Palynology Across a Sequence Boundary, Wilcox Group, Bastrop, Texas*

Regina L. Dickey[1] and Thomas E. Yancey[1]

Search and Discovery Article #50292 (2010)
Posted August 10, 2010

*Adapted from oral presentation at AAPG Convention, New Orleans, Louisiana, April 11-14, 2010

[1]Texas A&M University, College Station, TX (paleoreg@yahoo.com)

Abstract

Palynological sampling within shoaling-upward regressive deposits in the upper Calvert Bluff Fm and overlying transgressive deposits of the Carrizo Fm, exposed beside the Colorado River near Bastrop, Texas, reveals a rich assemblage of well-preserved palynomorphs. This section contains an unconformity equivalent to the sequence boundary between the Lower-Middle Wilcox and Upper Wilcox of the subsurface, probably corresponding to the Paleocene Eocene Thermal Maximum. Regressive deposits are shallow marine and shorezone in origin, later eroded and channeled during lowstand exposure, covered with fluvial channel fill deposits and capped with shallow marine shorezone sheet sands of the Carrizo Fm. Sedimentation rates were high and large amounts of plant material were deposited, resulting in the destruction of calcareous fossils due to production of acids from decaying plant material. Thus, palynology remains the key to understanding these deposits. Palynological processing included HCL, HF, acetolysis and heavy density separation. Kerogen slides were produced prior to acetolysis.

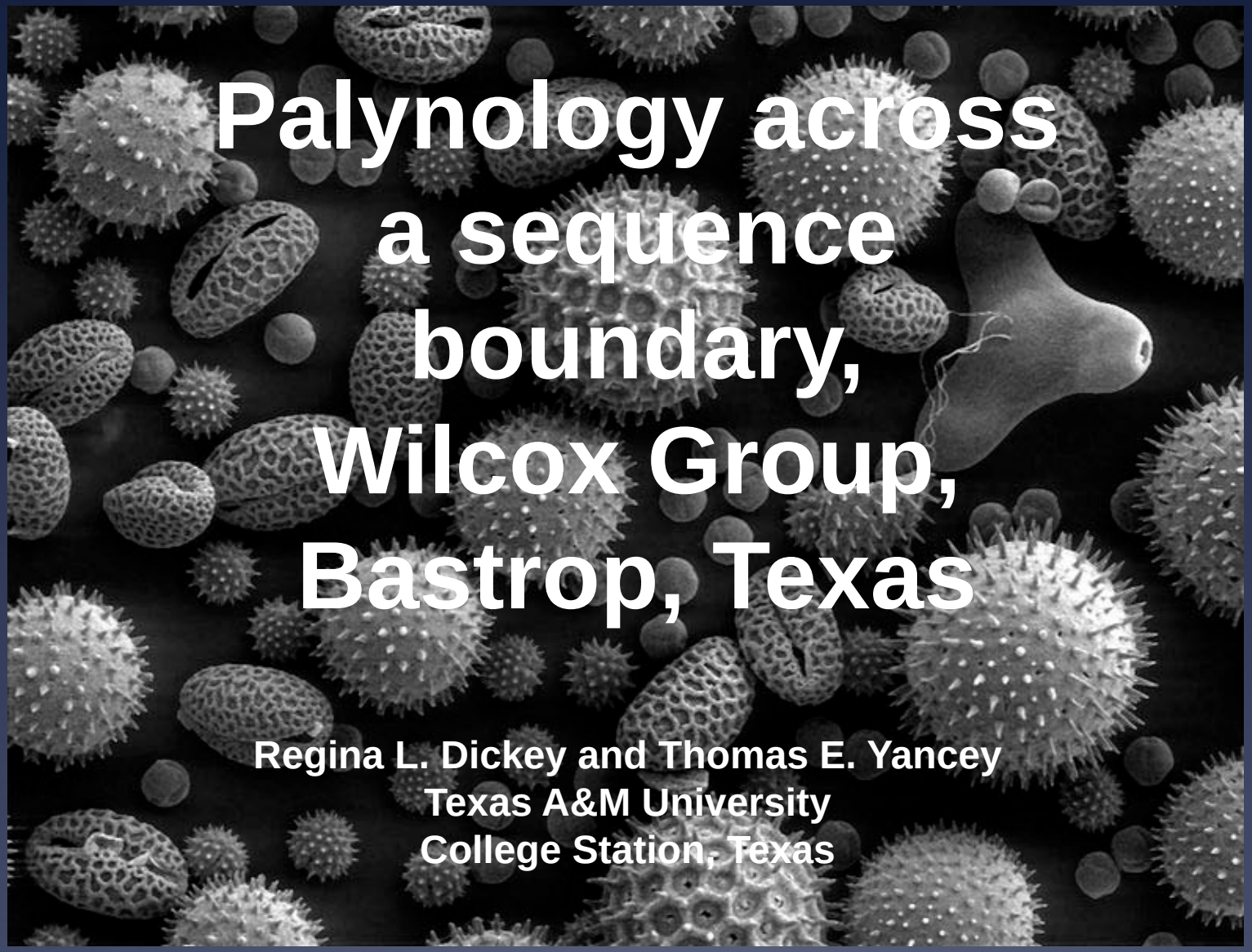
The diversity of palynomorphs is highest in sediments deposited in deeper and quieter waters, lower in the section. The Calvert Bluff section is entirely late Paleocene in age. The late Paleocene - late Eocene zonal indicator Thompsonipollis magnificus is present throughout the section and Paleocene palynomorphs Triporopollenites aroboratus, Nyssapollenites (?), Maceopolipollenites, Momipites, Caryapollenites, pre-Symplocoipollenites (?), Cicatricosisporites, Tetracolporopollenites and fungal spores Brachisporisporites and Diporisporites (D. hamenii) are present. Pollen in fluvial channel deposits is mostly reworked and poorly preserved, although plant tissue and trichomes are plentiful and well preserved. Plant spores, fugal spores and freshwater algae occur throughout the channel fill.

No dinoflagellate cysts have been identified in this sample set, but previous sampling in the section obtained sparse dinoflagellates and foram chamber linings. The plethora of pollen and spores and scarcity of dinoflagellates can be attributed to the large amounts of sediment and plant detritus flushed into this area.

References

Elsik, W.C. and J.P. Crabaugh, 2001, Palynostratigraphy of the upper Paleocene and lower Eocene Wilcox Group in the northwestern Gulf of Mexico Basin, in D.K. Goodman and R.T. Clarke, (eds.) Proceedings of the IX International Palynological Congress, Houston, Texas: American Association of Palynologists Foundation, Baton Rouge, LA, p. 233-237.

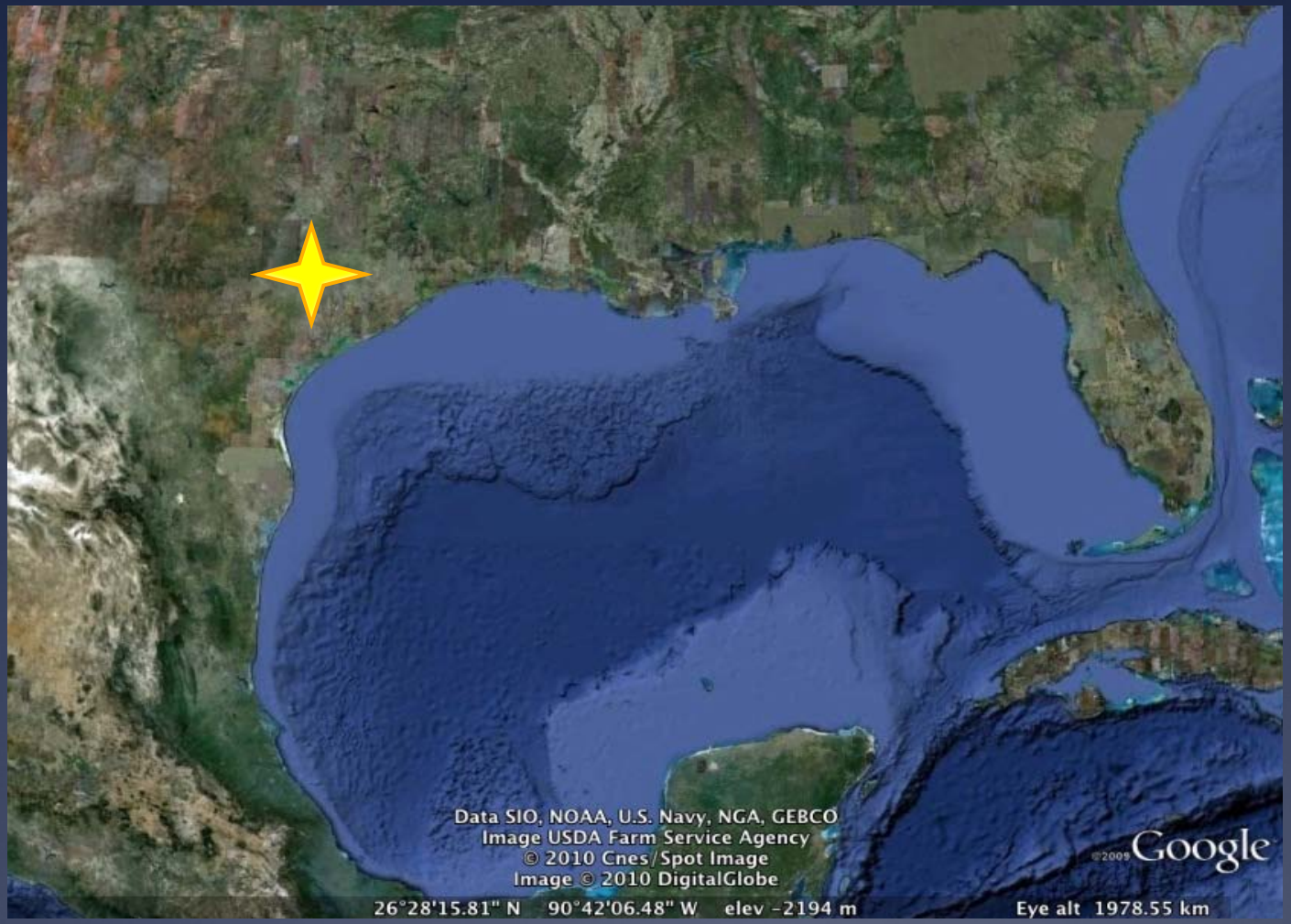
Fisher, W.L. and J.H. McGowen, 1967, Depositional systems in the Wilcox Group of Texas and their relationship to occurrence of oil and gas: Gulf Coast Association of Geological Societies Transactions, v. 17, p. 105-125.



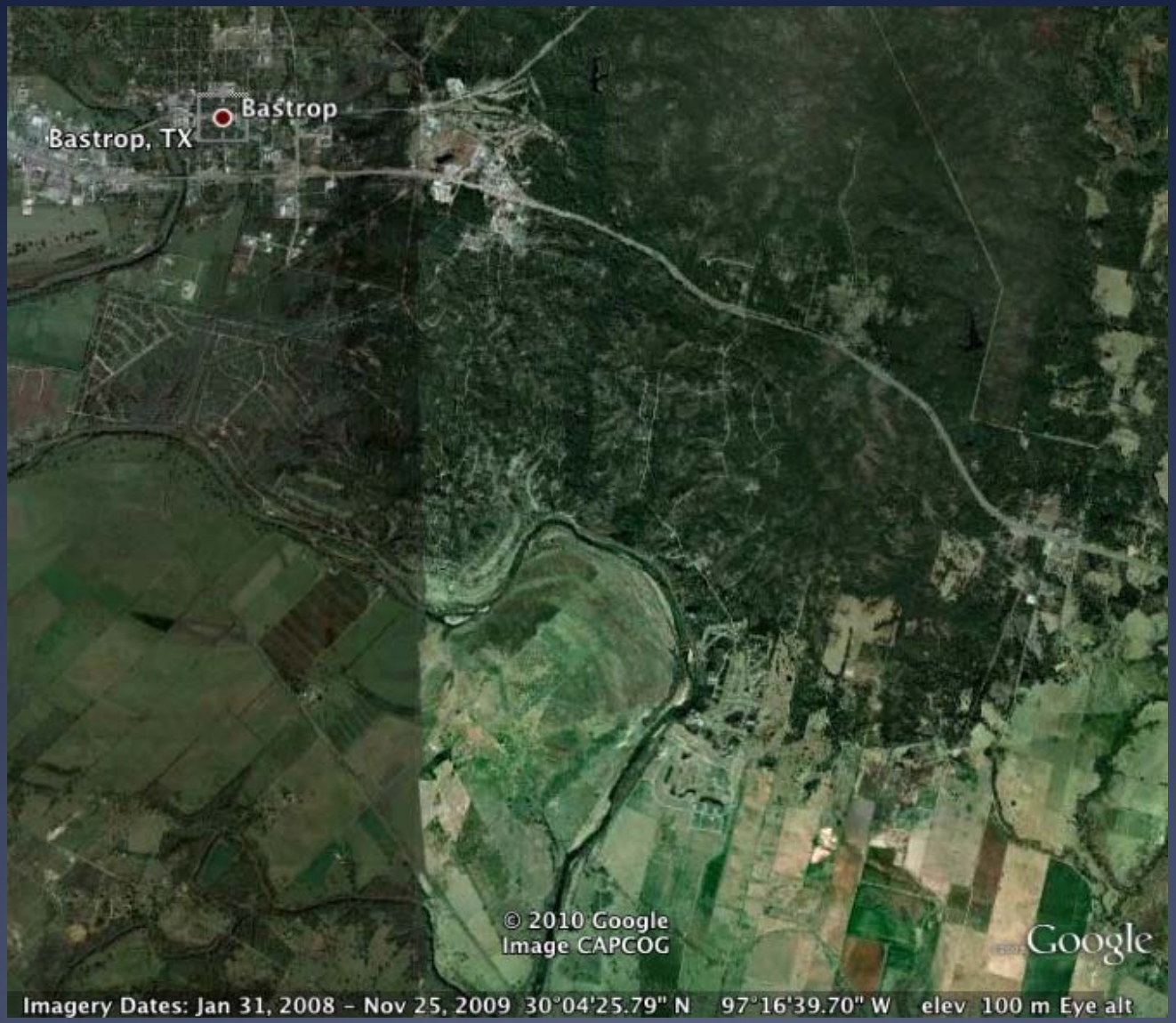
Palynology across a sequence boundary, Wilcox Group, Bastrop, Texas

Regina L. Dickey and Thomas E. Yancey
Texas A&M University
College Station, Texas

Study area -Northwestern GOM



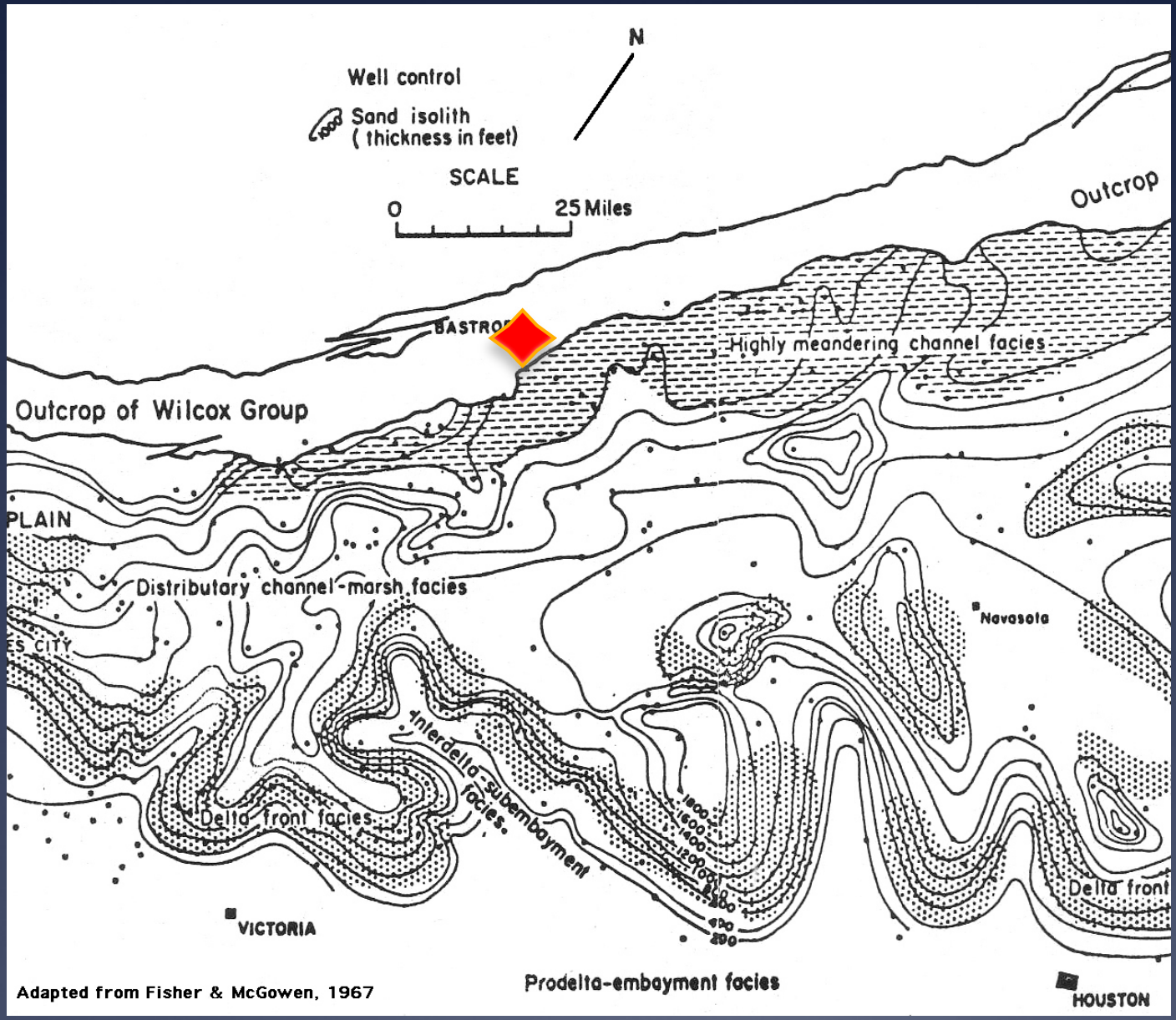
Study area


Bastrop
Bastrop, TX
© 2010 Google
Image CAPCOG
Google
Imagery Dates: Jan 31, 2008 - Nov 25, 2009 30°04'25.79" N 97°16'39.70" W elev 100 m Eye alt

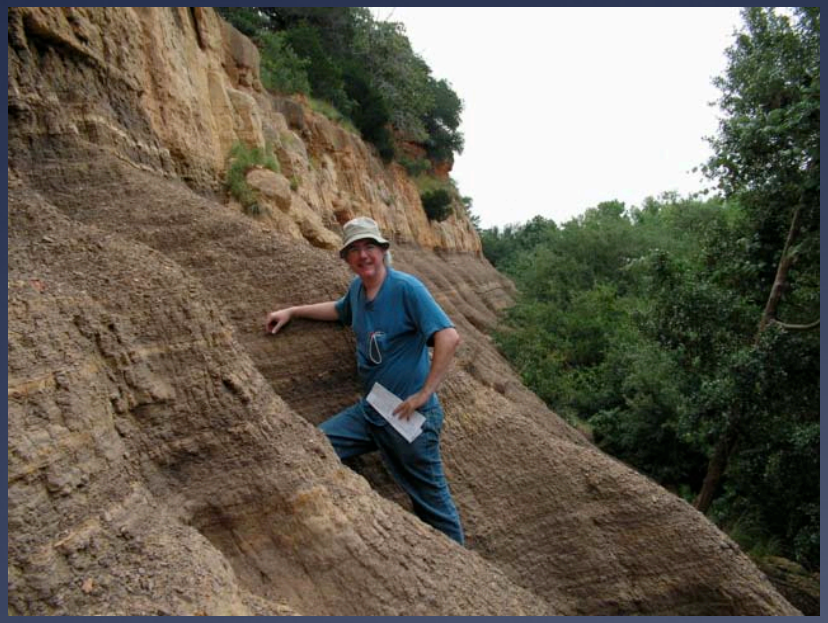
Study area

Pine Forest Golf Course and Red Bluff on Colorado River

Wilcox depositional systems



Red Bluff (Riverbank) section



Carrizo Fm above; Calvert Bluff Fm below

Continuous deposition – mud to sand

Shoaling-upwards deposition; increasing energy levels

Coarsening-upwards set of deposits;
mudstones grade upward to sandstones above

Great lateral continuity of thin and thick sediment layers

Lenses of storm sand

Evidence of marine deposition

Bioturbation fabric

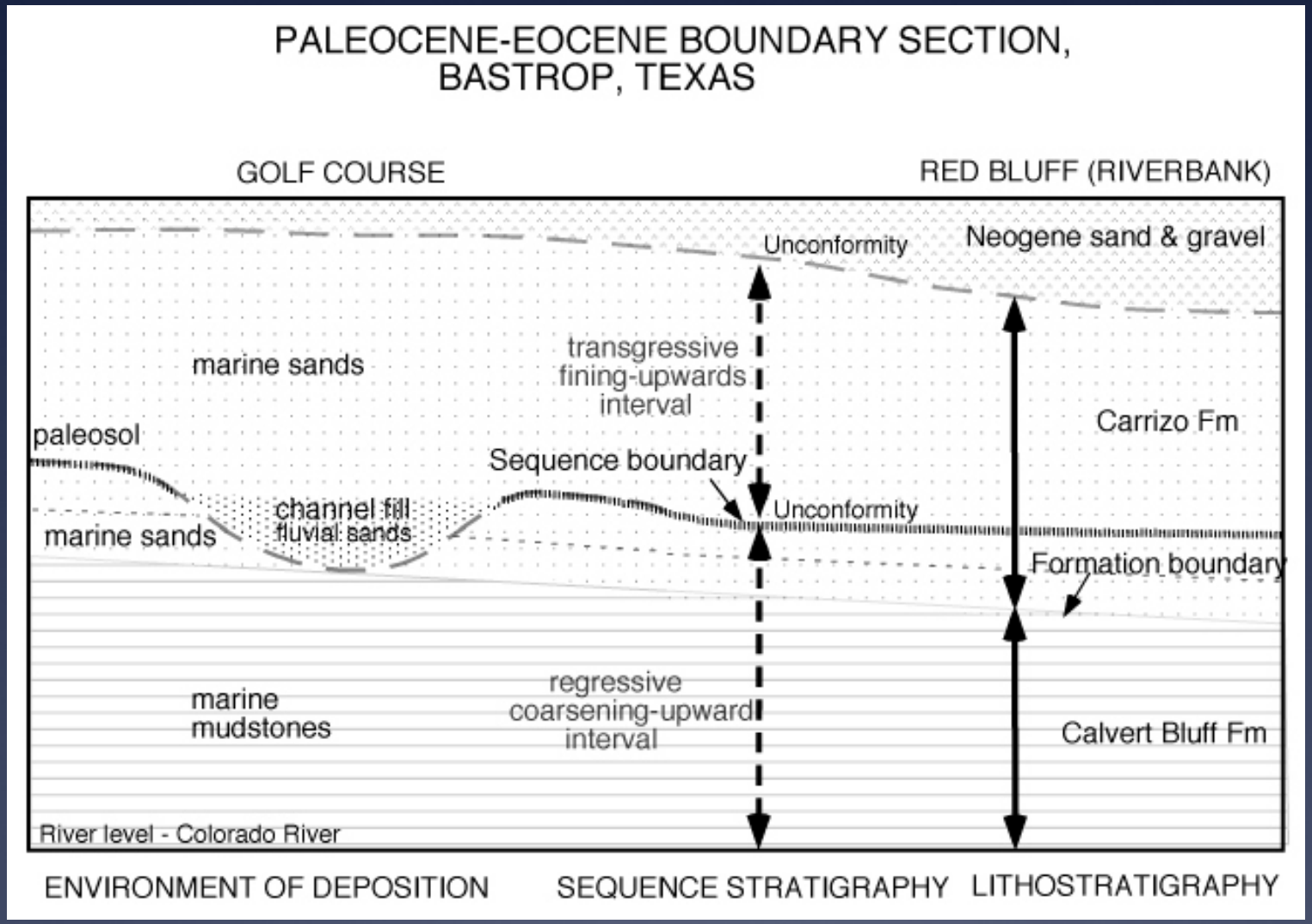
Ophiomorpha burrow

Presence of typical marine traces
Presence of marine microtaxa (foram test linings; dinoflagellates)

Study area

Pine Forest Golf Course and Red Bluff on Colorado River

Stratigraphy



Formation boundaries and sequence boundary in section

Paleosol on sequence boundary

Rooting traces visible in lower part of paleosol interval

Cart Path channel, Bastrop

Channel margin

Erosional margin of channel, cut into basal Carrizo sandstone
Pinching out of channel sands

Channel complex - lower fill

Pulses of deposition in channel fill;
sands with mudstone caps;
common water escape structures

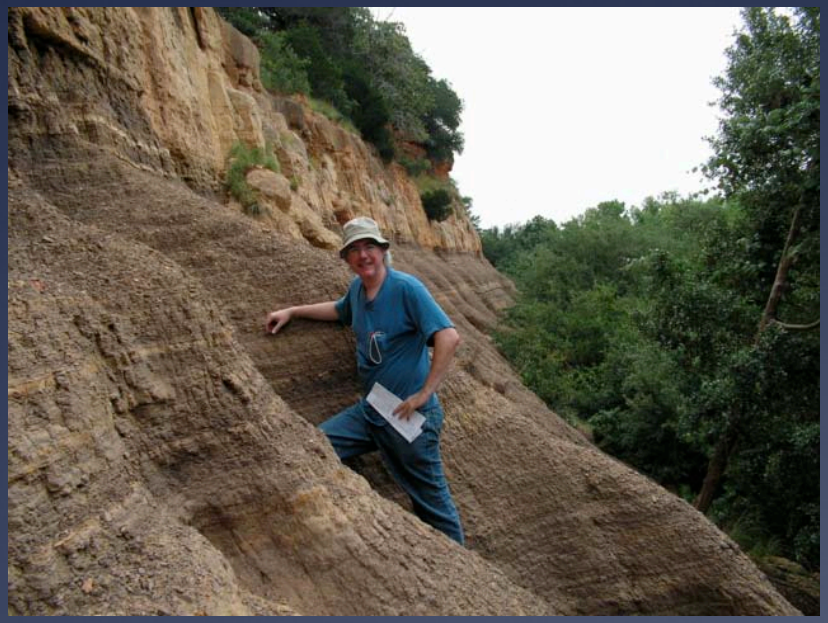
Sampling a zone of muddy sediment

Channel complex - top “lignite” fill

Deposit of granular wood particles mixed with quartz sand

Marine flooding horizon

Red Bluff (Riverbank) section

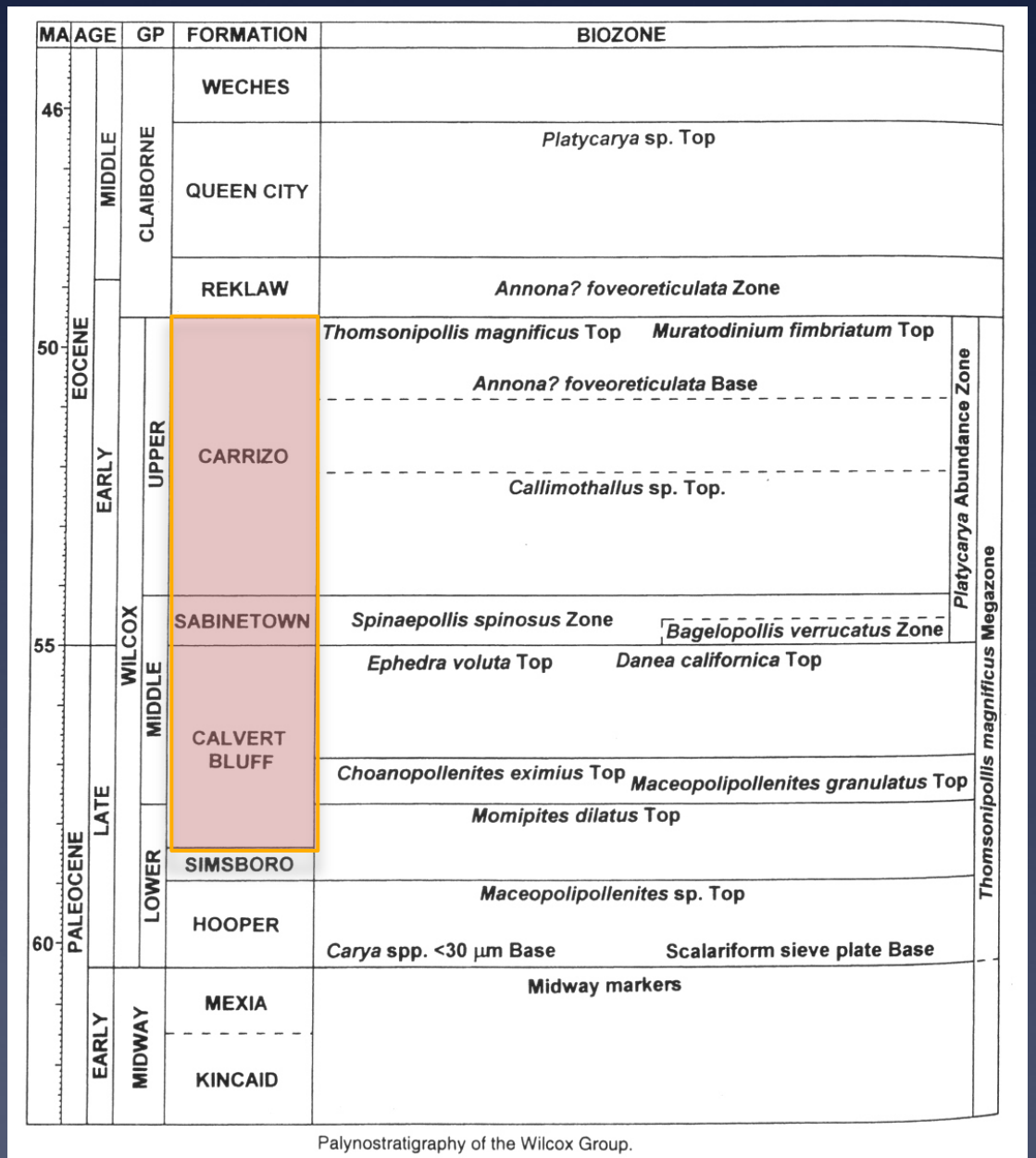


Carrizo Fm above; Calvert Bluff Fm below

Lower Paleogene pollen zonation

For northern Gulf of Mexico

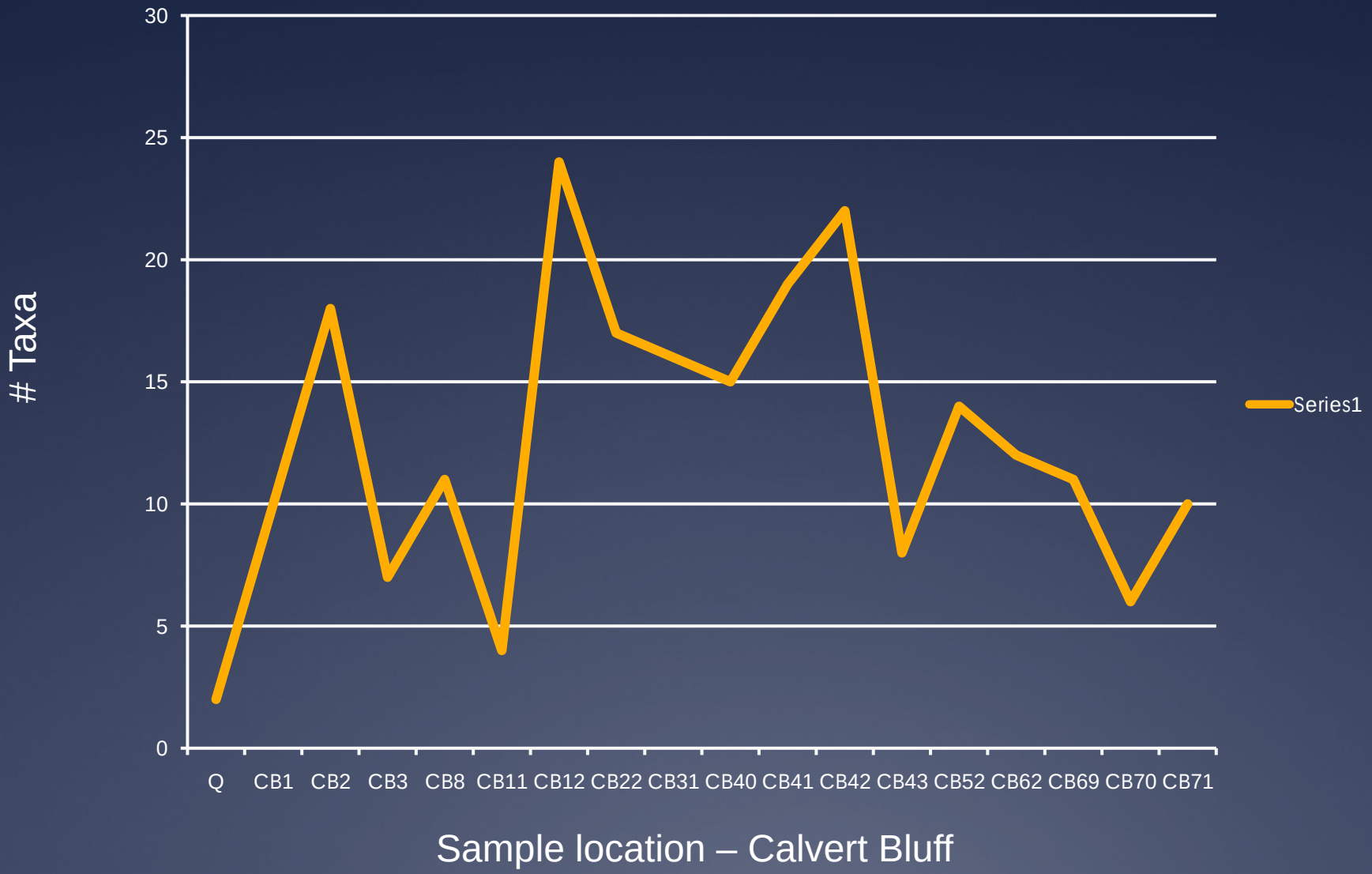
Elsik and Crabaugh (2001)



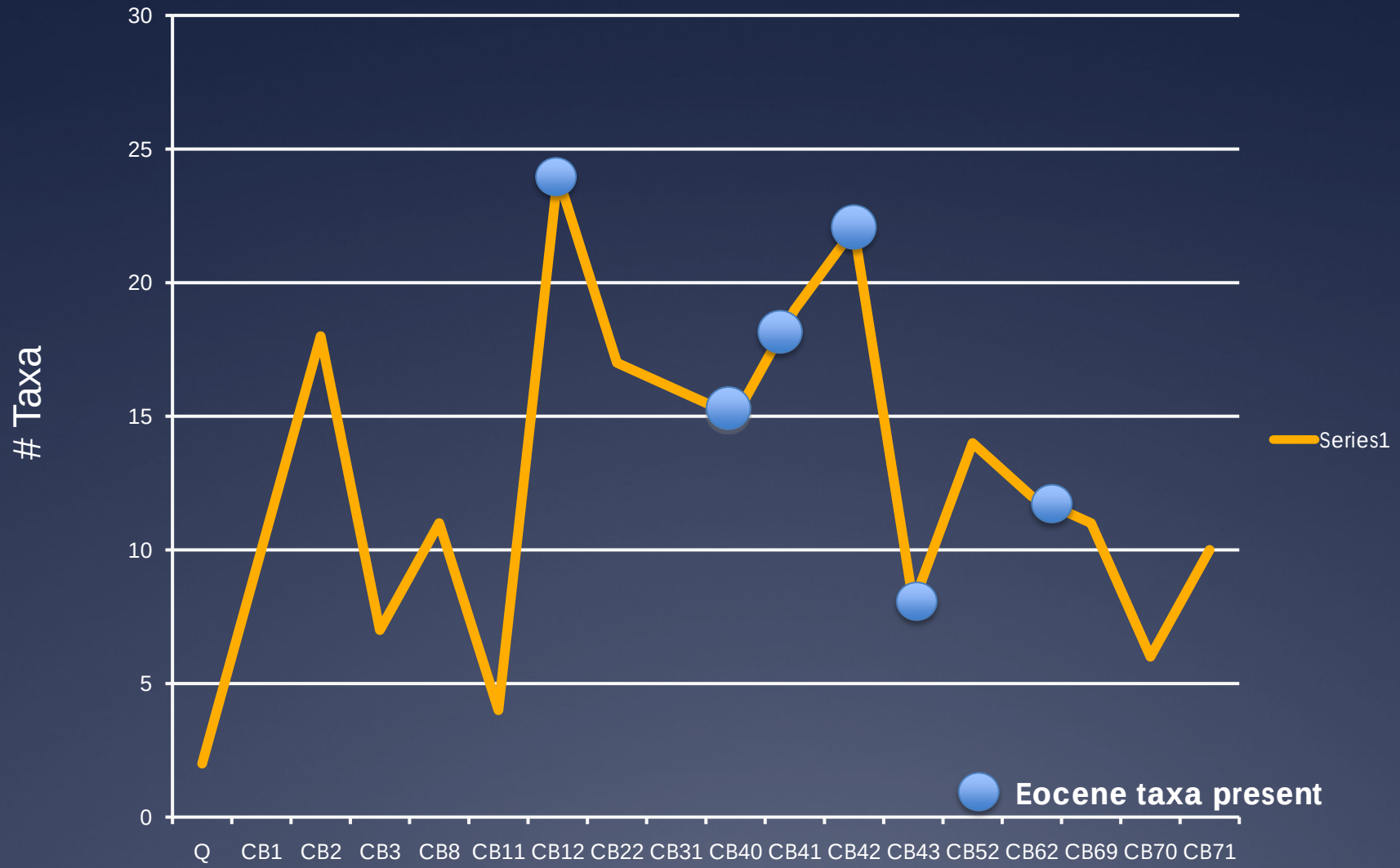
Palynostratigraphy of the Wilcox Group.

Sample diversity - palynomorphs

Calvert Bluff Fm. paly diversity: 67 forms



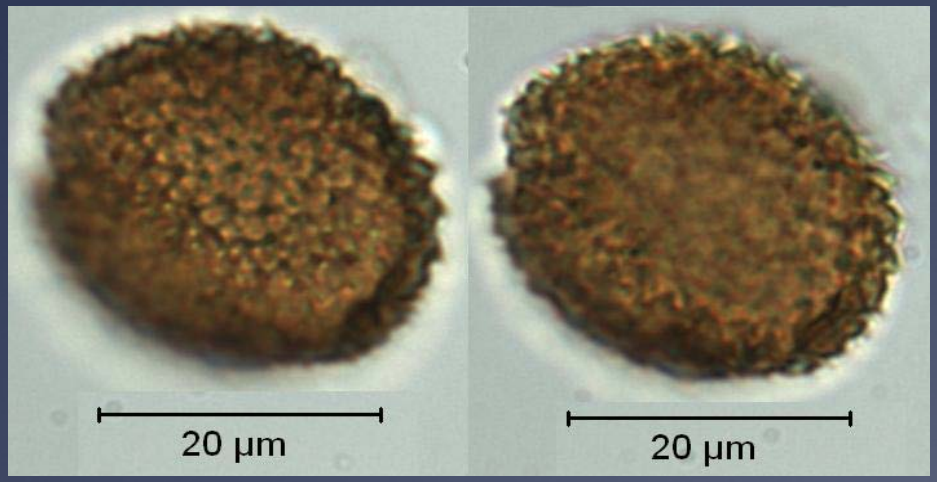
Calvert Bluff - Eocene taxa



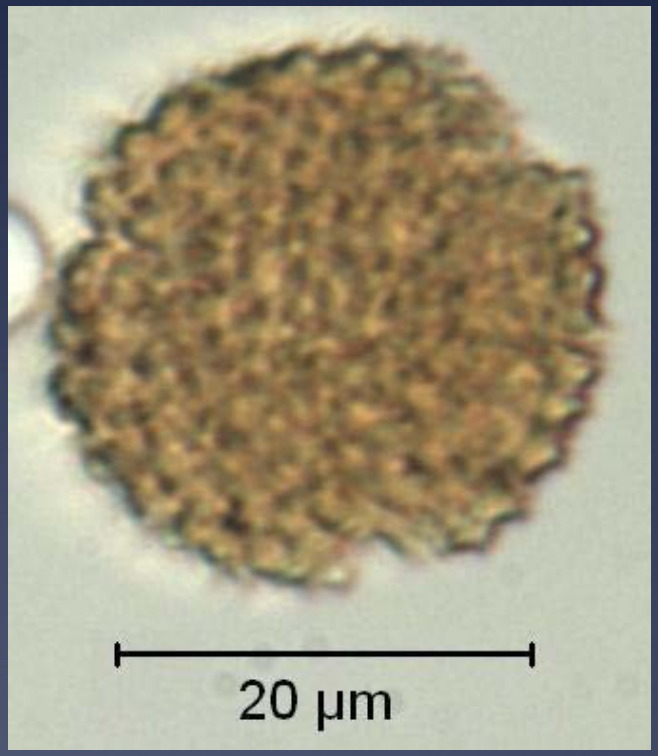
Sample location – Calvert Bluff Fm

Eocene pollen

Platycaryapollenites



Spineapollis spinosus



Spineapollis spinosus

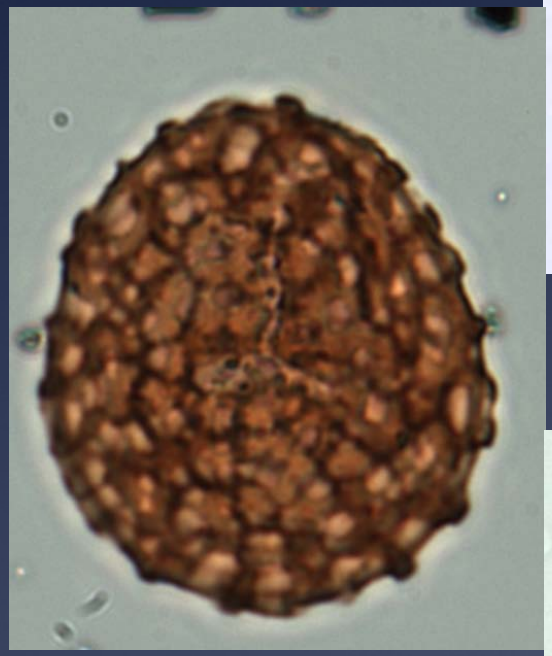
Eocene pollen

Bagelopollis verrucatus

Sonneratiaceae

Symplocoipollenites

Spores



Lycopodium

Sphagnum

Deltoidospora

Cicatricosisporites

Gymnosperms

Piceaepollenites

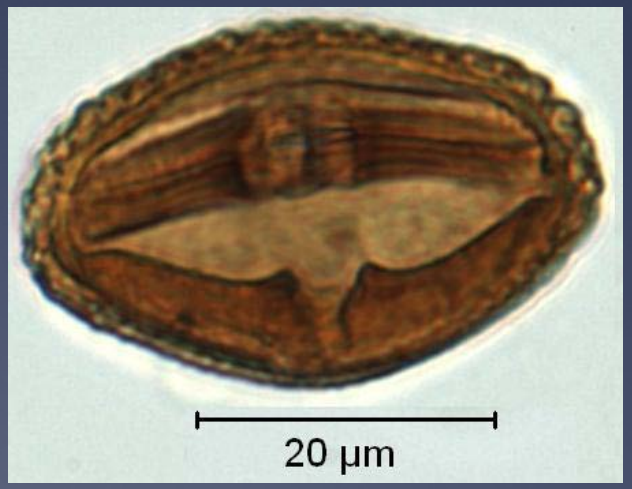
Abies or Pinus

Ephedra voluta

Additional taxa

Pistillipollenites mcgregorii

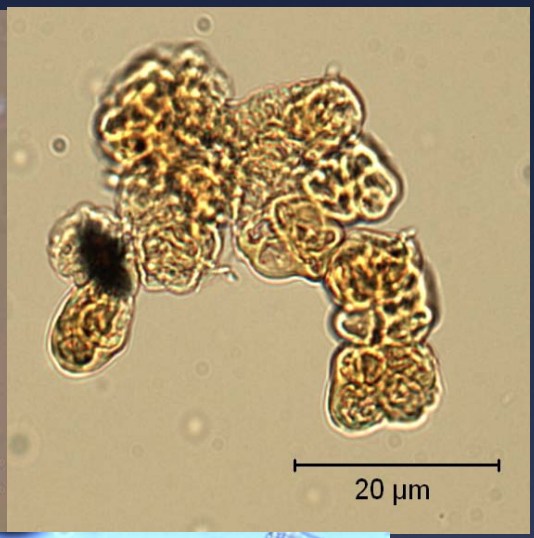
Momipites



Favitricolporites

Freshwater channel assemblage

- Schizosporis
- Foveolate algal cyst
- Botryococcus
- Tetraporina
- Cymatiosphaera?
- TCT
- Plant cuticle



P/E zonation

- Elsik zonation based primarily upon last occurrences of taxa (or first downhole occurrence)
- Is a general zonation for northern Gulf - not specific to northwest sector
- Concern that ages of taxa end ranges may vary along east-west climate gradient

Conclusions

- Calvert Bluff and Carrizo Fm. are marine influenced
- Calvert Bluff is at least partly basal Eocene in age

Acknowledgements

* Devon Energy

* Chevron

* GCSSEPM