

2001-02 AAPG Distinguished Lecture

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Falling Stage Systems Tract in Siliciclastic Systems and its Control on Reservoir Architecture and Exploration Strategies

Dag Nummedal

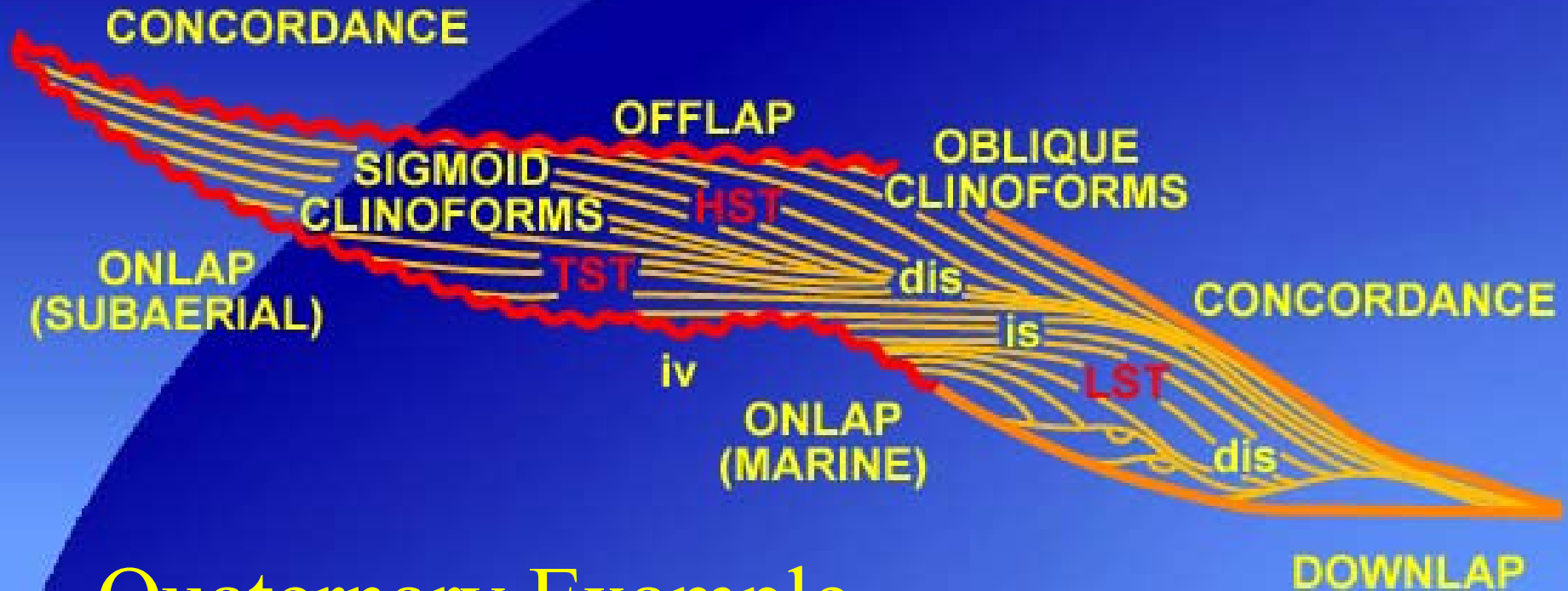
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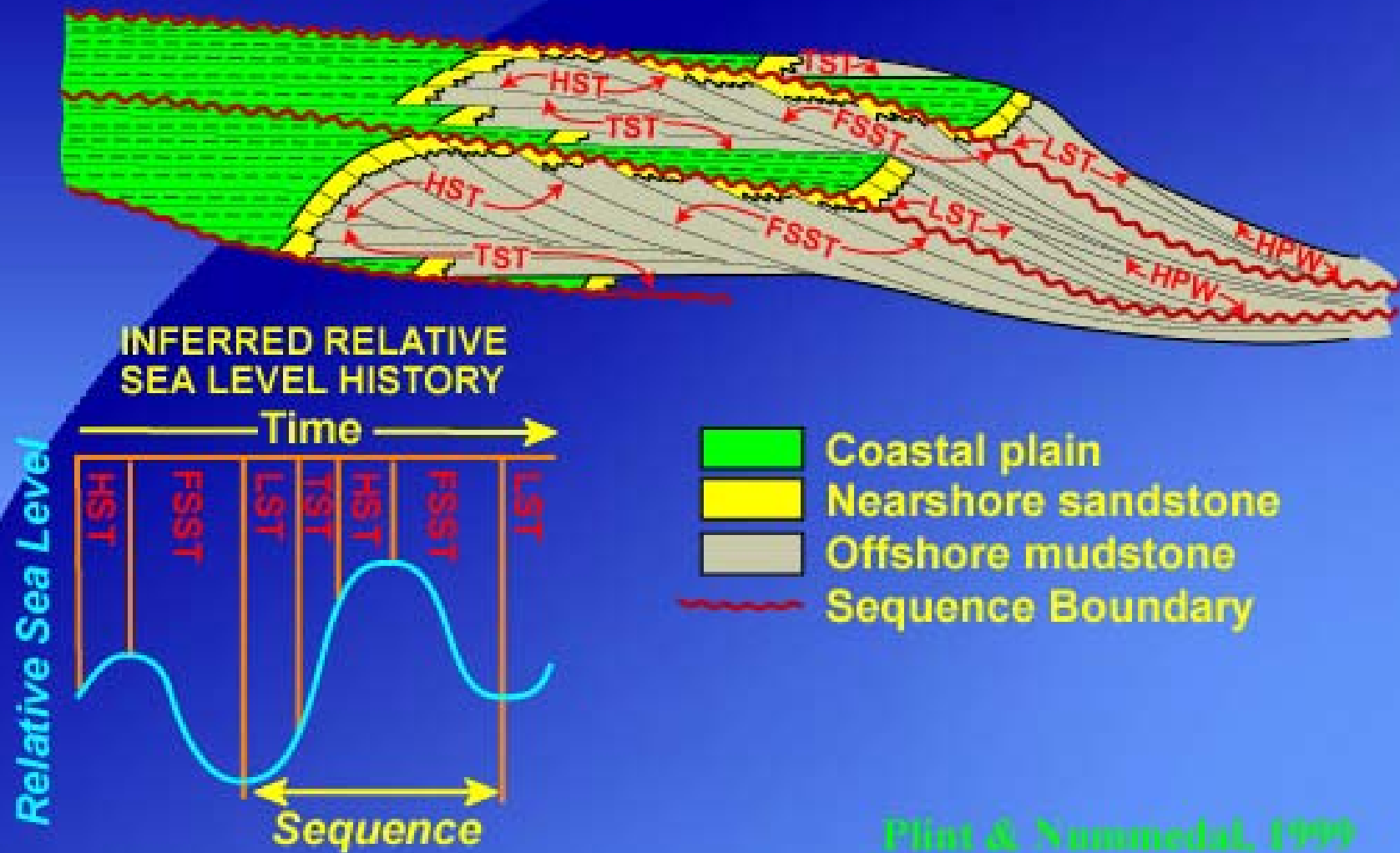
FSST - Principles



Quaternary Example

Cretaceous Example

SYSTEMS TRACTS IN A RAMP MARGIN SEQUENCE



Plint & Nummedal, 1999

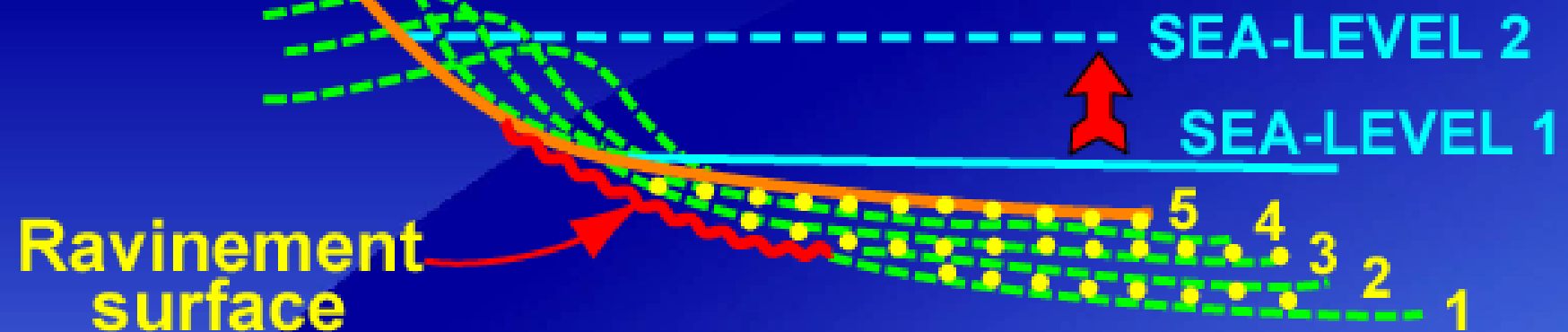


EROSION
DEPOSITION

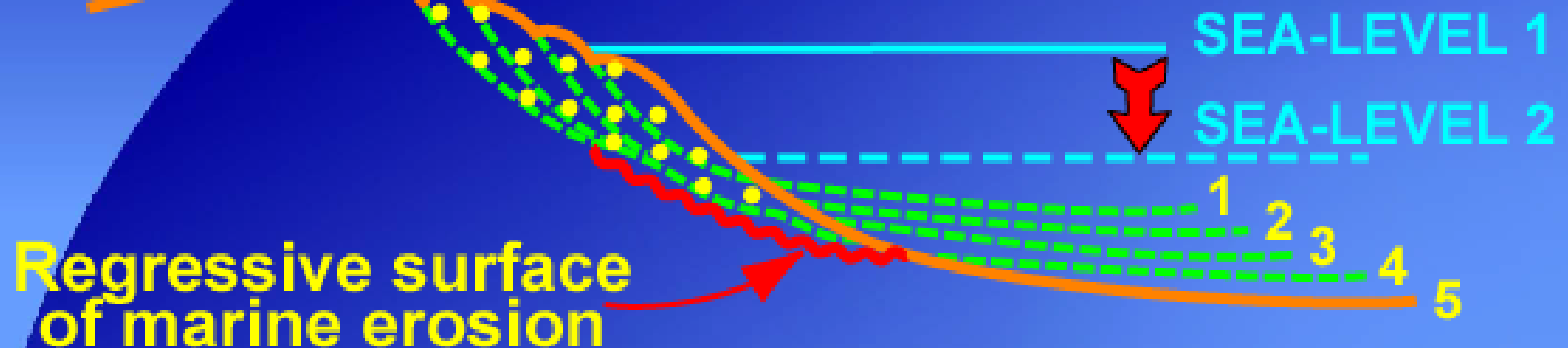
FINAL
PROFILE
INITIAL
PROFILE

SEDIMENT
TRANSPORT
DIRECTION

SEA-LEVEL RISE

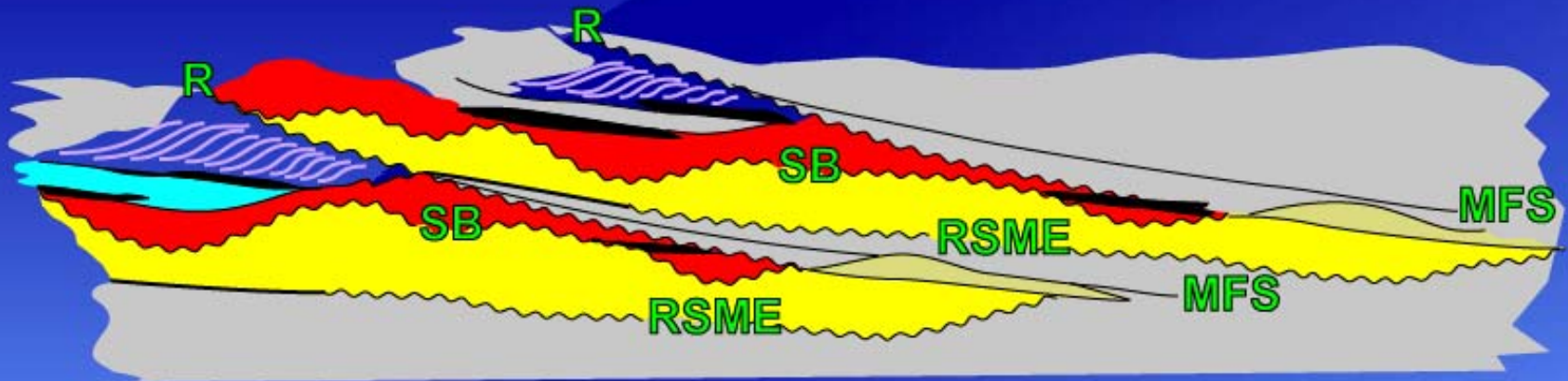








SEA-LEVEL FALL



— INITIAL PROFILE

SEQUENCES DOMINATED BY FALLING STAGE DEPOSITION



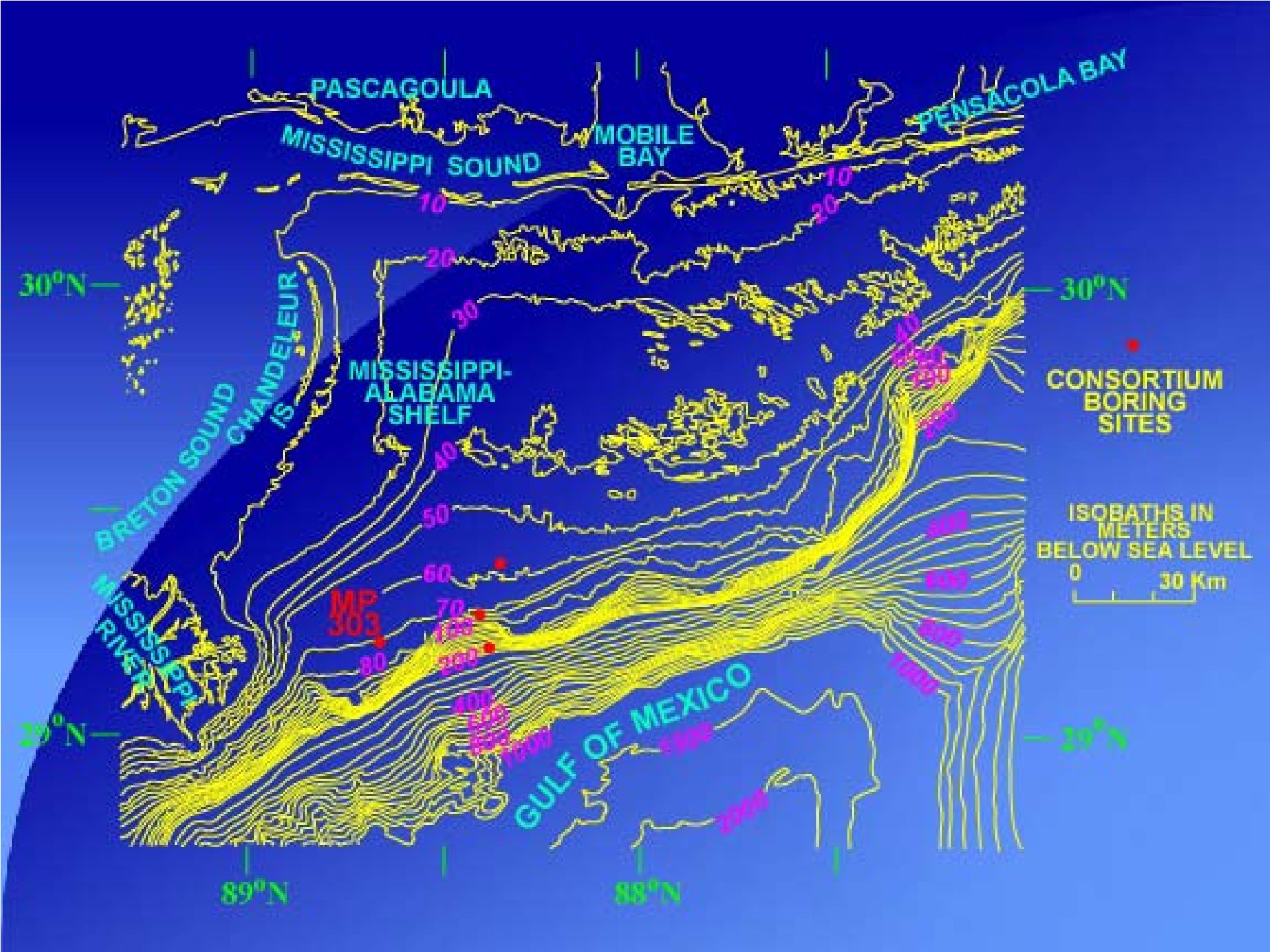
-  Fluvial channel
-  Estuarine sand body (e.g. FTD)
-  Shoreface
-  Shelf
-  Lake
-  Coal

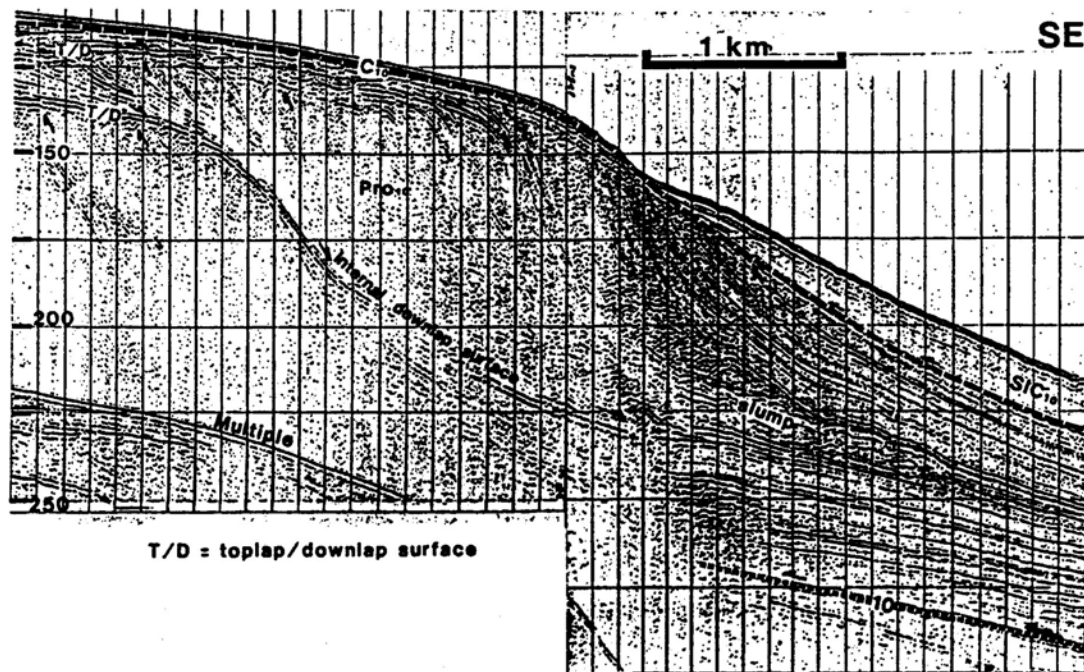
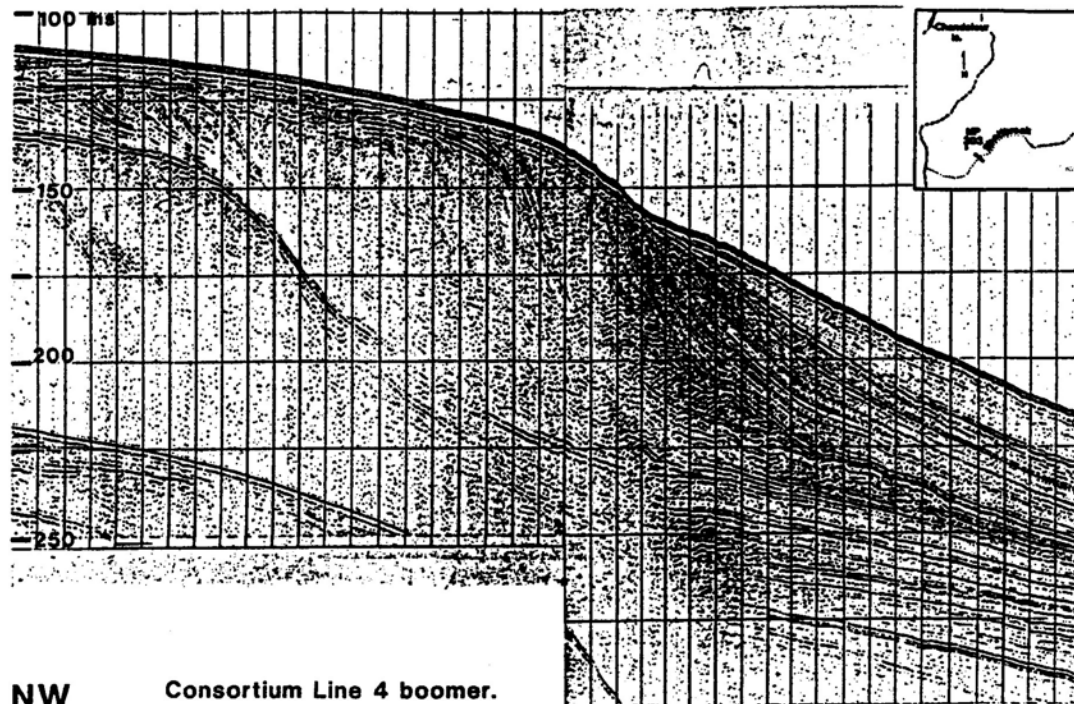
- R:** Ravinement
- MFS:** Maximum flooding surface
- SB:** Sequence boundary
- RSME:** Regressive surface of marine erosion

From: Nummedal & Molenaar, 1996









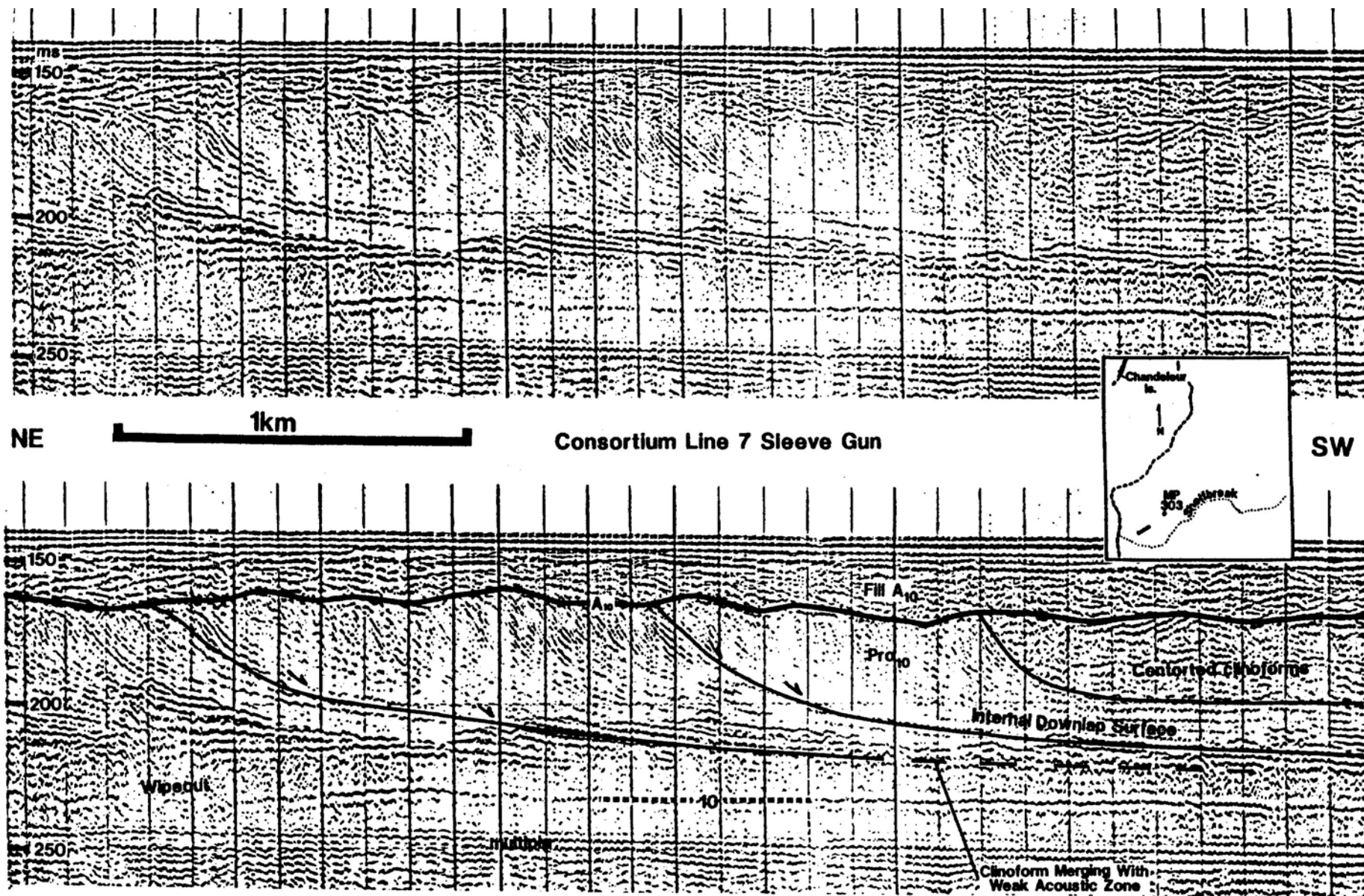
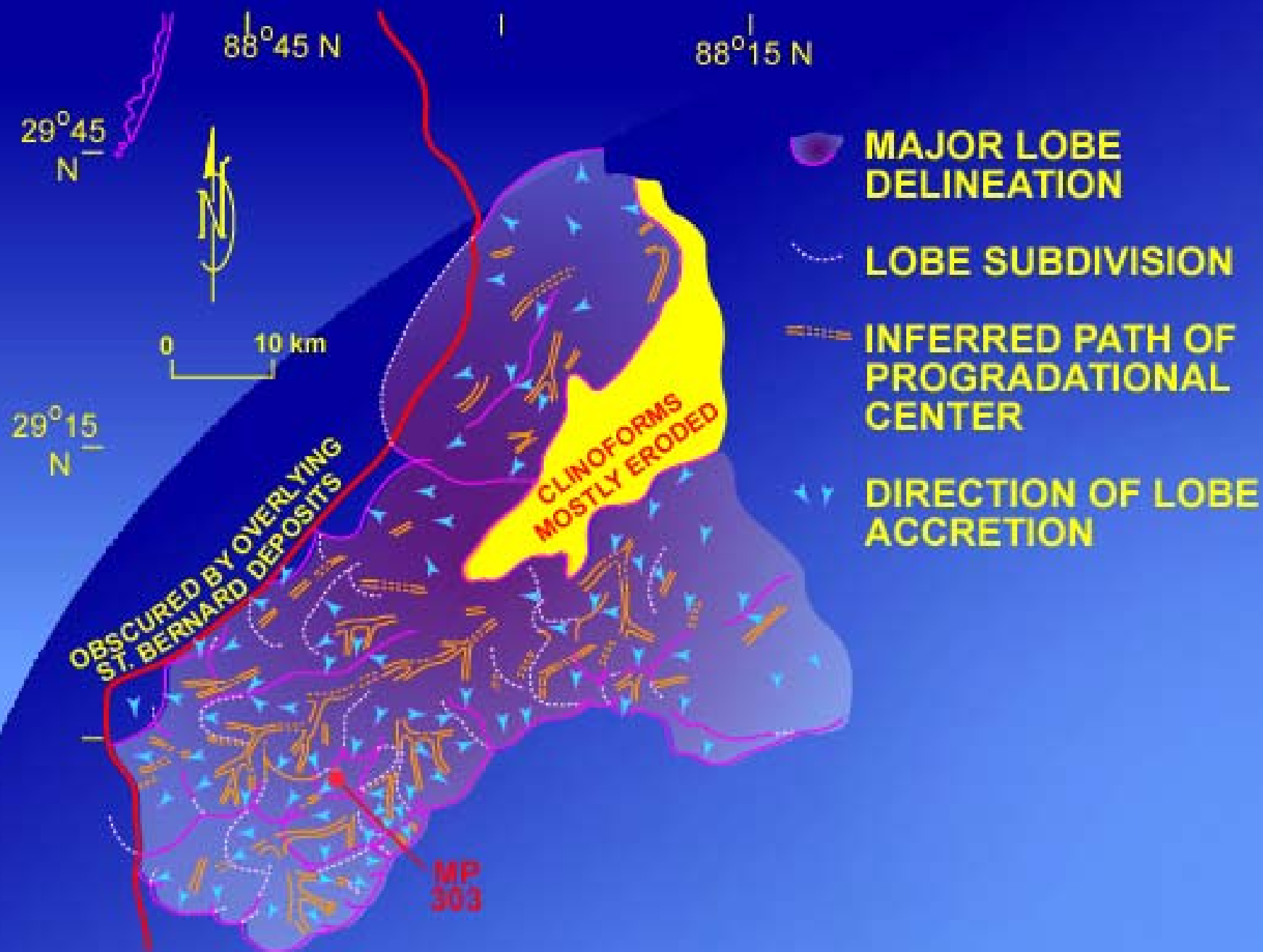
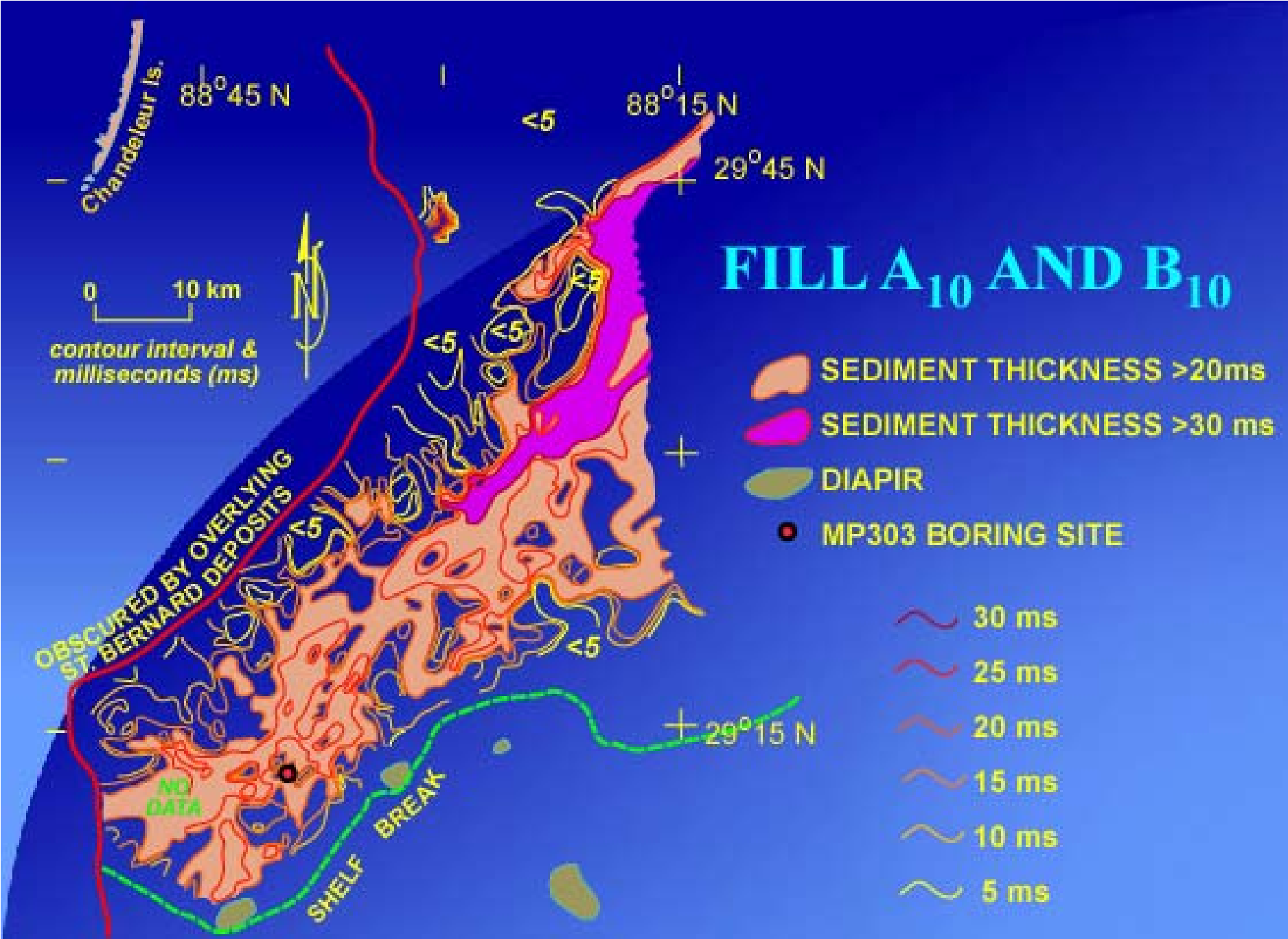


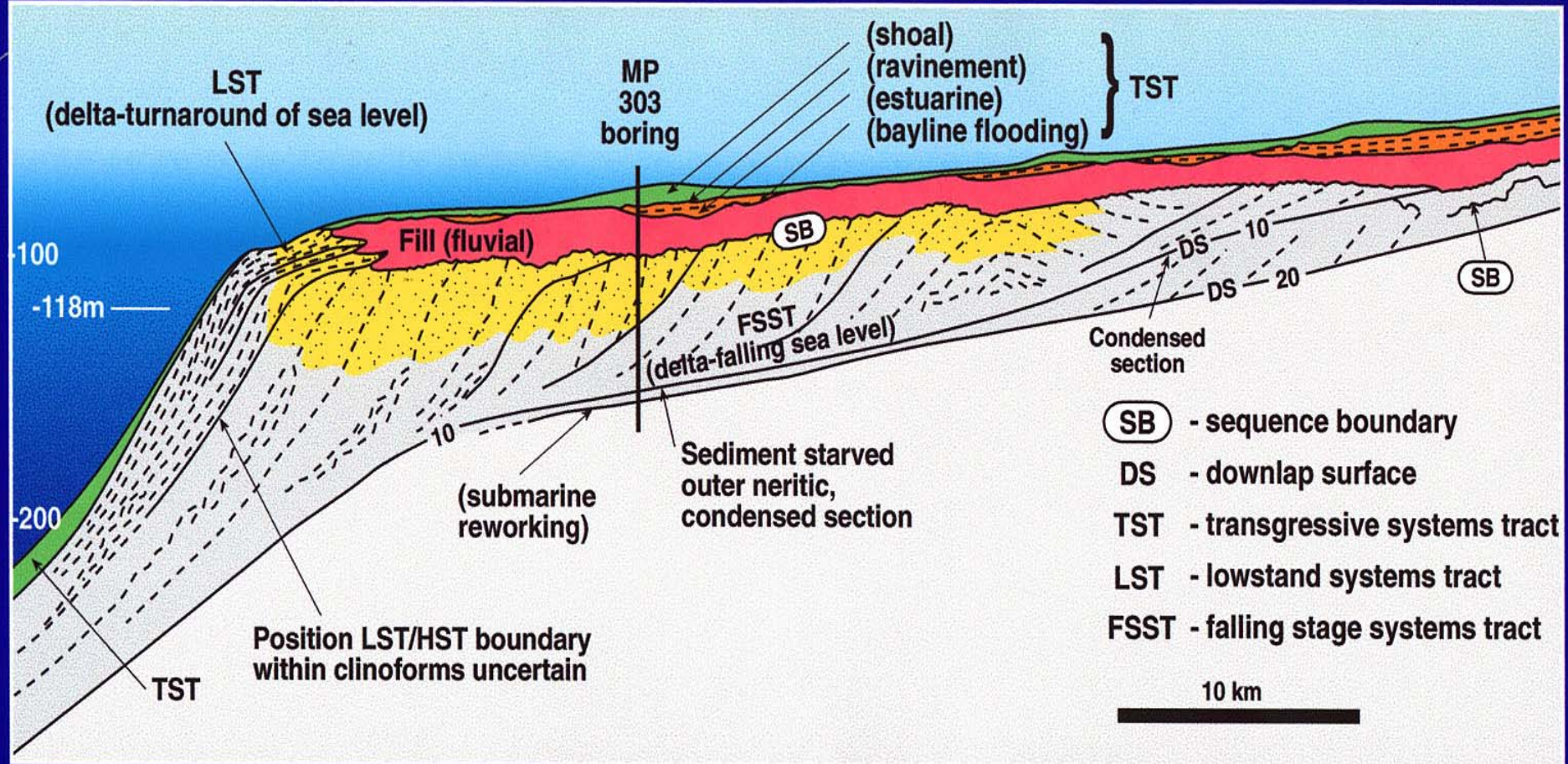
Figure 3.9. Sample ORE Geopulse seismic record of delta front clinoform seismic facies near the SW corner of the delta complex. Blank line on top, interpretation below. Note internal downlaps within the clinoform package, denoting delta-lobe switching. From Sydow (1992).





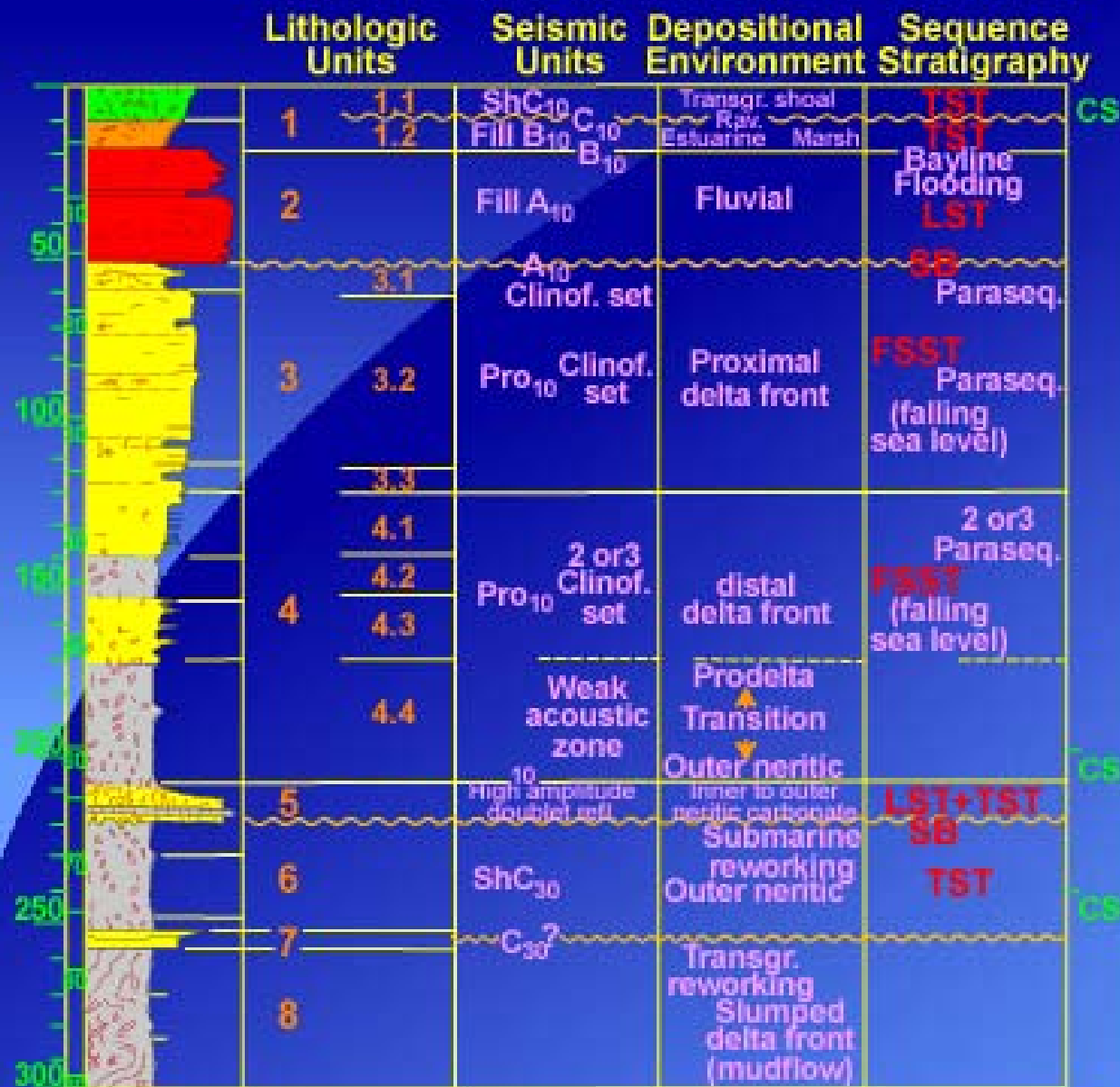
SEQUENCE STRATIGRAPHY OF THE LAGNIAPPE DELTA

present sea level



From Sydow & Roberts, 1994

BORING TROUGH LAGNIAPPE DELTA



Clinof. = clinoform

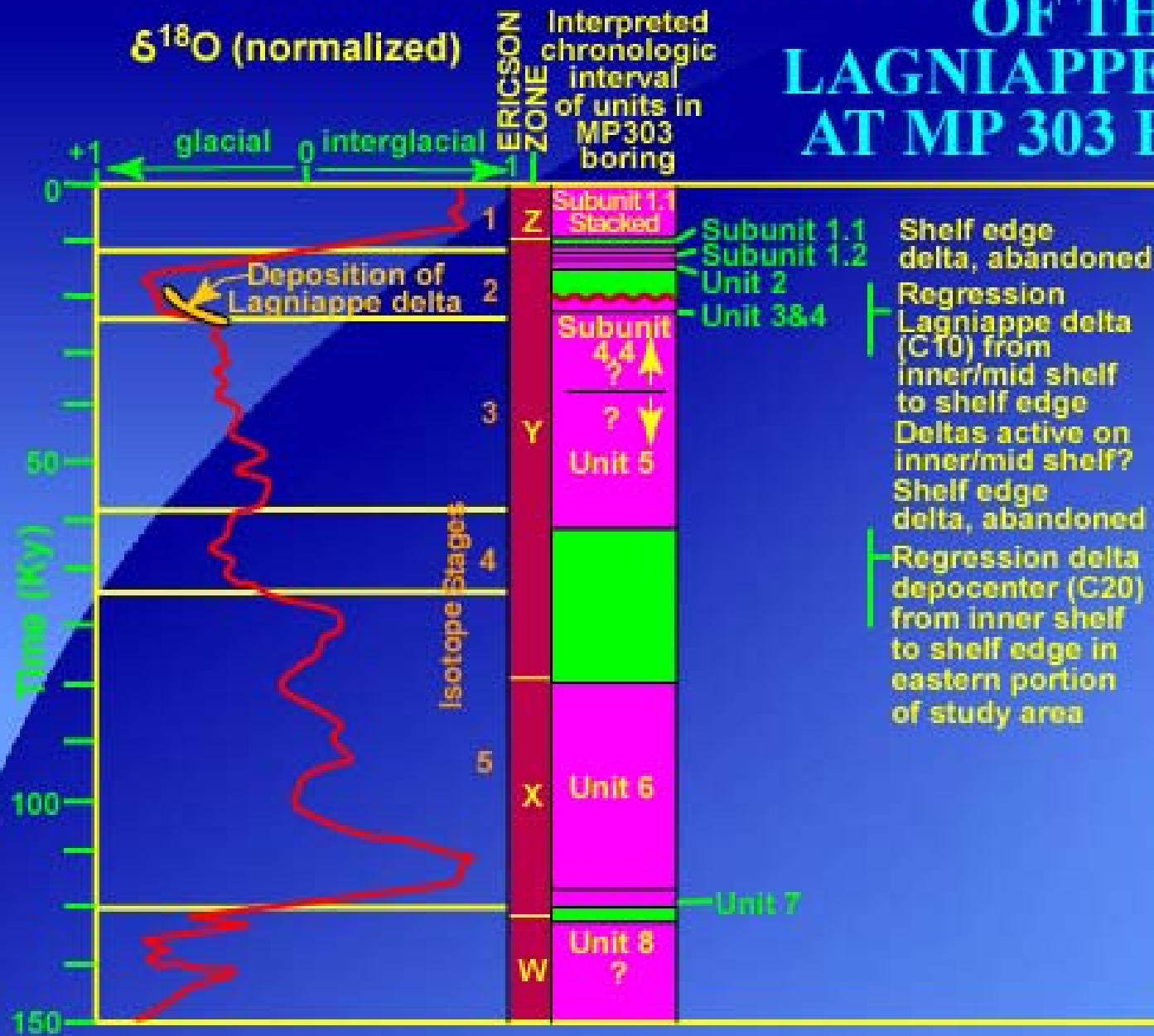
Transgr. = transgressive

Rav. = ravinement surface

CS = condensed section

Paraseq. = parasequence

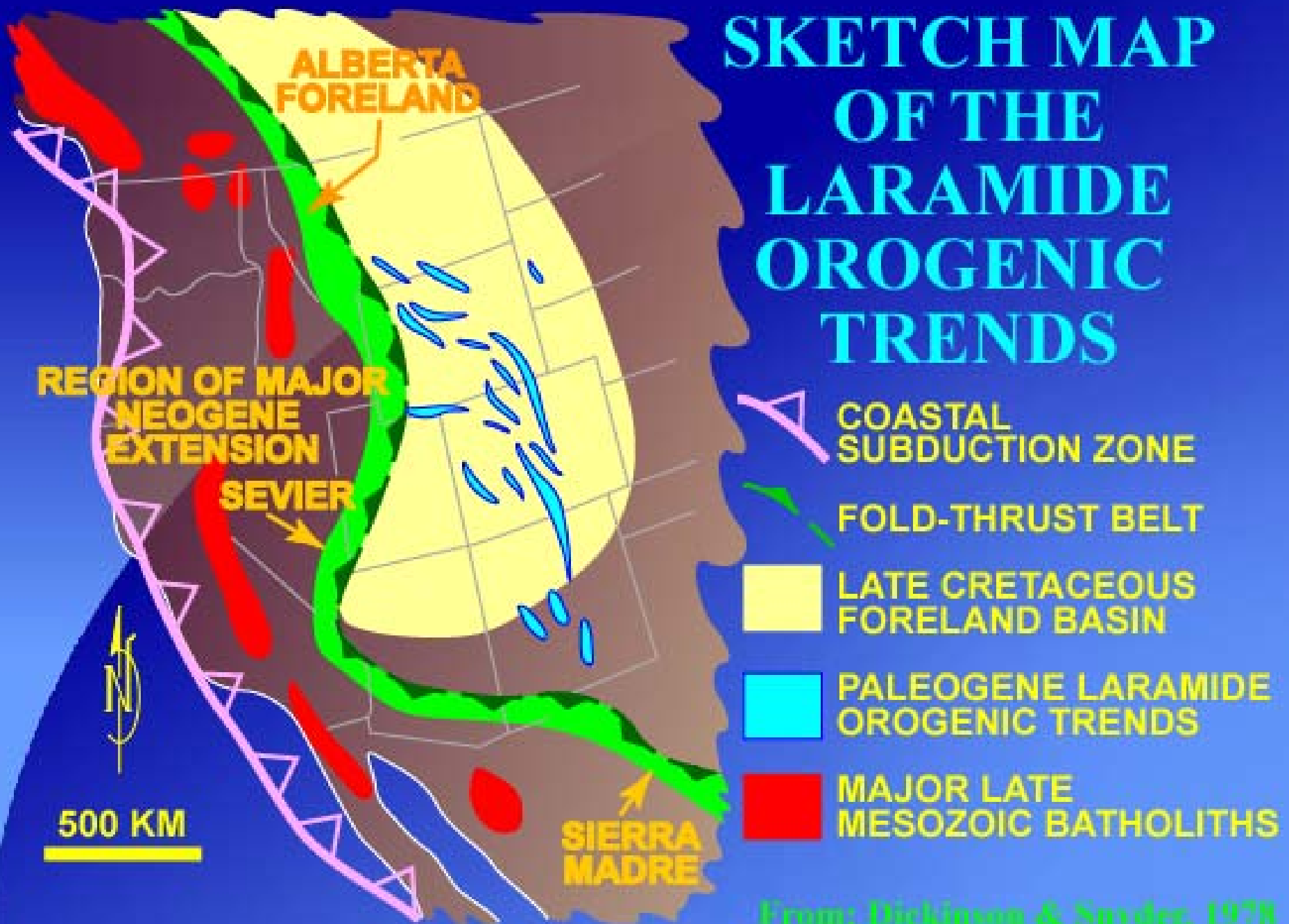
CHRONOSTRATIGRAPHY OF THE LAGNIAPPE DELTA AT MP 303 BORING



Modified after
SPOT MAP series
of Matassa et al. 1987

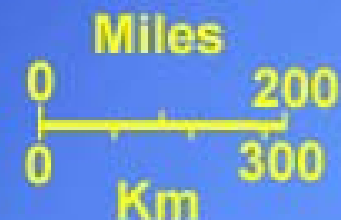
From
Hyde & Roberts, 1994

SKETCH MAP OF THE LARAMIDE OROGENIC TRENDS

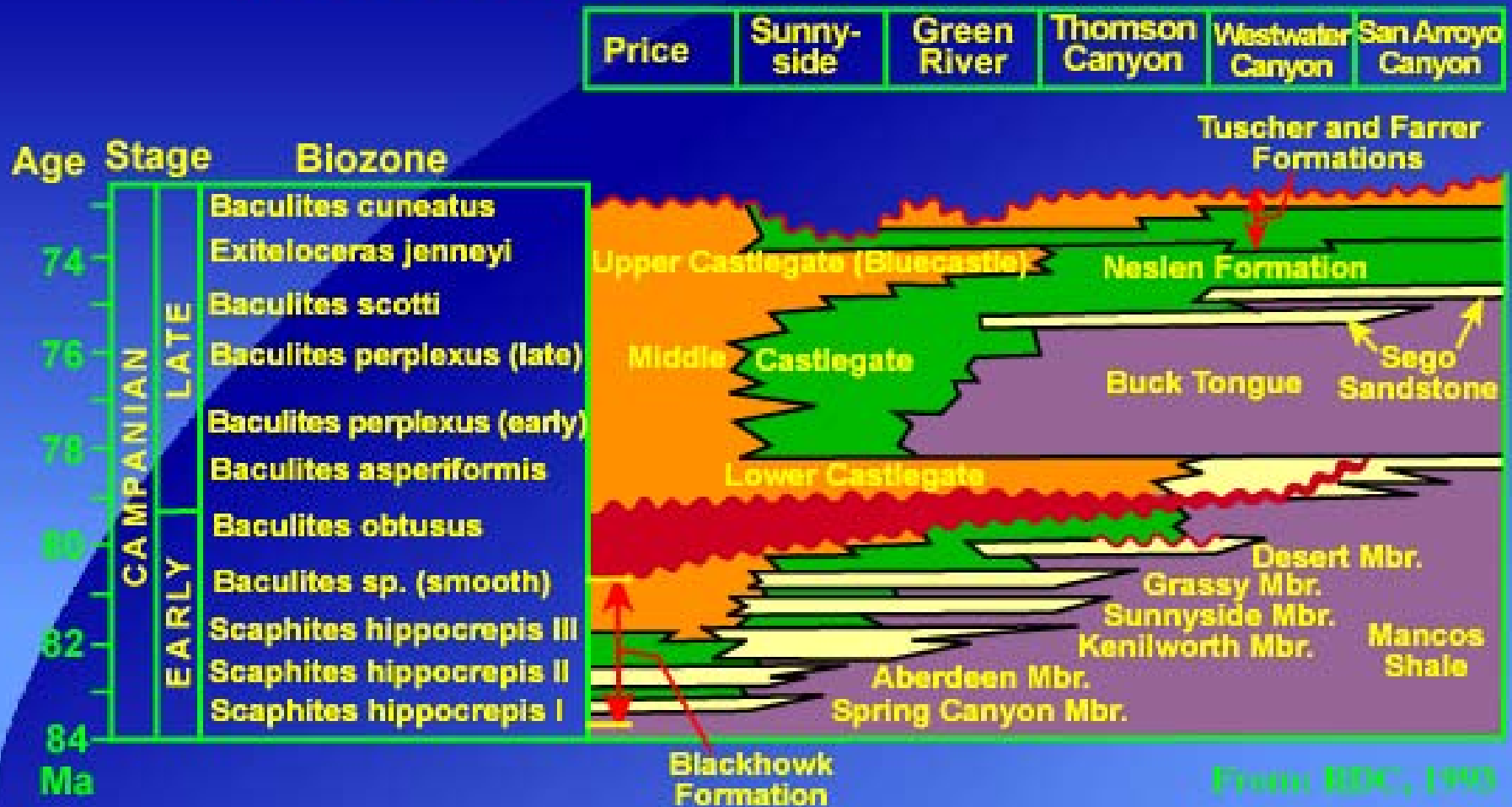


From: Dickinson & Snyder, 1978

MAJOR LARAMIDE ROCKY MOUNTAINS BASINS

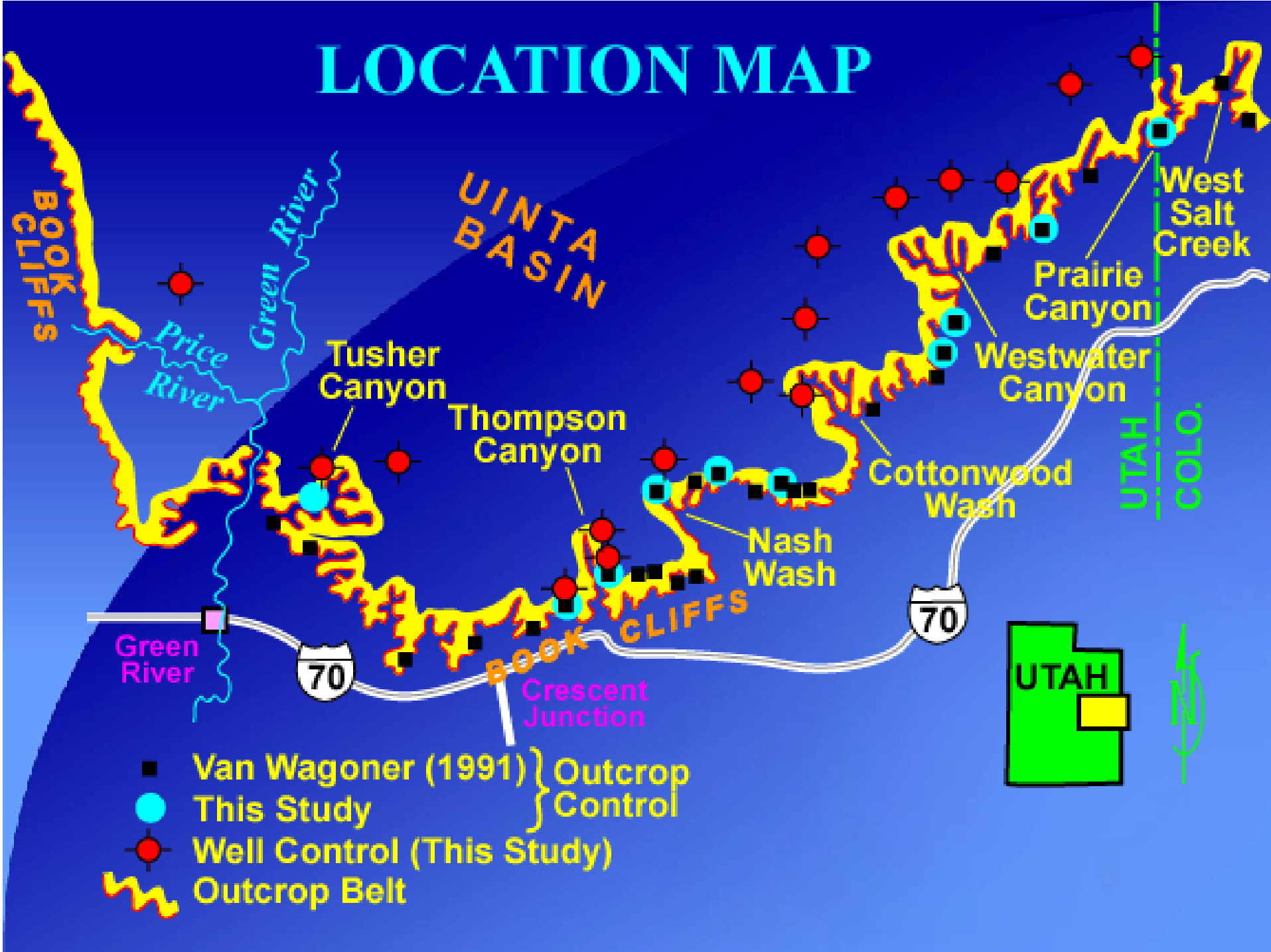


STRATIGRAPHIC TERMINOLOGY FOR SOUTHERN UINTA BASIN, UTAH

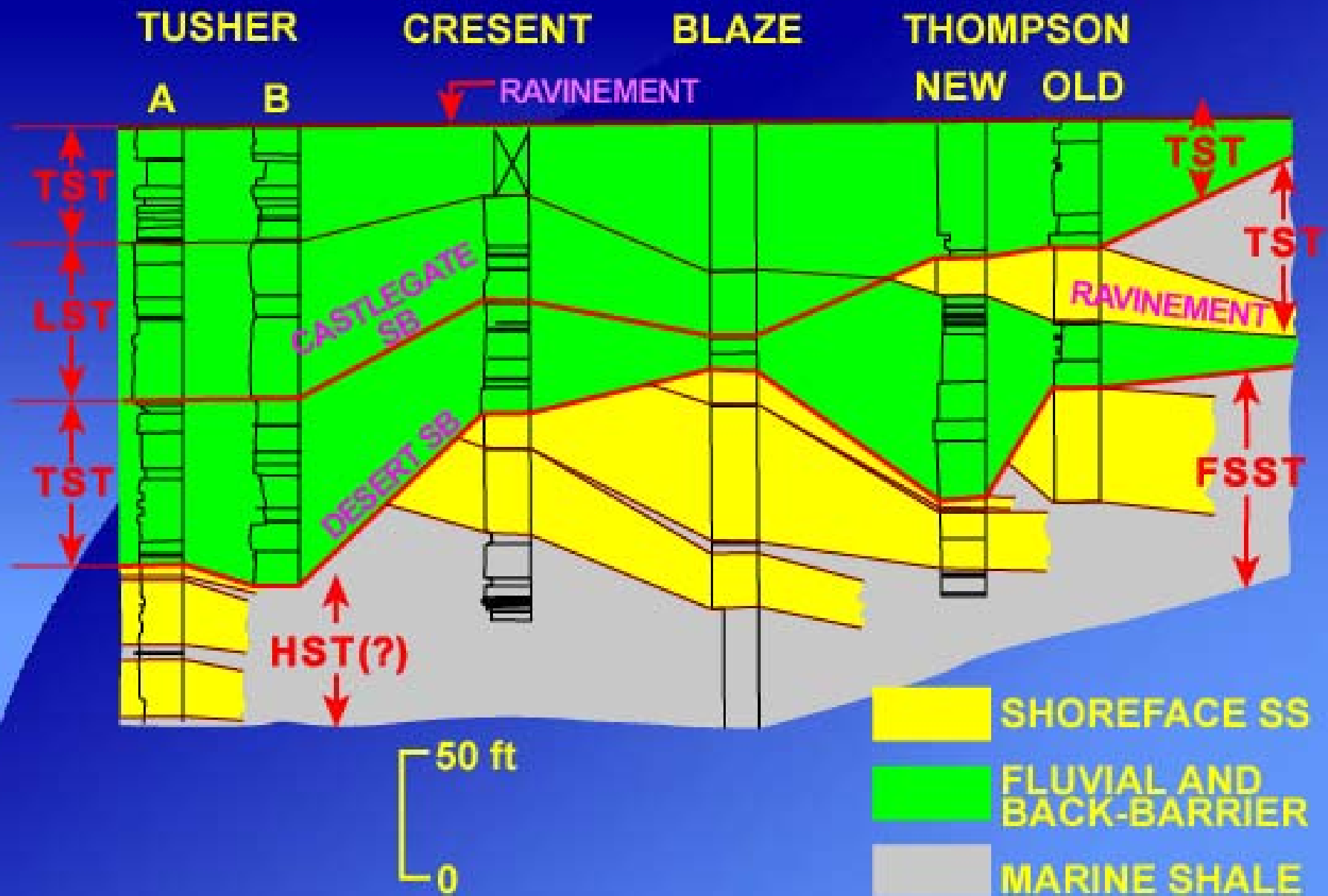




LOCATION MAP



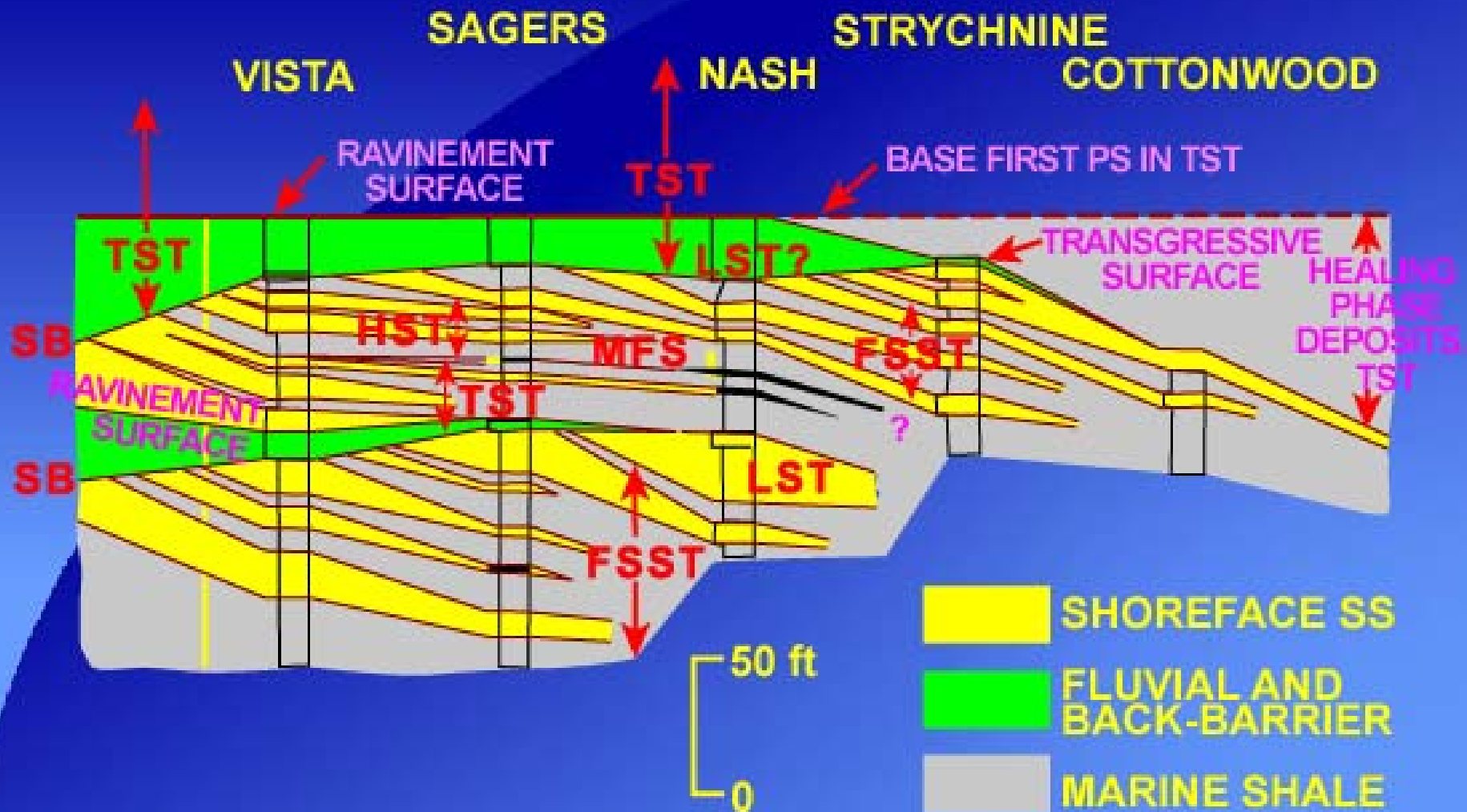
DESERT-CASTLEGATE PART 1







DESERT-CASTLEGATE PART 2



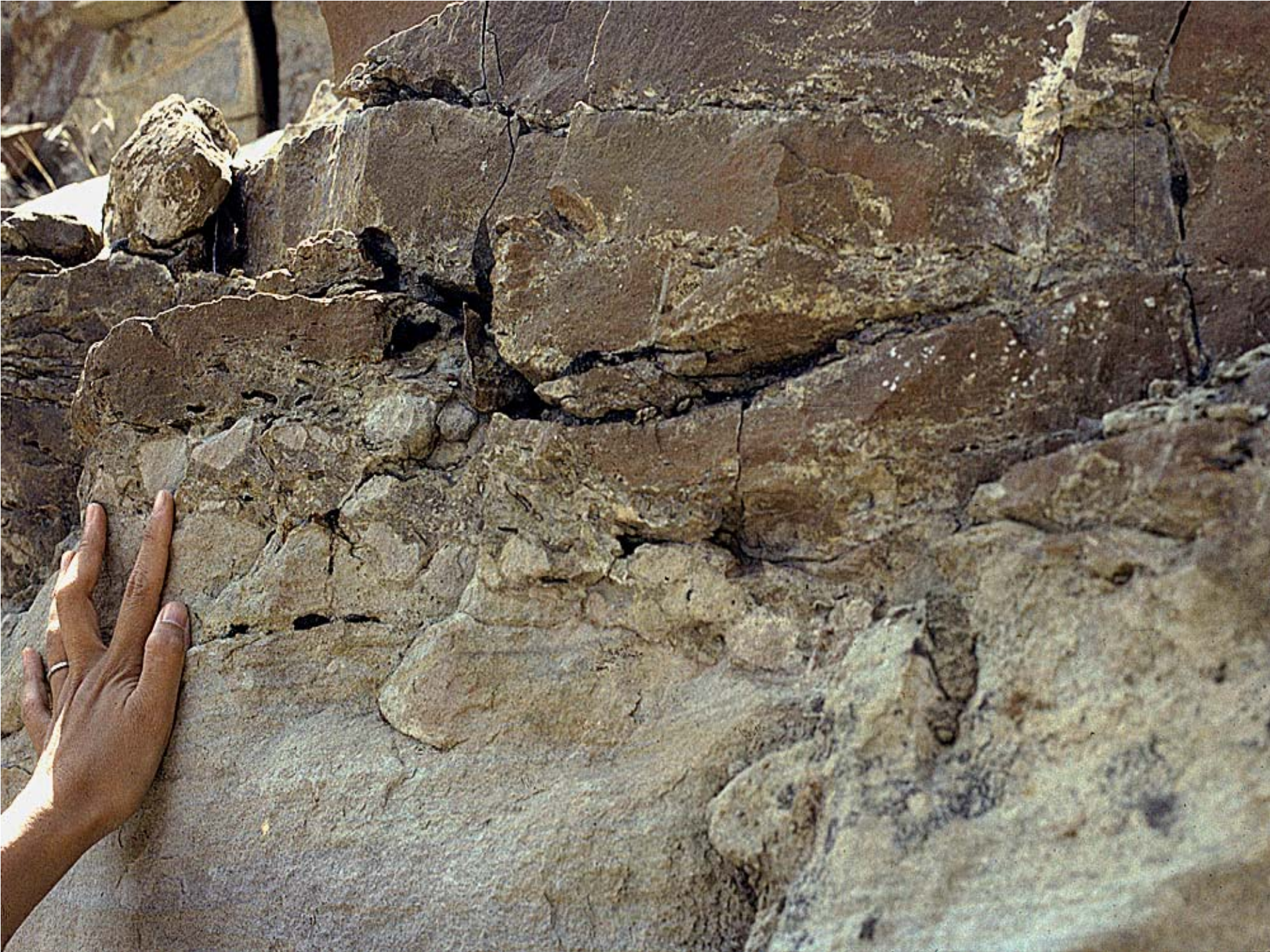






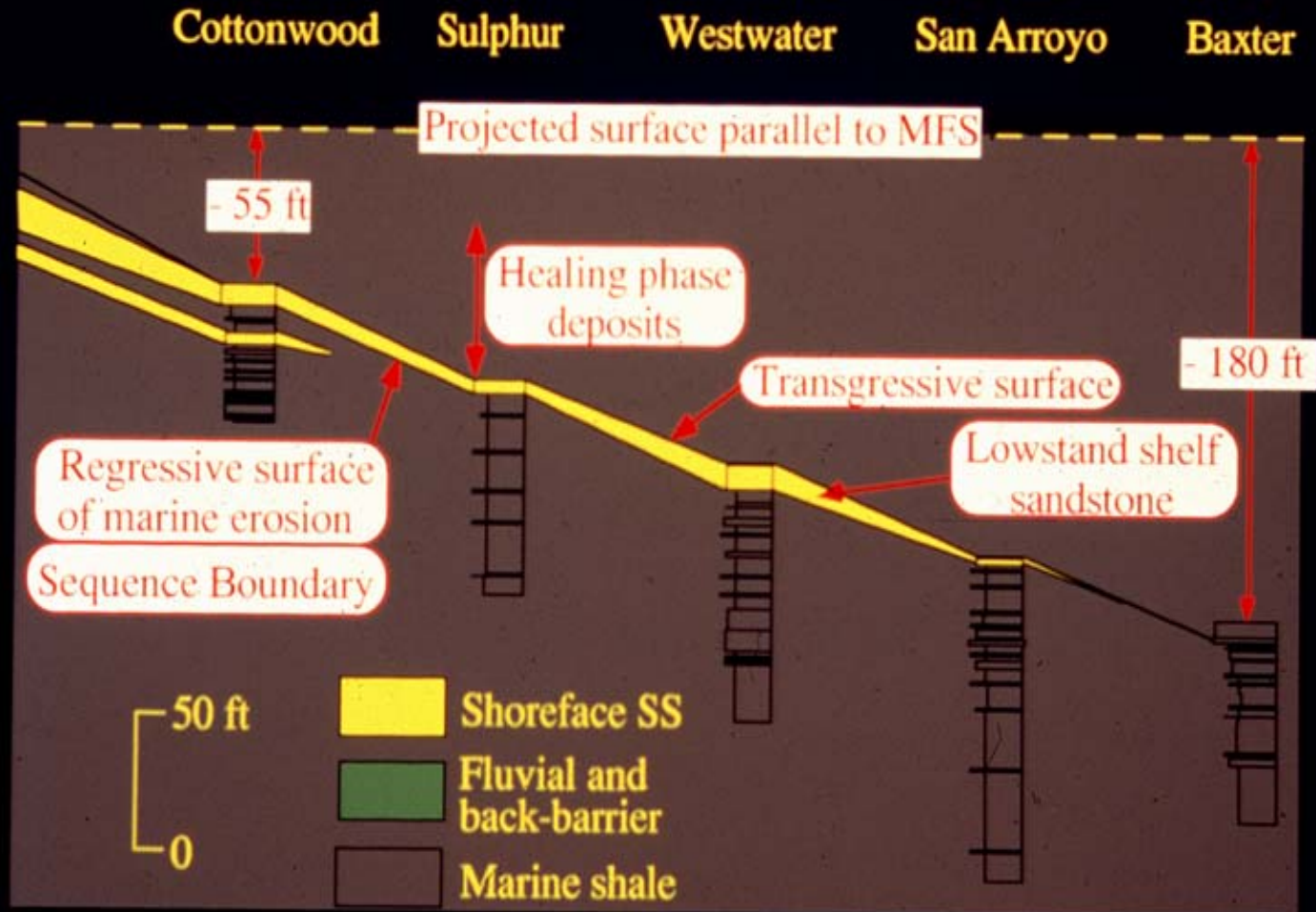






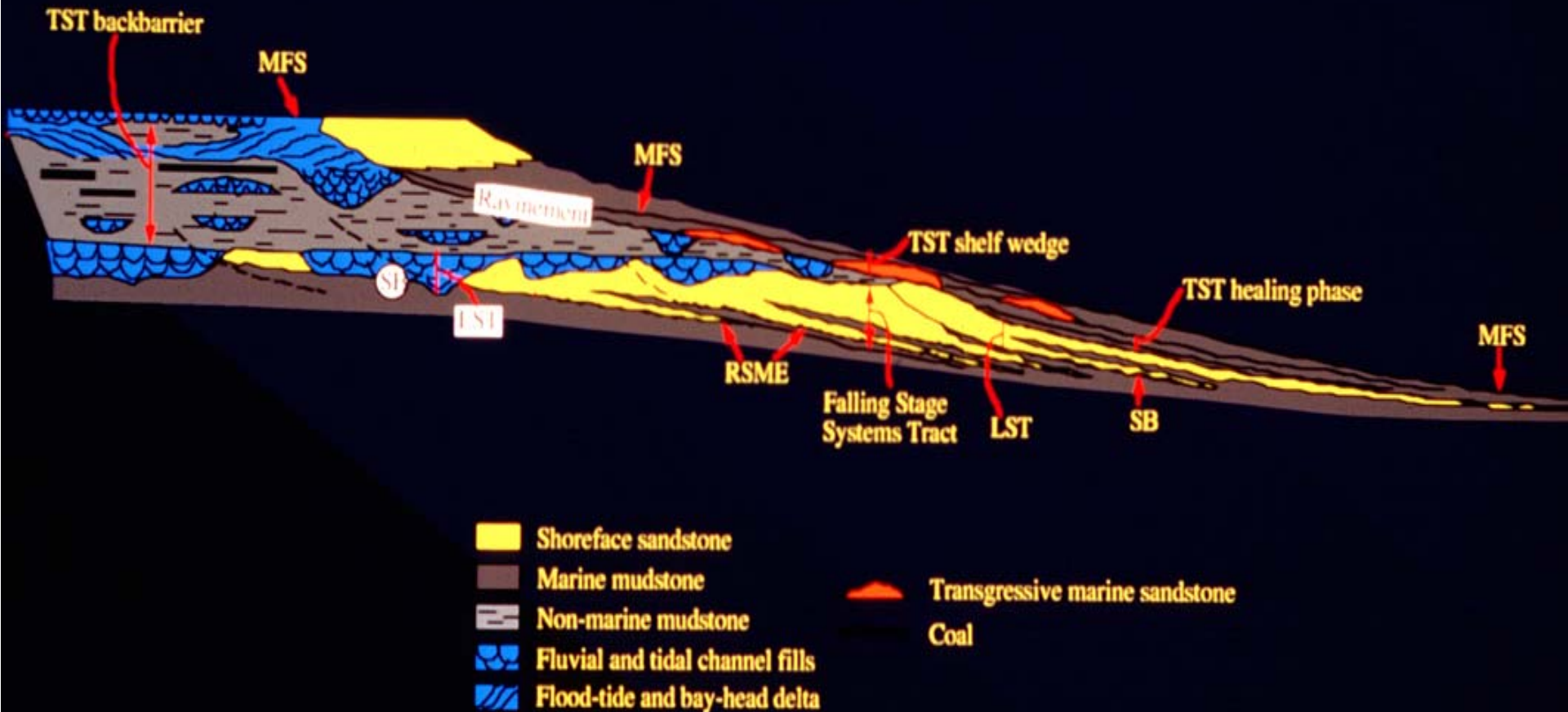


Desert-Castlegate Part 3





Ramp Sequence Model 2



Conclusions - 1

- During sea level fall, accommodation space on the continental shelf is reduced
- Therefore, a regressive surface of marine erosion (RSME) forms at the base of the prograding shoreface
- This RSME is not the sequence boundary; typically, multiple RSMEs exist within a Falling Stage Systems Tract

Conclusions - 2

- The Falling Stage Systems tract is characterized by 'offlap': successively younger strata extend less far landward. All other systems tracts onlap the SB
- Quaternary shelf edge deltas appear to be composed primarily of delta front (or shoreface) sands of the FSST, and formed just prior to the last sea level lowstand isotope stage 2)

Conclusions - 3

Cretaceous shallow marine sequences in the Book Cliffs of Utah consist of the following systems tracts:

- Most of the shoreface SS belong to the FSST, a minor amount is LST
- The fluvial sandstone is mostly LST
- Estuarine heterolithic strata dominate the TST
- Strata of the HST are essentially absent

Thank You!

