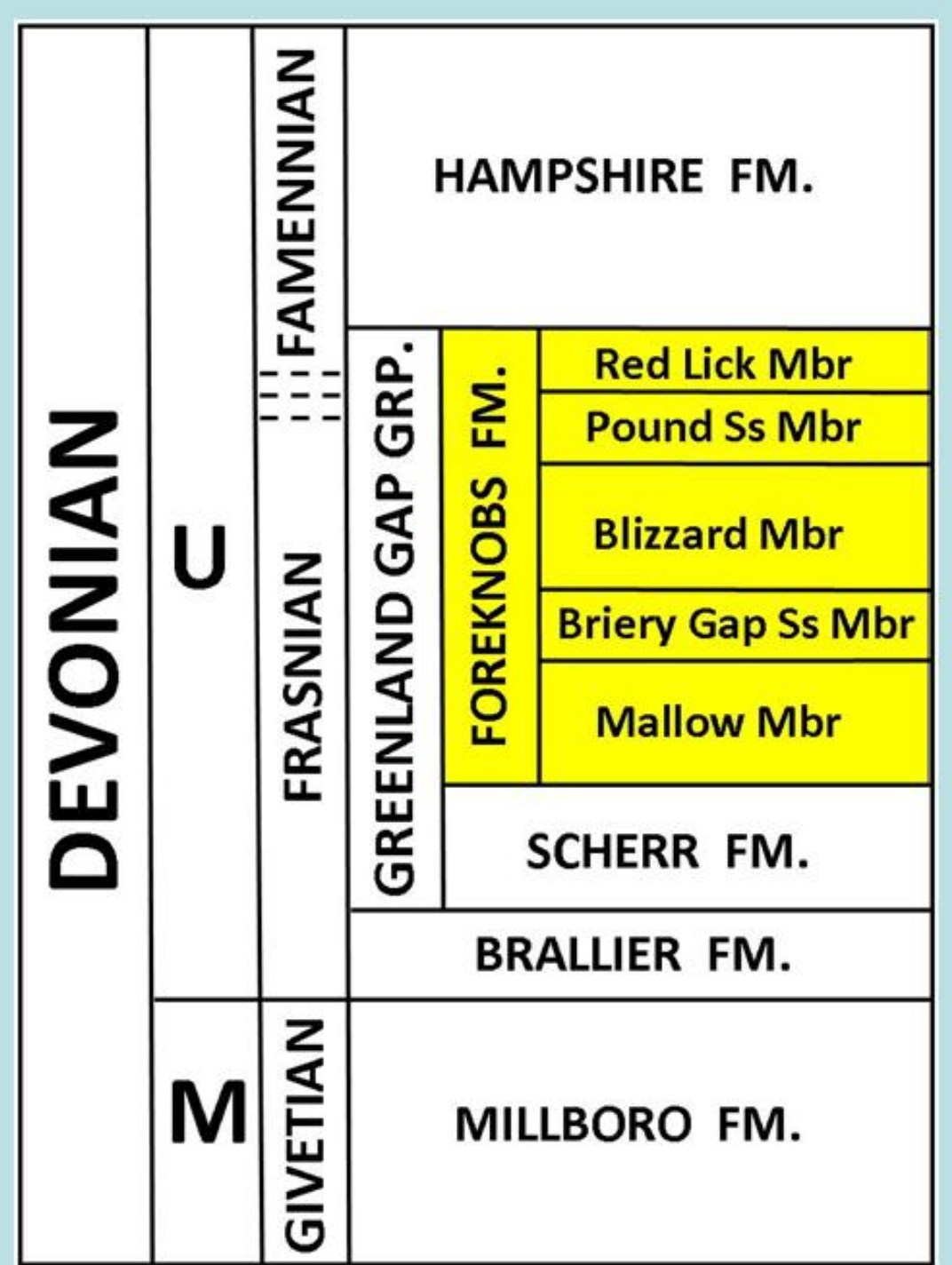


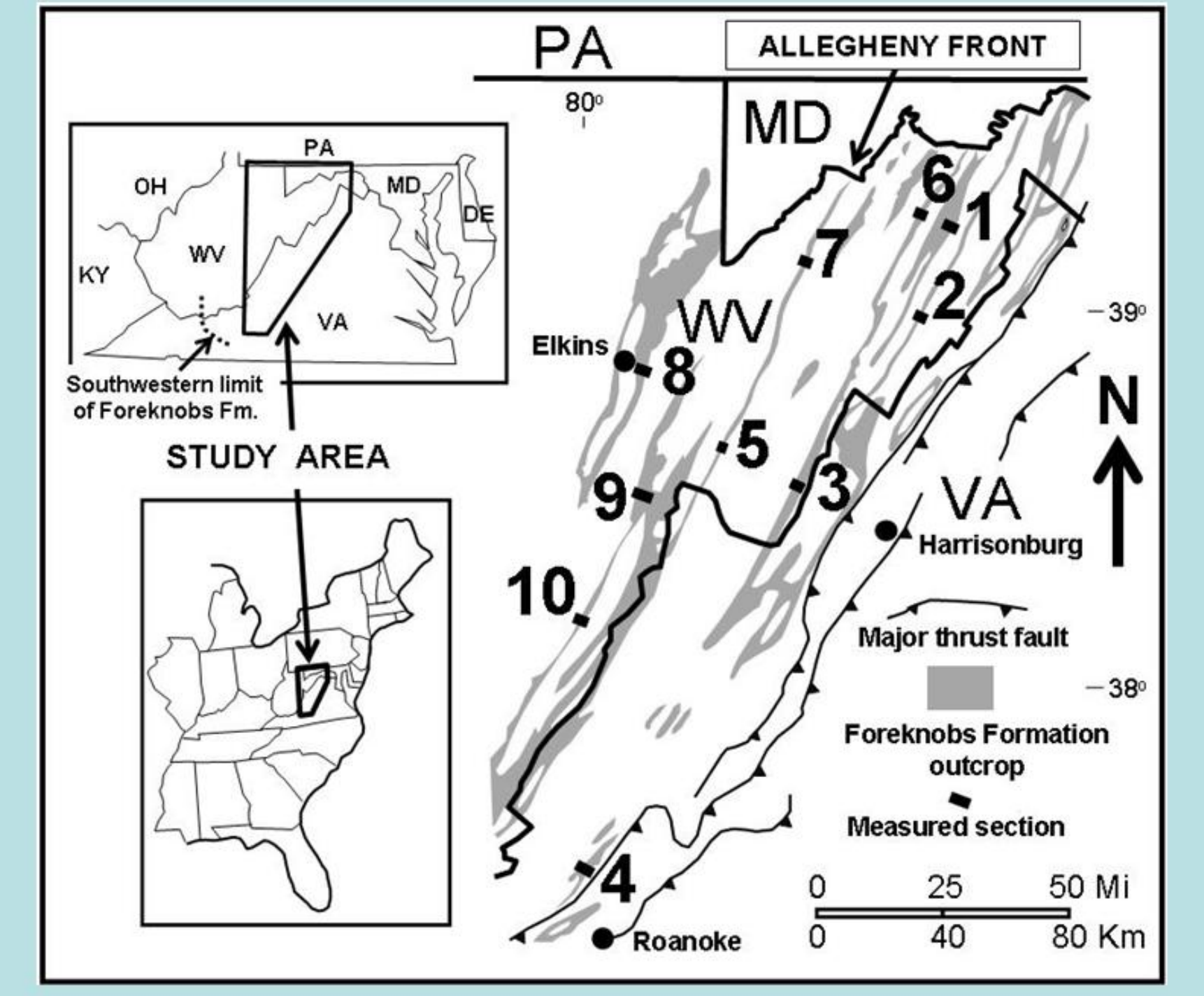
A Glacioeustatic Origin for the Upper Devonian Foreknobs Formation, South-Central Appalachian Basin, West Virginia-Virginia

W. S. McClung – retired Chevron USA Inc.
 K.A. Eriksson – Dept. of Geosciences, Virginia Tech
 D.O. Terry, Jr. – Dept. of Earth & Environmental Science, Temple Univ.
 C.A. Cuffey – Chevron USA Inc.

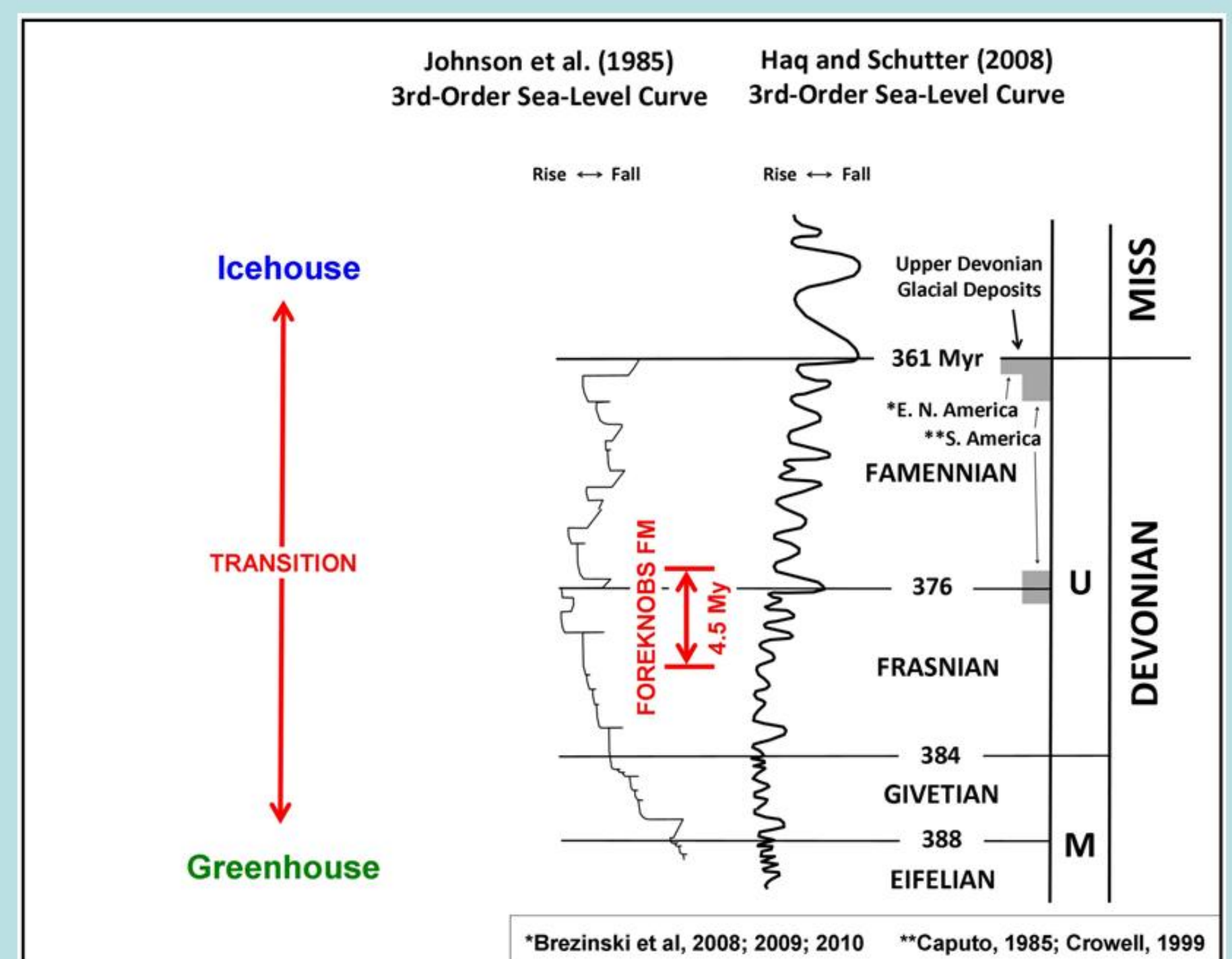
McClung, W.S., Eriksson, K.A., Terry, D.O. Jr., Cuffey, C.A., 2013, Sequence stratigraphic hierarchy of the Upper Devonian Foreknobs Formation, central Appalachian Basin, USA: Evidence for transitional greenhouse to icehouse conditions, *Jour. of Palaeogeography, Palaeoclimatology, Palaeoecology*, v. 387, p. 104-125.



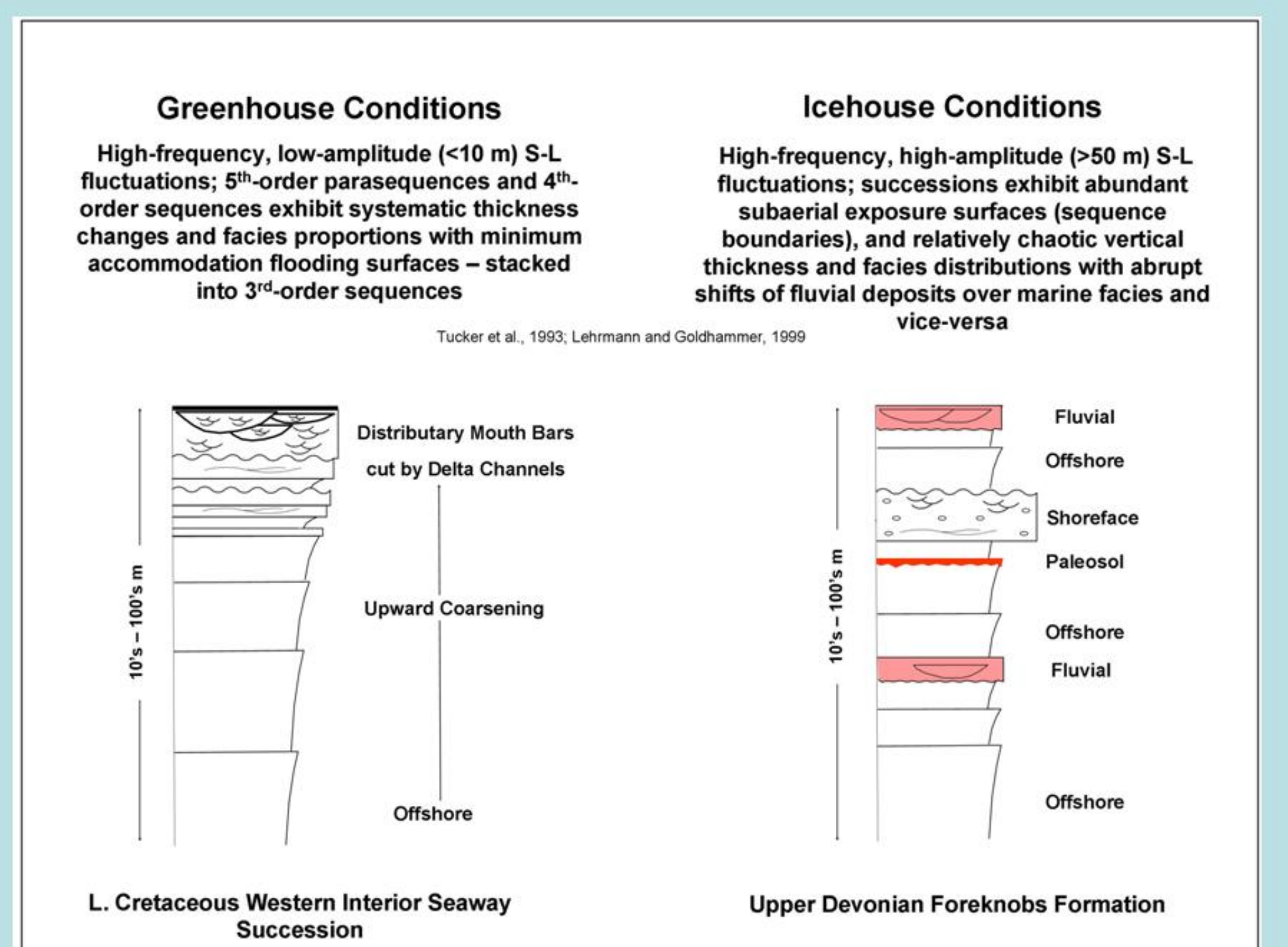
STRATIGRAPHIC NOMENCLATURE OF THE FOREKNOBS FORMATION



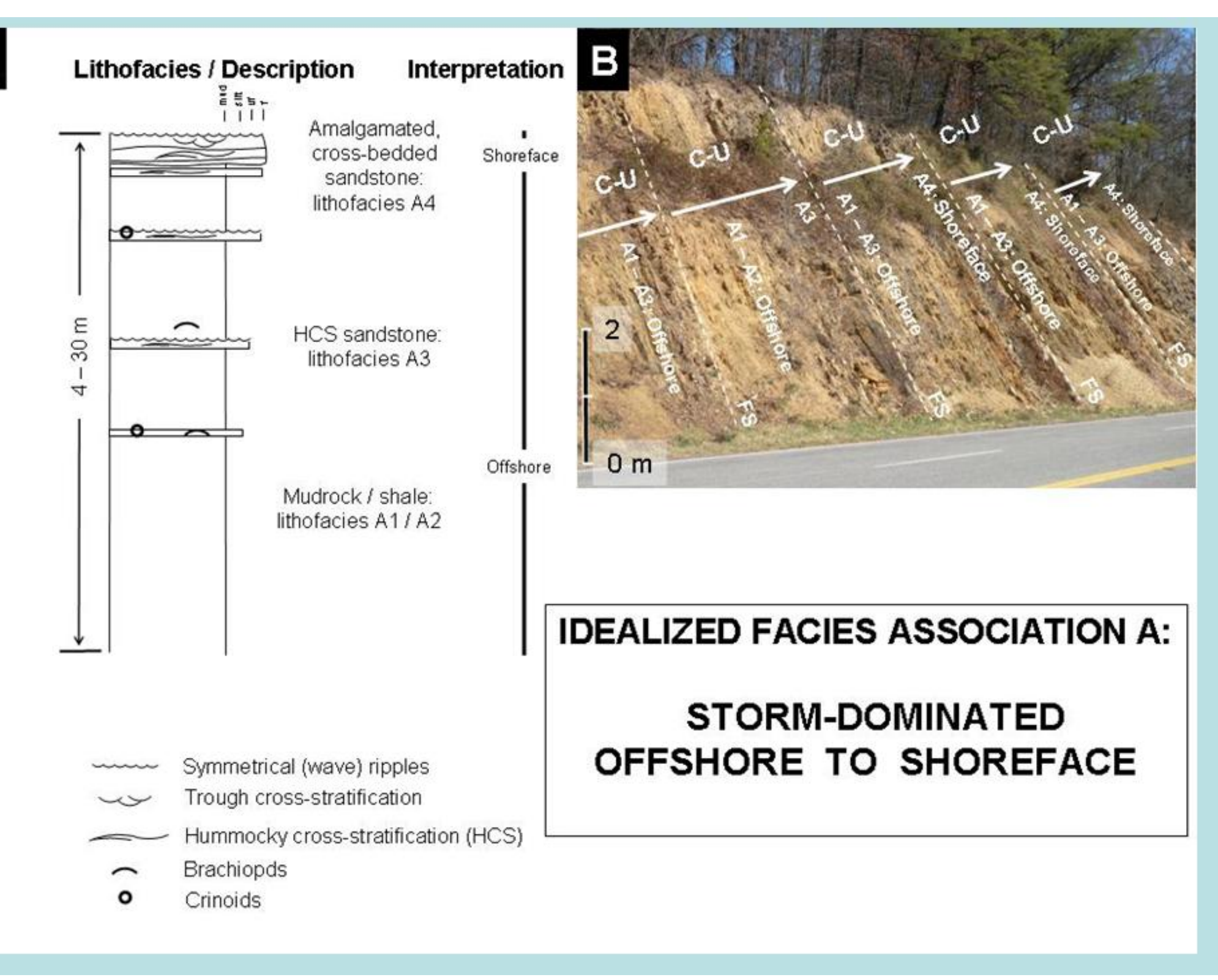
MAP OF STUDY AREA - FOREKNOBS FORMATION MEASURED SECTIONS (10)



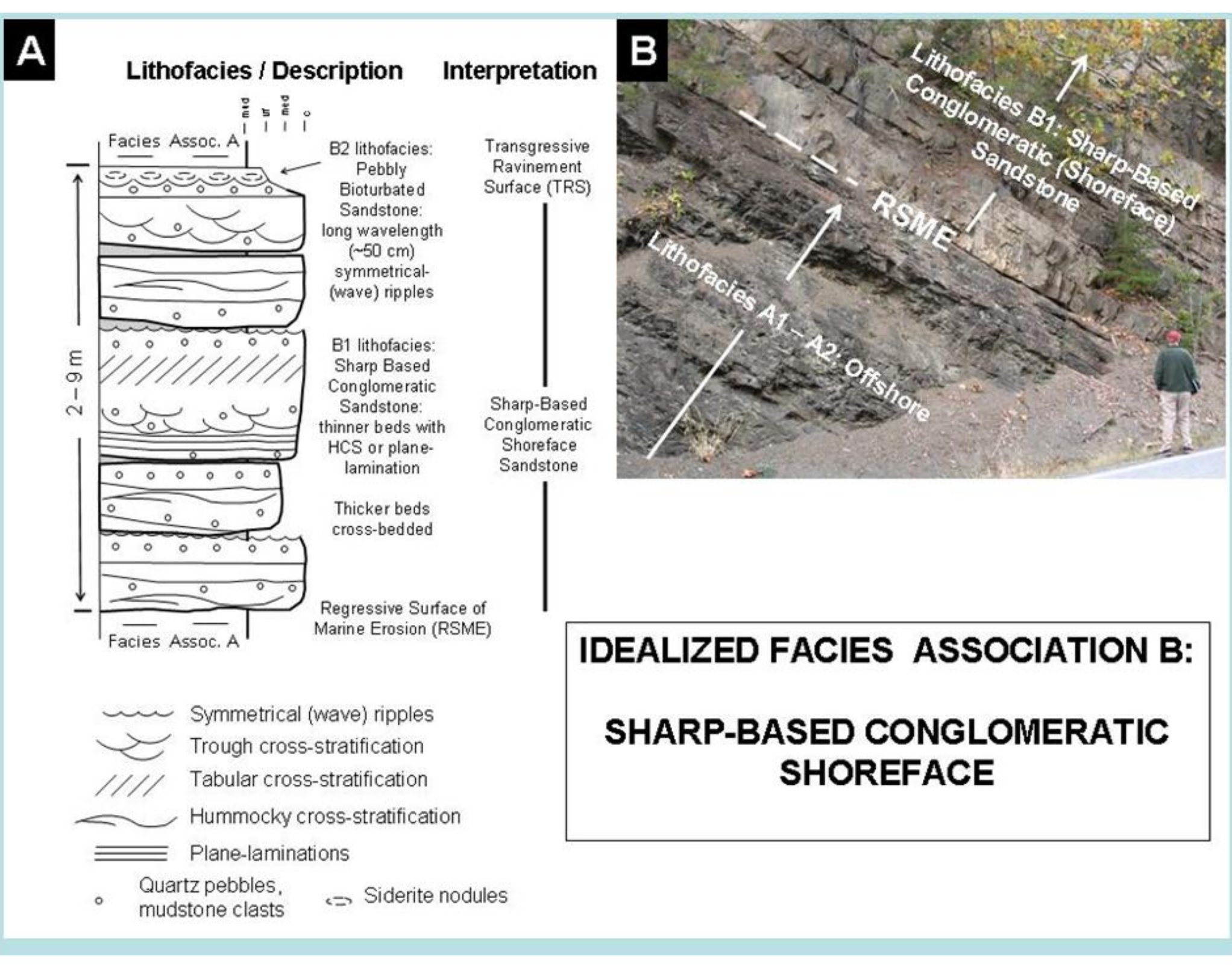
3rd-ORDER SEA-LEVEL CURVES; GREENHOUSE – ICEHOUSE TRANSITION



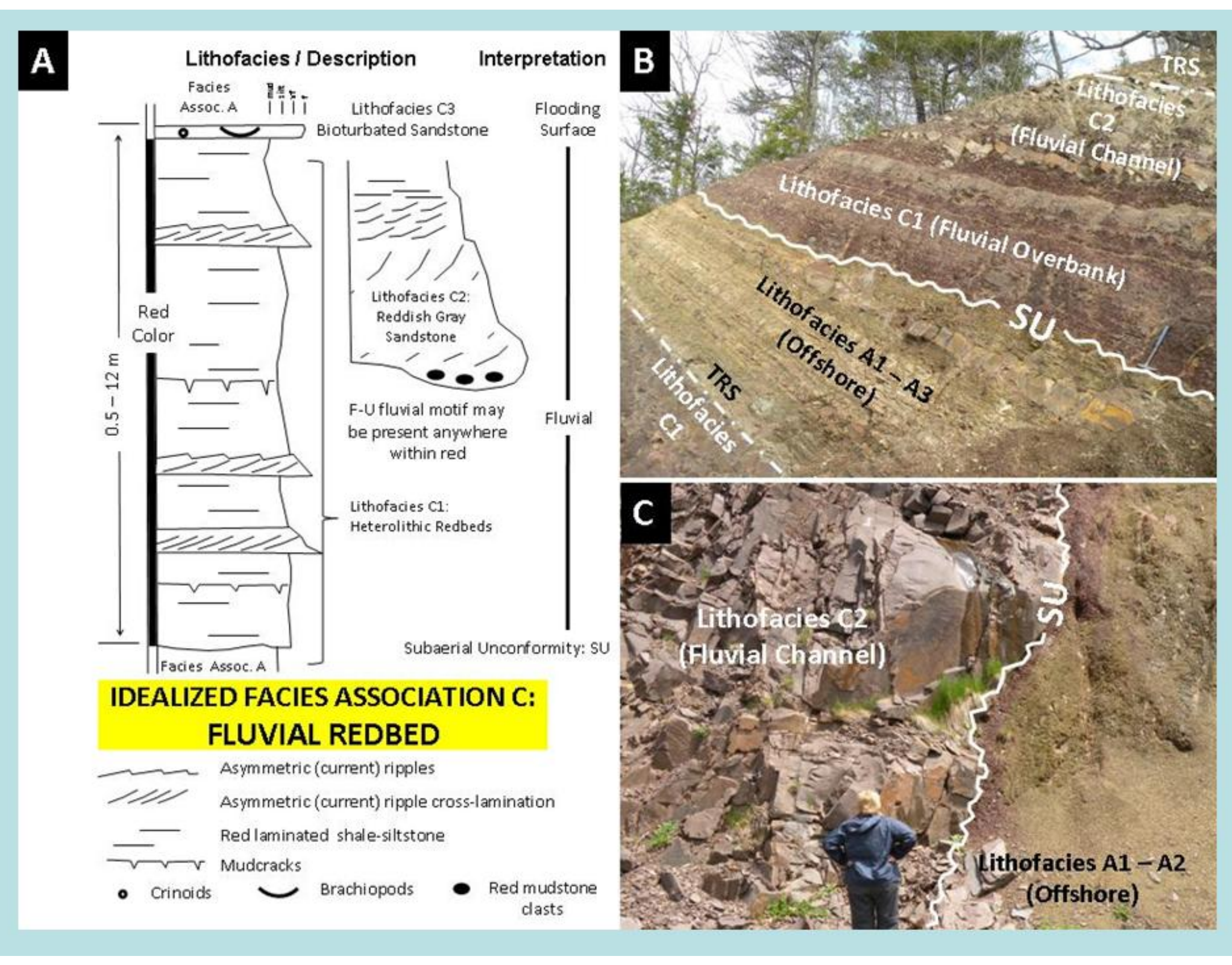
Greenhouse Conditions vs. Icehouse Conditions



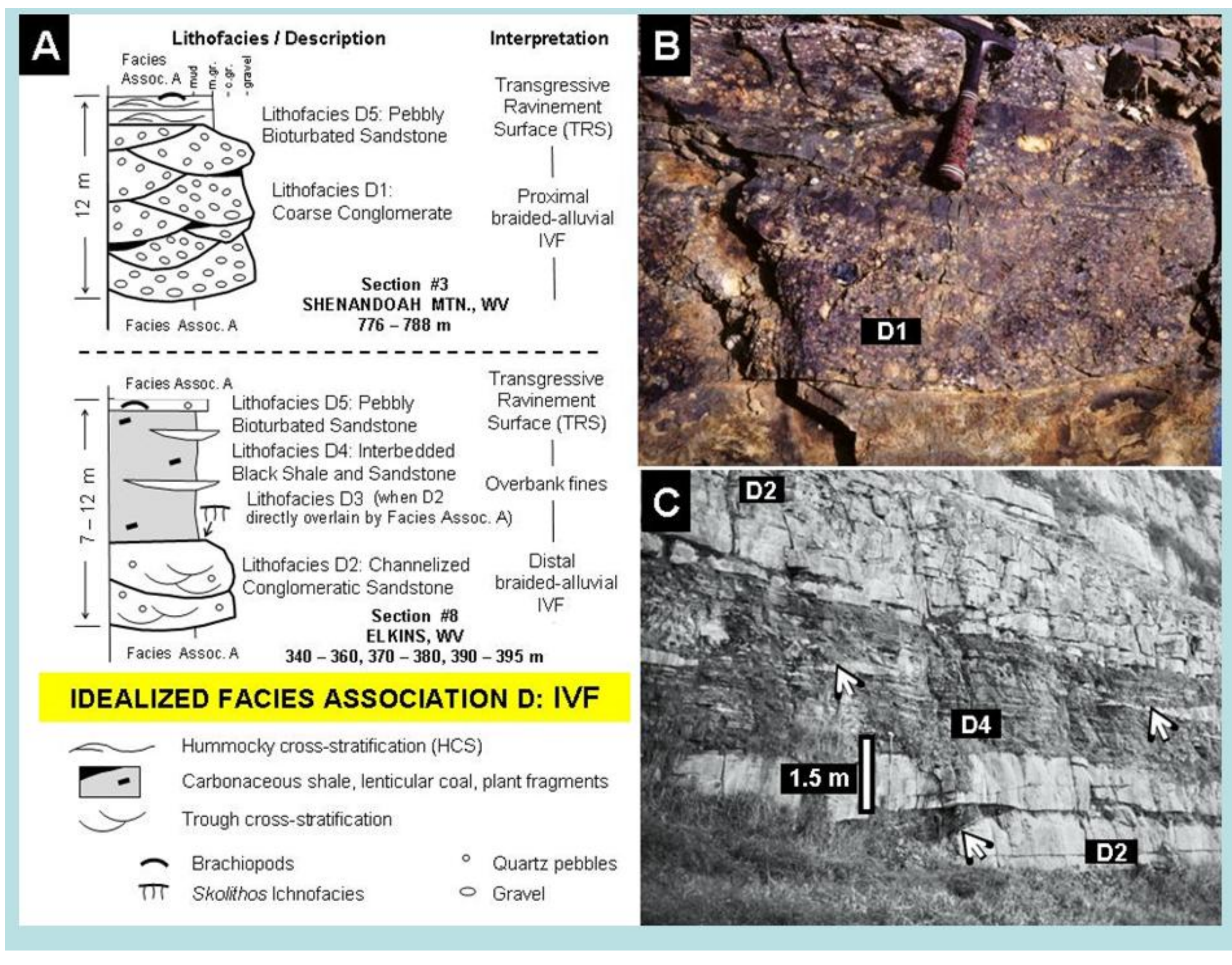
IDEALIZED FACIES ASSOCIATION A: STORM-DOMINATED OFFSHORE TO SHOREFACE



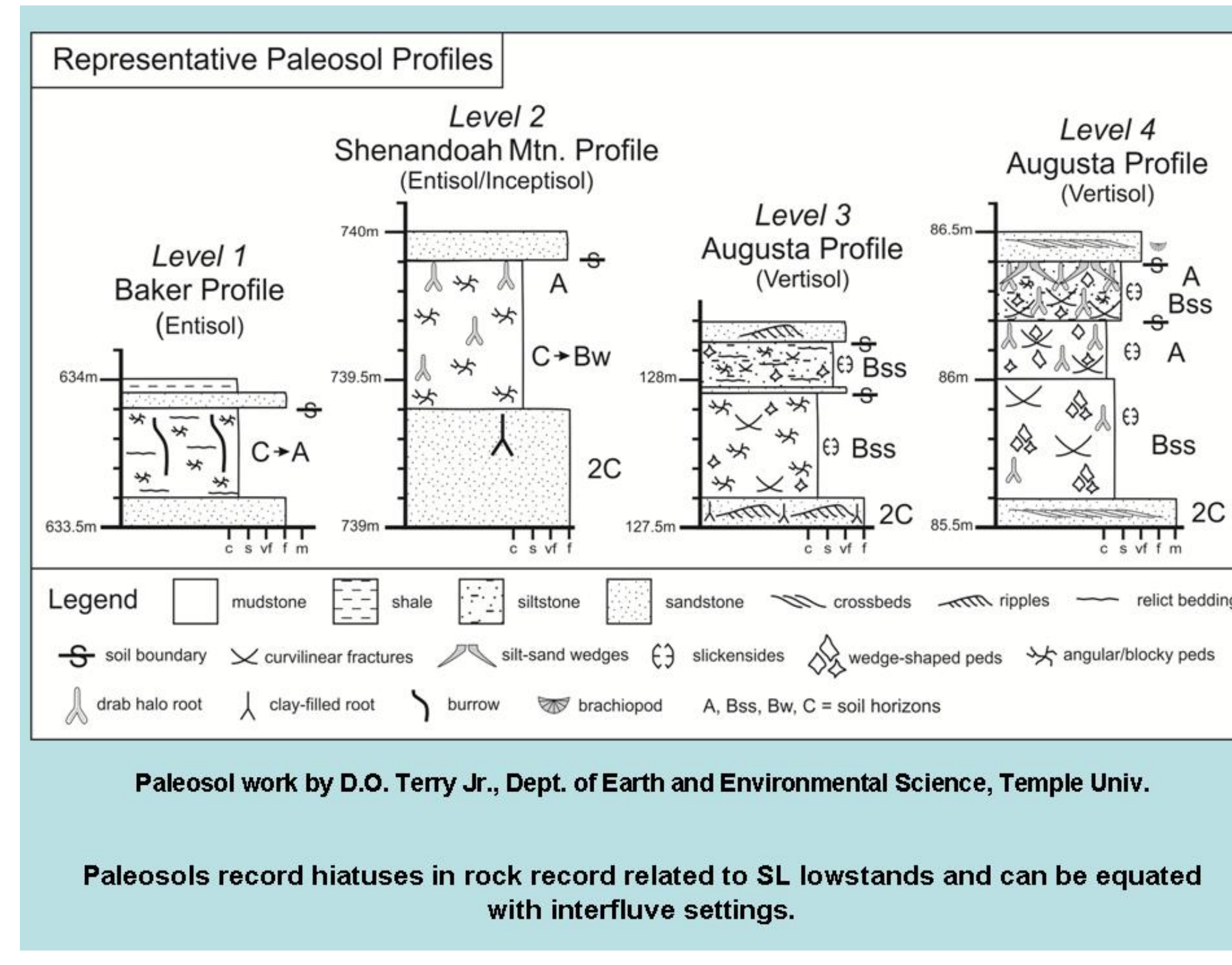
IDEALIZED FACIES ASSOCIATION B: SHARP-BASED CONGLOMERATIC SHOREFACE



IDEALIZED FACIES ASSOCIATION C: FLUVIAL REDDED



IDEALIZED FACIES ASSOCIATION D: IVF

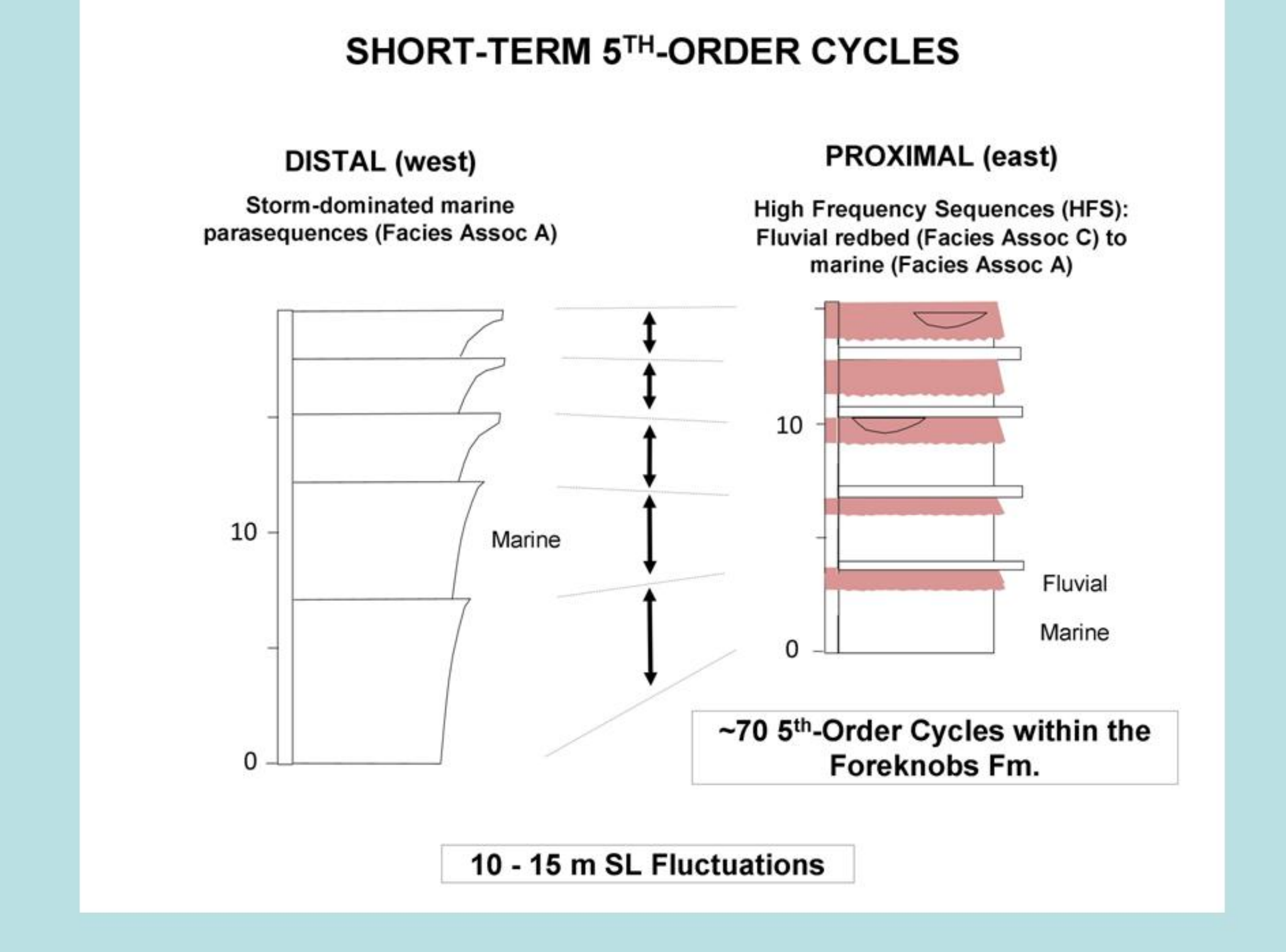


Representative Paleosol Profiles

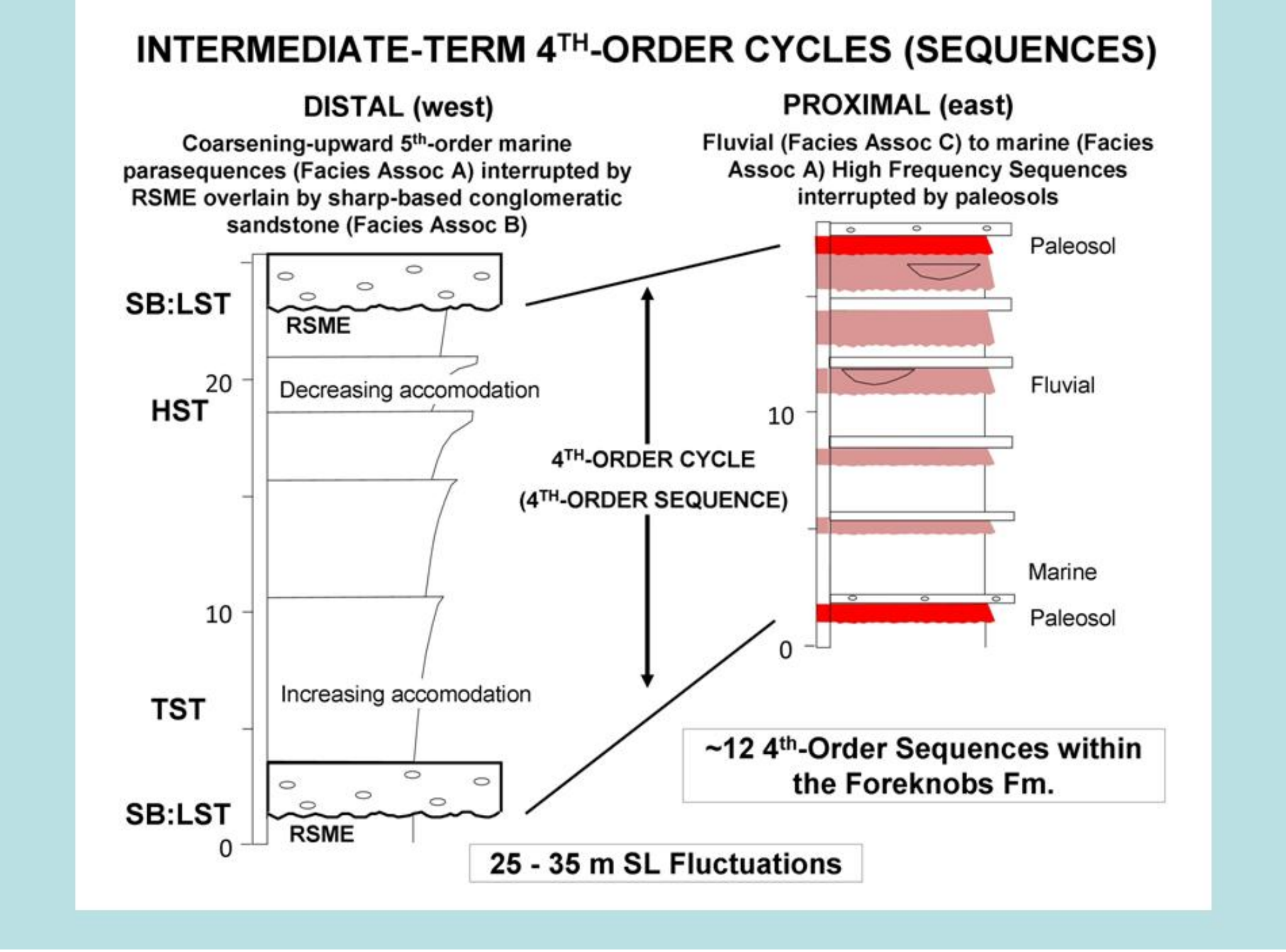
Foreknobs Fm. inferred to have been deposited during a time span of ~4.5 Myr. (Kaufmann, 2006).

Vertical juxtaposition of lithofacies and stacking patterns indicate recognition of 3 scales of cyclicity.

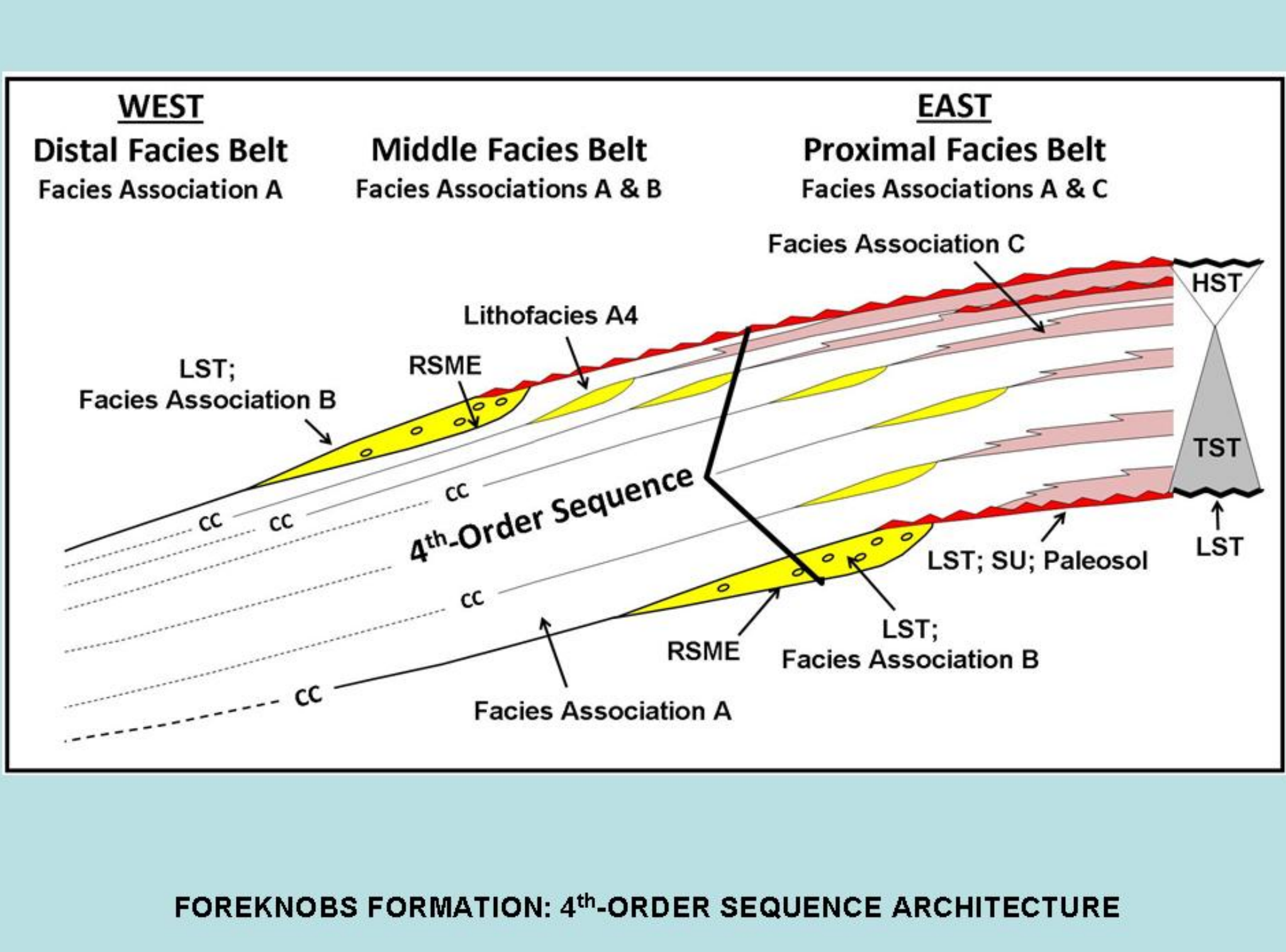
- "Short term" 5th-Order (Vail et al., 1991): 70 cycles: ~65 Kyr years each
- "Intermediate term" 4th-Order: 12 cycles: ~375 Kyr each
- "Long term" 3rd-Order: ~3+ cycles: 1.12 Myr each



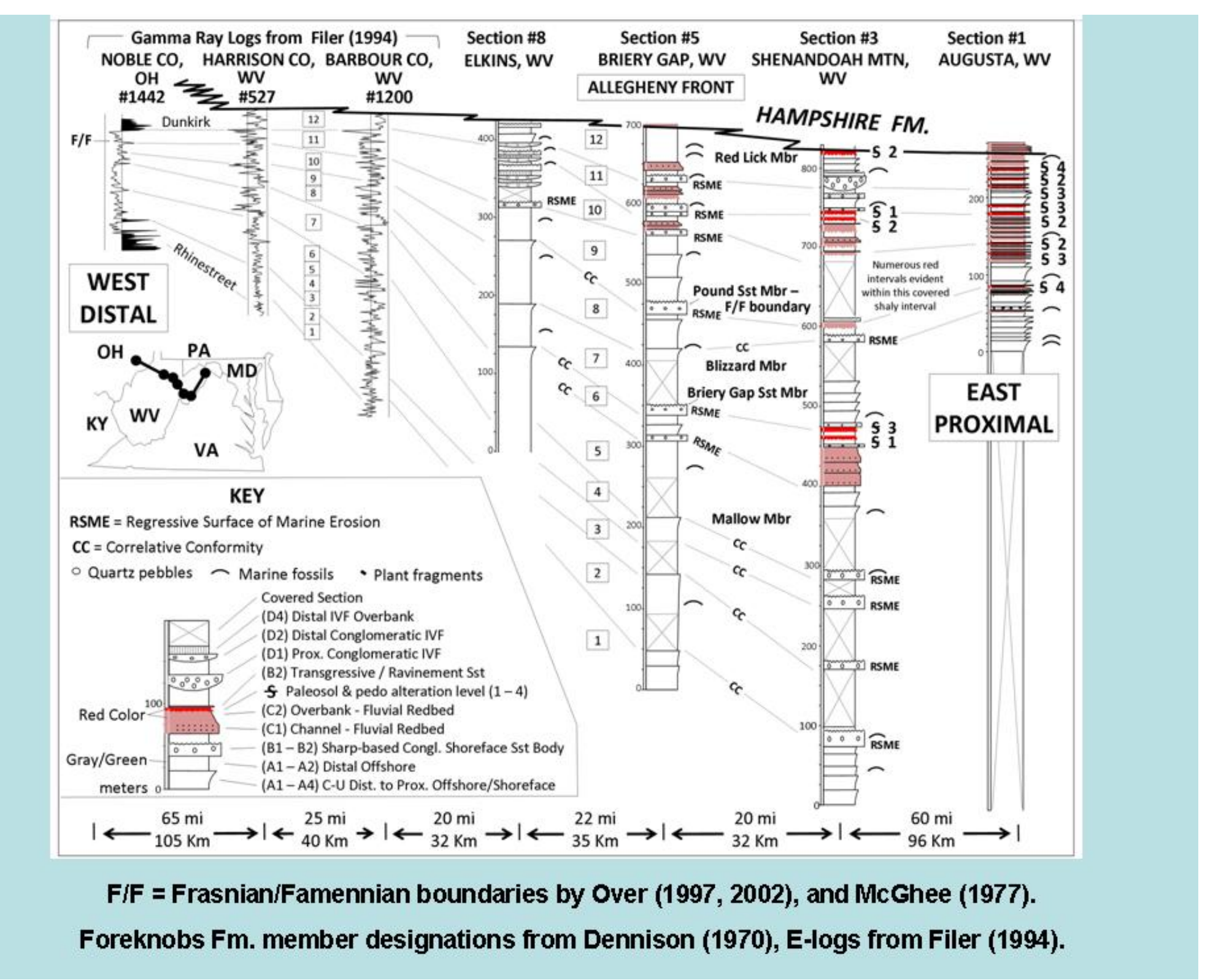
SHORT-TERM 5TH-ORDER CYCLES



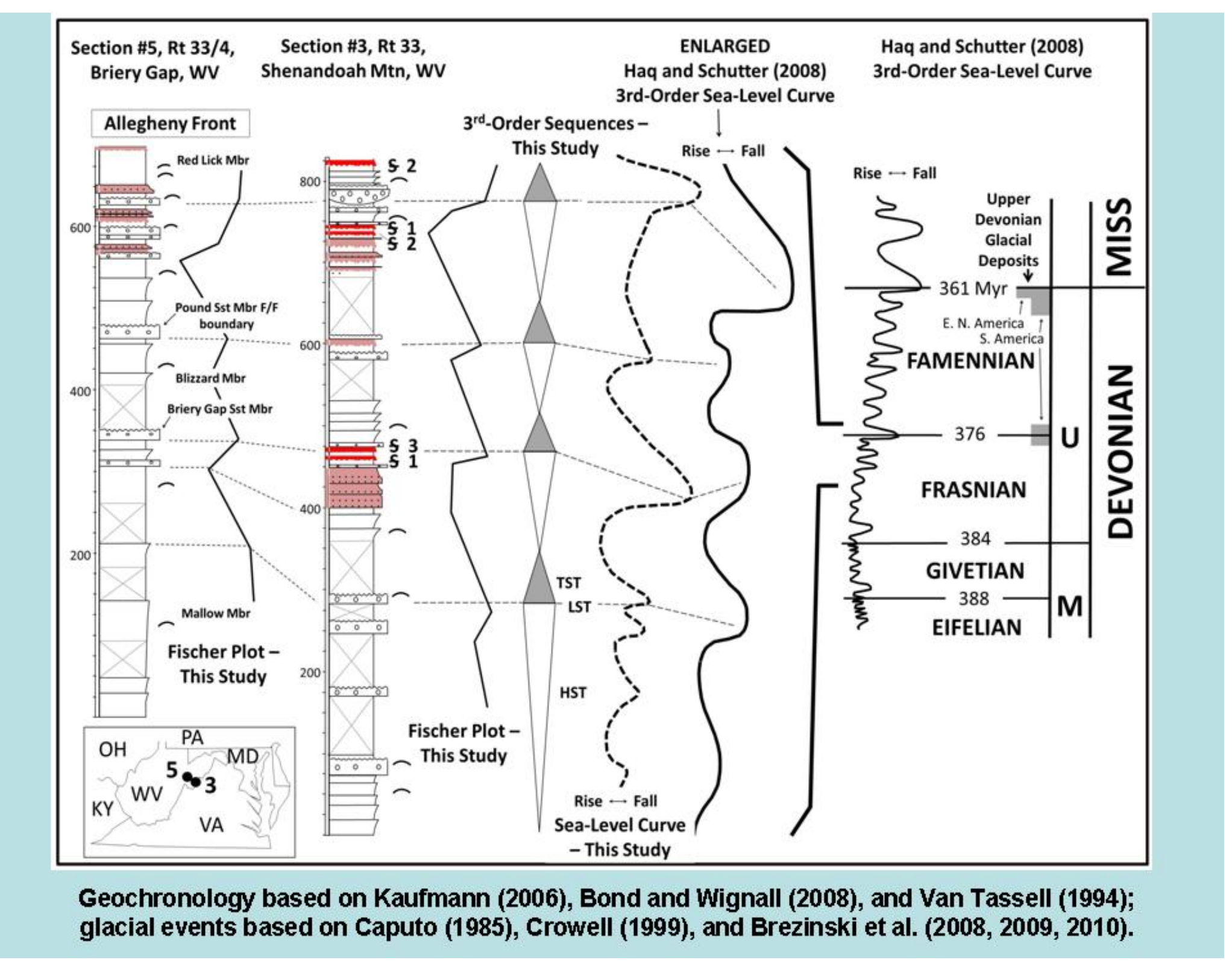
INTERMEDIATE-TERM 4TH-ORDER CYCLES (SEQUENCES)



LONG-TERM 3RD-ORDER CYCLES



F/F = Frasnian/Famennian boundaries by Over (1997, 2002), and McGhee (1977). Foreknobs Fm. member designations from Dennison (1970), E-logs from Filer (1994).



Geochronology based on Kaufmann (2006), Bond and Wignall (2008), and Van Tassell (1994); glacial events based on Caputo (1985), Crowell (1999), and Brezinski et al. (2008, 2009, 2010).

- ### Conclusions
- 1) Stacking patterns of 4 facies associations suggest S-L fluctuations > what you would expect with Greenhouse successions
 - 2) 5th, 4th, and 3rd-order cycles can be recognized
 - 3) A S-L curve generated for the Foreknobs Formation agrees well with published 3rd-order S-L curves
 - 4) Paleosols are important in understanding sequence stratigraphic framework because they record interfluve environments and represent hiatuses in the rock record equivalent to 4th- and 3rd-order sequence boundaries
 - 5) Previously interpreted "Prograding muddy shoreline motifs" are 5th-order High Frequency (unconformity bound) Sequences
 - 6) Previously interpreted "shelf sand bars" encased in marine shale are conglomeratic shoreface sandstone bodies deposited during times of S-L lowstand – steepened gradients produced by lowstand transported pebbles to the shoreline
 - 7) Briery Gap and Pound Sandstone Members change facies to the west (cc) and east (paleosols / fluvial) of Allegheny Front
- ? Questions ?

Conclusions