismic Expression of a Frio Example, Louisiana

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Foundered shelf edges are a geomorphic event that can be sudden in occurrence. They are a result of a rapid shifting of the shelf edge landward. This shift of the shelf edge is a result of a mass wasting of the prior shelf and erosion of underlying deposits. Various geologic features are formed with the failure of the shelf into deeper water. These include slump blocks, ramping and erosion. This new mini basin then results in an accommodation space that is filled with slope fans, proximal shore face grainstones and prograding wedges. Capping the sequence is a highstand deposit that is more regional in extent.

A well developed FSE in St. Landry and Acadia Parishes has previously been documented. Frio aged incised valley formations have fed into and filled this FSE with deep water, shallow shelf proximal material and prograding wedge deposits. A cross-section through the various parts of the FSE is re-printed here for discussion with permission (Fig. 1).

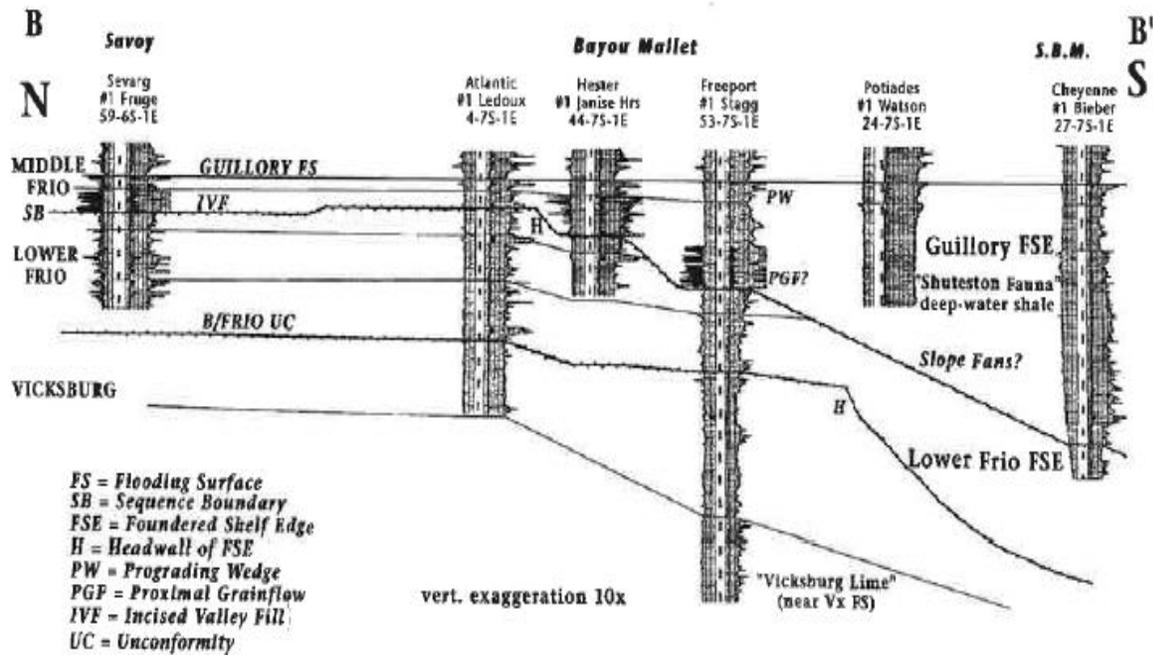


Fig. 1 Well-log cross-section B-B' of middle and lower Frio strata from Savoy to South Bayou Mallet Fields, St. Landry and Acadia Parishes, LA. (from T. E. Ewing and F. S. Vincent, 1997)

A proprietary 3D seismic volume was acquired in 2012 over the area encompassing this

cross-section. This 3D volume illustrates the various characteristics of the FSE fill previously described by Ewing and Vincent's subsurface interpretation. Visual examples of incised valley fill, proximal grain flows, prograding wedge, slope fans and deep water shales will be presented supporting the previously described model based on subsurface information only (Fig. 2).

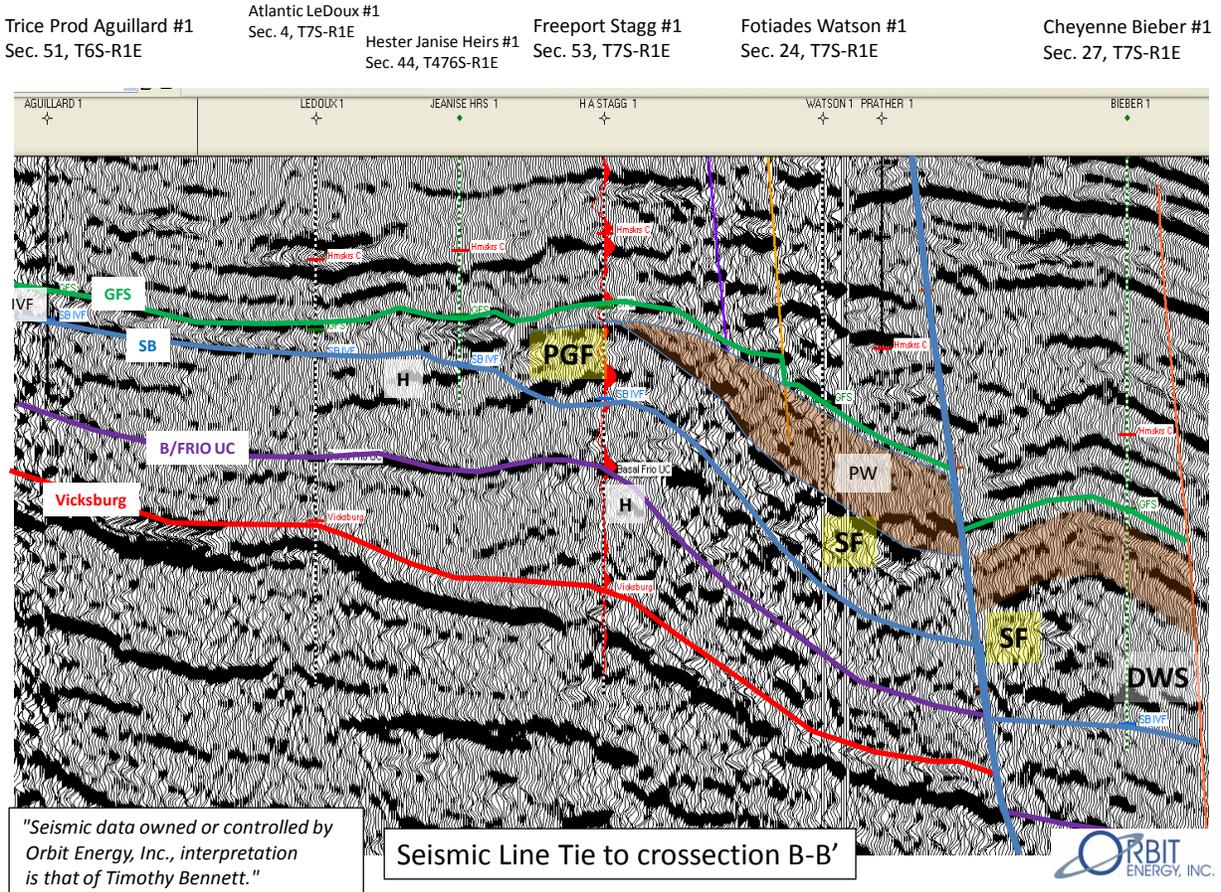


Figure 2. Arbitrary seismic line tie to cross-section B-B'. GFS=guillory flooding surface, SB=sequence boundary, IVF=incised valley fill, B/Frio UC=basal Frio unconformity, PGF=proximal grain flow, PW=prograding wedge, SF=slope fan, DWS=deep water shale

Hydrocarbon exploration drove the acquisition of this 3D volume over the Frio FSE. The seismic confirmed the subsurface correlations showing the FSE fill is very much like the subsurface interpretation. The seismic clearly illustrates proximal grain flows, onlapping slope apron gravity flows and deep water slope fans. The variable nature of the fill has shown most traps are stratigraphically controlled. Documented models of FSE fills tied with the seismic volume has assisted in the development of numerous exploratory targets. Subsequent exploratory drilling

indicates the deep water sand deposits may be gravity flow slump blocks and will be a topic of discussion. A secondary discussion will focus on where hydrocarbons have been found with recent drilling in this filled event and possible explanations on occurrence of and volumes discovered.

References

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