Pliocene Sub-Willis Unconformity in Southeastern Texas: Forebulge to the Pliocene Mississippi Delta

Thomas E. Ewing

Frontera Exploration Consultants, 19240 Redland Rd., Ste. 250, San Antonio, Texas 78259

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ABSTRACT

A major unconformity is mappable within the updip Neogene strata of southeastern Texas. Regional correlations for hydrologic framework refinement show that the upper Miocene (Goliad) units present in the subsurface are truncated before they reach outcrop and are overlain by sand-rich Willis rocks of late Pliocene or early Pleistocene age. This is consistent with surface mapping, which shows Goliad overlapped east of Columbus, and a band of Fleming (lower Miocene) rocks to the east that are highly overlaid by Willis sands eastward from Huntsville to the Sabine River. Mapping the subcrop lines of the Miocene rocks shows that the unconformity forms the margin of a gentle uplift or 'bulge' that was centered in Polk, San Jacinto, and Montgomery counties; effects of the unconformity extend southward nearly to Tomball and Liberty. Erosion on this axis may have begun during the late Miocene (regional correlations are too imprecise to be sure) but probably peaked in the Pliocene.

This gentle uplift probably formed by isostatic adjustment to the deposition of the thick Pliocene delta systems in and south of southern Louisiana. As such, it is a version of the Angelina-Caldwell Flexure (probably Oligocene-Miocene) that is displaced southward in Pliocene time because of the marked difference in thickness and loading between Texas and Louisiana shelf margins.

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Pliocene sub-Willis unconformity in southeast Texas:

Forebulge to the Pliocene Mississippi Delta

Thomas E. Ewing
Frontera Exploration Consultants, San Antonio, TX
tewing@fronteraexploration.com

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ABSTRACT

- **A major unconformity is mappable within the updip Neogene strata of southeast Texas.**
- **Regional correlations for hydrologic framework refinement show that the upper Miocene (Goliad) units present in the subsurface are truncated before they reach outcrop and are overlain by sand-rich Willis rocks of late Pliocene or early Pleistocene age.**
- **This is consistent with surface mapping, which shows Goliad overlapped east of Columbus, and a band of Fleming (lower Miocene) rocks to the east that are highly overlaid by Willis sands eastward from Huntsville to the Sabine River.**
- **Mapping the subcrop lines of the Miocene rocks shows that the unconformity forms the margin of a gentle uplift or 'bulge' that was centered in Polk, San Jacinto and Montgomery Counties; effects of the unconformity extend southward nearly to Tomball and Liberty.**
- **Erosion on this axis may have begun during the late Miocene (regional correlations are too imprecise to be sure) but probably peaked in the Pliocene.**
- **This gentle uplift is probably formed by isostatic adjustment to the deposition of the thick Pliocene delta systems in and south of South Louisiana.**
- **As such, it is a version of the Angelina-Caldwell flexure (probably Oligocene-Miocene) that is displaced southward in Pliocene time because of the marked difference in thickness and loading between Texas and Louisiana shelf margins.**

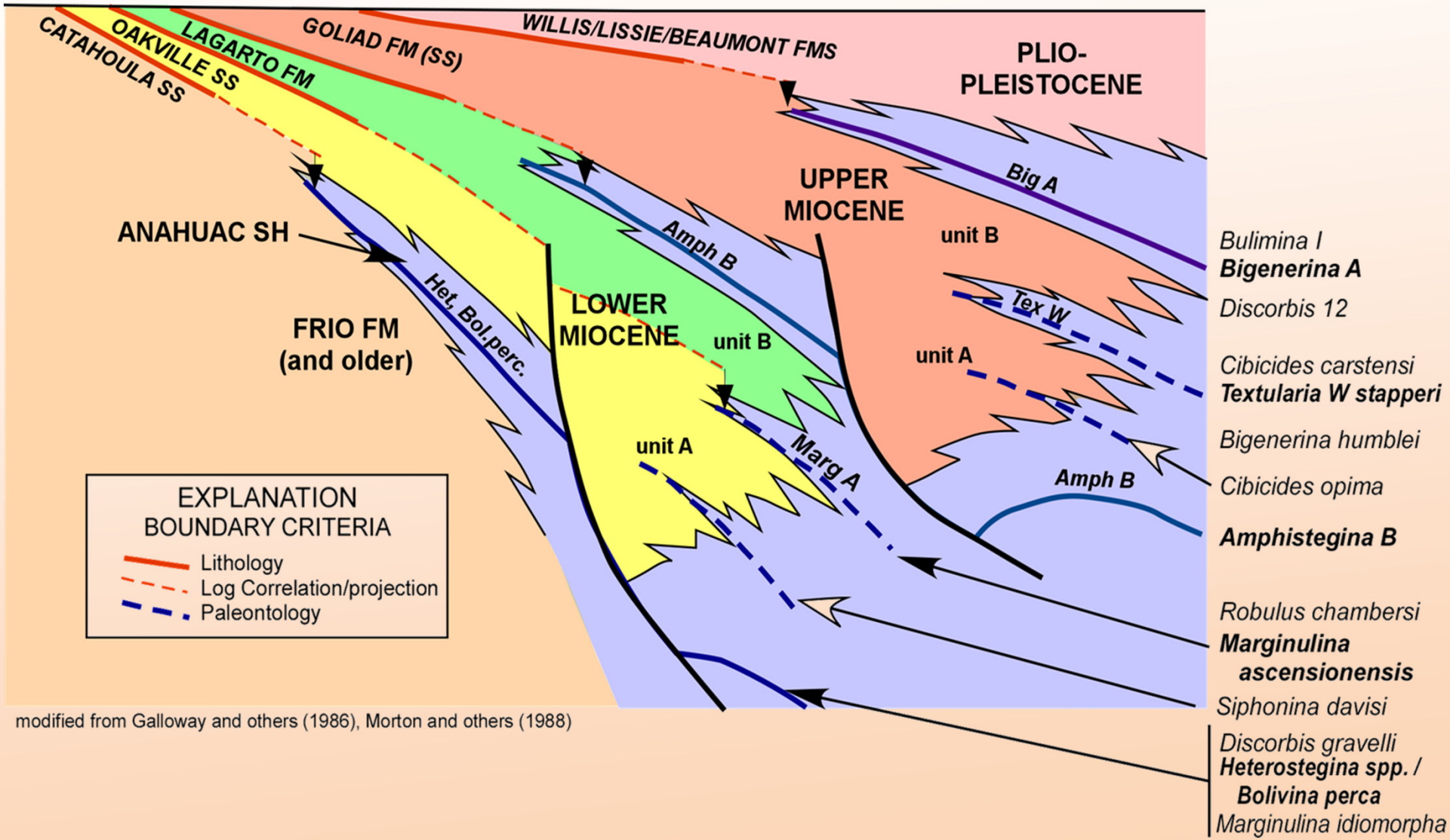
SUMMARY

- Significant unconformity below Willis (Late Pliocene) in southeast Texas
  - Mapped in surface and subsurface
  - Truncates Goliad (Middle-Upper Miocene) units
- Probably an isostatic bulge around Pliocene depocenter in Louisiana
  - No Mio-Plio depocenters in Texas
  - Anomalous seaward extension of Angelina-Caldwell flexure
- Based on work for INTERA Corp on brackish water resources of the Texas Gulf Coast.
  - TWDB Contract; Steve Young, project director

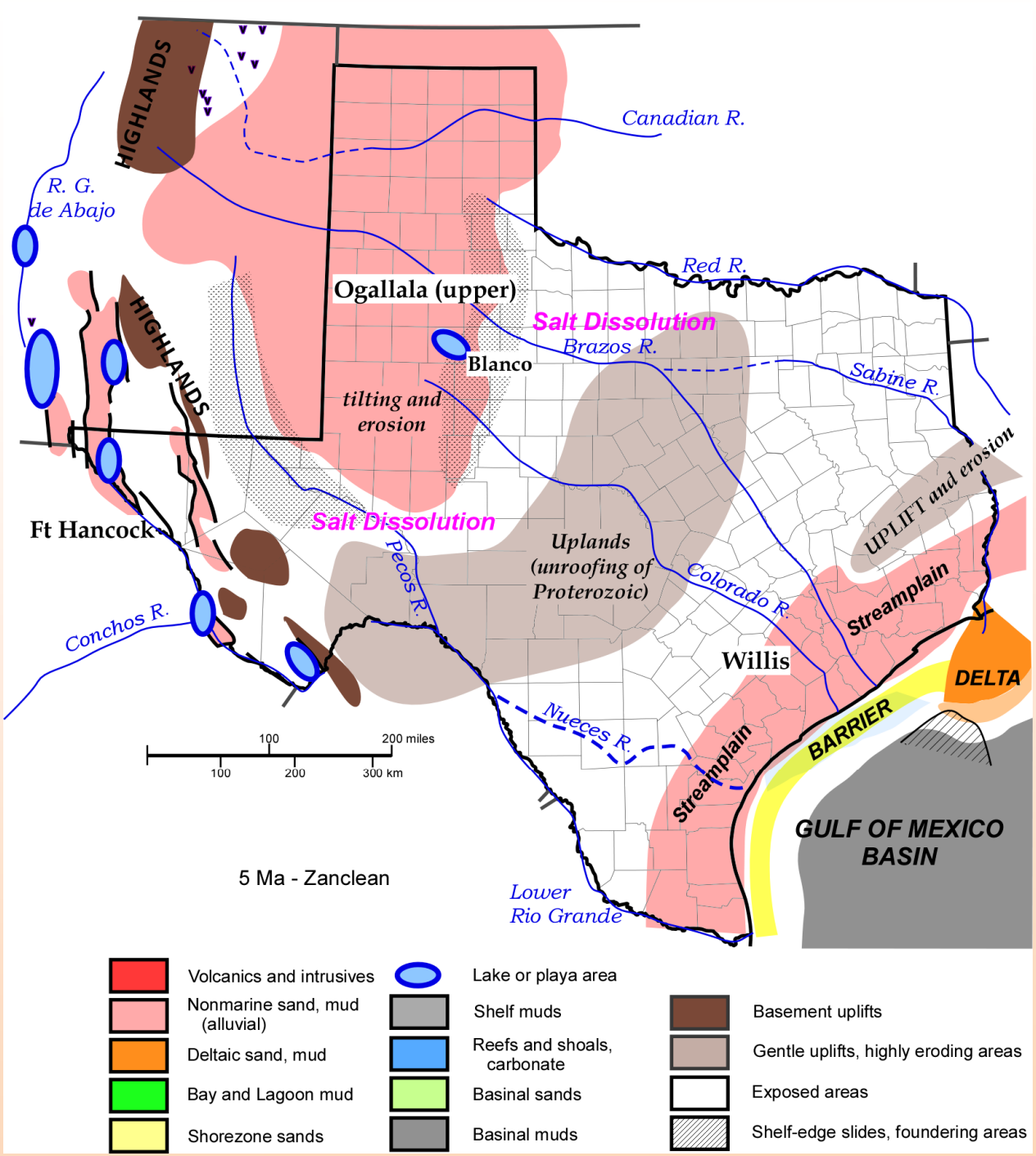
Texas Gulf Coast - Time Chart, Eocene-Quat.

Time Chart - Neogene

Neogene Strat Sketch



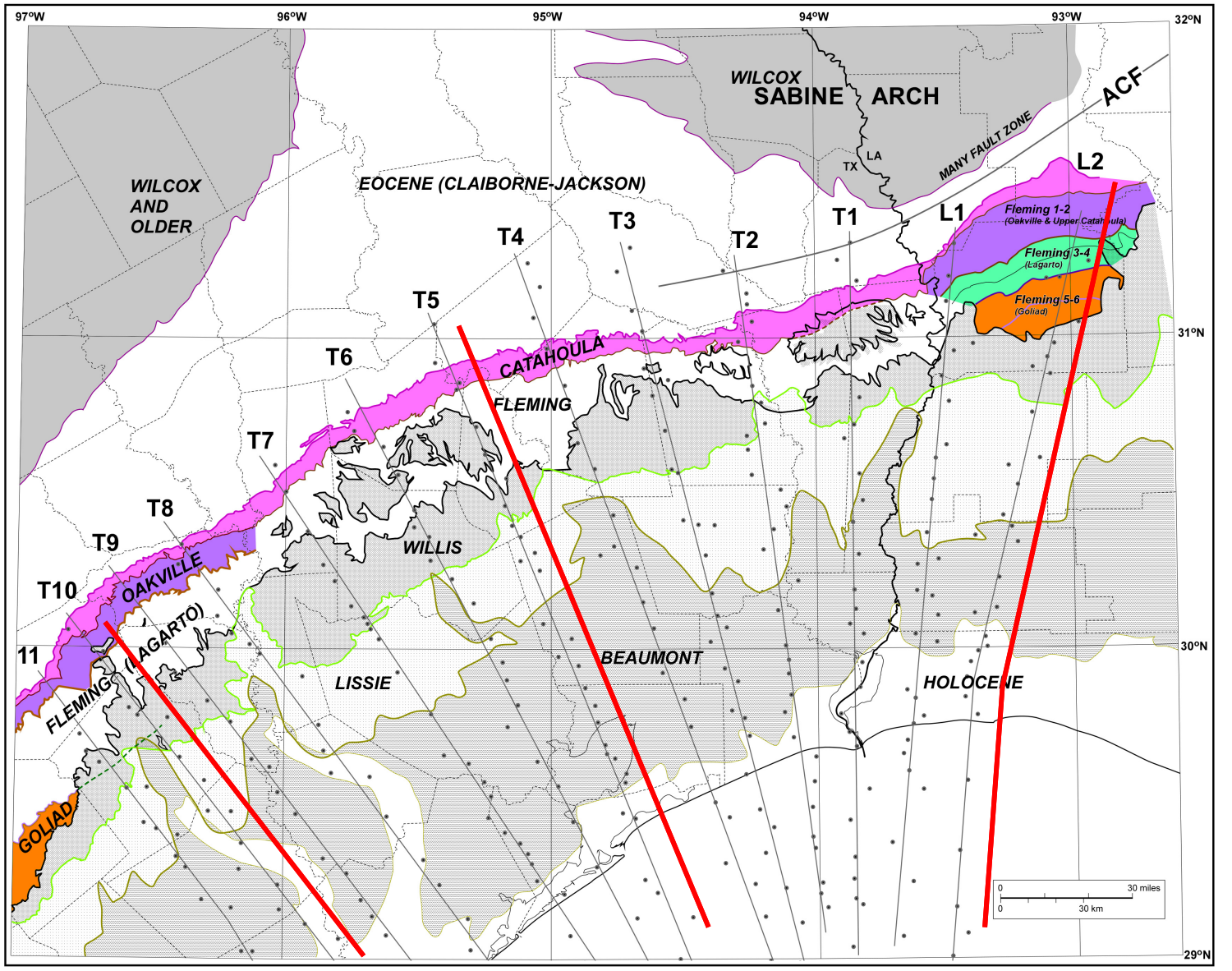
modified from Galloway and others (1986), Morton and others (1988)



Pliocene paleo-geography

(From Ewing, 2016, **Texas Through Time**; UT Bur. Econ. Geol.)

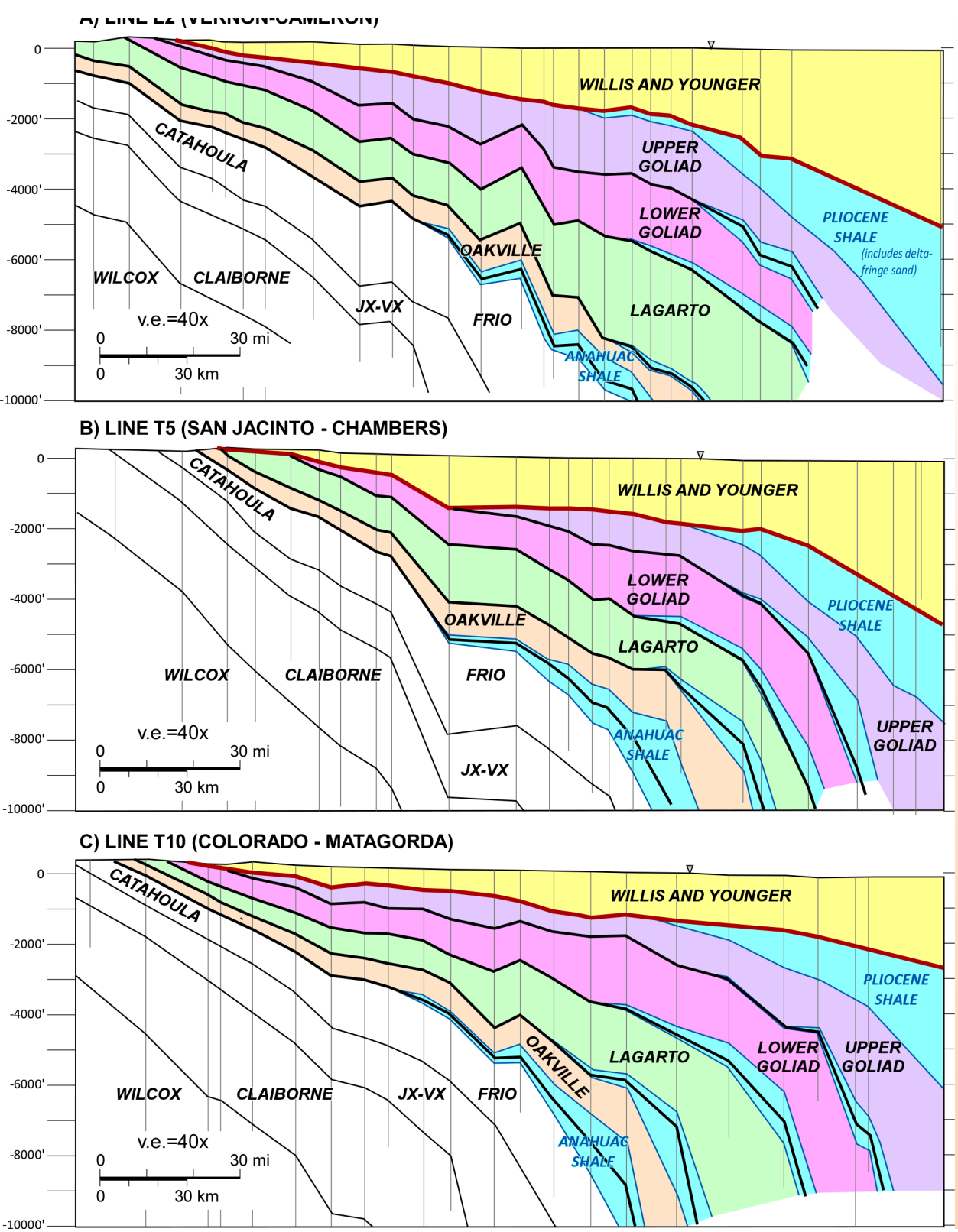
Surface Geology and Dip Lines



Note Willis outliers sitting on Fleming, even Catahoula

Also note absence of Goliad strata in southeast Texas

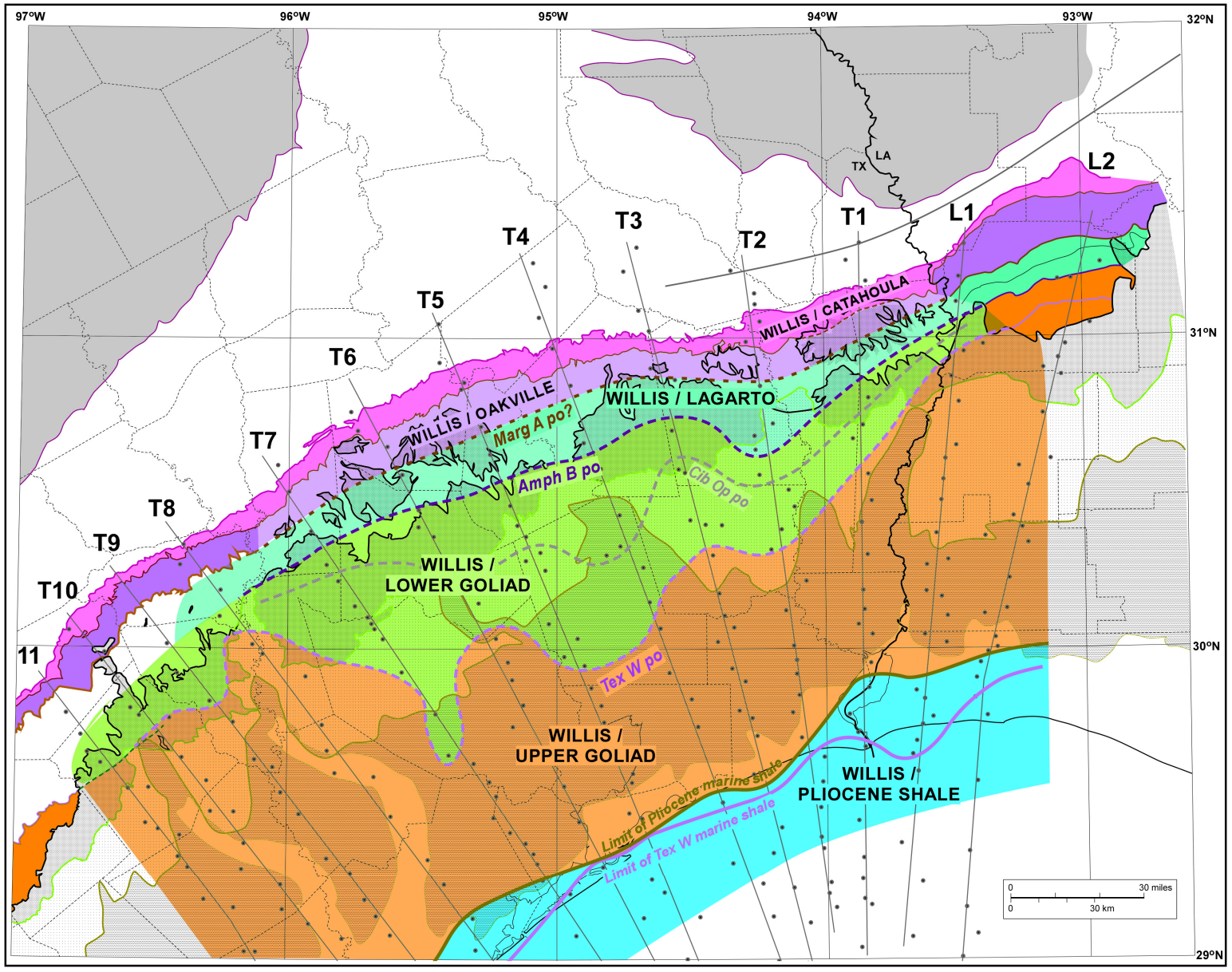
ACF – Angelina – Caldwell Flexure

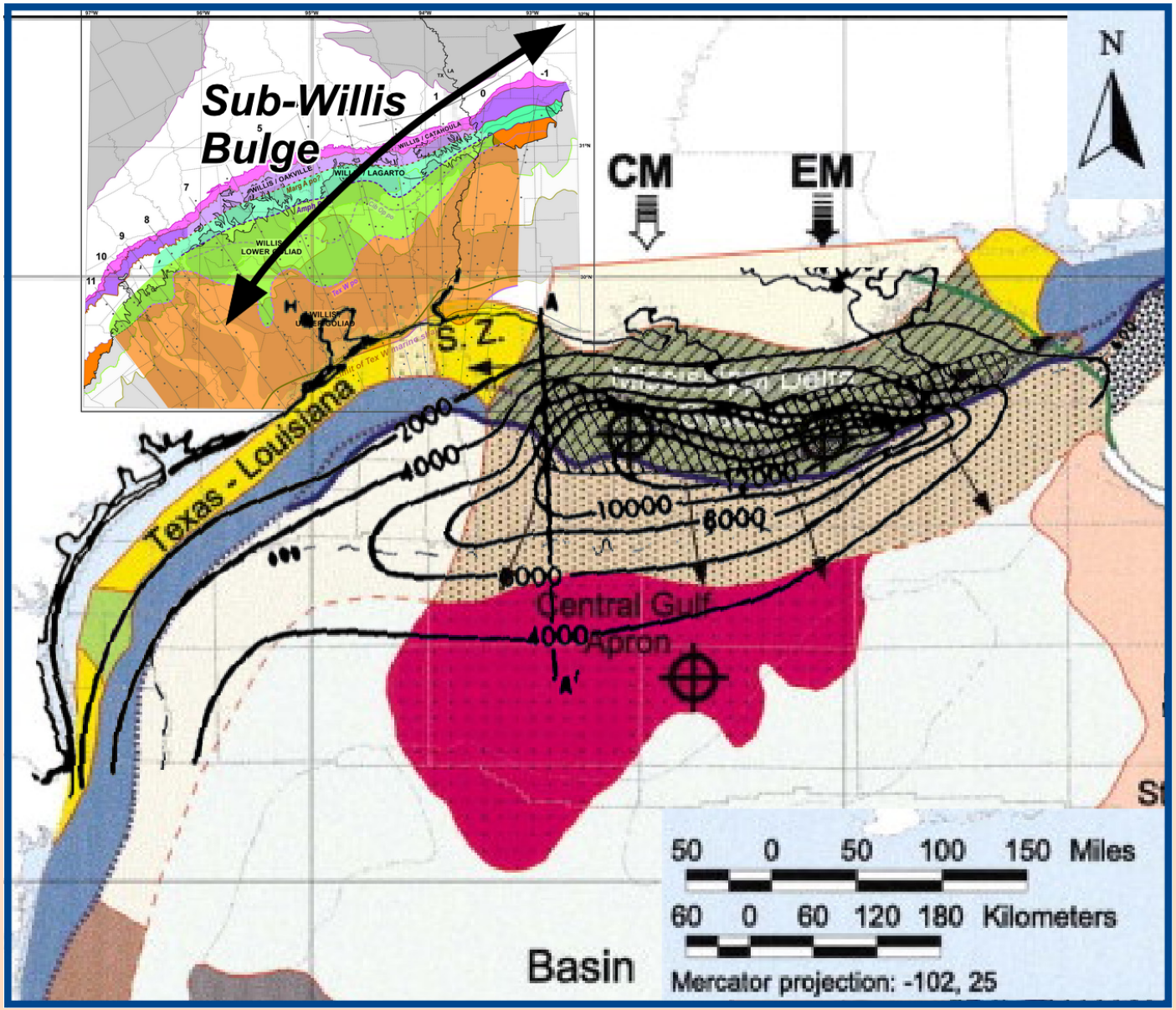


Three Key Sections

Note truncation of Upper Goliad in all 3, and truncation of Lower Goliad in section T5.

Subcrops and Surface Geology





Relation-ship to Pliocene depo-center

Depositional systems from Galloway and others (2000); contours from Woodbury and others (1973)

Thank you! Questions?