Regional Stratigraphic and Rock Characteristics of Eagle Ford Shale in Its Play Area: Maverick Basin to East Texas Basin*

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Abstract

The potential play area of the Upper Cretaceous Eagle Ford Shale (EFS) extends for at least 400 mi from the Texas-Mexico border northeastward to the East Texas Basin. Observations of the variations in lithostratigraphy, thickness, and depth trends of the EFS in this area provide a first approximation of potential producing areas. The EFS comprises two units in the Maverick Basin/Rio Grande Embayment area. The upper EFS, which exists solely south of the San Marcos Arch, consists of interbedded low- and high-gamma-ray burrowed and calcareous mudrock. In contrast, the more organic-rich, lower EFS, characterized by generally high gamma-ray values, extends continuously from South Texas across to the northeast flank of the San Marcos Arch. Only the lower EFS crops out southwest of the East Texas Basin and northeast of the Maverick Basin. The Eagle Ford interval, thickest in the Maverick Basin, gradually thins to a minimum over the arch. It continues from the northeast flank of the arch into the southwest East Texas Basin, where the sandstone-rich Woodbine Group occurs between Eagle Ford Group and Maness Shale. With facies pinch-out of the Woodbine complex and its equivalent Pepper Shale on the basin's southwest flank, however, the Eagle Ford mudrock lies directly above the Maness. Depths of the southeast-dipping lower EFS range considerably from outcrop to ~17,000 ft (~5,180 m) at the Stuart City shelf margin on the northeast flank of the San Marcos Arch. Regional depth gradients of the unit are greatest on the flanks and crest of the San Marcos Arch.

Reference

Childs, O.E., G. Steele, A. Salvador, F.A. Lindberg, 1988, Correlation of stratigraphic units in North America (COSUNA) Project: AAPG, Tulsa, Oklahoma, 20 map sheets.

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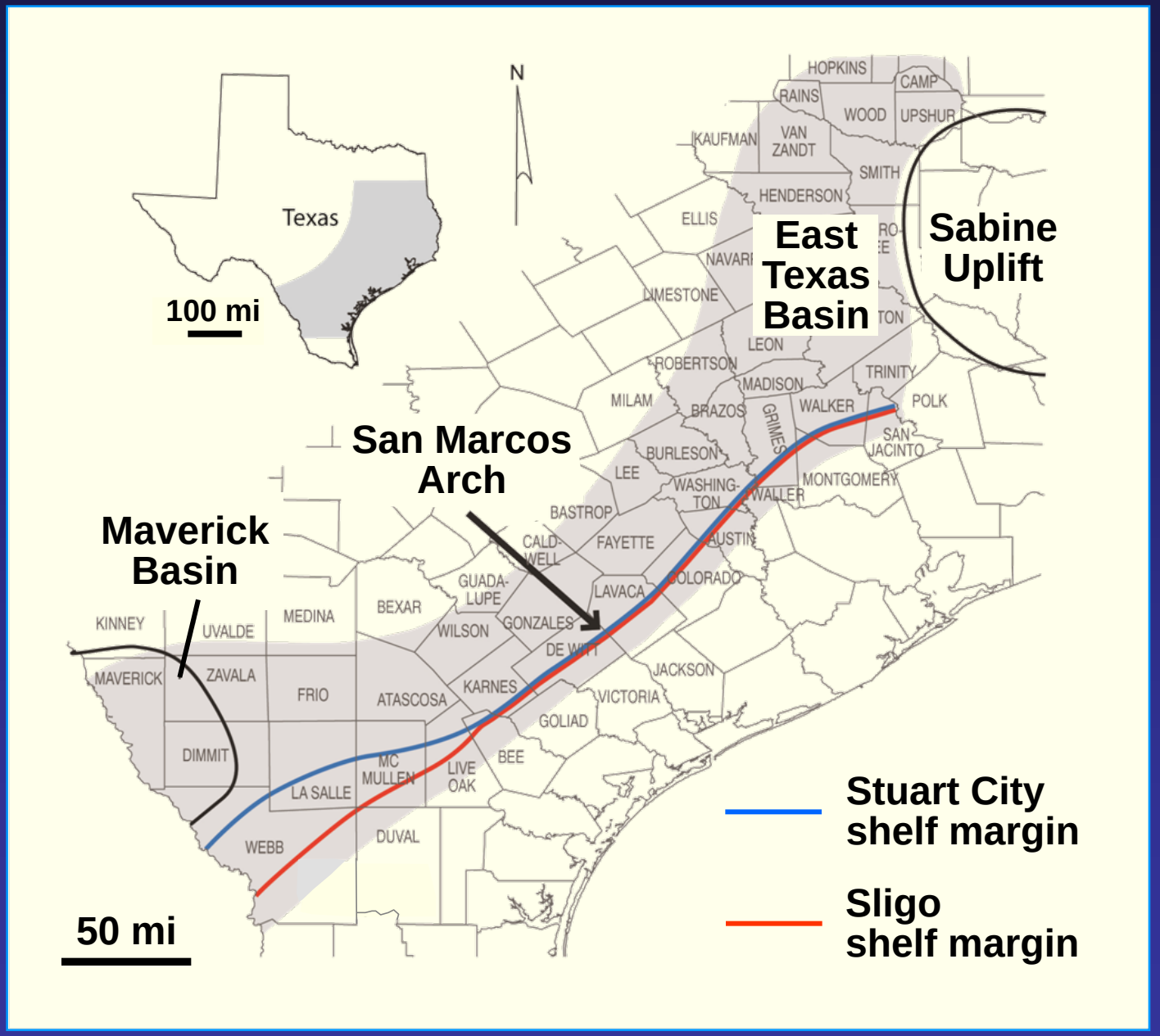
Focus

- Preliminary regional lithostratigraphic framework of the Eagle Ford Shale in its play area
- Regional depth and thickness trends as guides to resource development
- Eagle Ford of South Texas (Maverick Basin and San Marcos Arch)
- Eagle Ford stratigraphic transition between the Maverick Basin and East Texas Basin

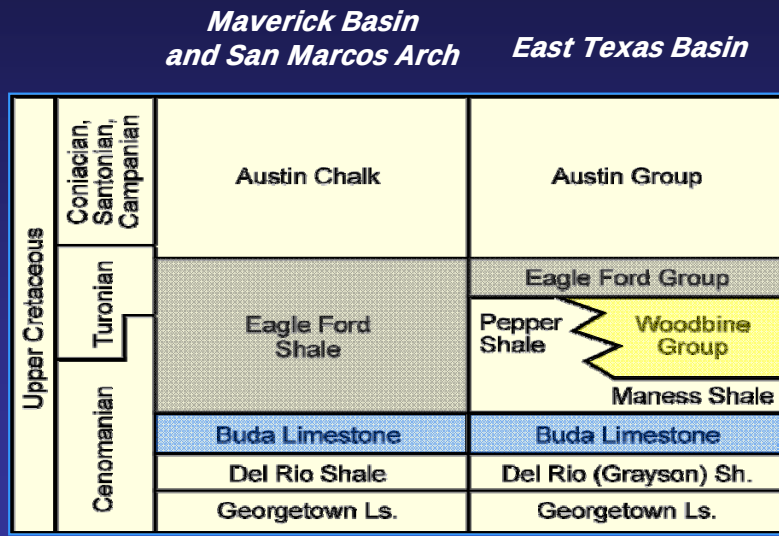
Data Limits

- Wireline logs from ~675 wells
- GR logs to ensure consistent and accurate representation of mudrock and sandstone/limestone intervals
- In Maverick Basin / San Marcos Arch, study wells extend from the Eagle Ford outcrop to just downdip of the Stuart City and Sligo shelf margins
- In East Texas Basin, data are restricted to areas updip of the Stuart City shelf edge

Eagle Ford Play Area



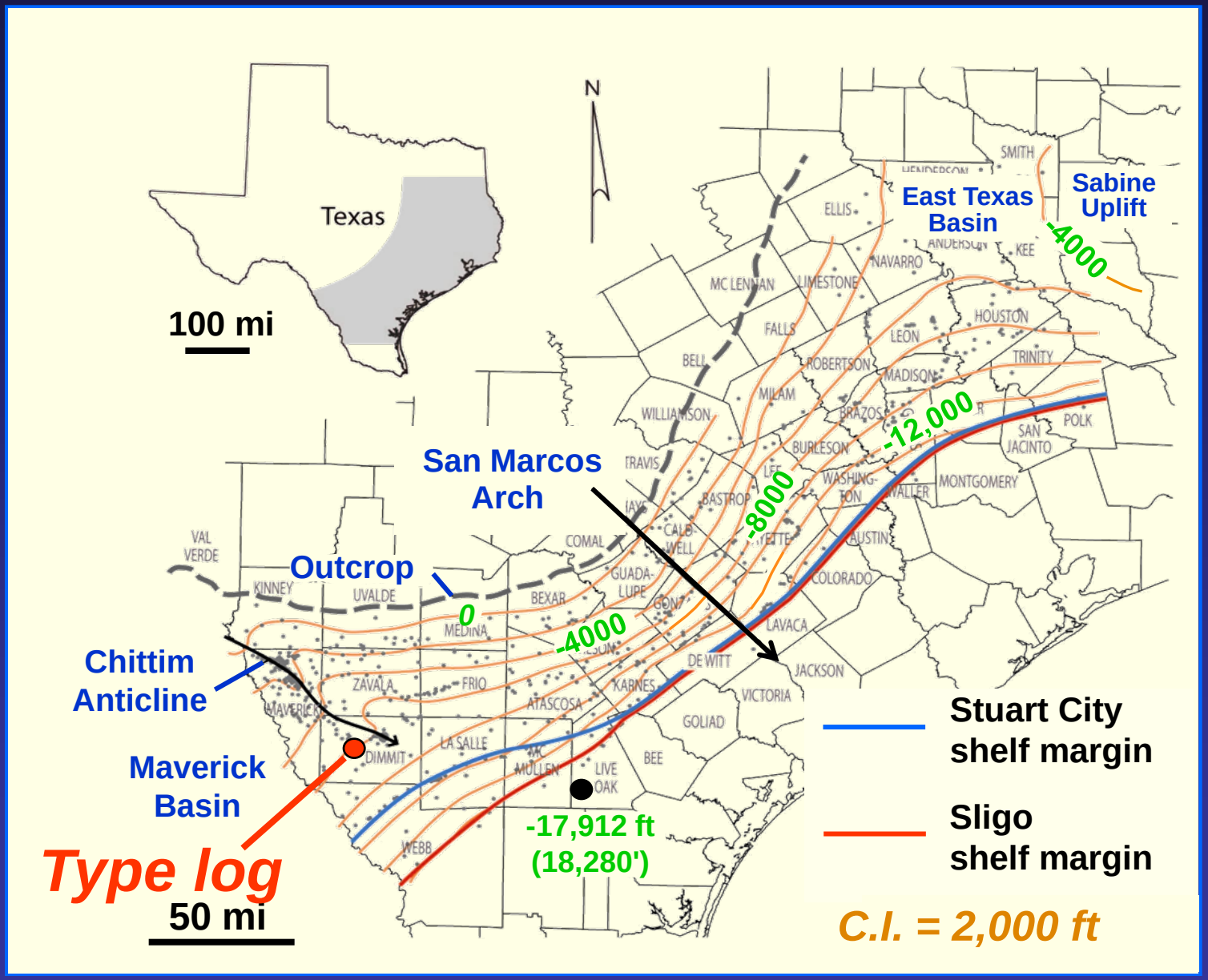
Conventional Lithostratigraphy



Childs et al. (AAPG COSUNA Project, 1988)

Presenter's Note: Unconformity at top of Buda Ls.

Regional Play Structure



Structure contours: top Buda Limestone

Type Log and Lithology (S. Texas)

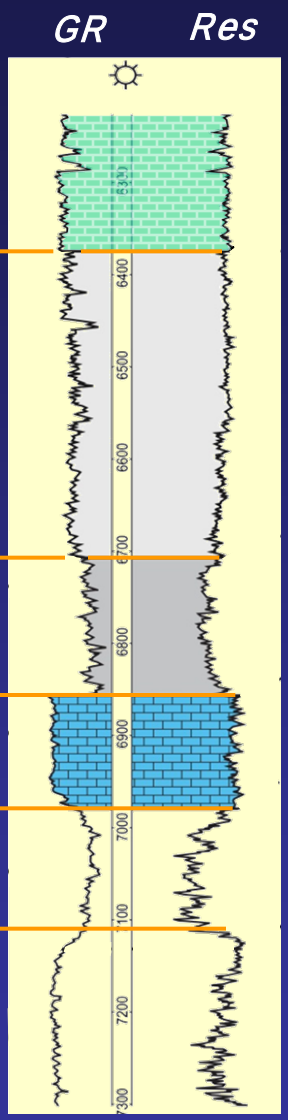
Core Facies

Austin

Upper Eagle Ford

Lower Eagle Ford

1 in



200 ft

Deep-platform lime mudstone

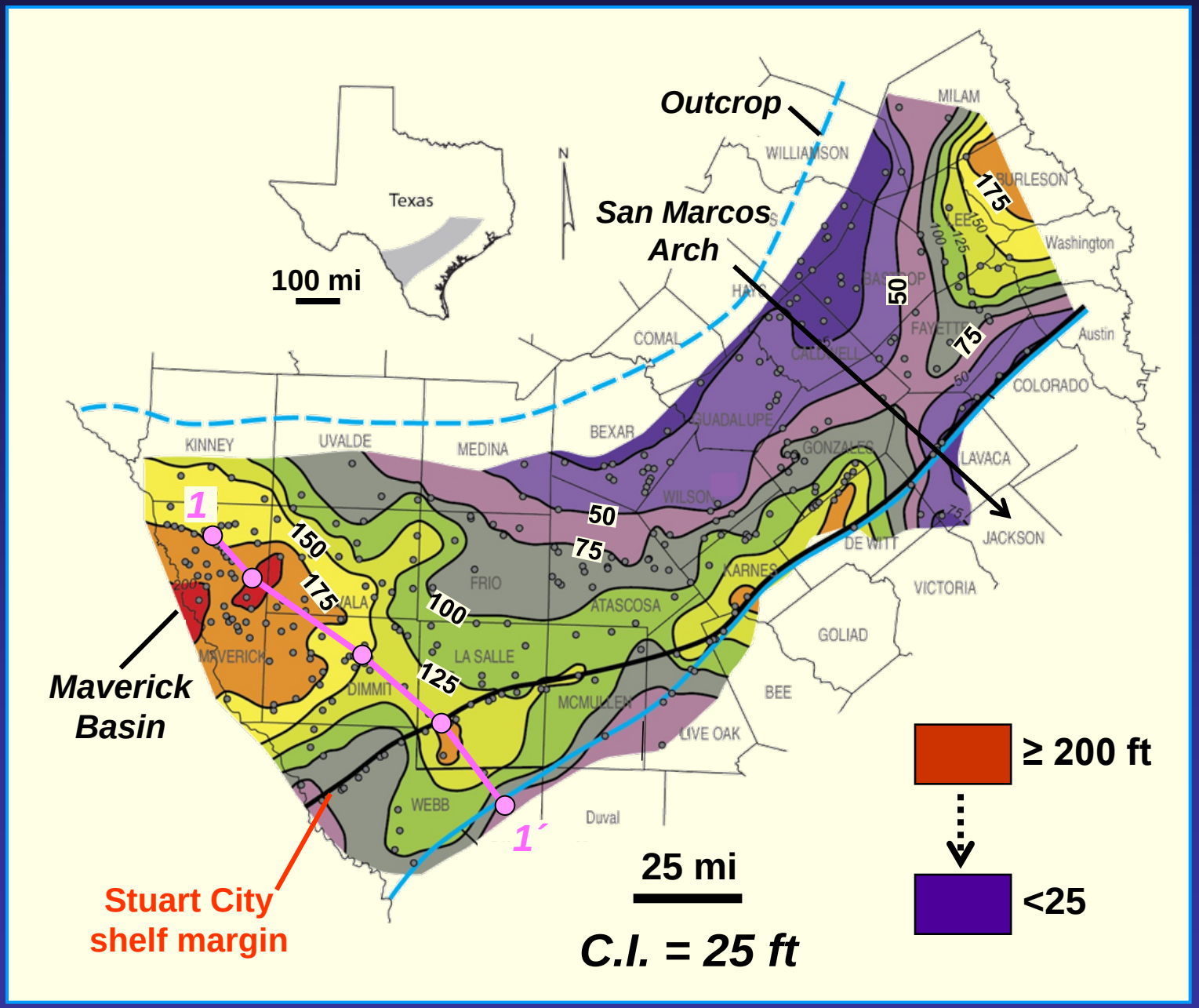
Interbedded, burrowed, and laminated calcareous mudrock

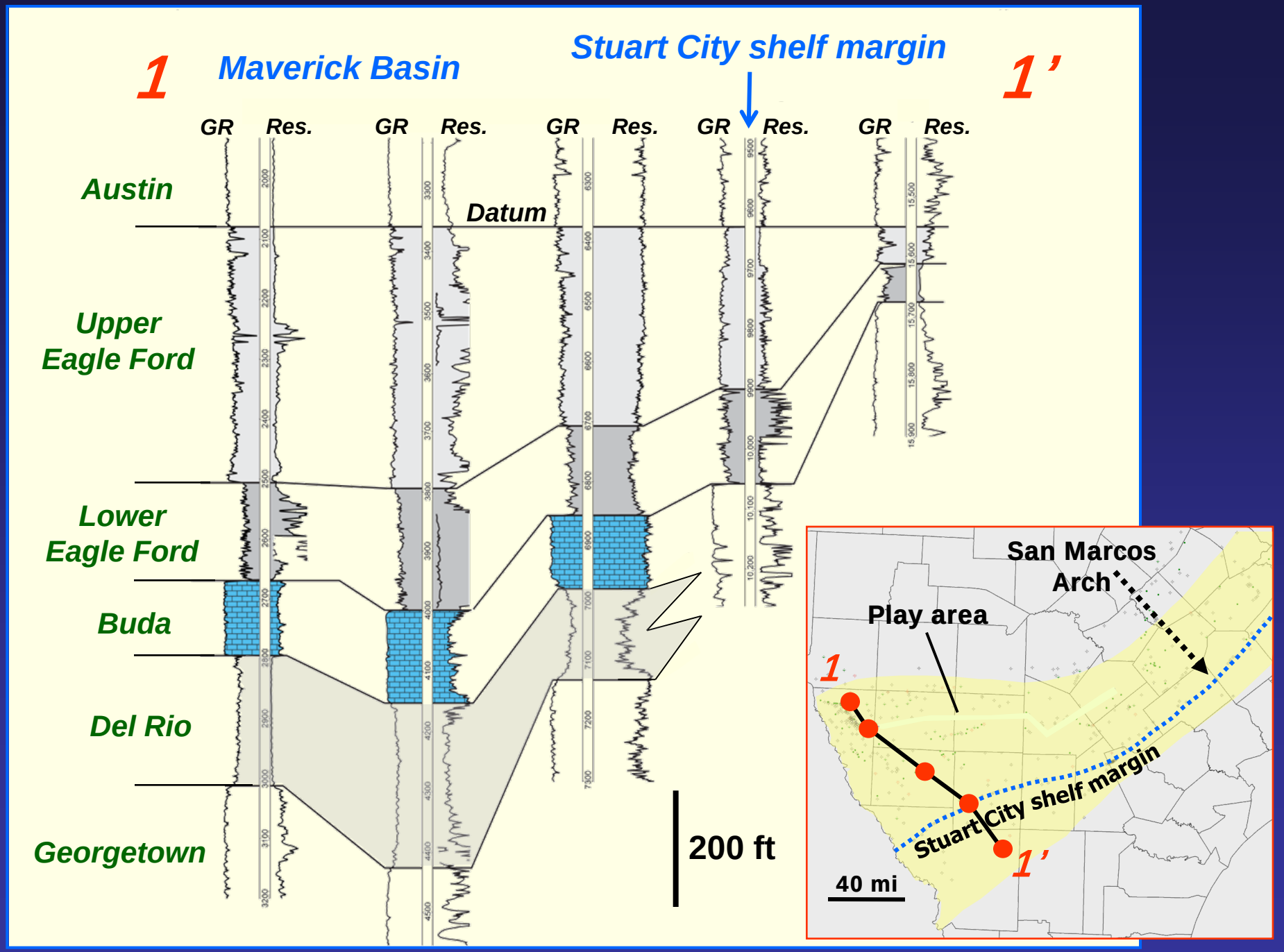
Organic-rich, laminated, calcareous mudrock

Shallow-platform lime mudstone

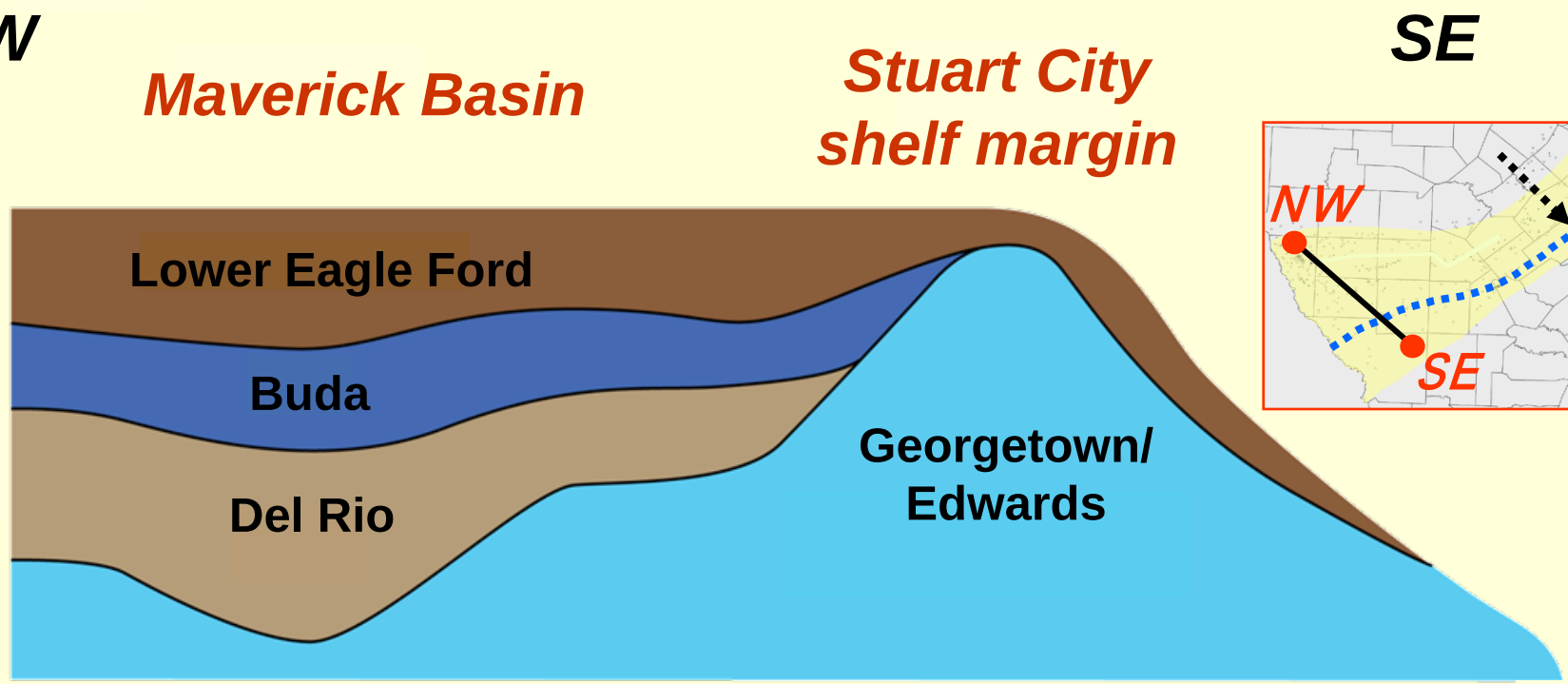
Virgin Oil Bowers #1
Dimmit County

Isopach: Lower Eagle Ford Shale

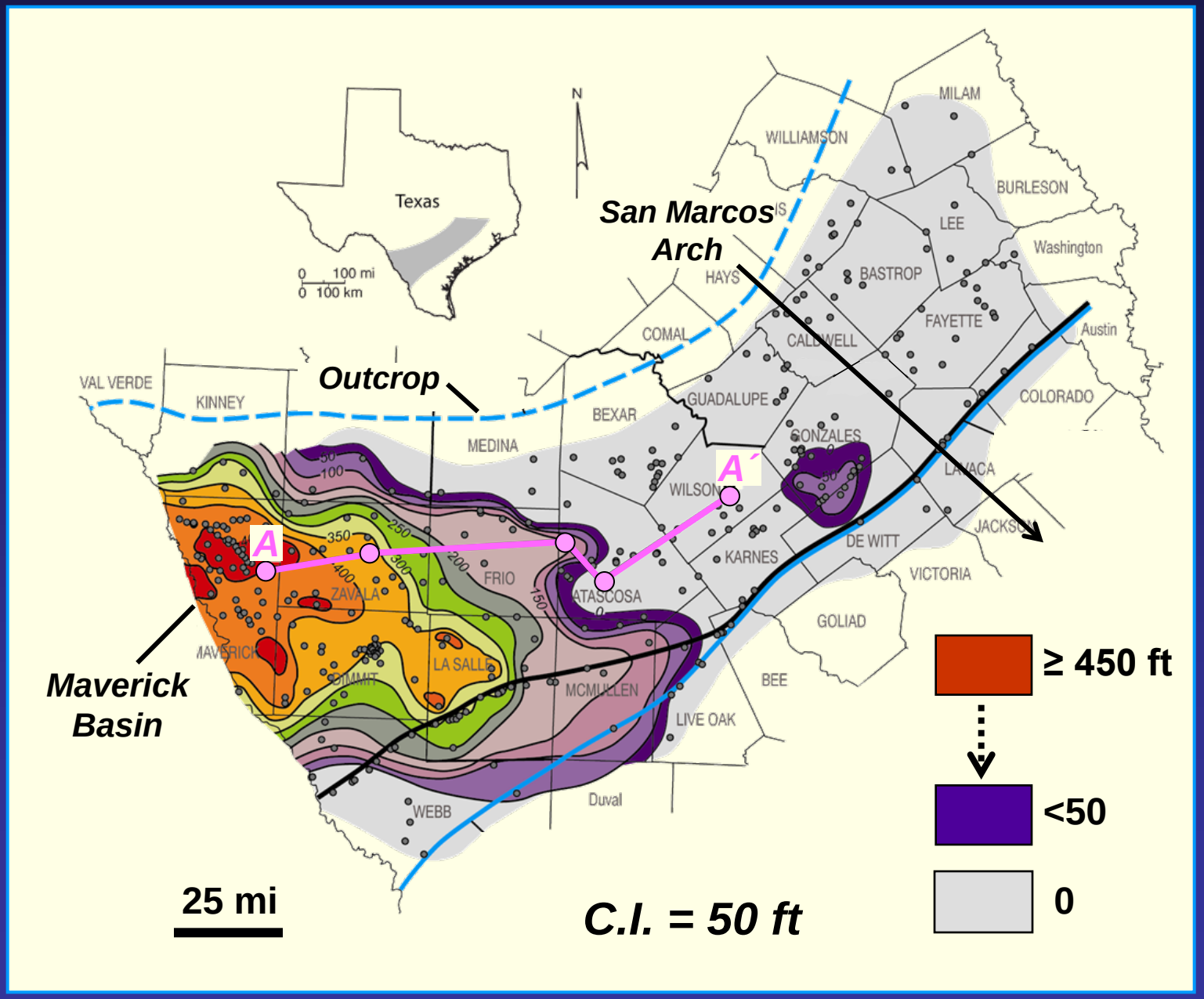


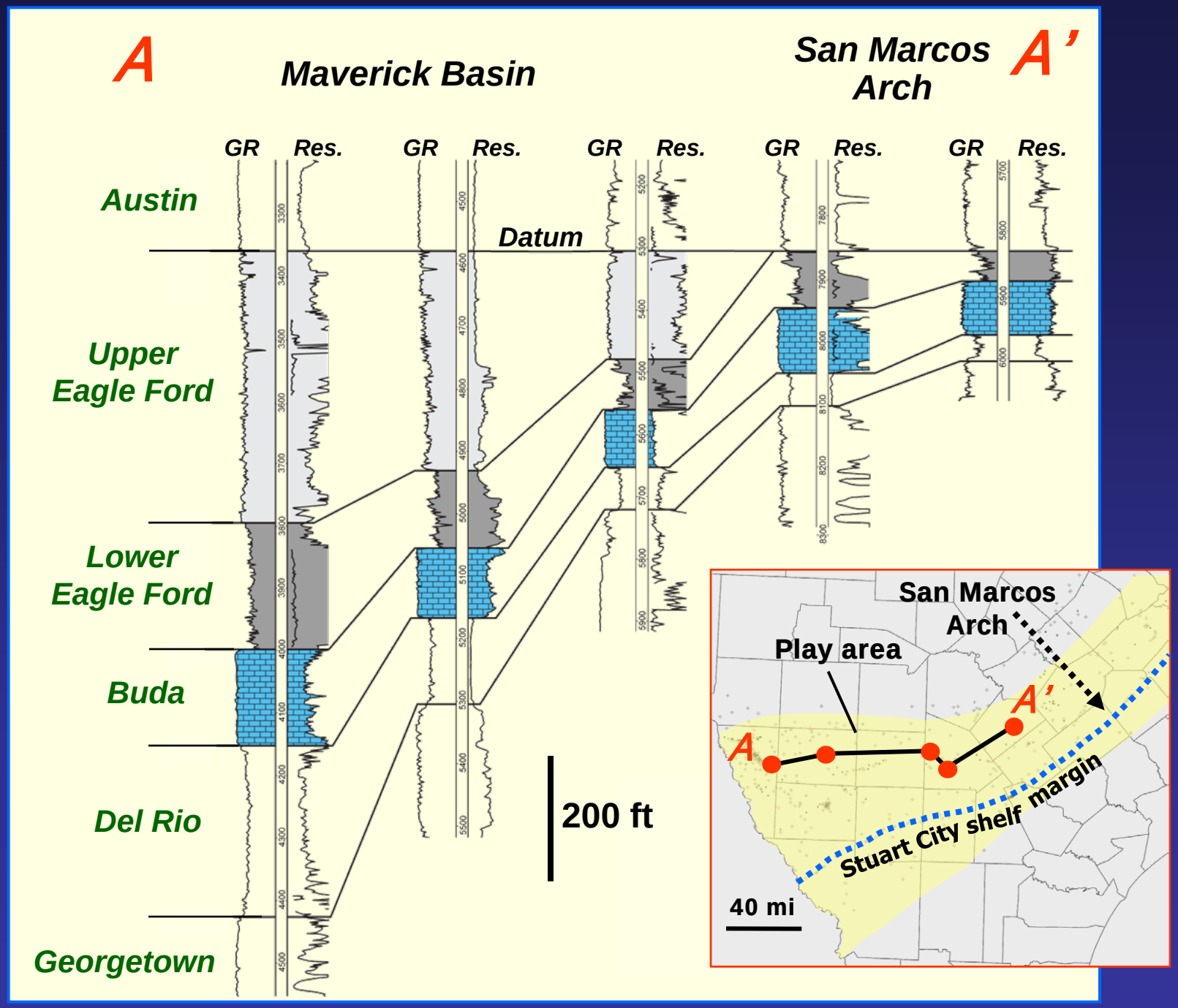

1
Maverick Basin
Stuart City shelf margin
1'
GR
Res.
GR
Res.
GR
Res.
GR
Res.
GR
Res.
Austin
Datum
Upper
Eagle Ford
Lower
Eagle Ford
Buda
Del Rio
Georgetown
200 ft
San Marcos
Arch
Play area
1
Stuart City shelf margin
1'
40 mi

Schematic Interpretation of Facies Relationships (Dip Section 1-1')

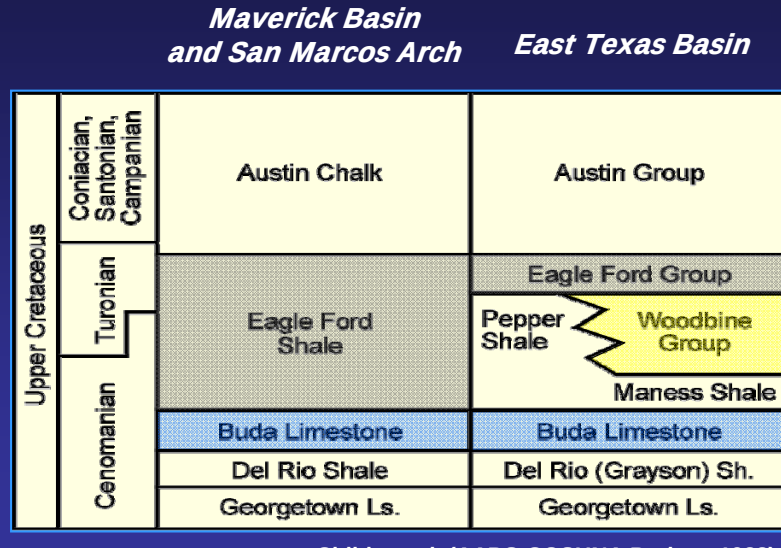


Isopach: Upper Eagle Ford Shale




A
Maverick Basin
San Marcos Arch
A'
GR
Res.
Austin
Datum
Upper Eagle Ford
Lower Eagle Ford
Buda
Del Rio
Georgetown
200 ft
San Marcos Arch
Play area
A'
A
Stuart City shelf margin
40 mi

Conventional Lithostratigraphy



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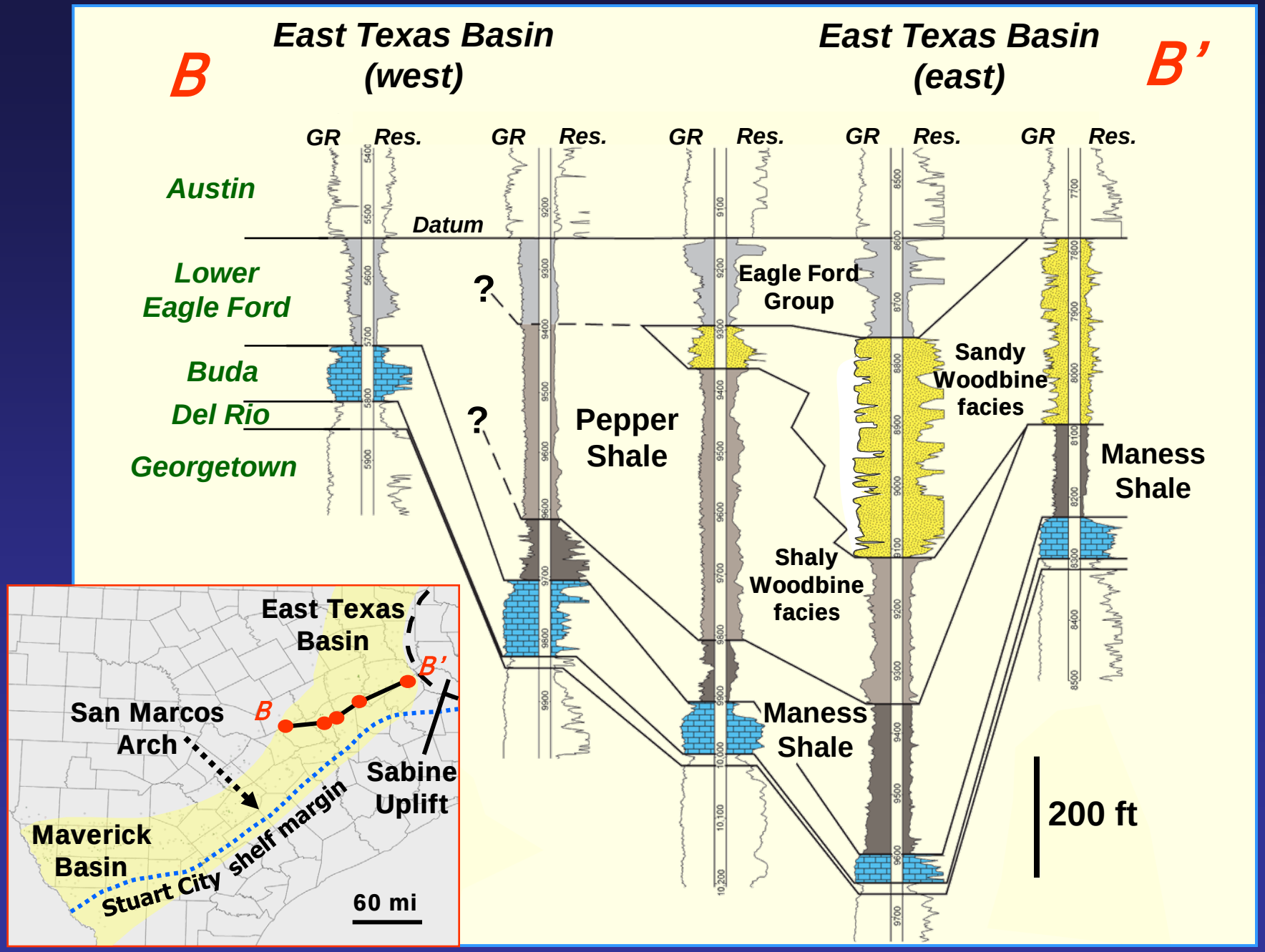
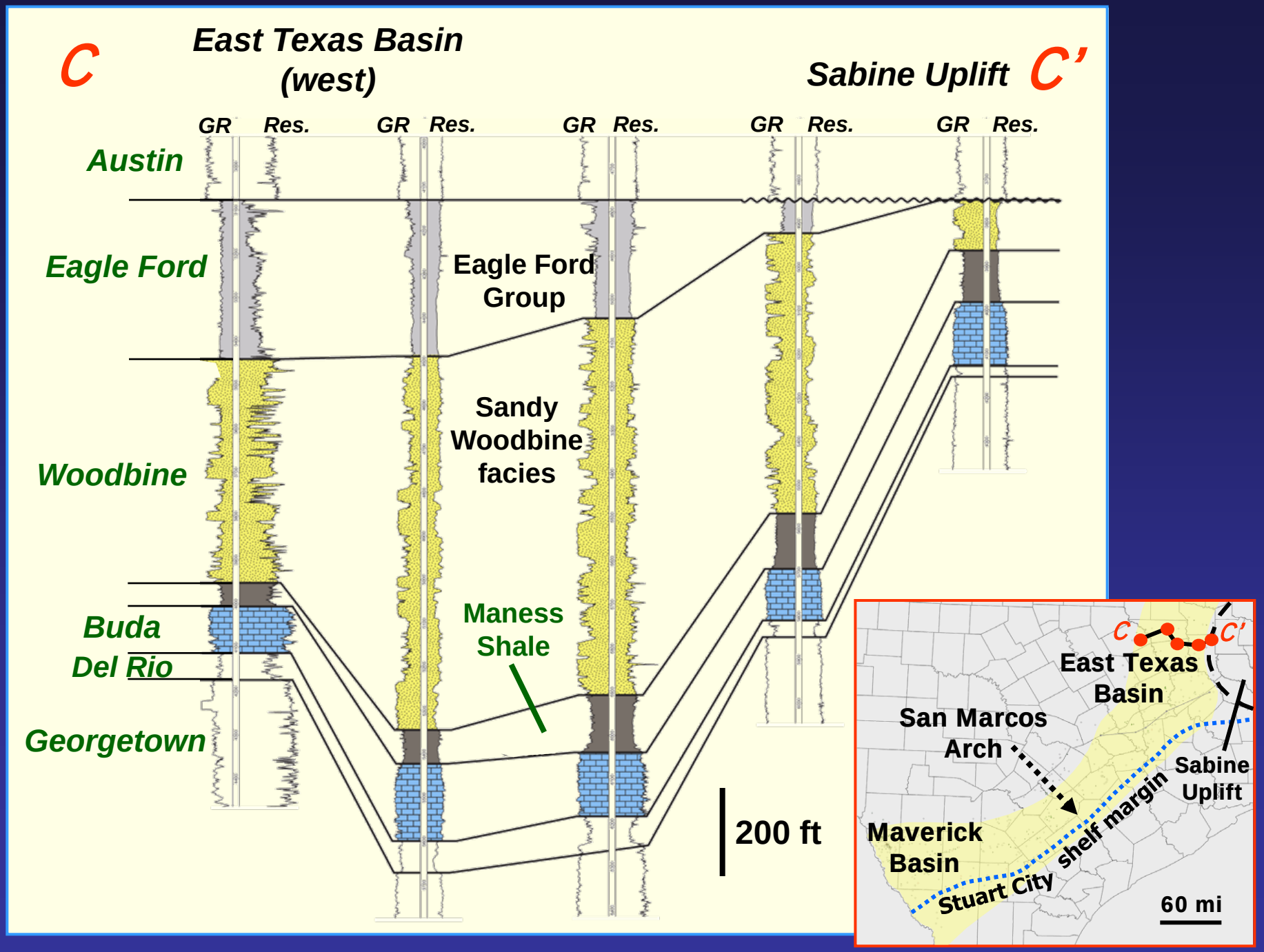
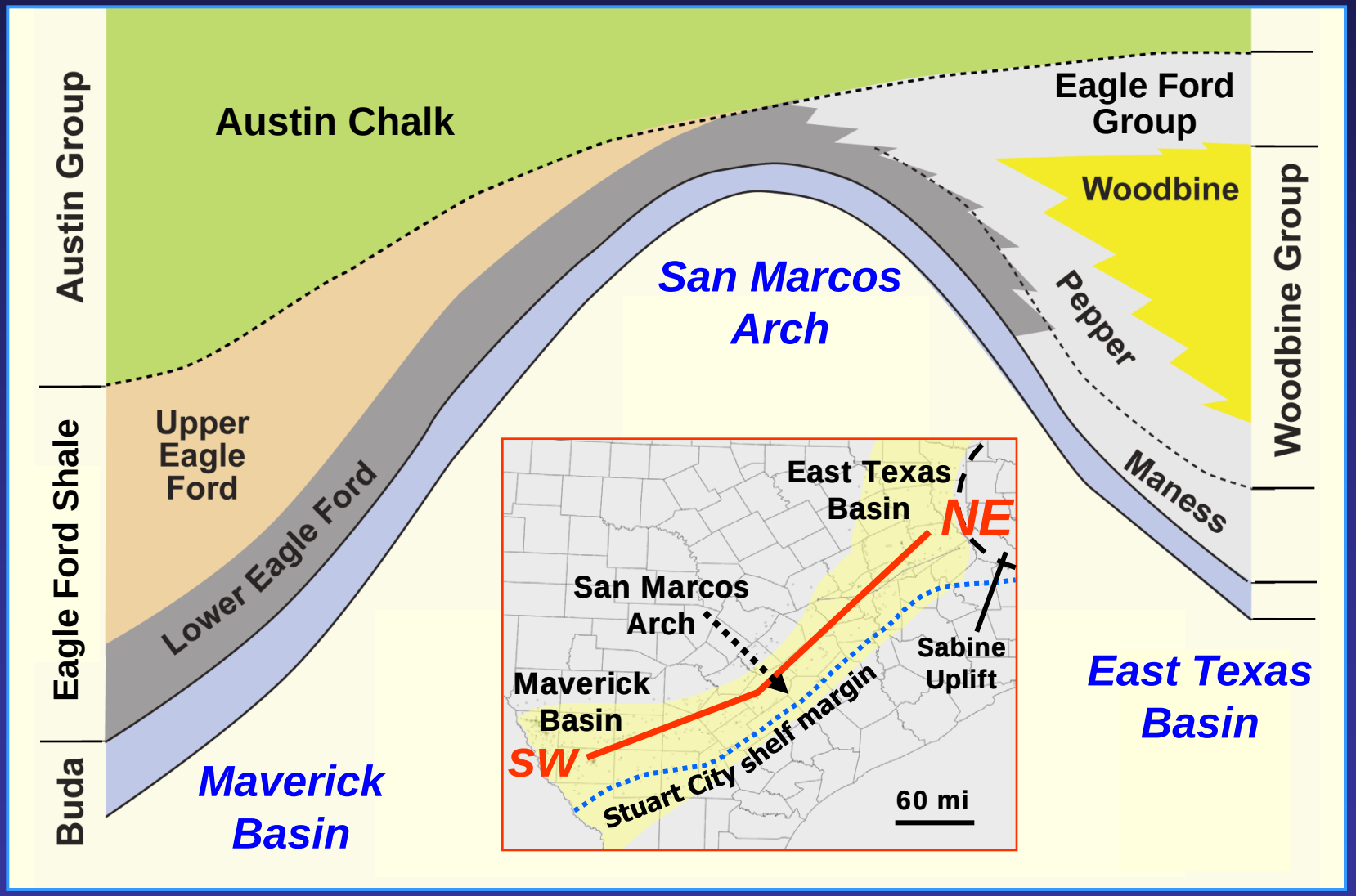
Presenter's Note: Unconformity at top of Buda Ls.


B
East Texas Basin (west)
East Texas Basin (east)
B'
GR
Res.
Austin
Datum
Lower Eagle Ford
Buda
Del Rio
Georgetown
?
?
Pepper Shale
Eagle Ford Group
Sandy Woodbine facies
Shaly Woodbine facies
Maness Shale
Maness Shale
200 ft
East Texas Basin
B'
B
San Marcos Arch
Sabine Uplift
Maverick Basin
Stuart City shelf margin
60 mi


C
East Texas Basin
(west)
Sabine Uplift
C'
GR
Res.
GR
Res.
GR
Res.
GR
Res.
GR
Res.
Austin
Eagle Ford
Woodbine
Buda
Del Rio
Georgetown
Eagle Ford
Group
Sandy
Woodbine
facies
Maness
Shale
200 ft
C
C'
East Texas
Basin
San Marcos
Arch
Sabine
Uplift
shelf margin
Maverick
Basin
Stuart City
60 mi

Schematic Strike Cross Section: Play Area



Conclusions

- Upper Eagle Ford Shale is restricted to south of the San Marcos Arch, whereas the organic-rich lower Eagle Ford extends north of the structure.

- Depth to lower Eagle Ford ranges from outcrop to a maximum of ~16,500 ft at the Stuart City shelf margin on the northeast flank of the San Marcos Arch, and >18,200 ft basinward of the shelf edge.

- Both the lower and upper Eagle Ford zones thin downdip from the Maverick Basin toward and across the Stuart City shelf margin.

Conclusions, cont.

- The total Eagle Ford interval, thickest in the Maverick Basin, thins to a minimum over the San Marcos Arch. It continues from the NE flank of the arch into the SW part of the East Texas Basin as a combination of the Maness and Eagle Ford Group facies.

- Correlation of facies between the San Marcos Arch and East Texas Basin suggests that the lower Eagle Ford is at least in part equivalent to the Maness Shale.

Acknowledgements

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