Concepts in salt tectonics relevant to the Norwegian Continental Shelf

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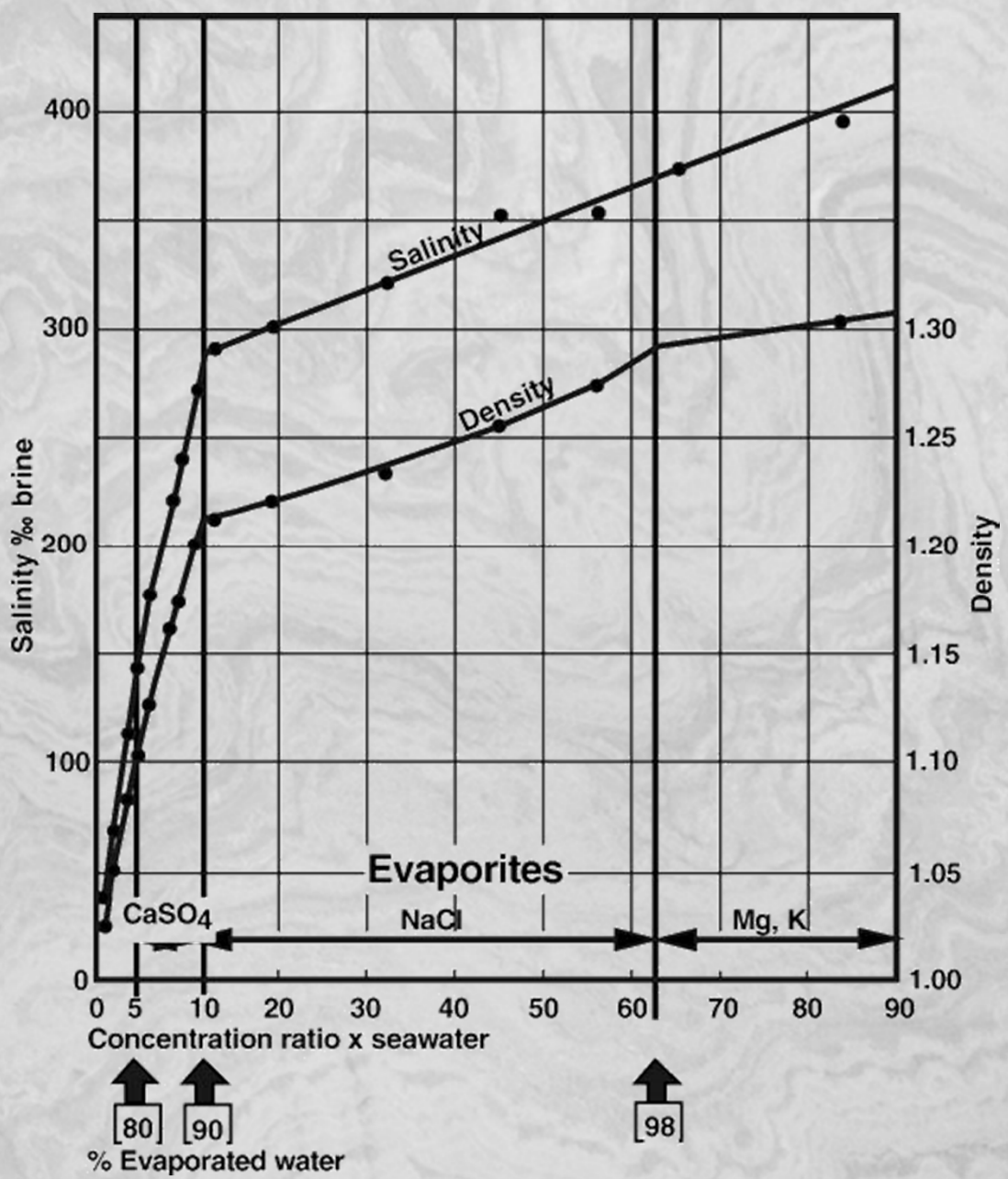
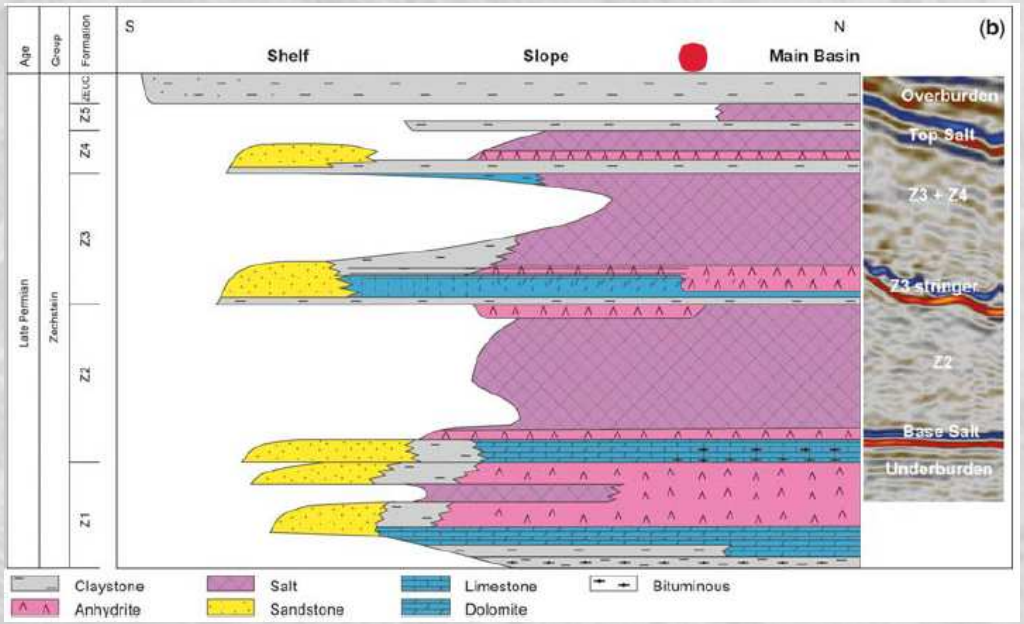
- Layered evaporite sequences
- Mechanics
- Extensional salt tectonics
- Contractional salt tectonics
- Vertical salt tectonics

Layered evaporite sequences

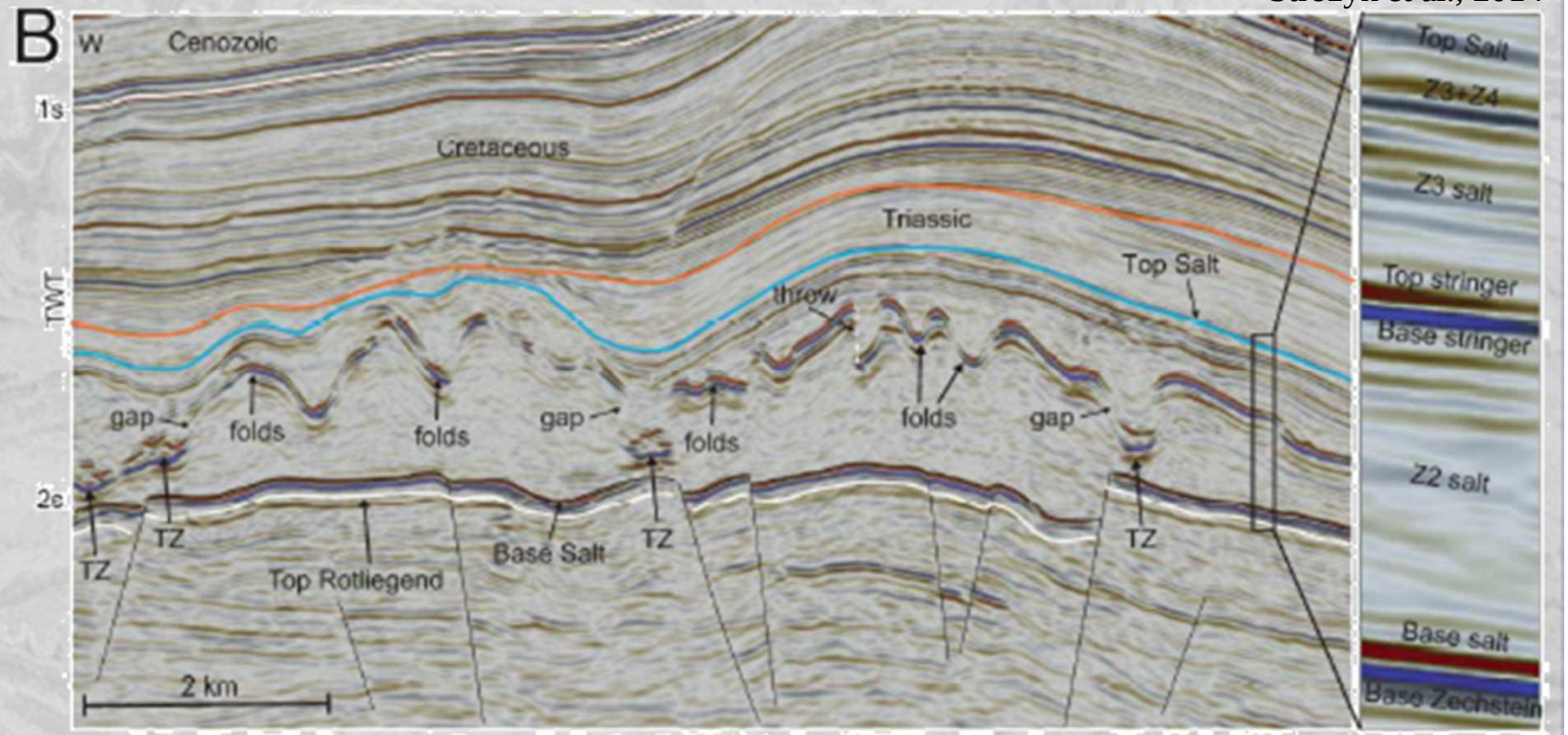


Rouchy & Caruso, 2006



Strozyk et al., 2012
(modified from Geluk, 2007)

Strozyk et al., 2014



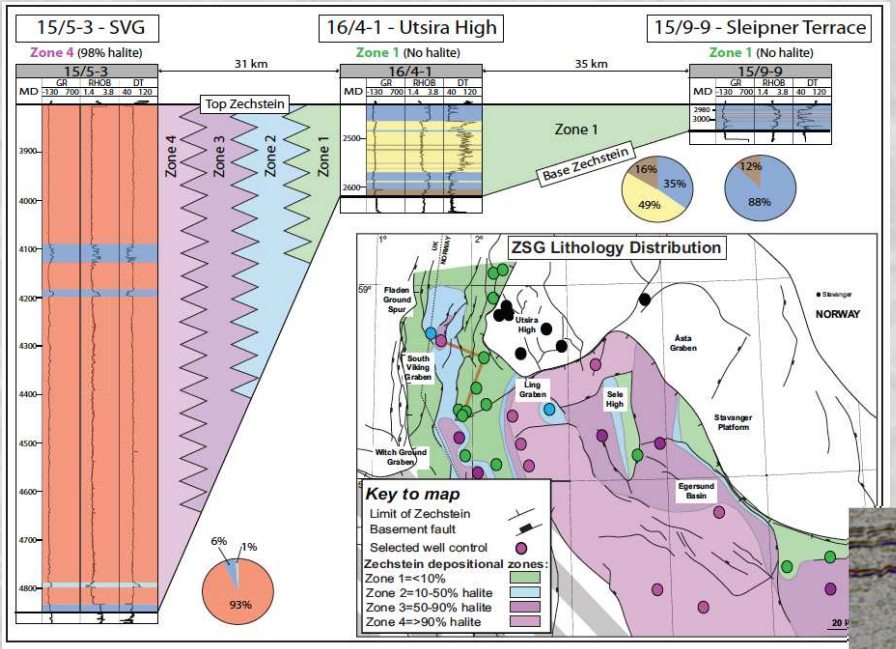


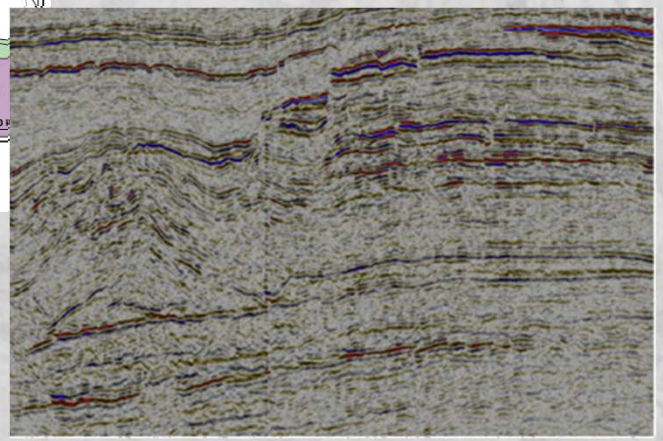
Fig. 3a

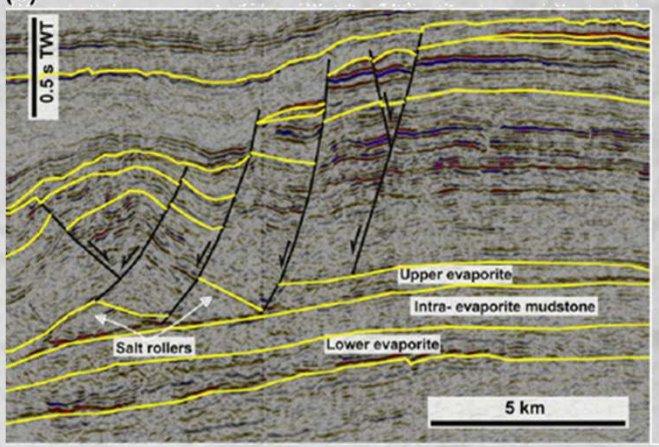
Key for stratigraphic correlation

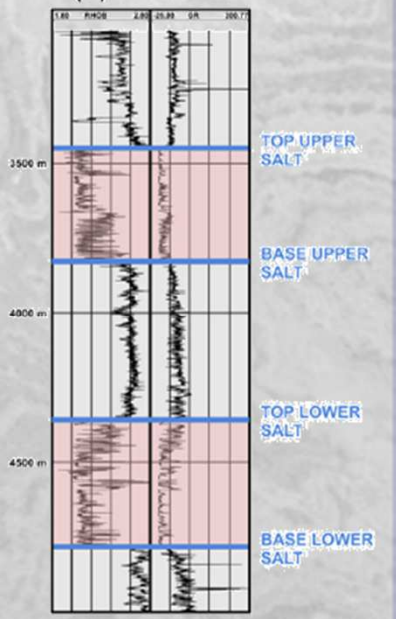
Anhydrite | Halite | Carnallite | Carbonate | Silt-Silstone | Shale

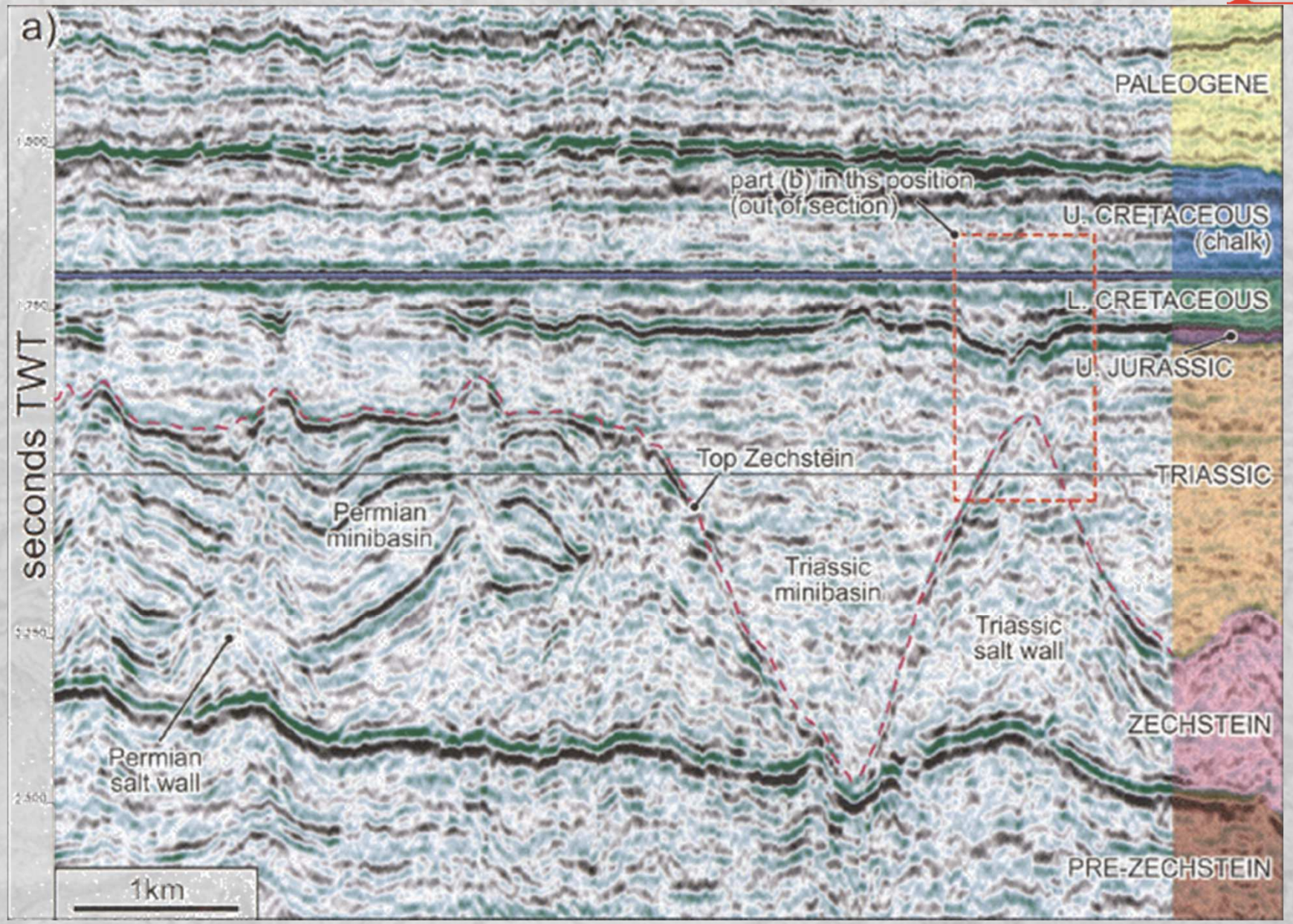
Jackson et al., 2012

Wilson et al., 2013



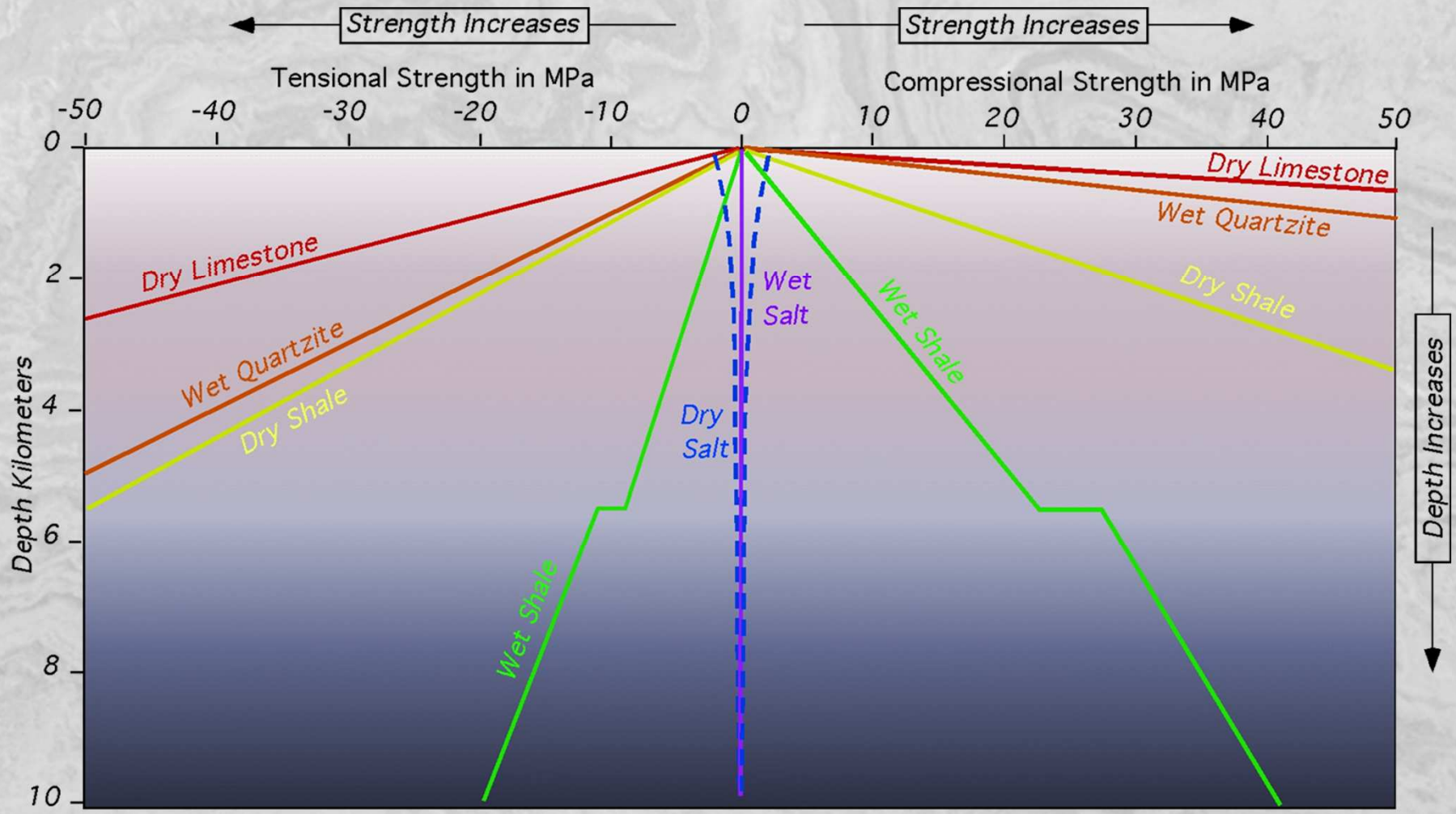




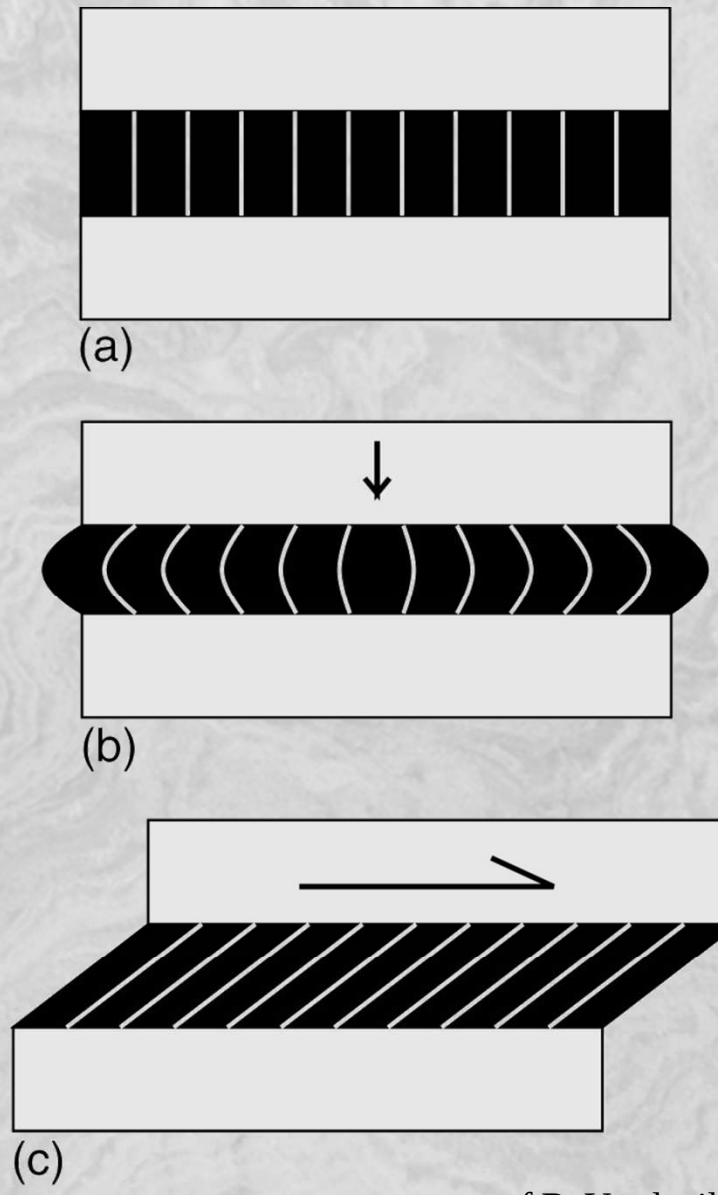


Stewart, 2007

Mechanics



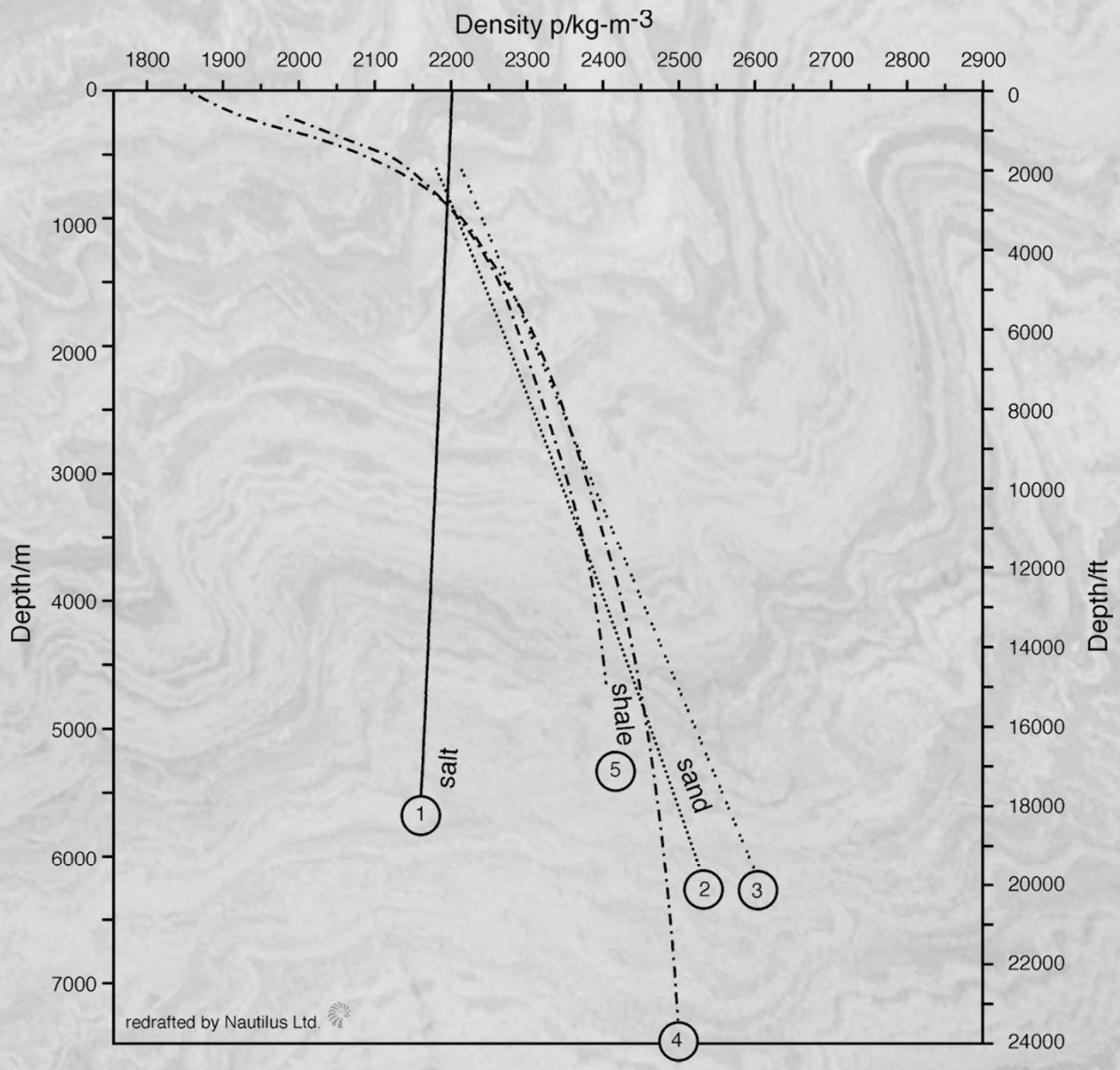
modified by K. Mueller from Jackson and Vendeville, 1994



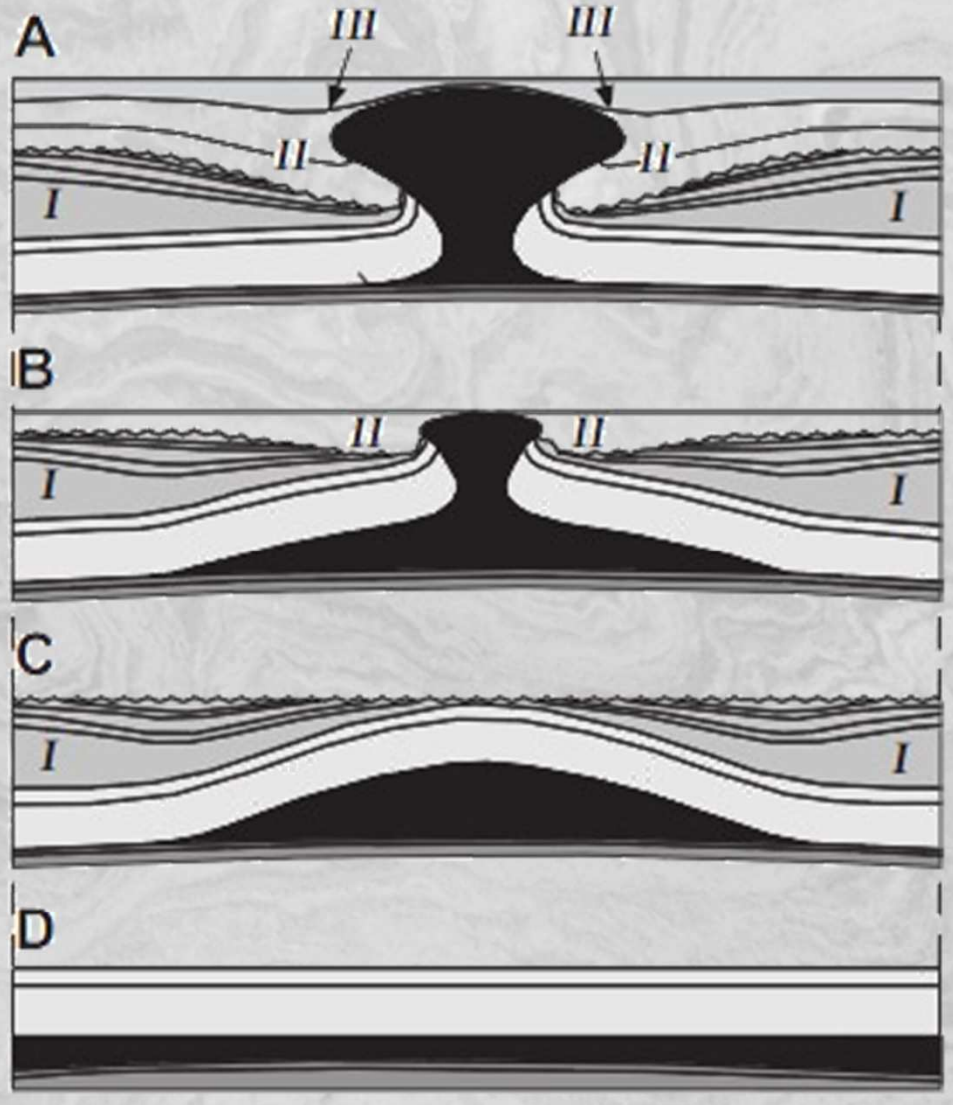
Poiseuille flow

Couette flow

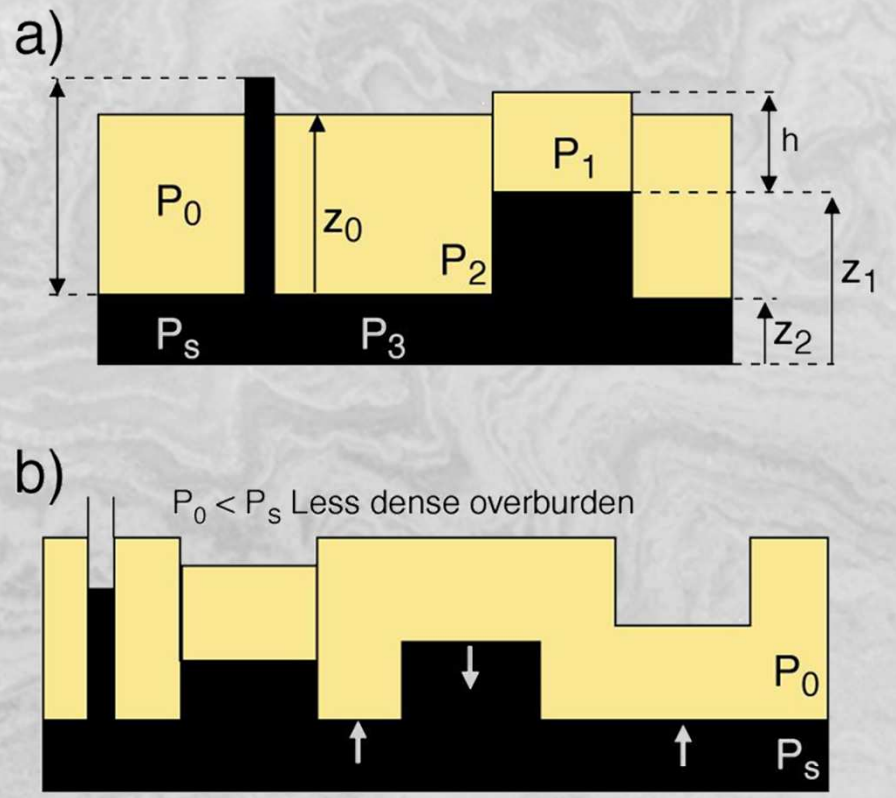
courtesy of B. Vendeville



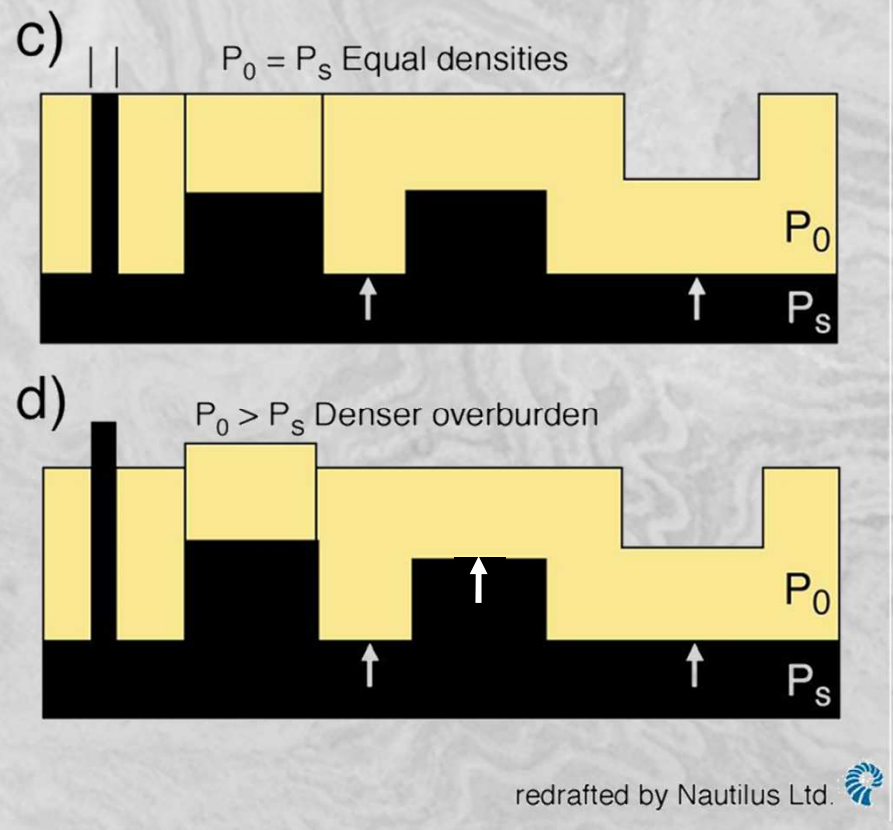
Jackson and Talbot, 1986

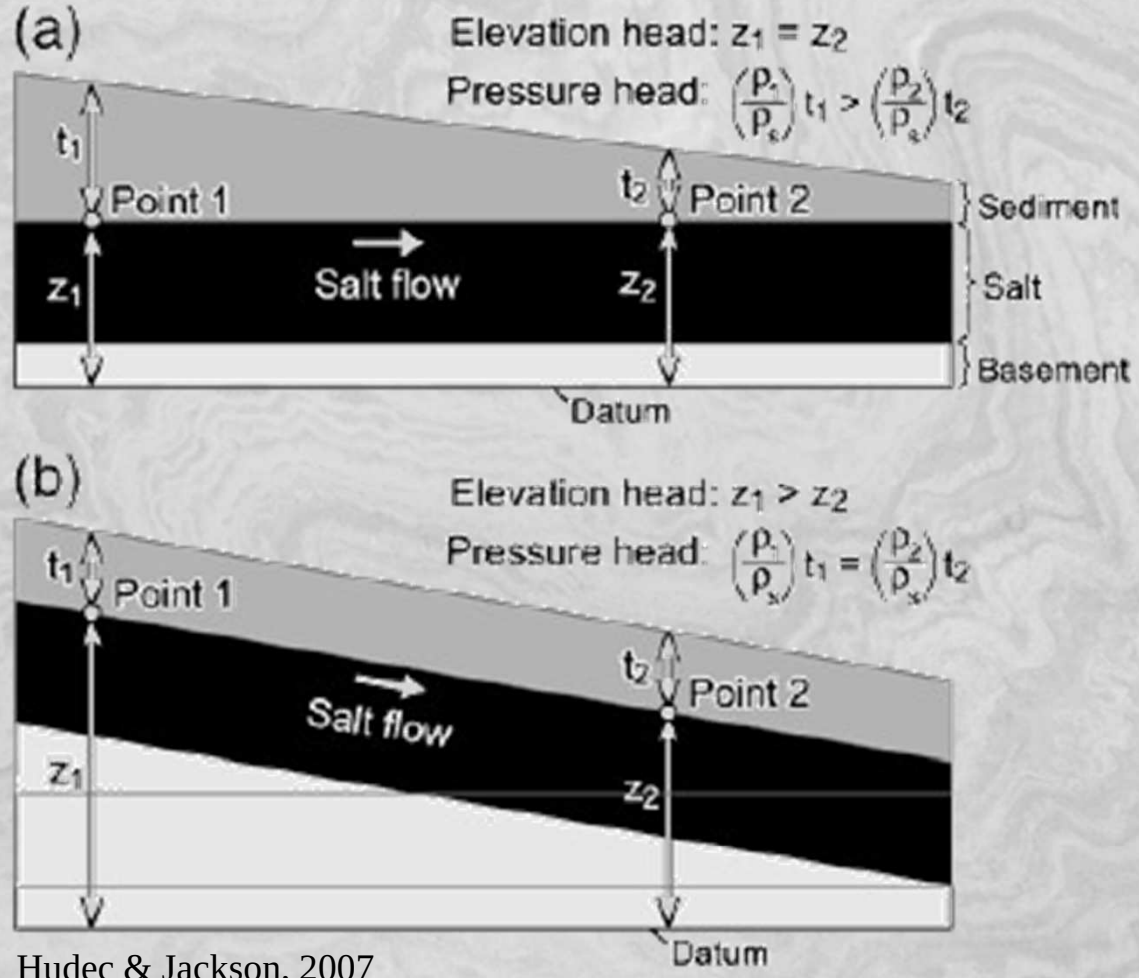


Trusheim, 1960



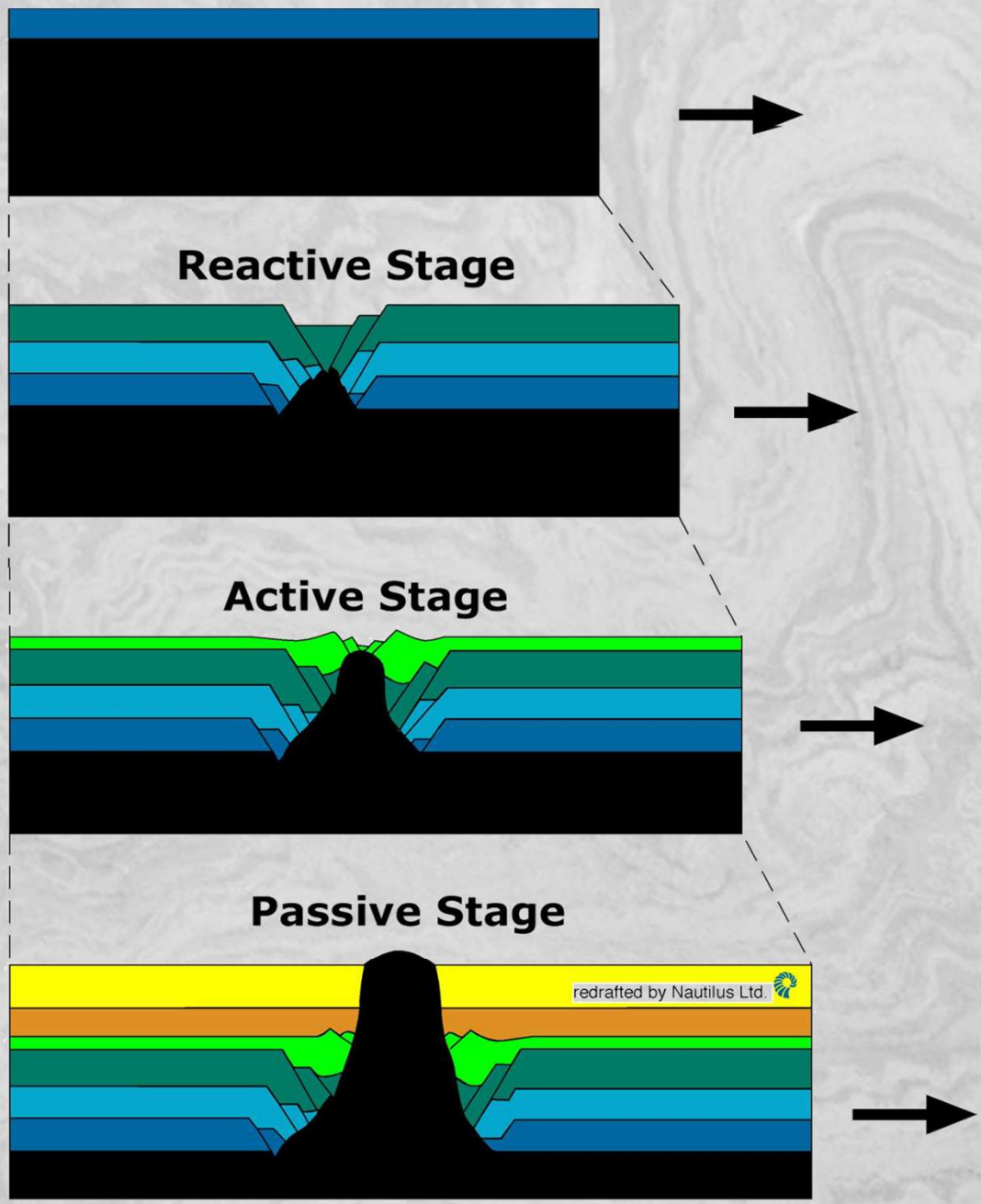
Vendeville and Jackson, 1992a



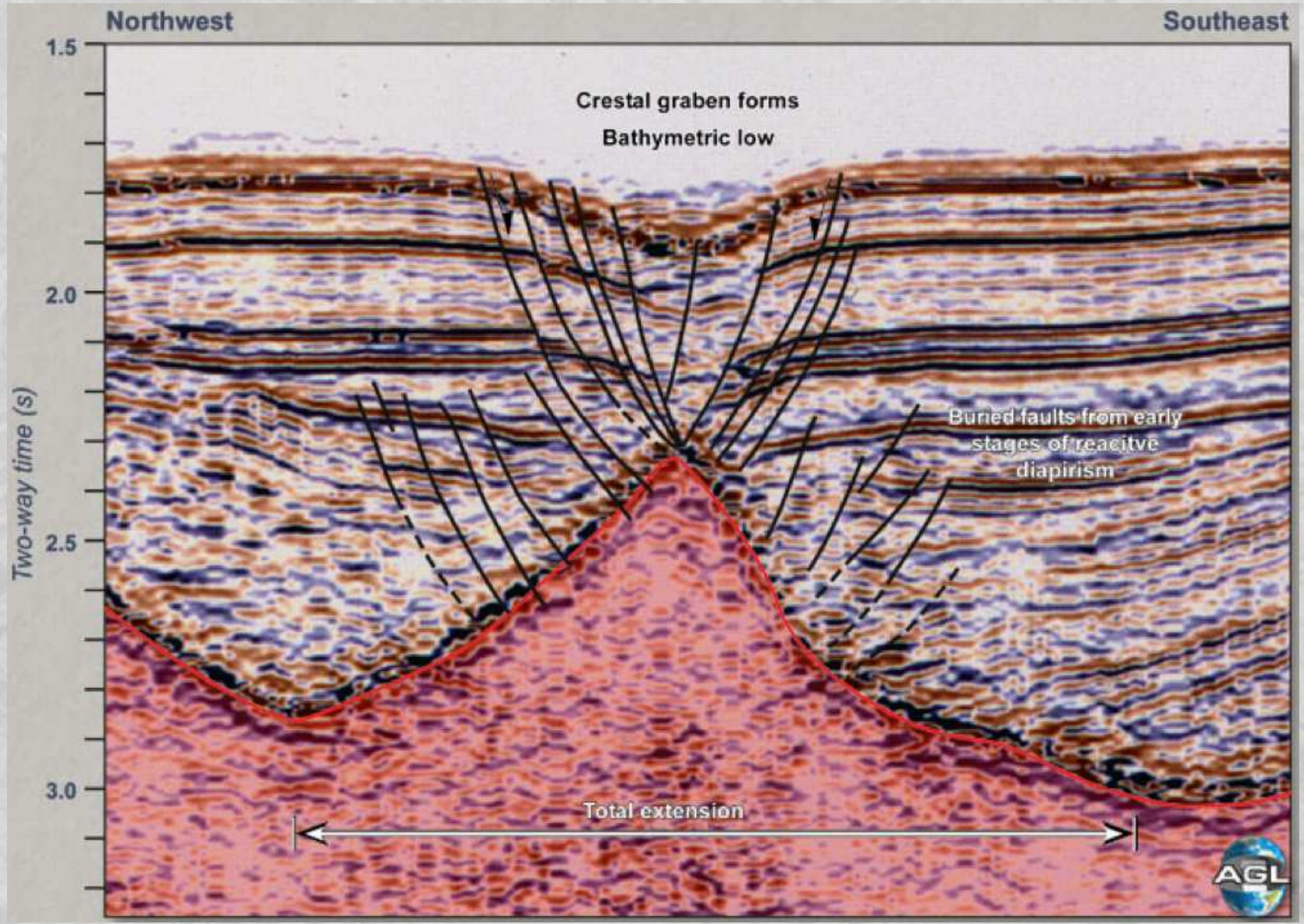


Hudec & Jackson, 2007

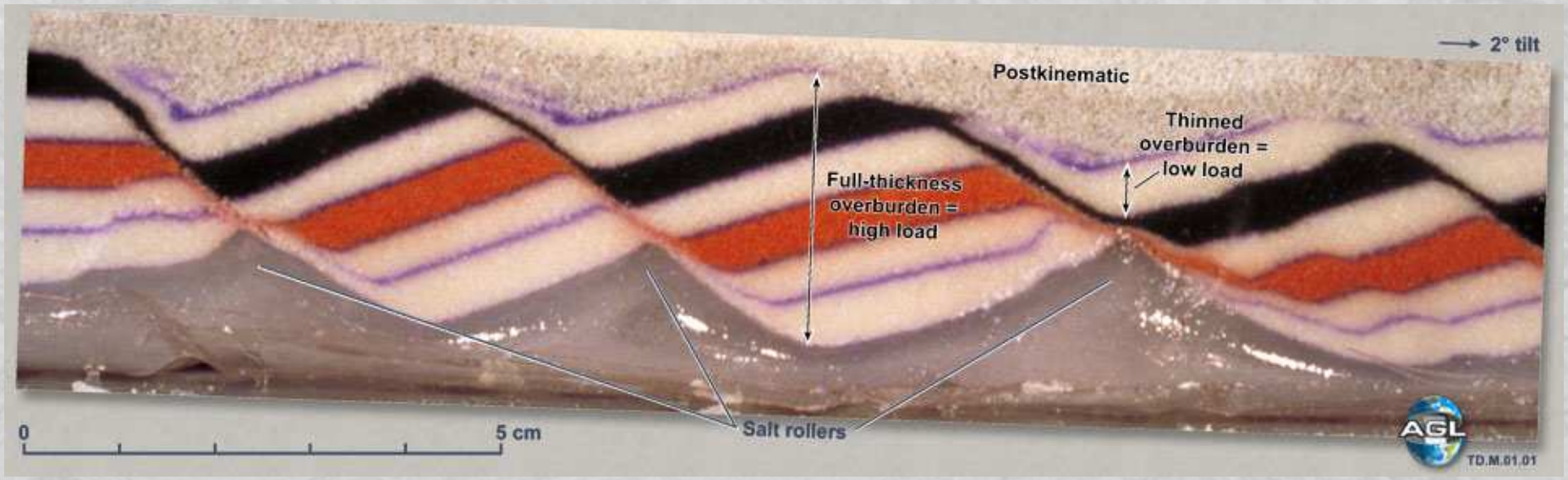
Extensional salt tectonics



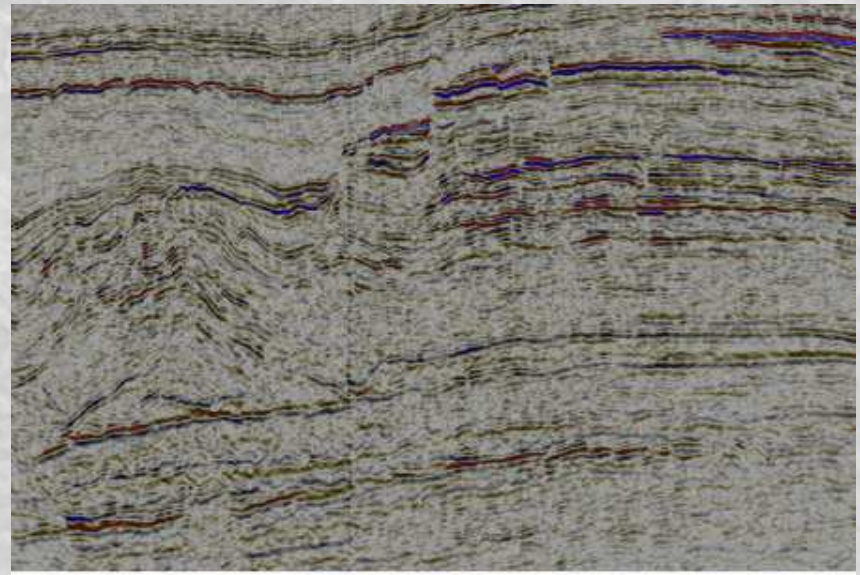
Vendeville and Jackson, 1992a



Rowan et al. ,1999 (modified in Hudec & Jackson, 2011



B. Vendeville (in Hudec & Jackson, 2011)



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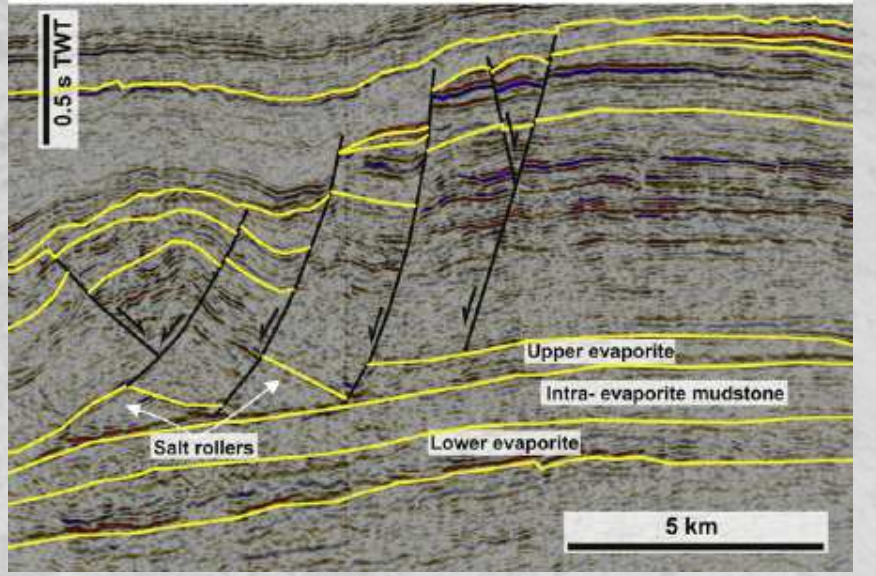
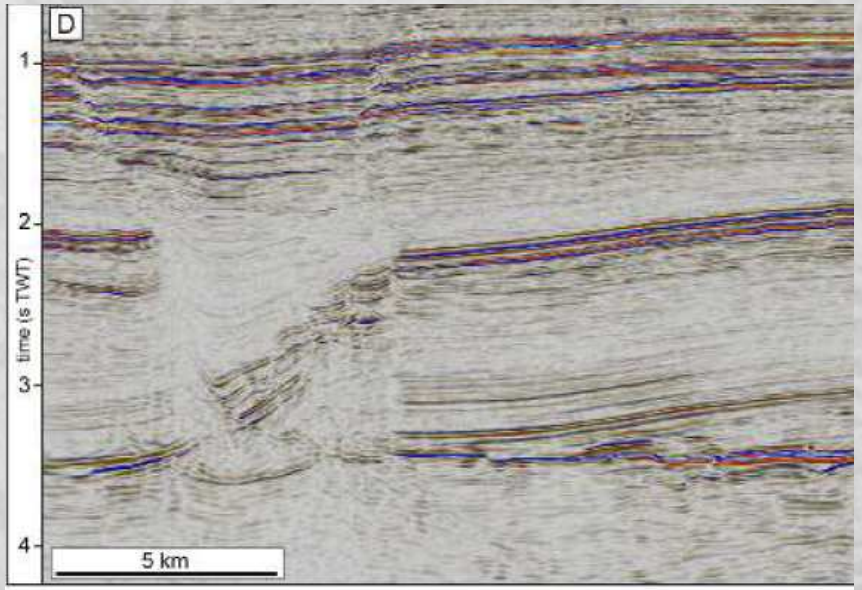
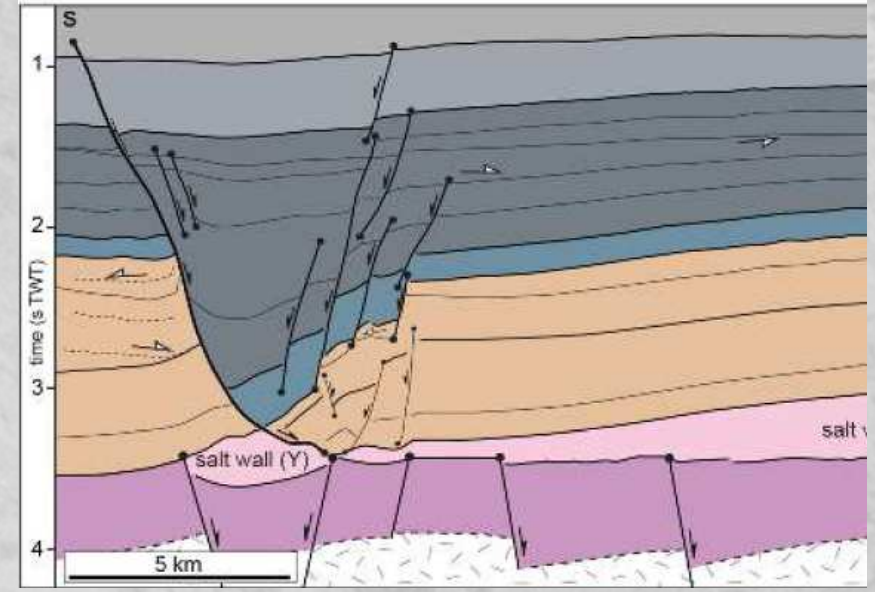
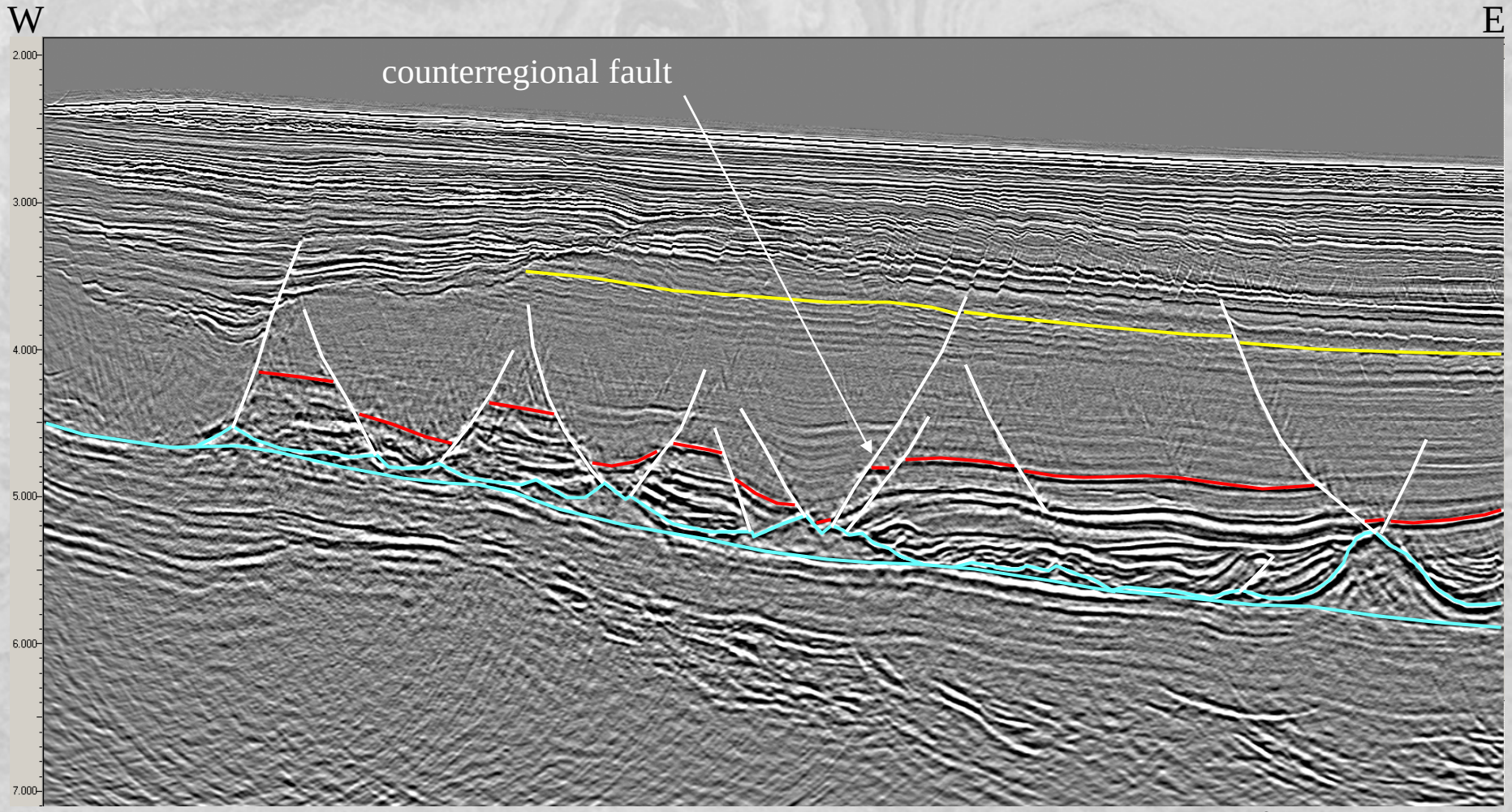


Wilson et al., 2013

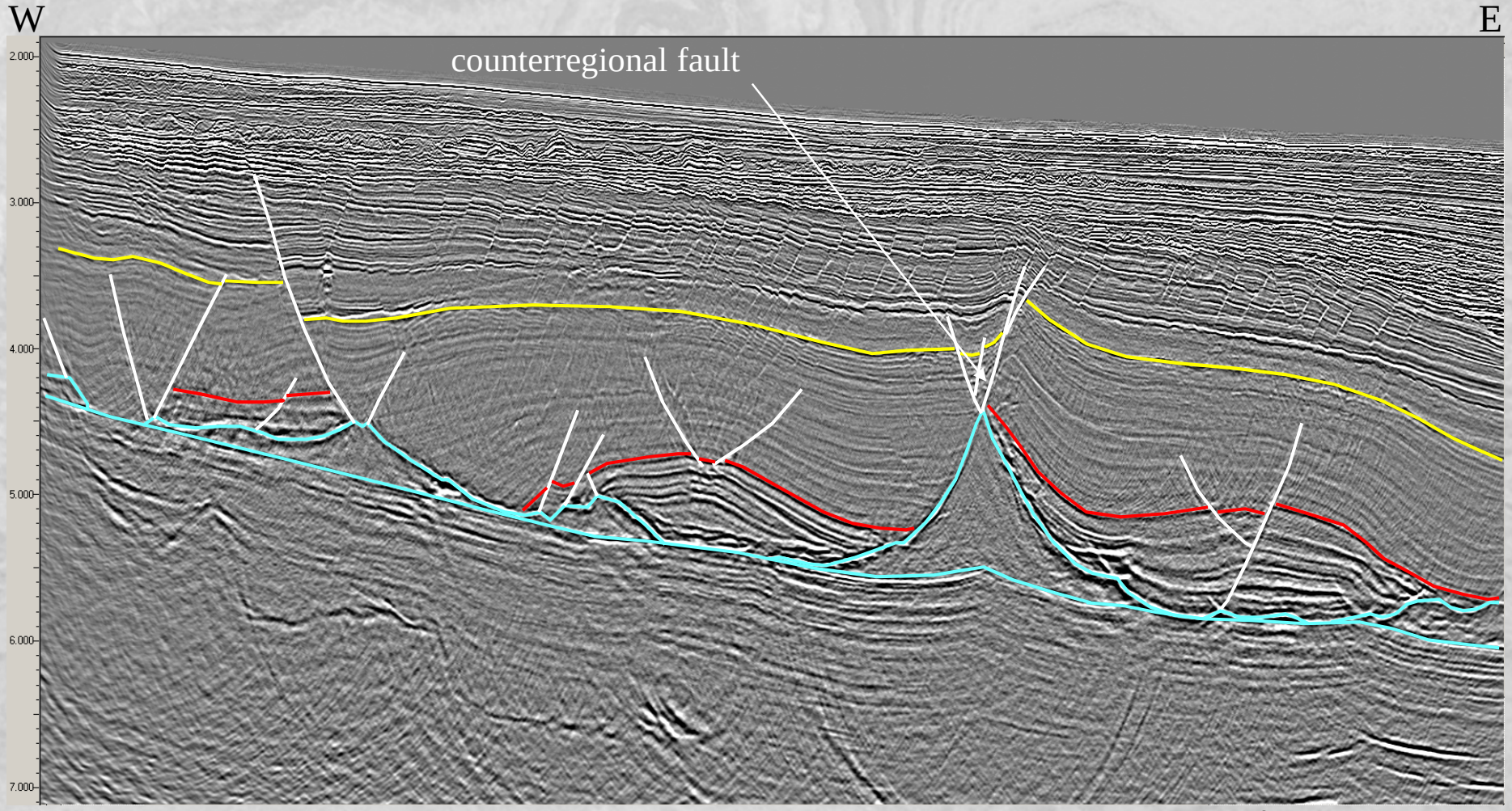




Jackson et al., 2014



data courtesy of C. Fiduk and CGG



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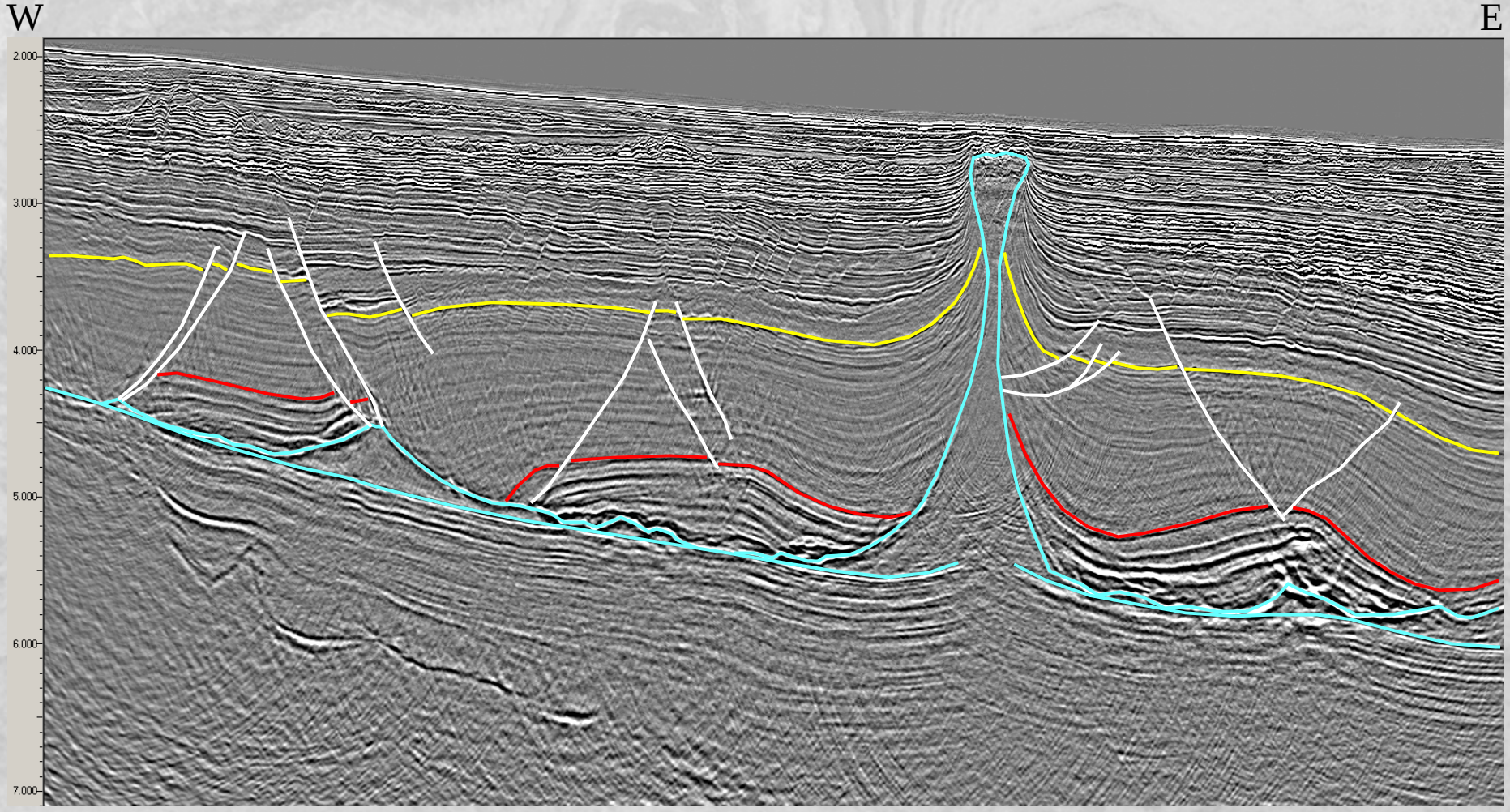

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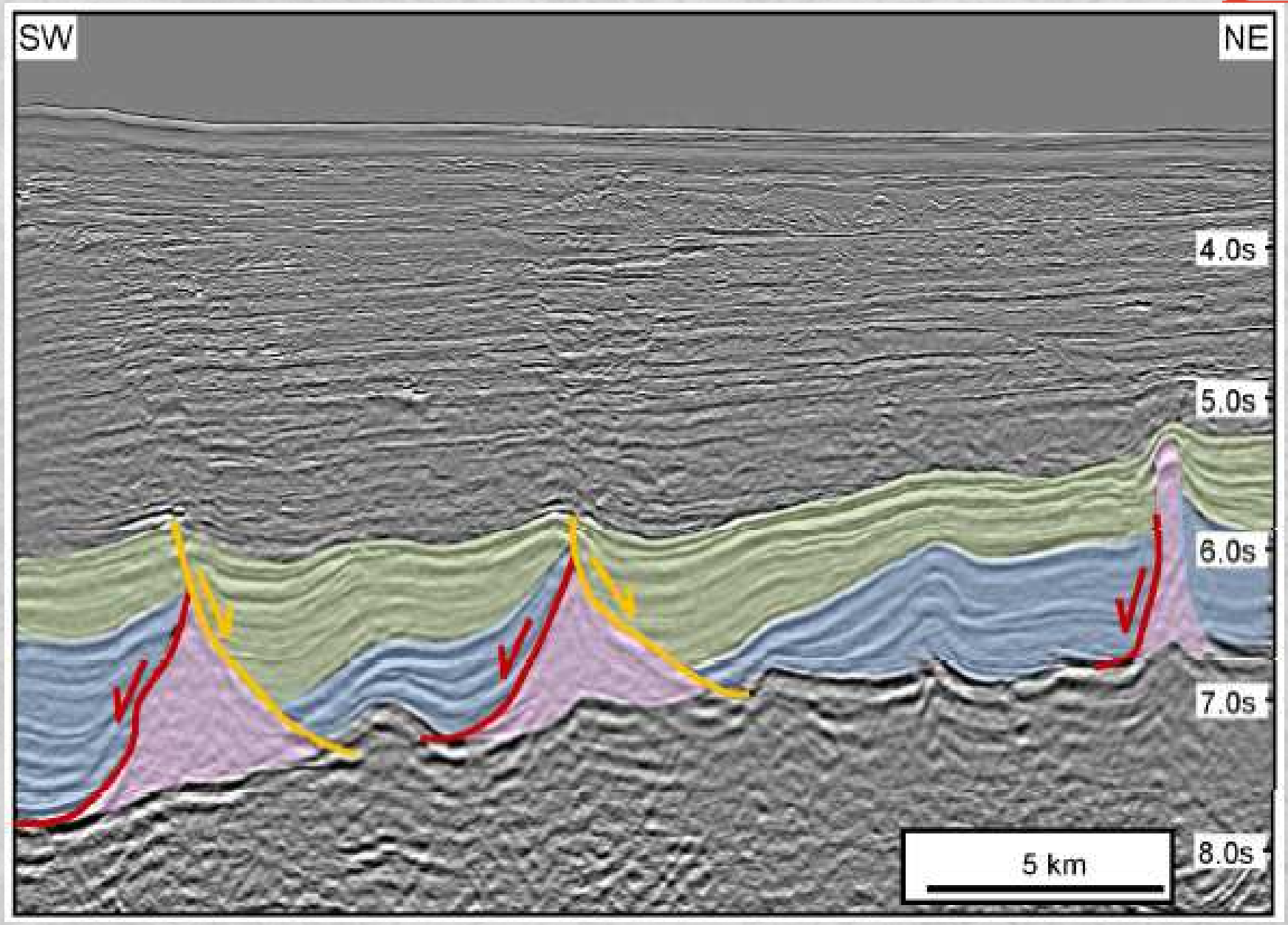
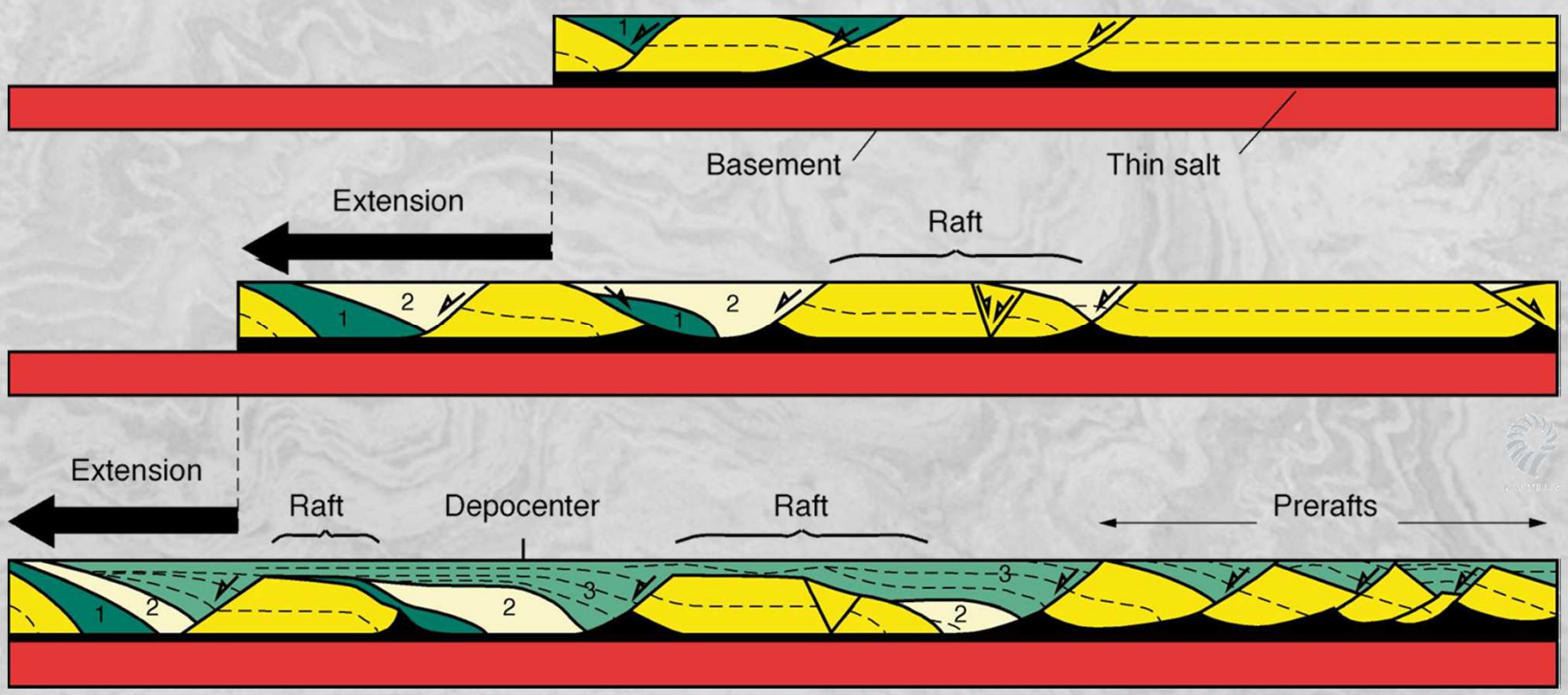
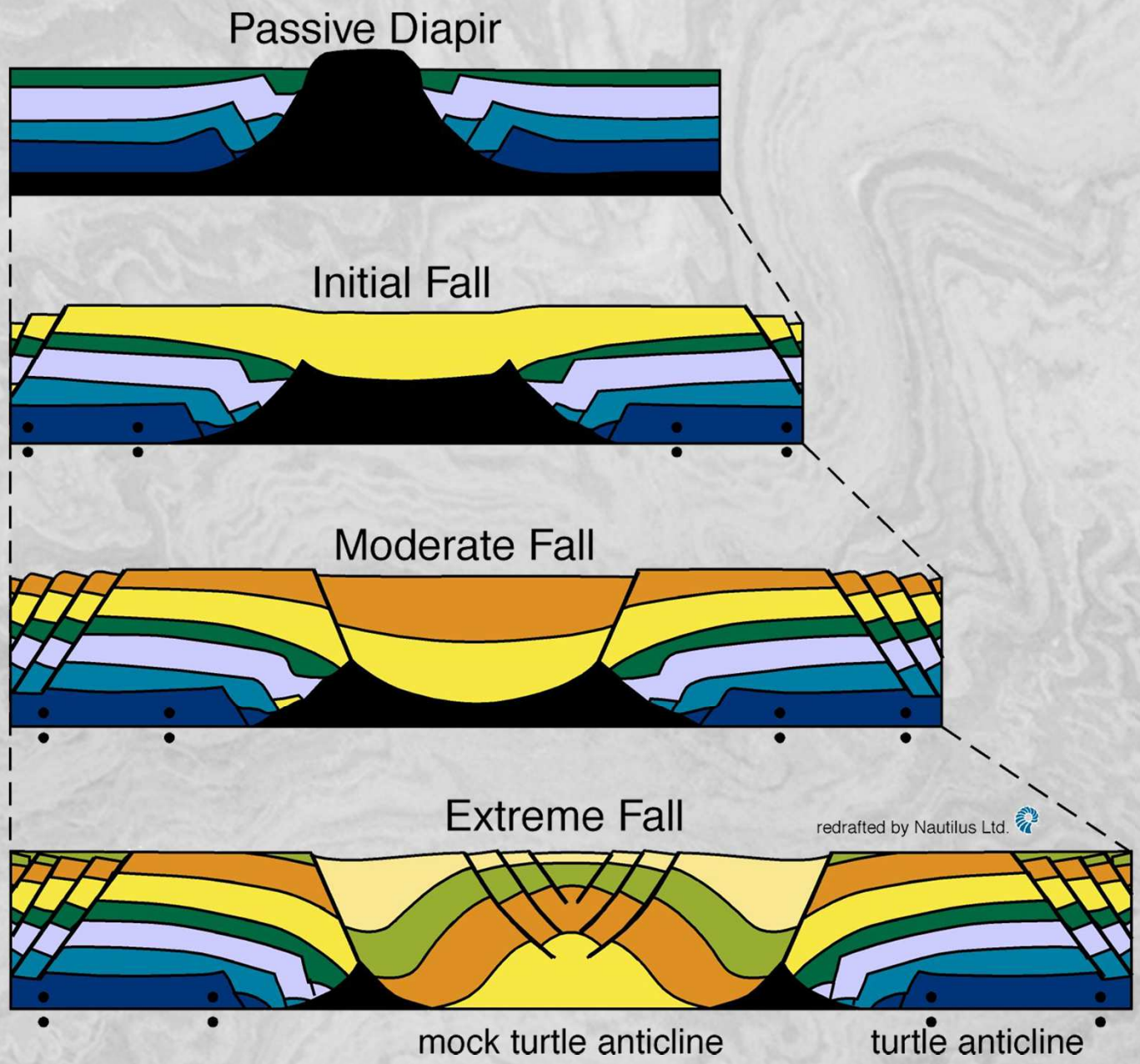


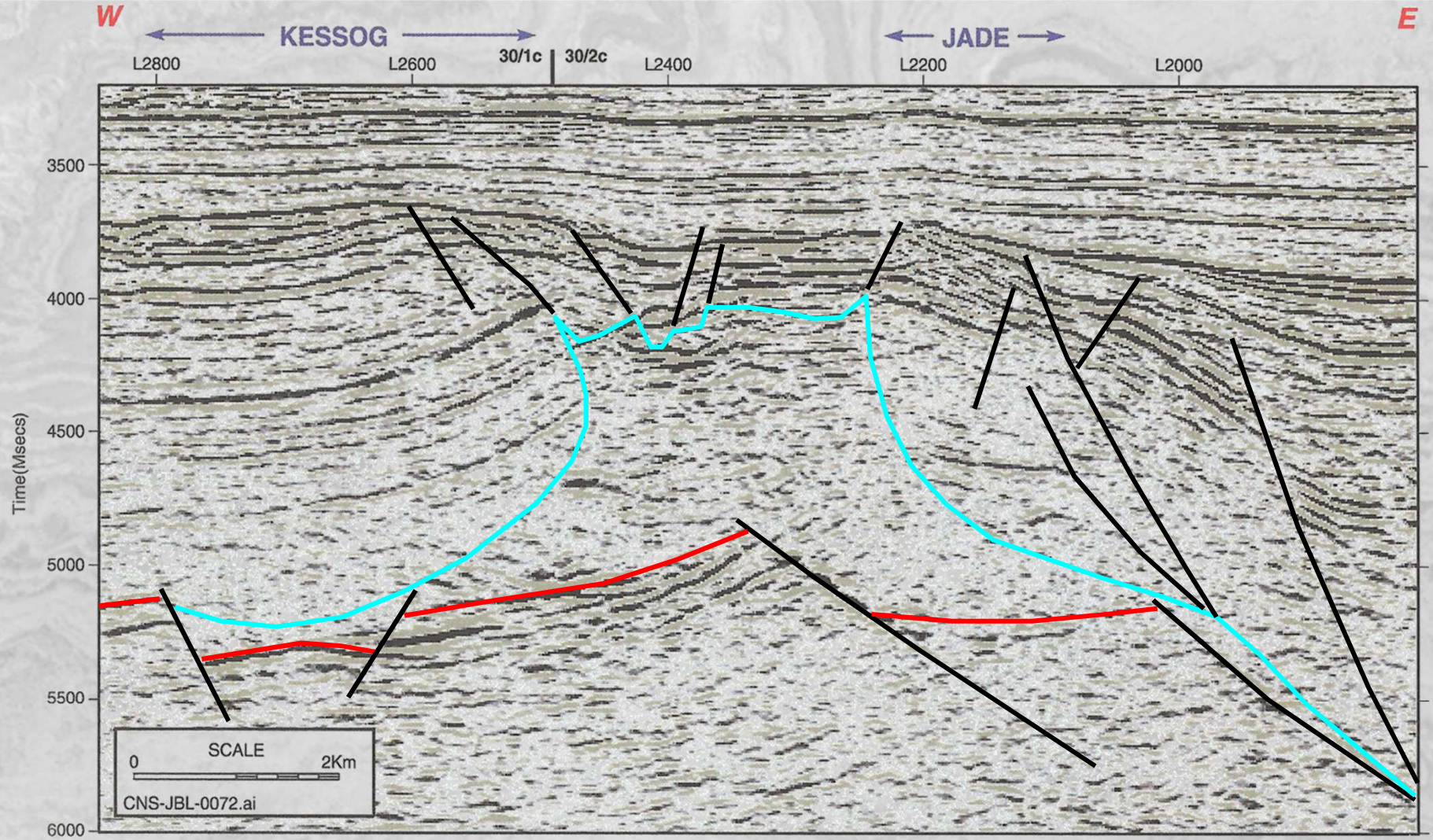
Pilcher et al., 2014



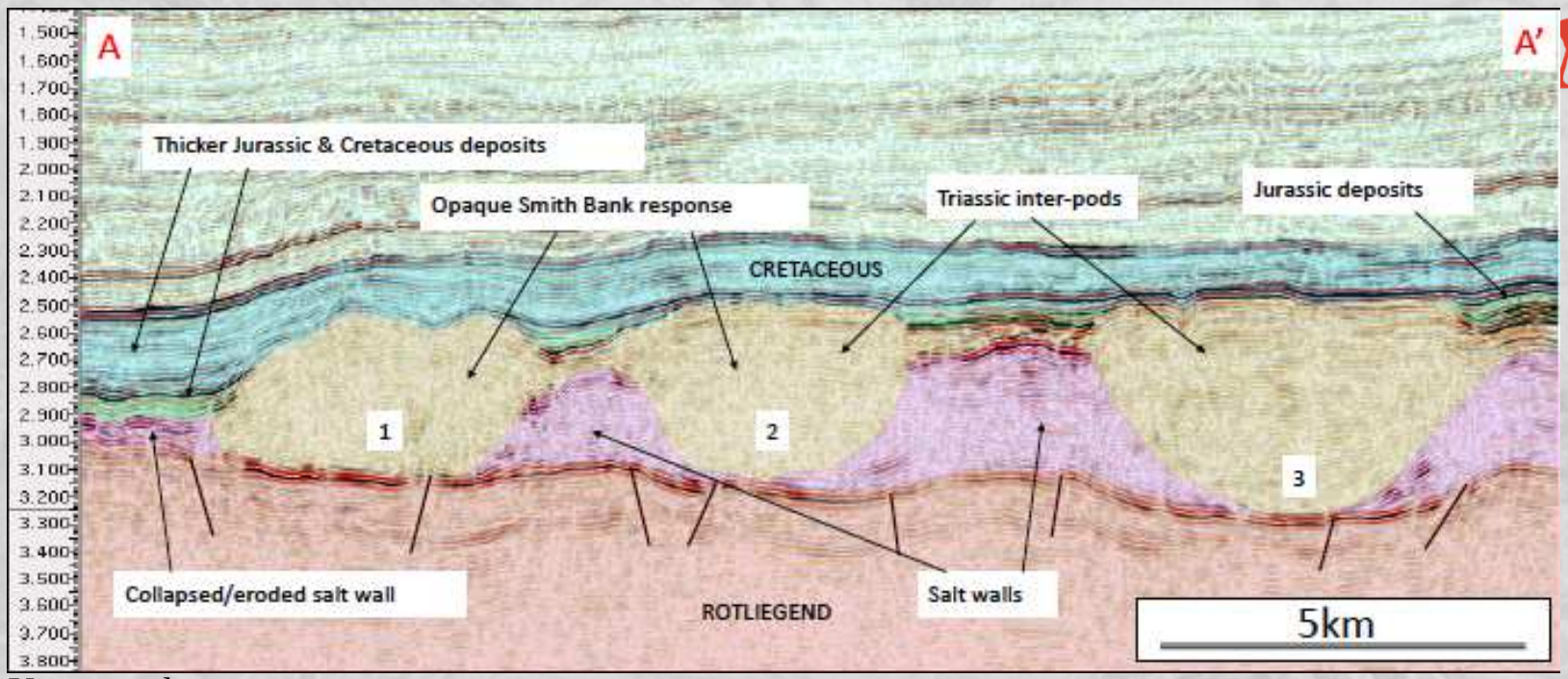
Duval et al., 1992



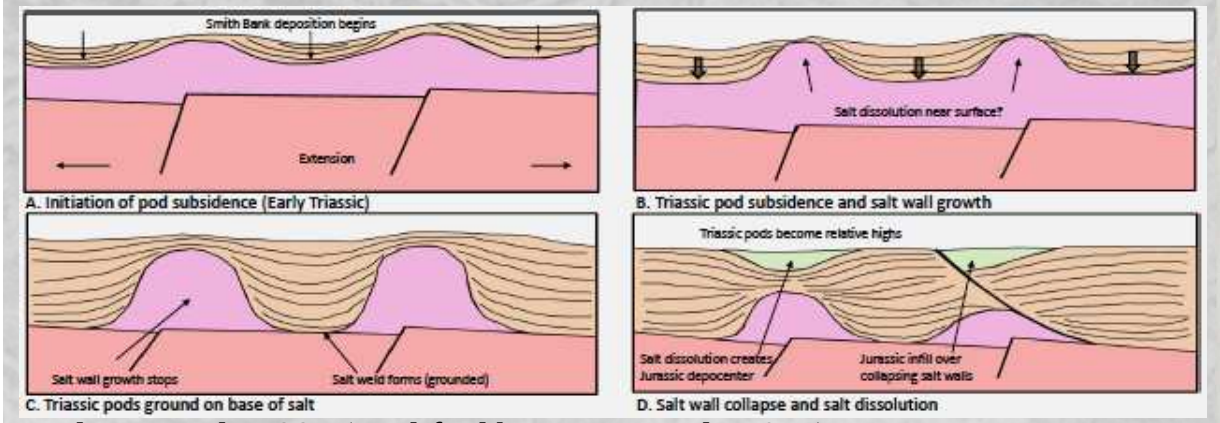
Vendeville and Jackson, 1992b



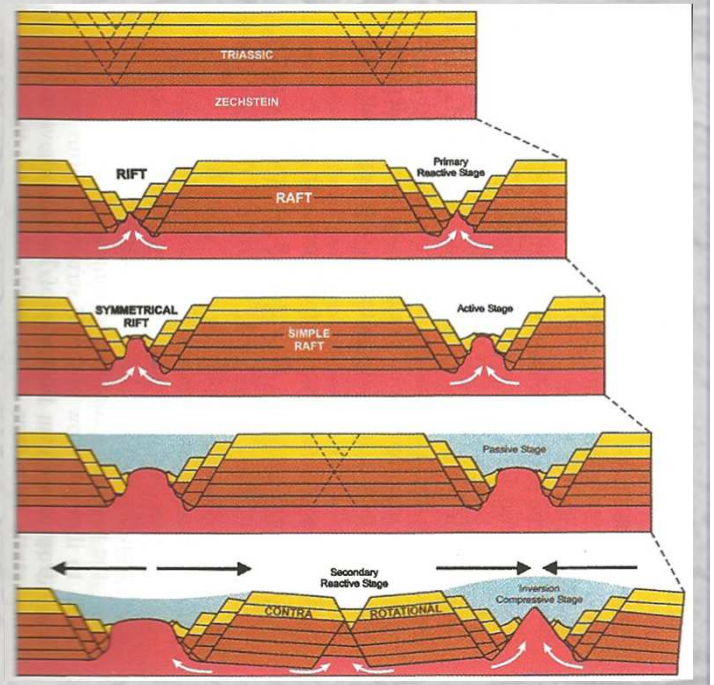
seismic from Jones et al. 2005



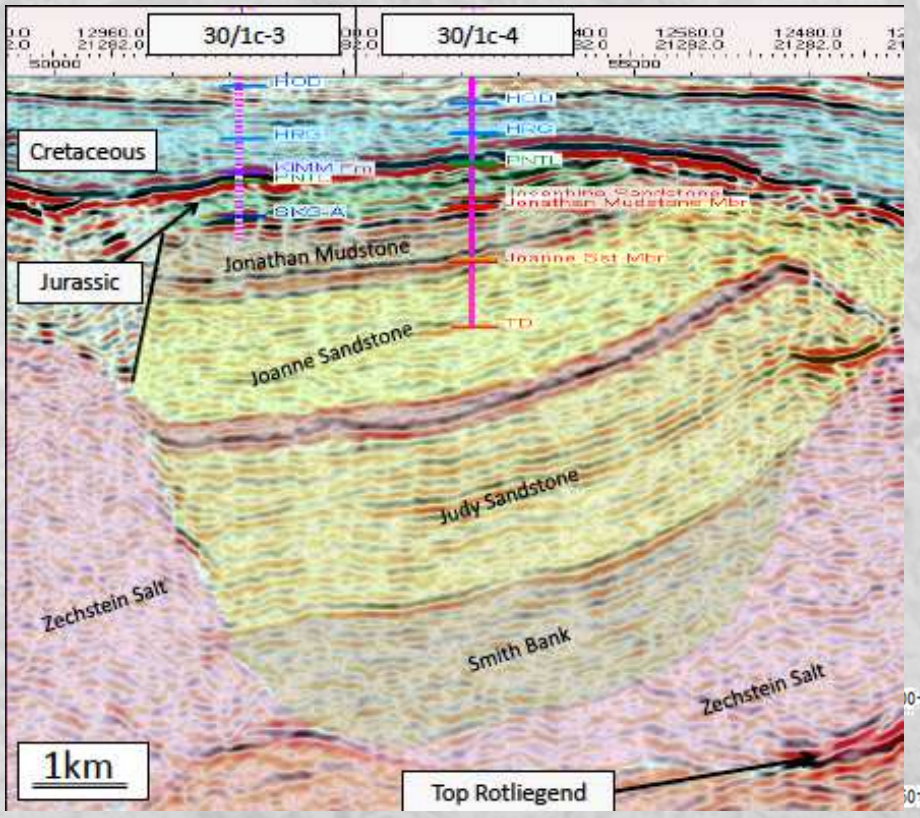
Young et al,. 2012



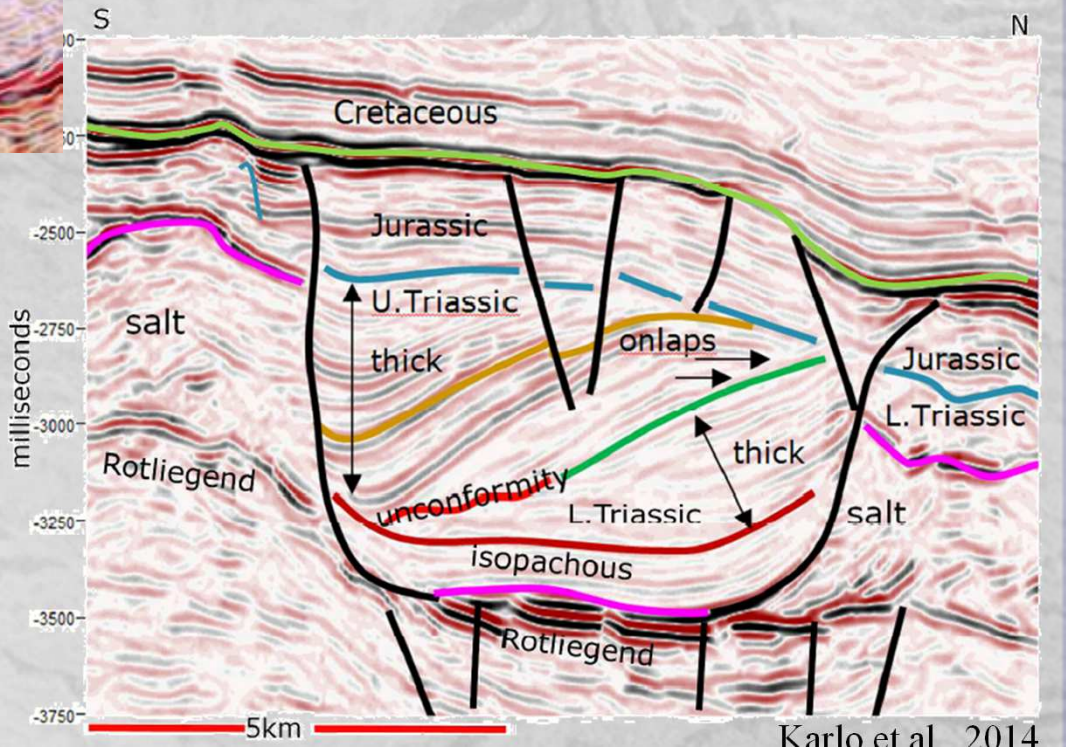
Hodgson et al., 1992 (modified by Young et al., 2012)



Penge et al,. 1999



Young et al., 2012



Karlo et al., 2014

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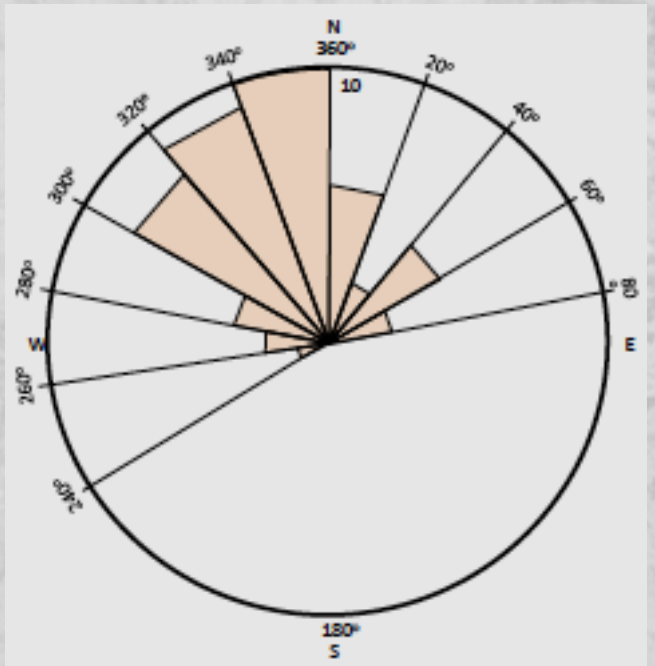
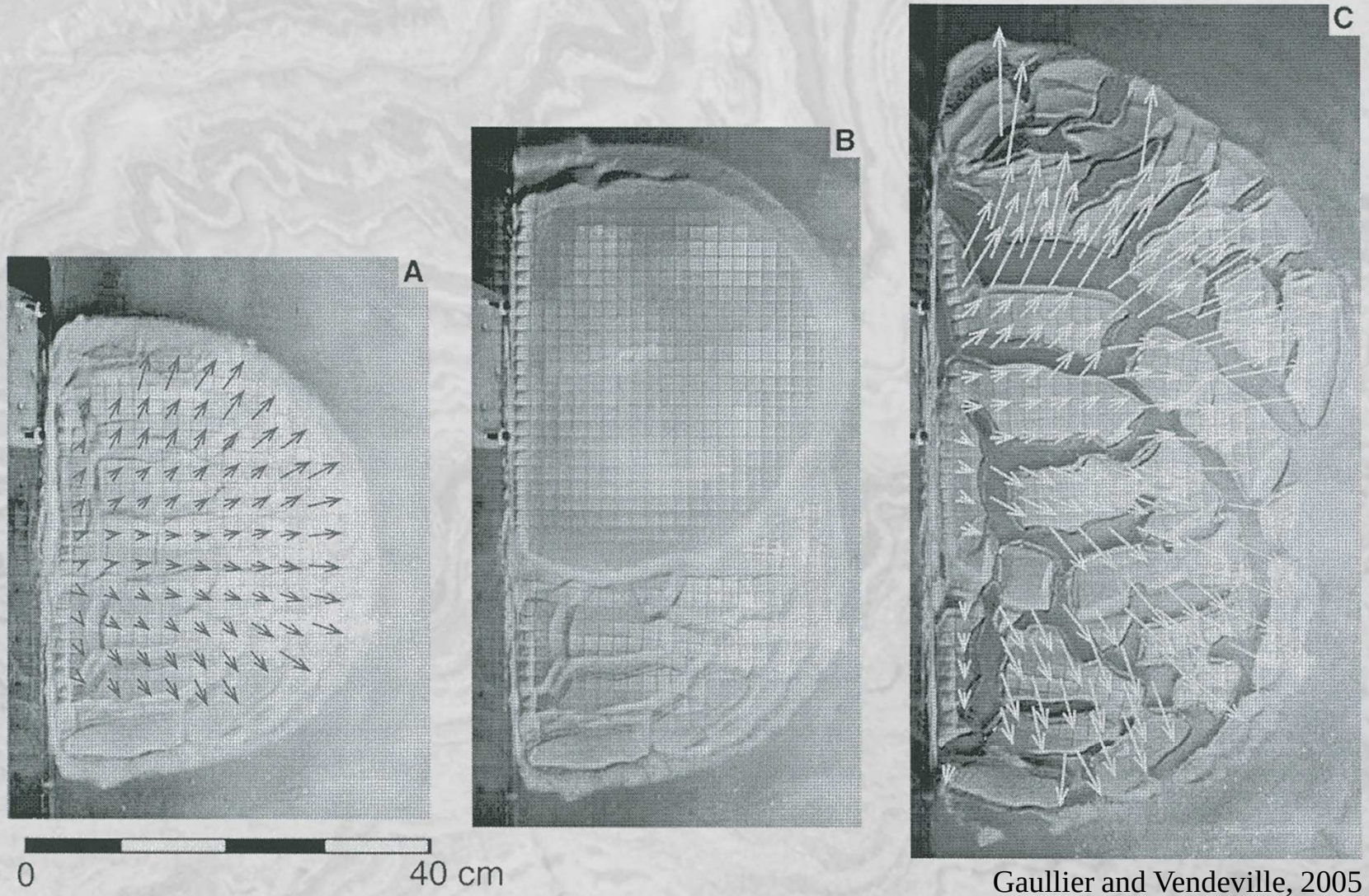


Young et al., 2012

courtesy of N. Pike (BG)



Gaullier and Vendeville, 2005

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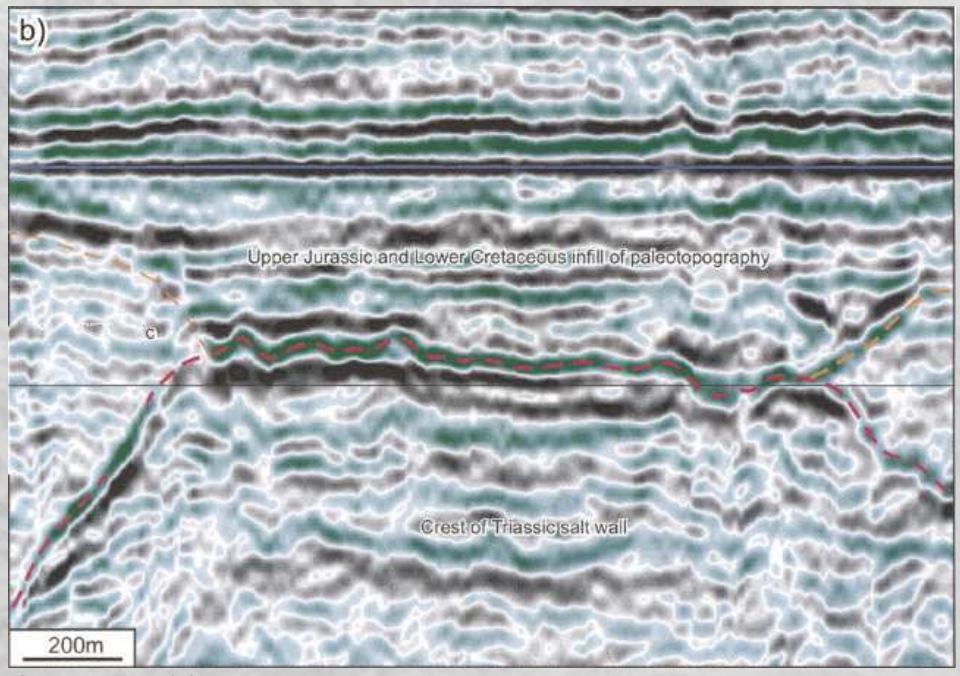
Data courtesy of CGG, interpretations by N. Pike (BG)



Stewart, 2007

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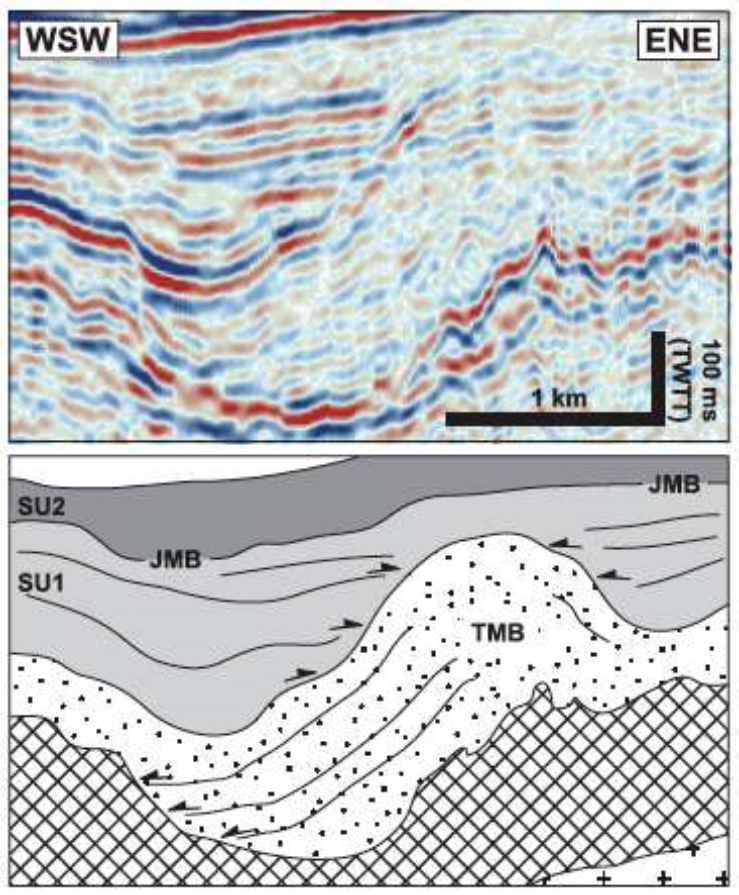
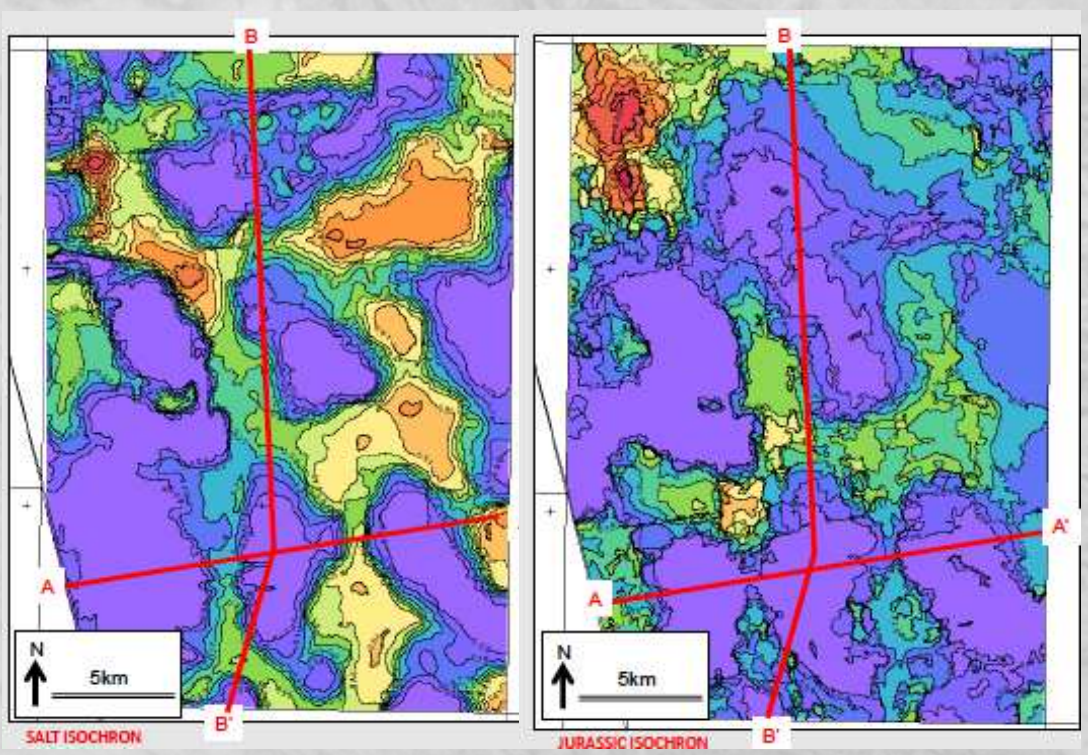
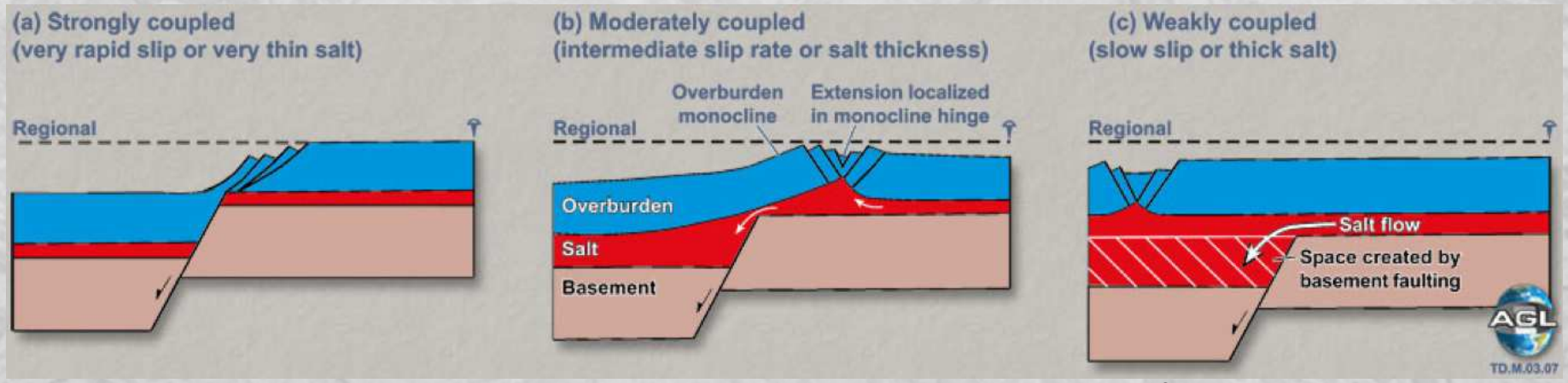


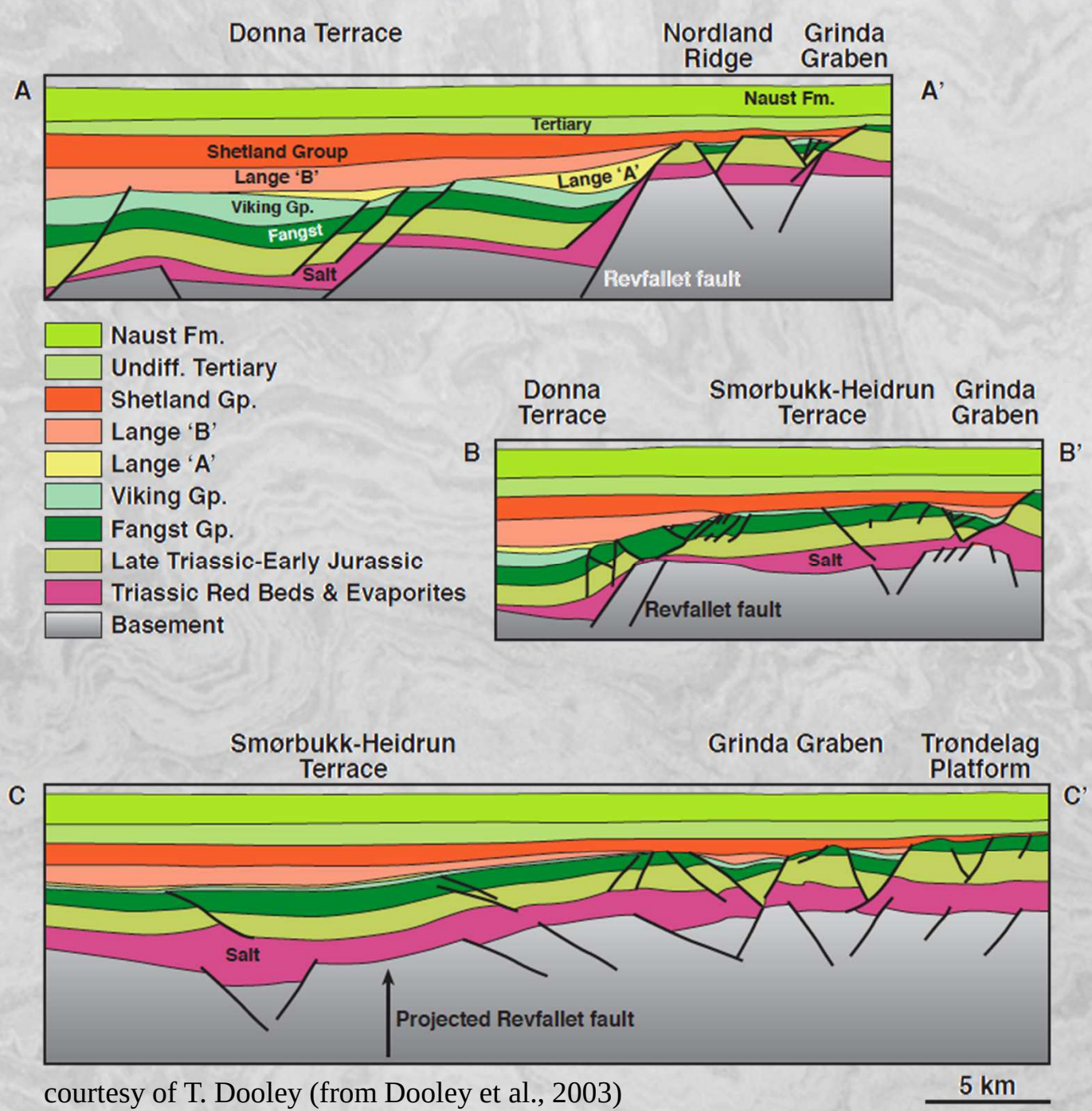
Jackson et al., 2010



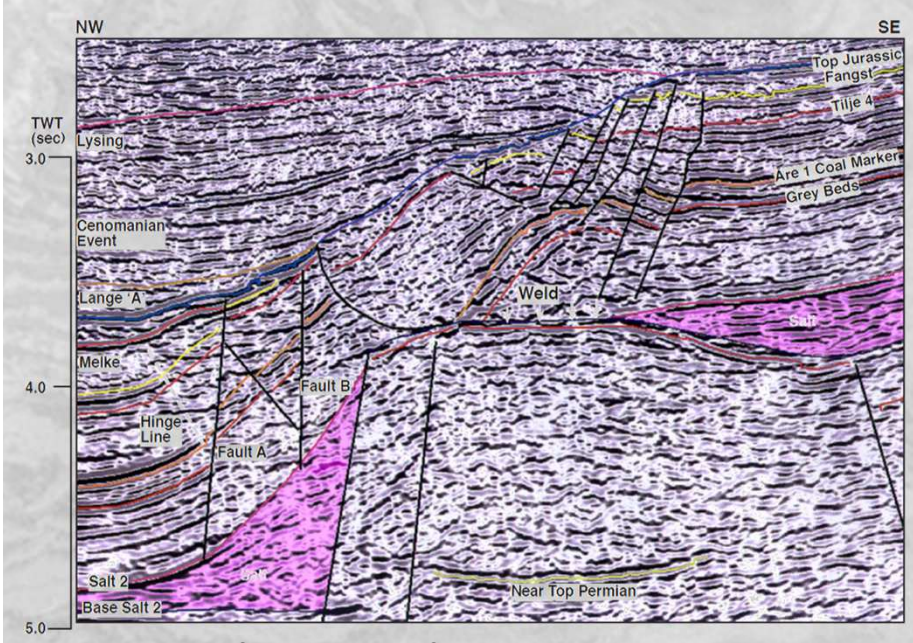
Young et al., 2012



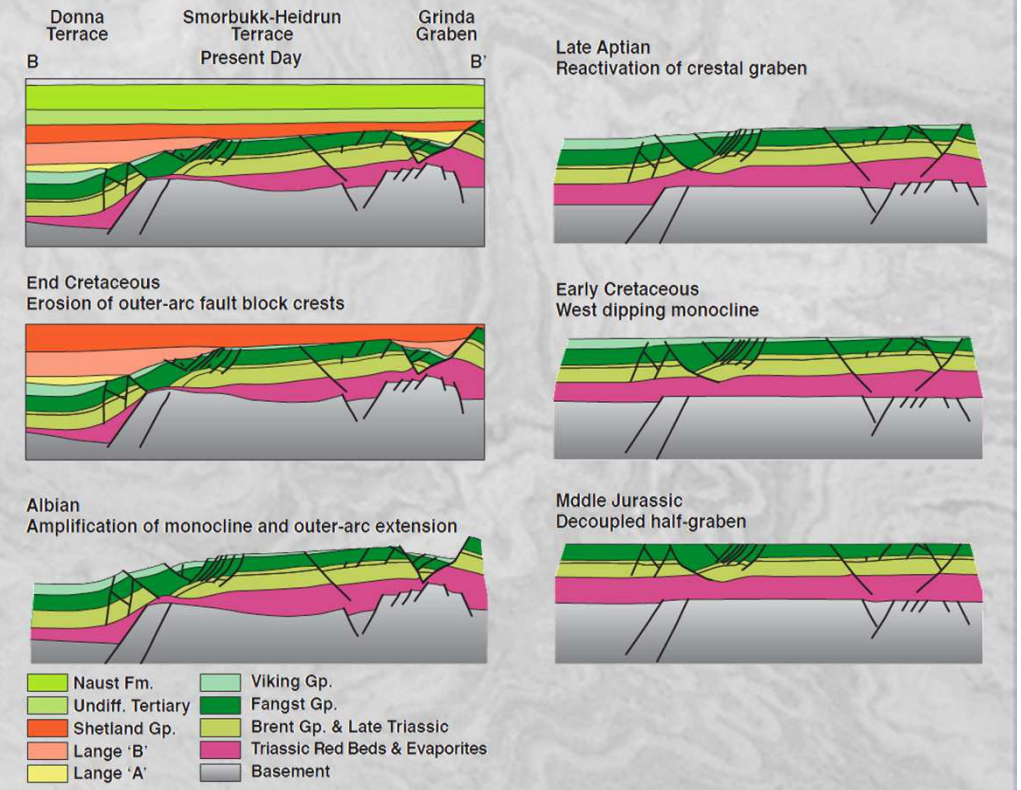
Jackson et al., 1994 (modified in Hudec & Jackson, 2011)

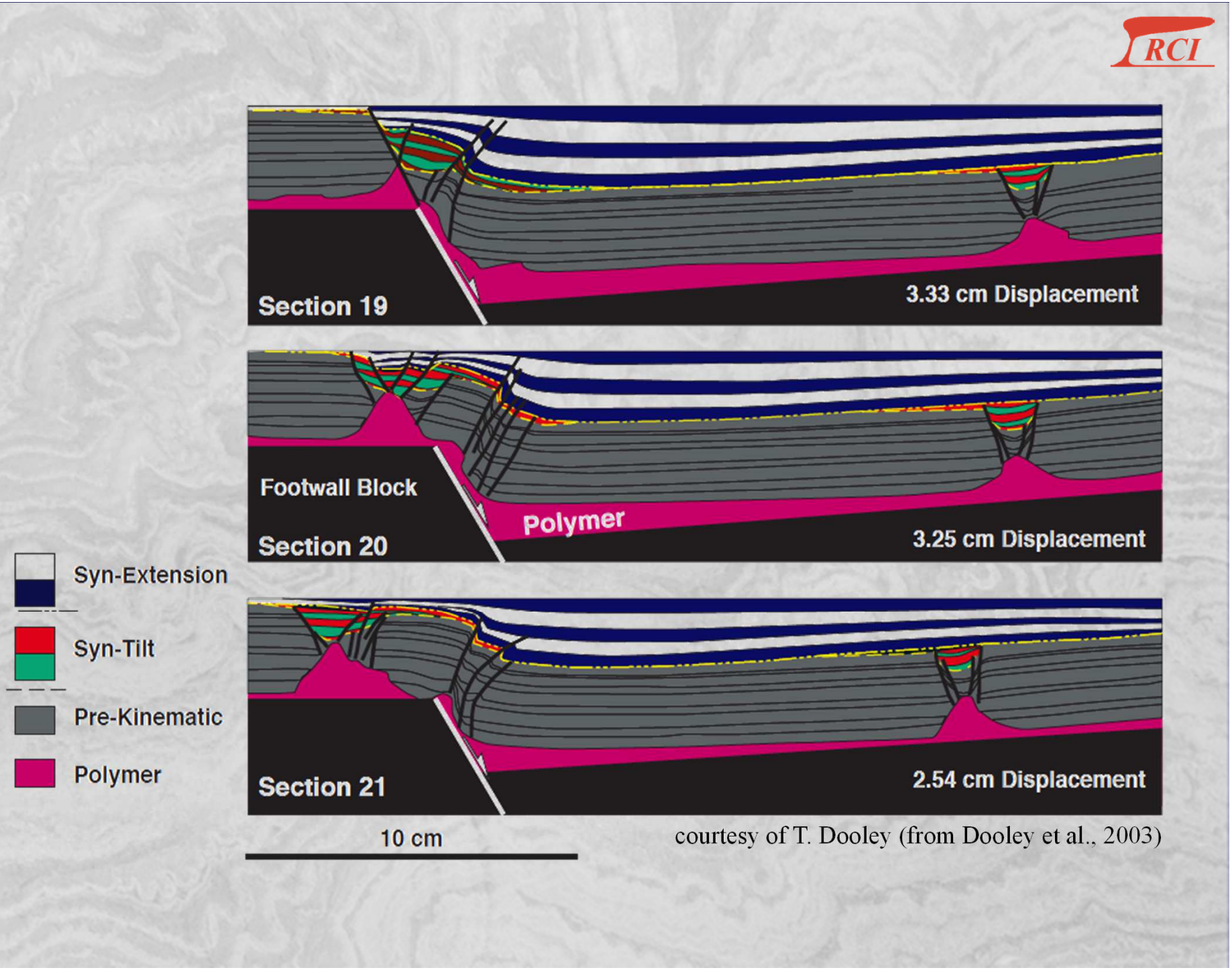


courtesy of T. Dooley (from Dooley et al., 2003)



courtesy of T. Dooley (from Dooley et al., 2003)





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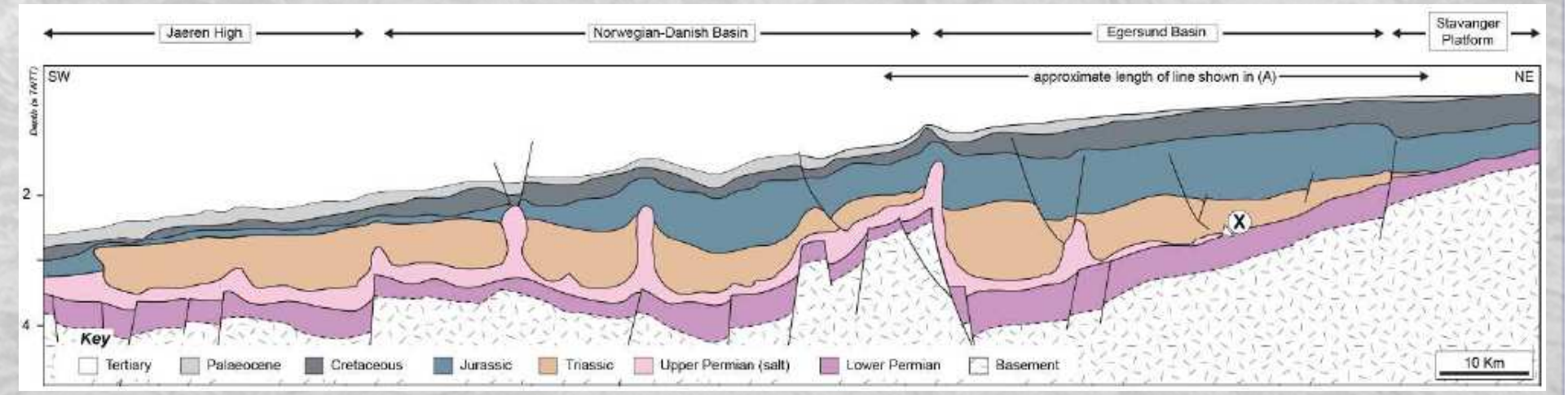
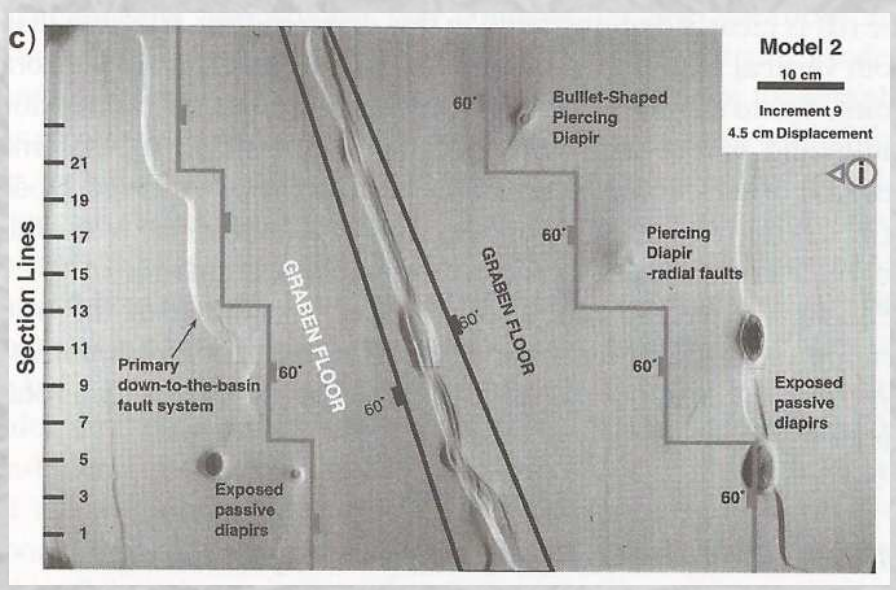
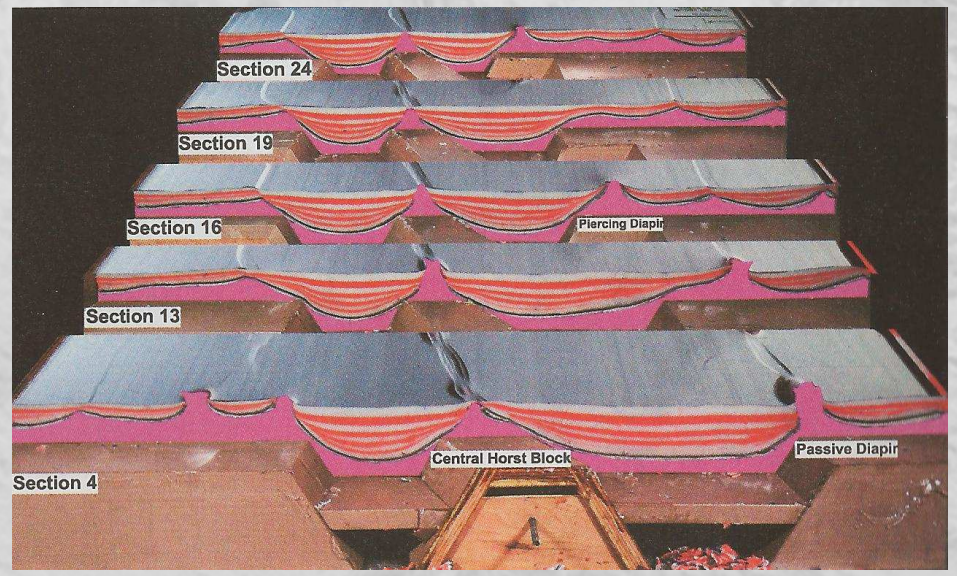
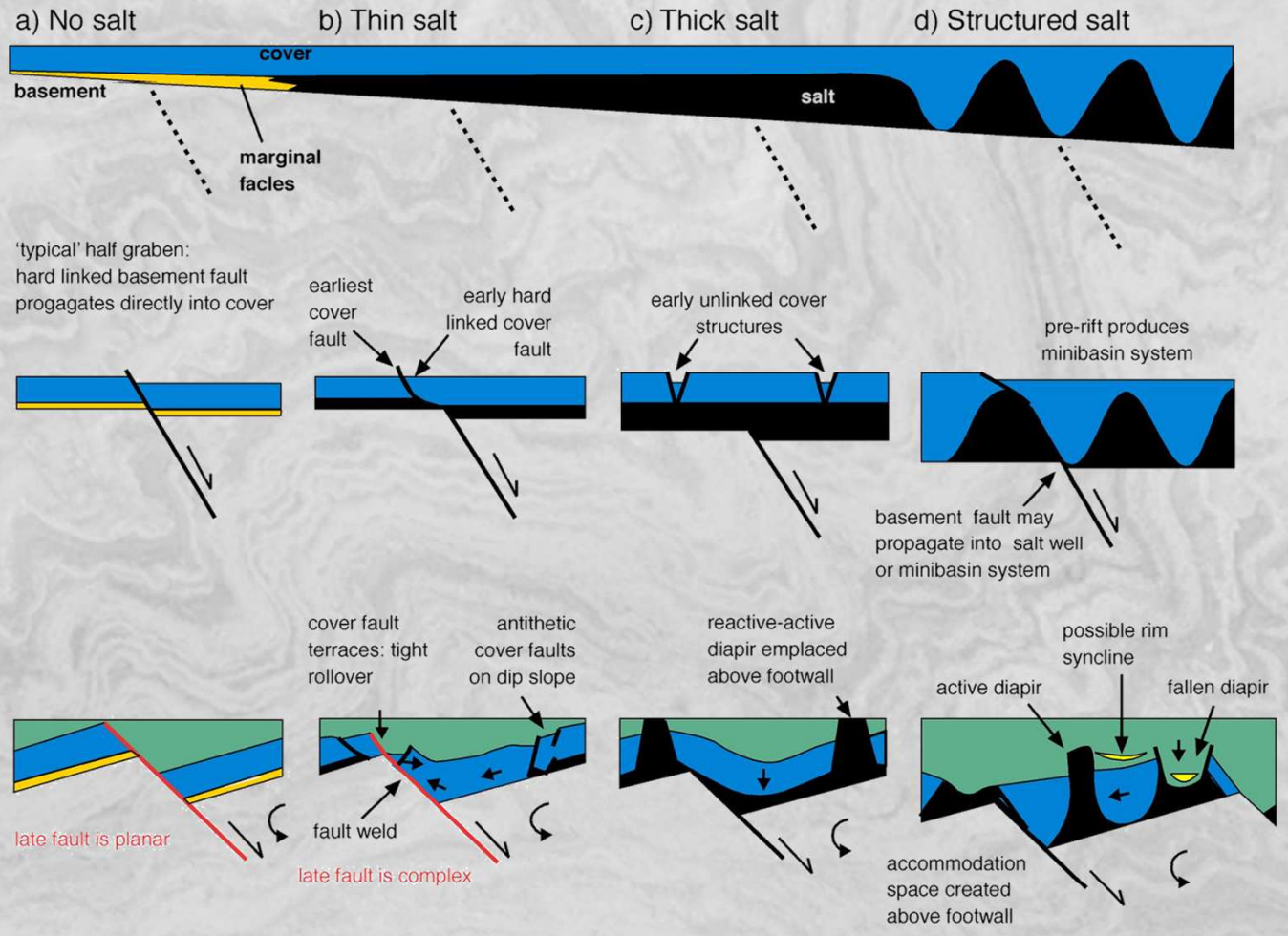


Jackson and Lewis, 2014

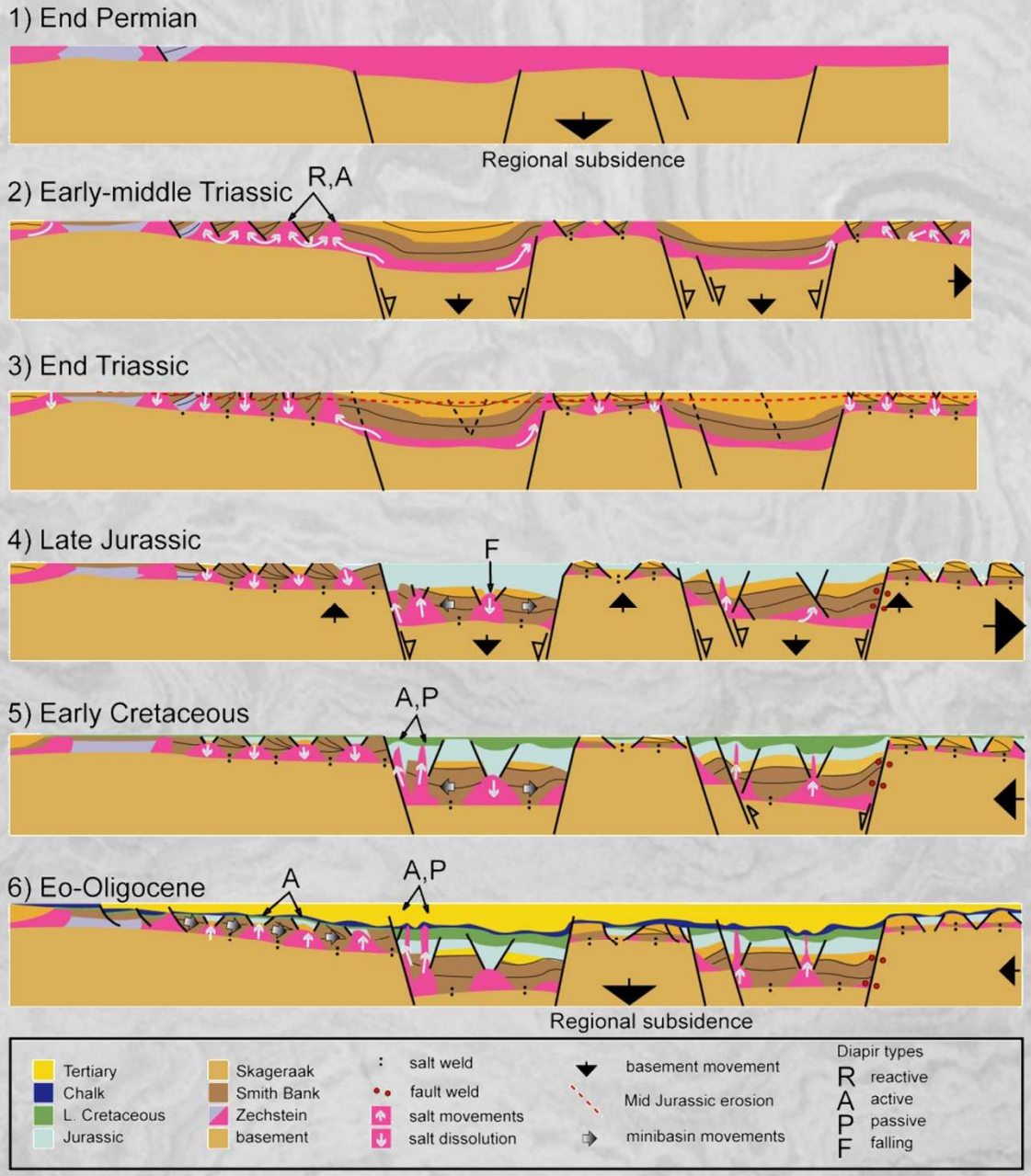




Dooley et al., 2005

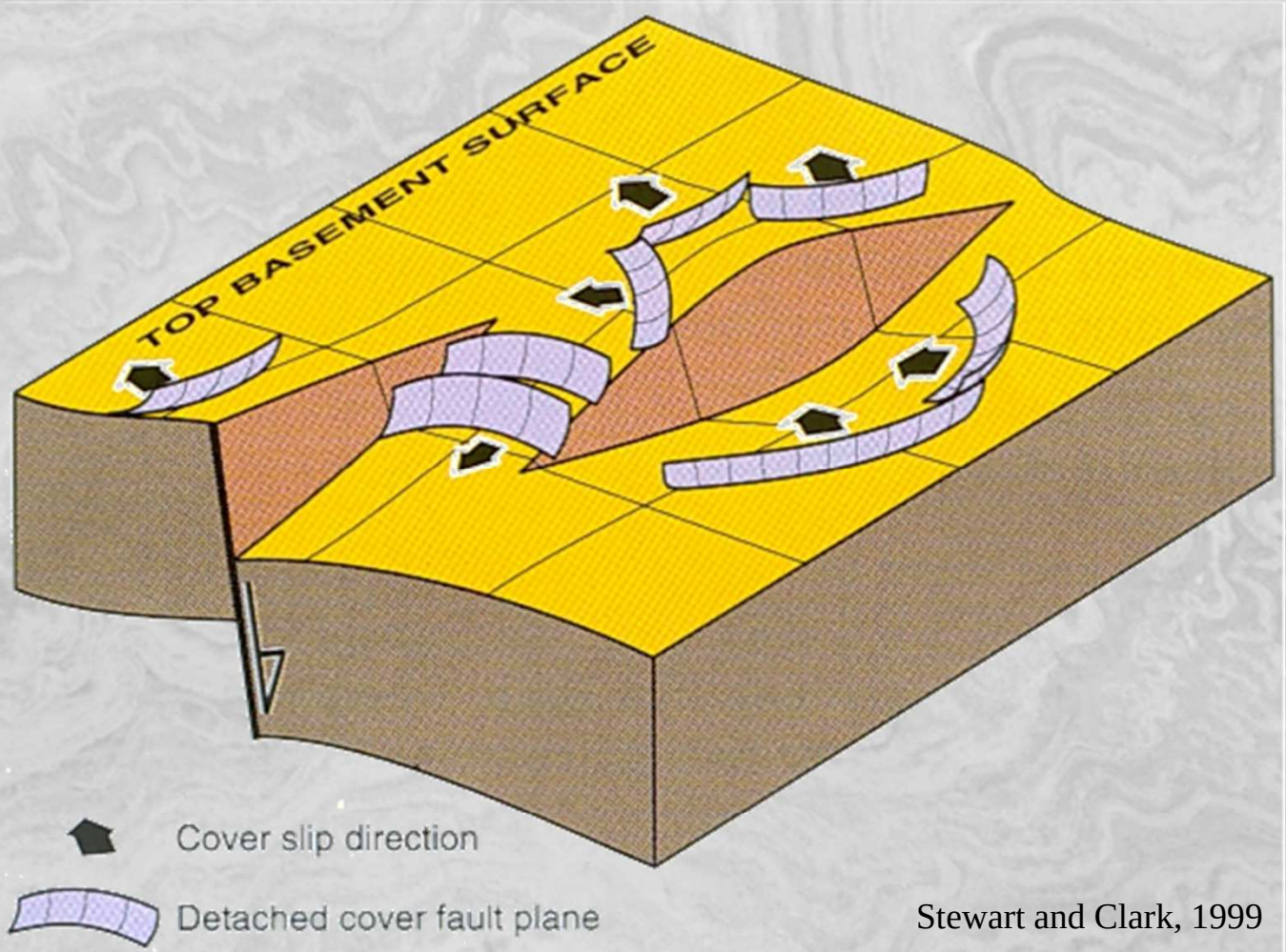


Stewart and Clark, 1999

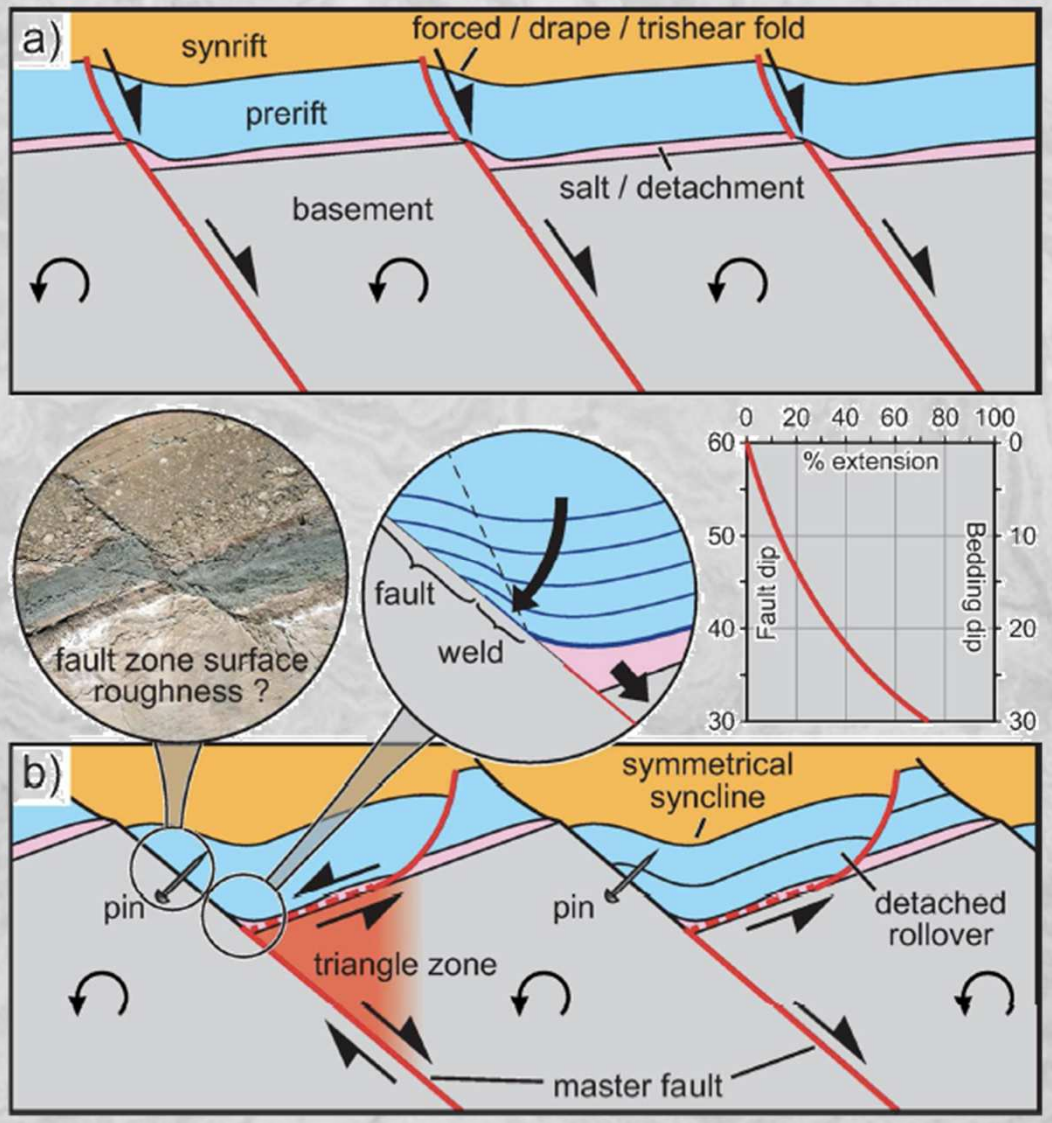


Stewart and Clark, 1999

redrafted by Nautilus Ltd.

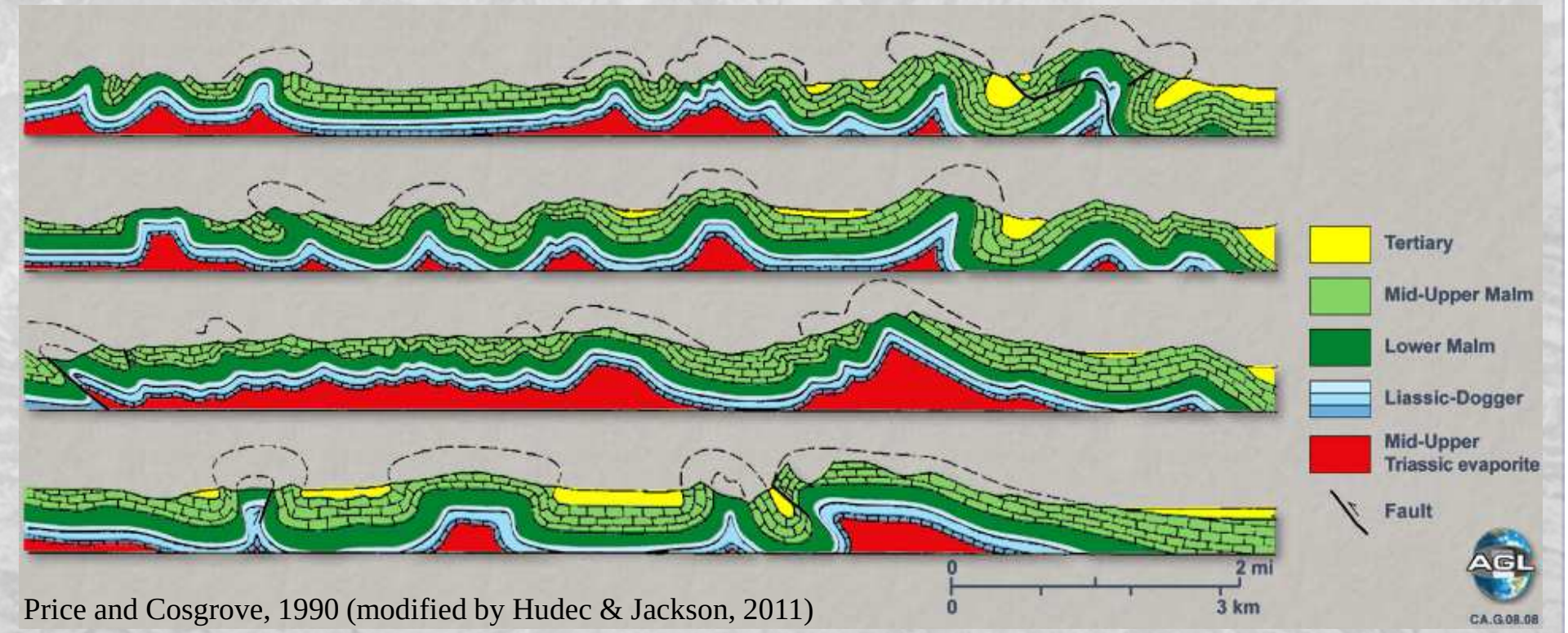


Stewart and Clark, 1999

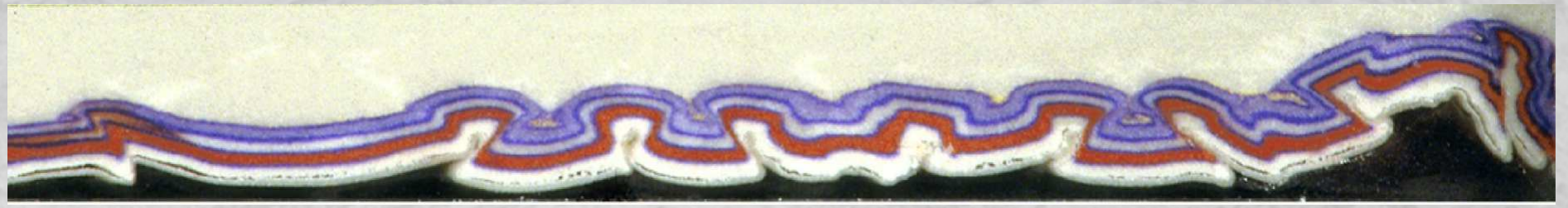


Stewart, 2014

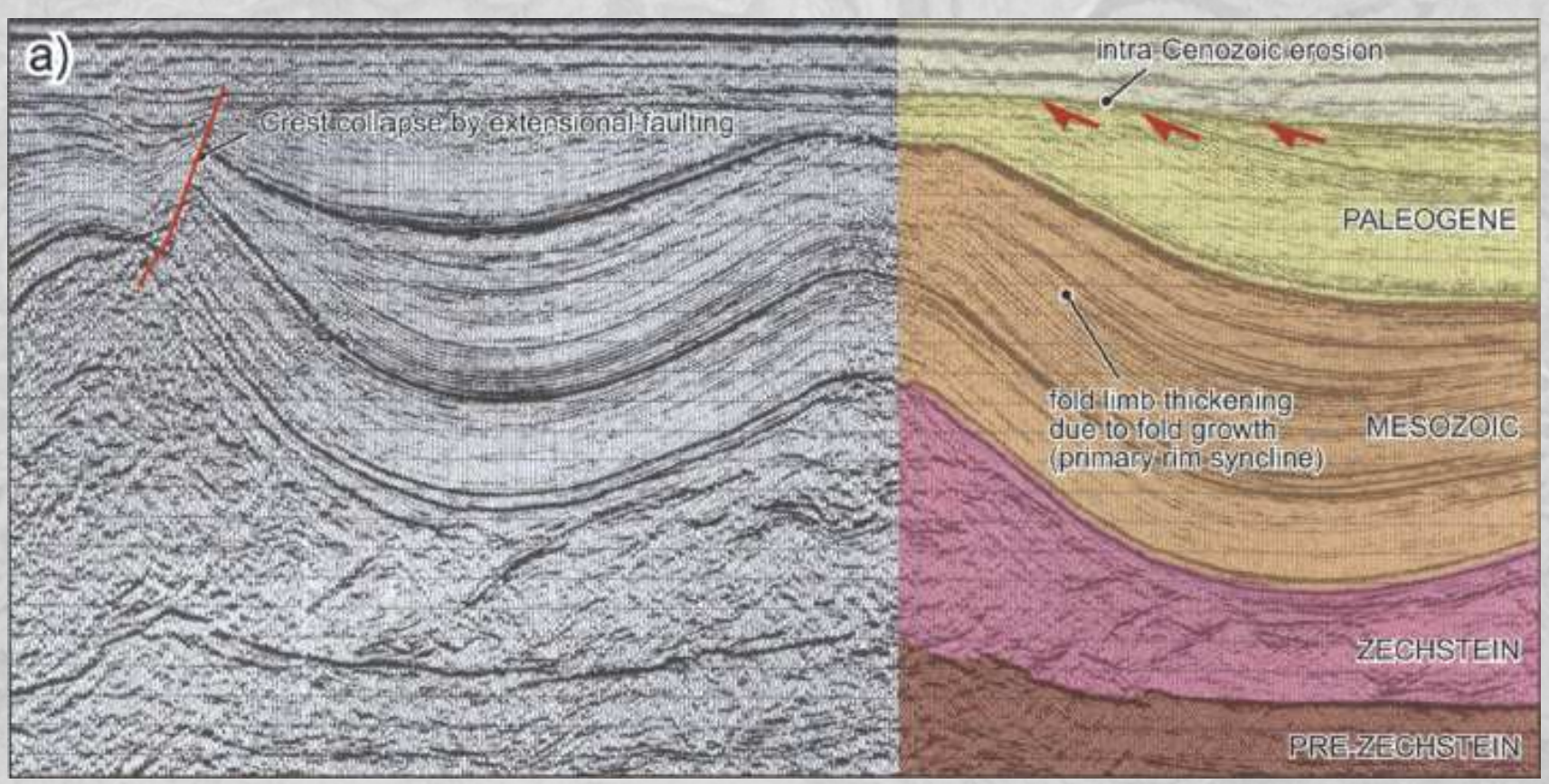
Contractional salt tectonics



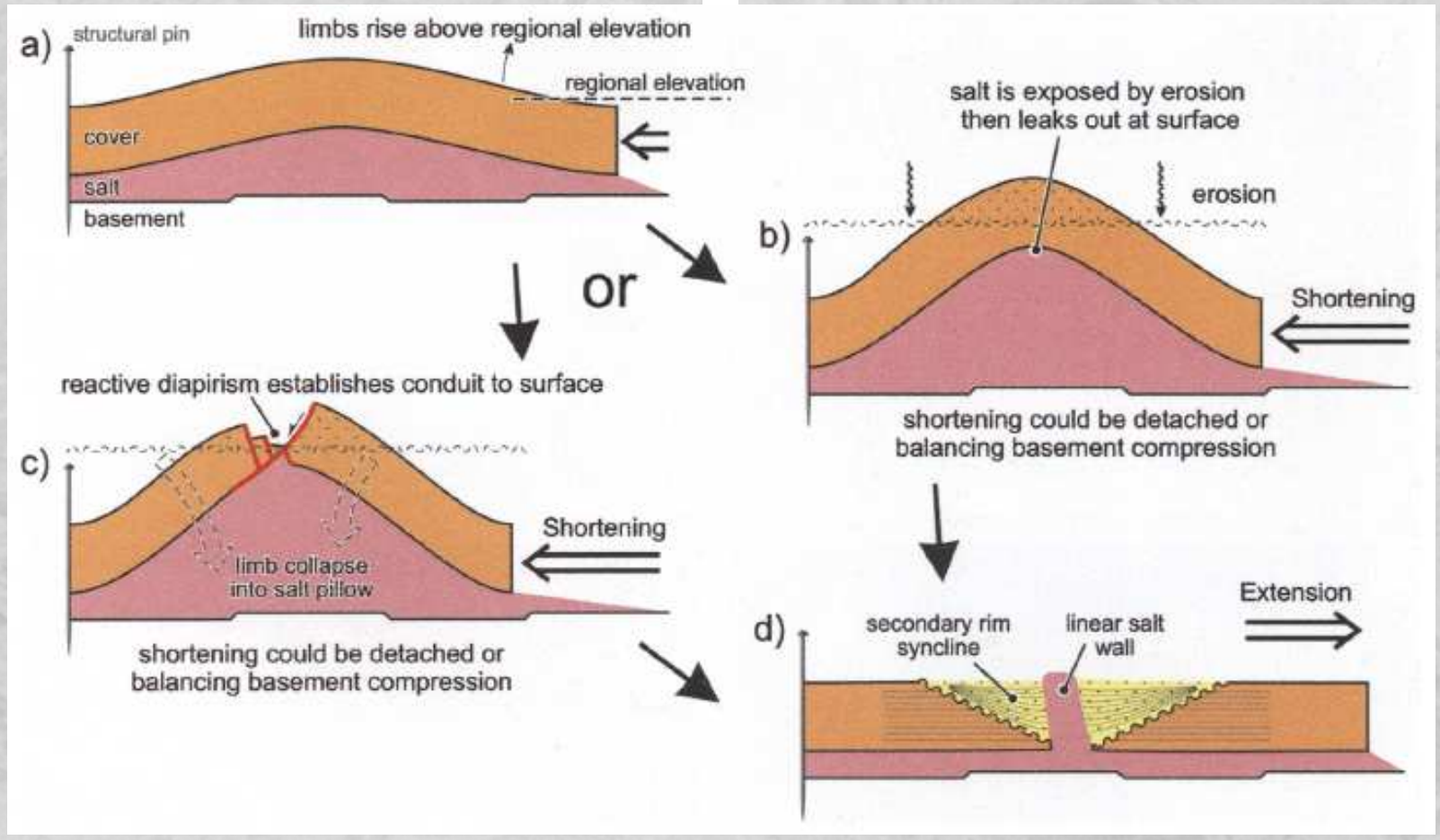
Price and Cosgrove, 1990 (modified by Hudec & Jackson, 2011)



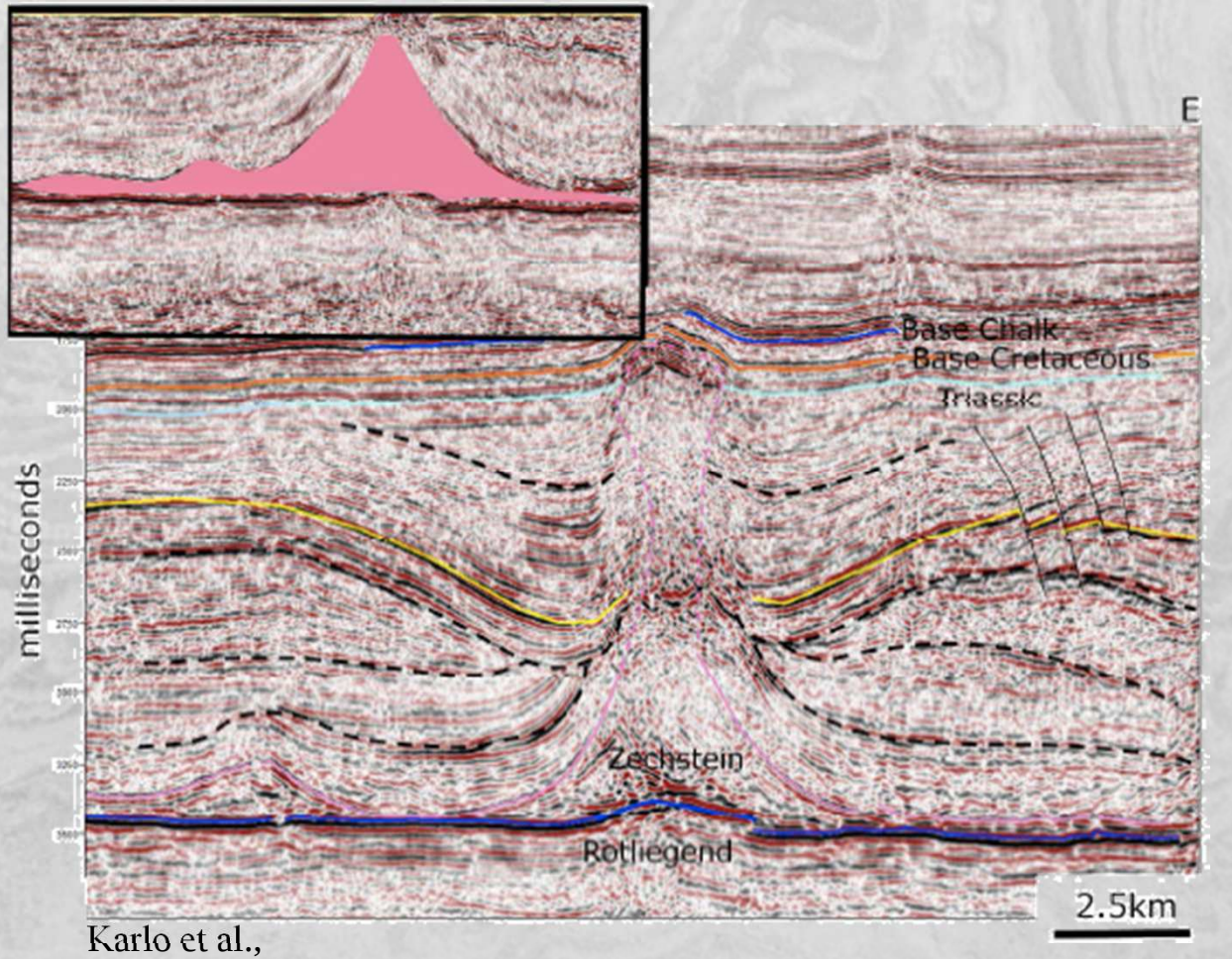
courtesy of B. Vendeville



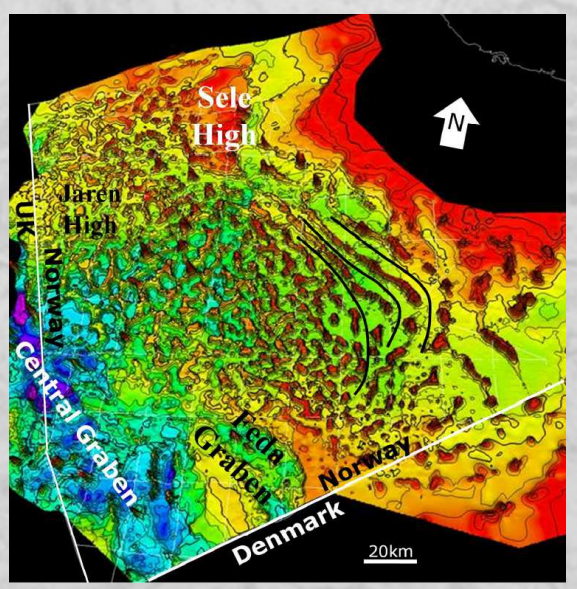
Stewart, 2007

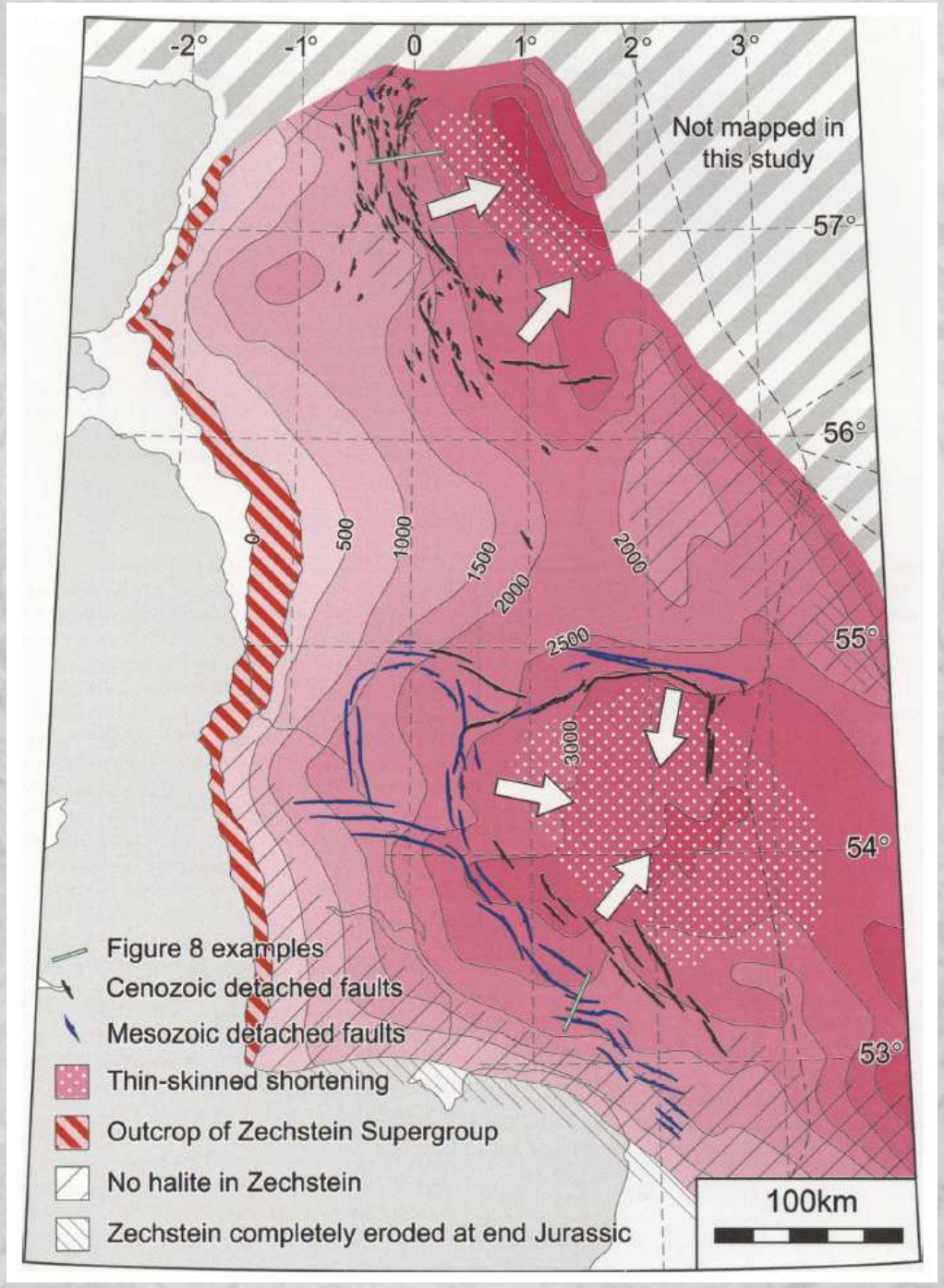


Stewart, 2007 (modified from Coward and Stewart, 1995)

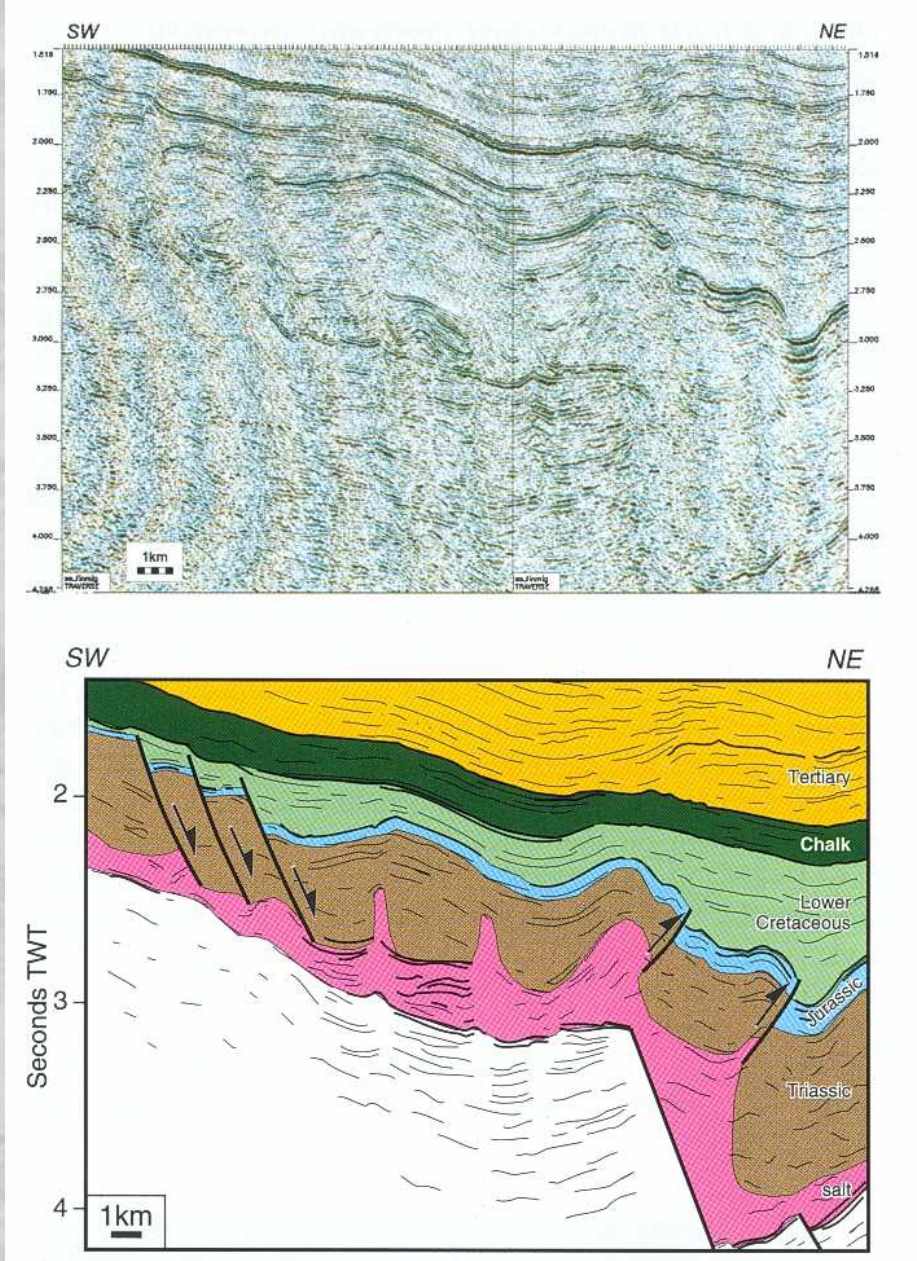


Karlo et al., 2014

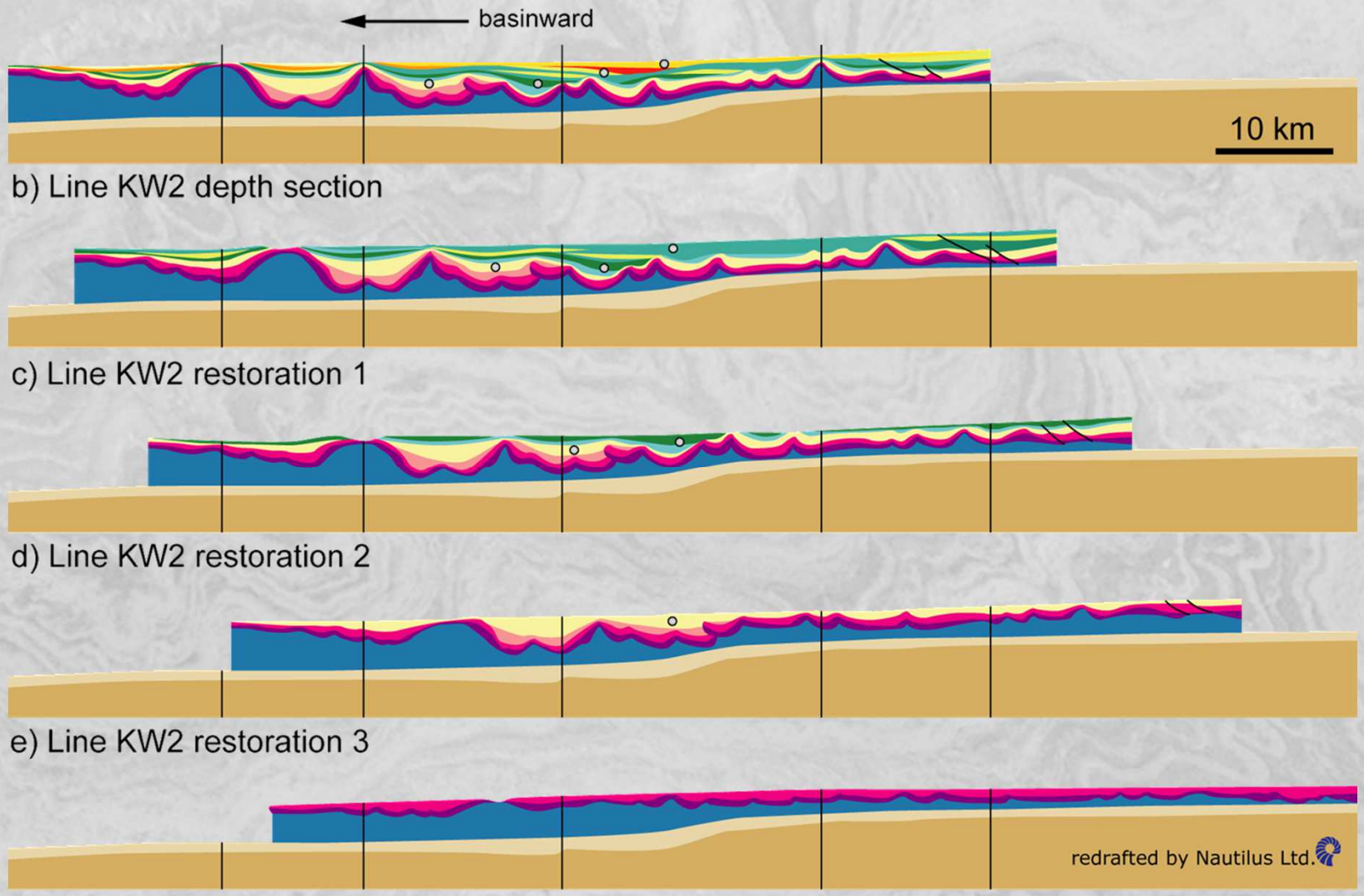




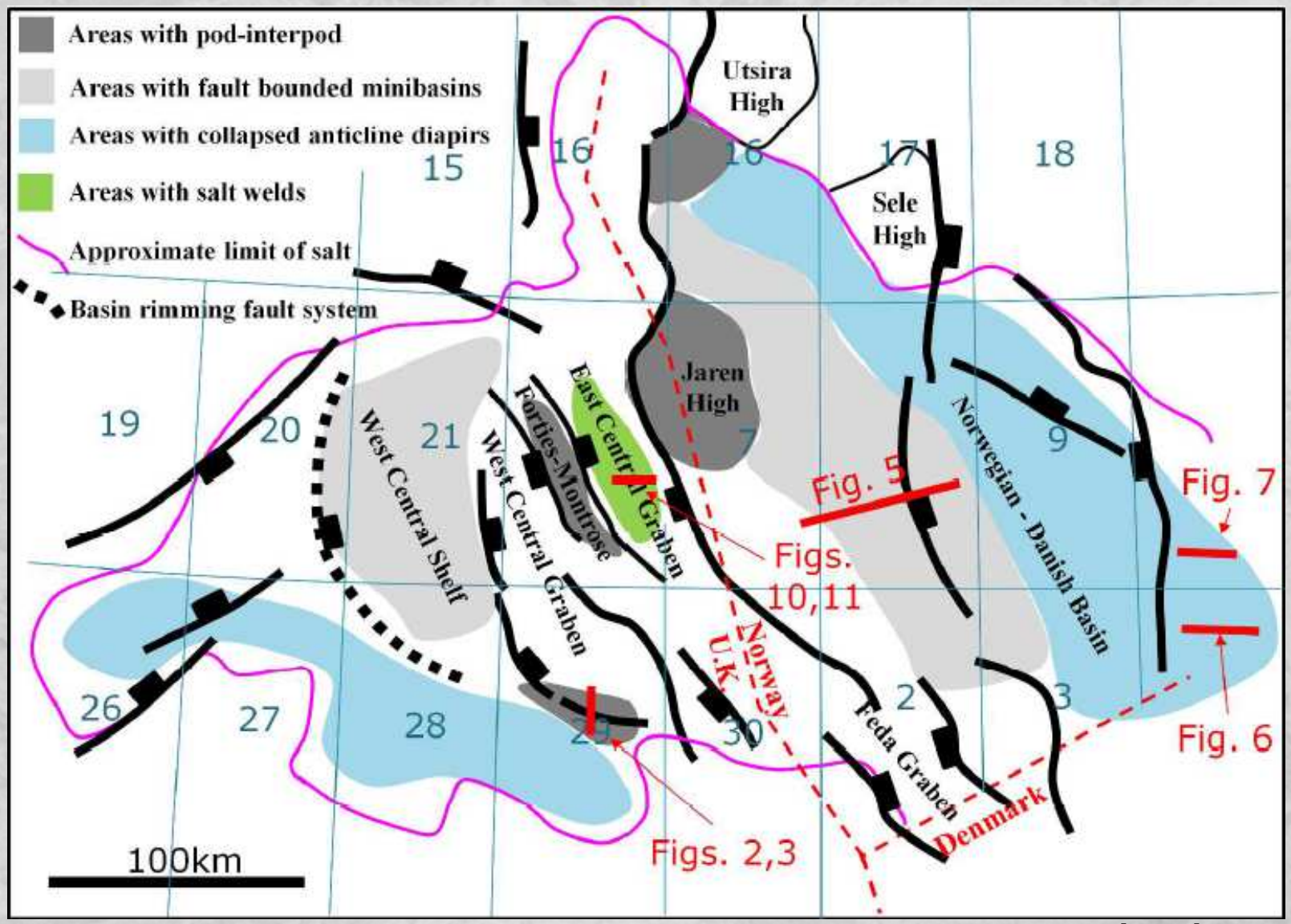
Stewart, 2007



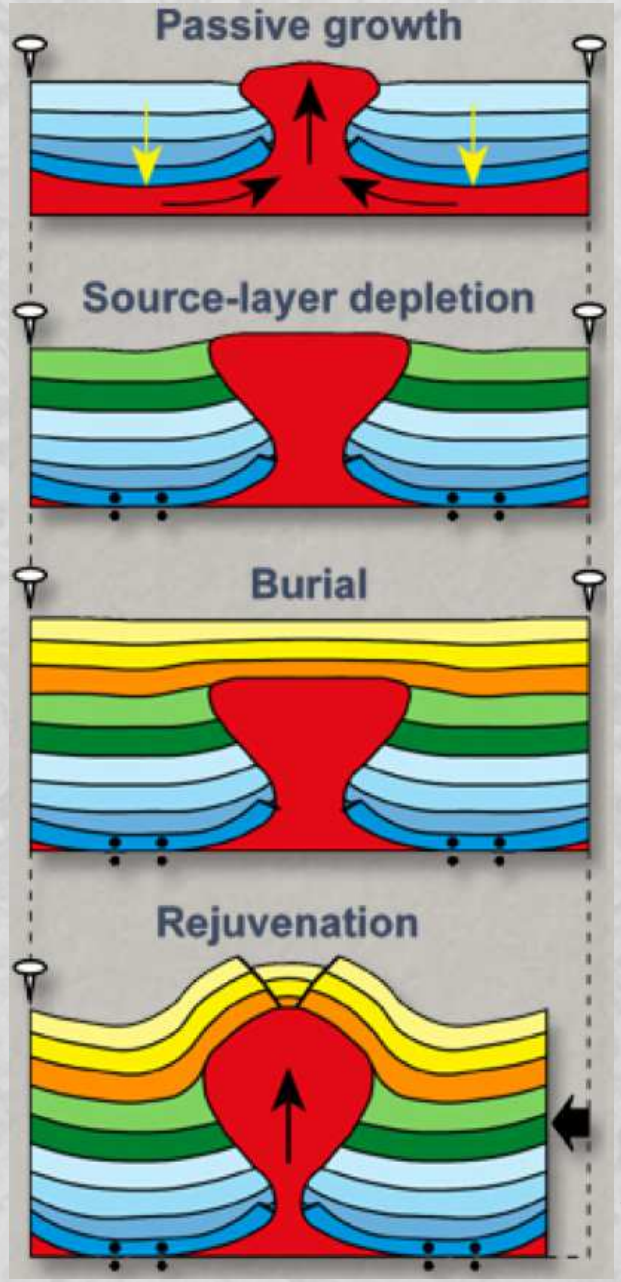
Stewart and Clark 1999



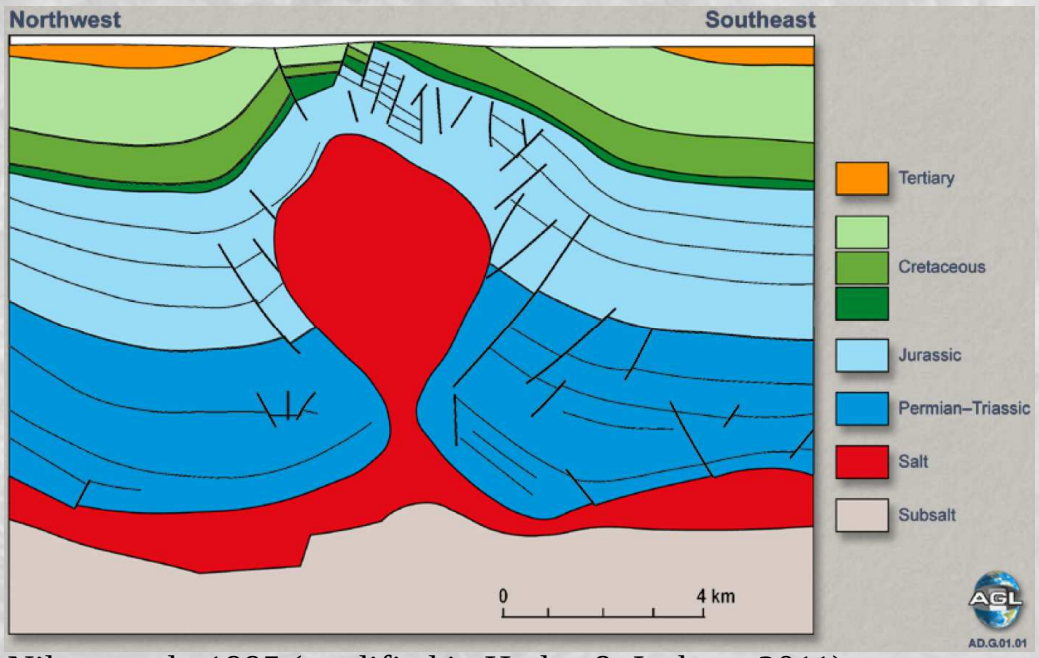
Rowan et al., 2004



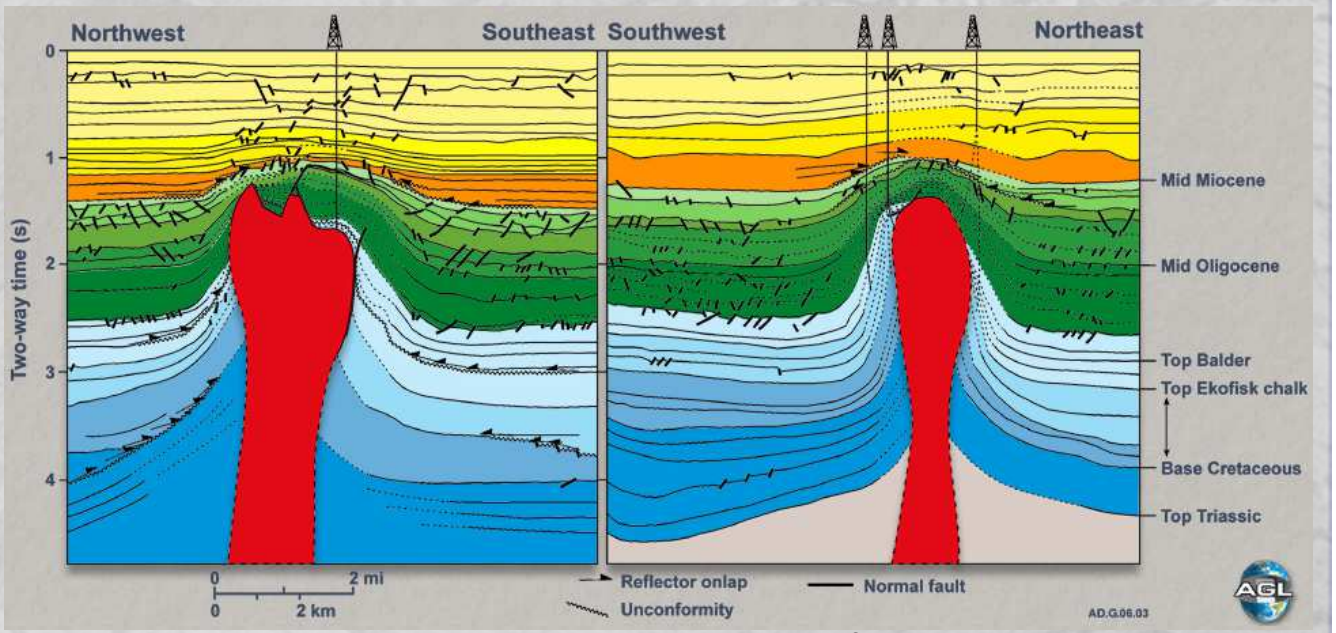
Karlo et al., 2014



Vendeville and Nilsen, 1995 (modified in Hudec & Jackson, 2011)

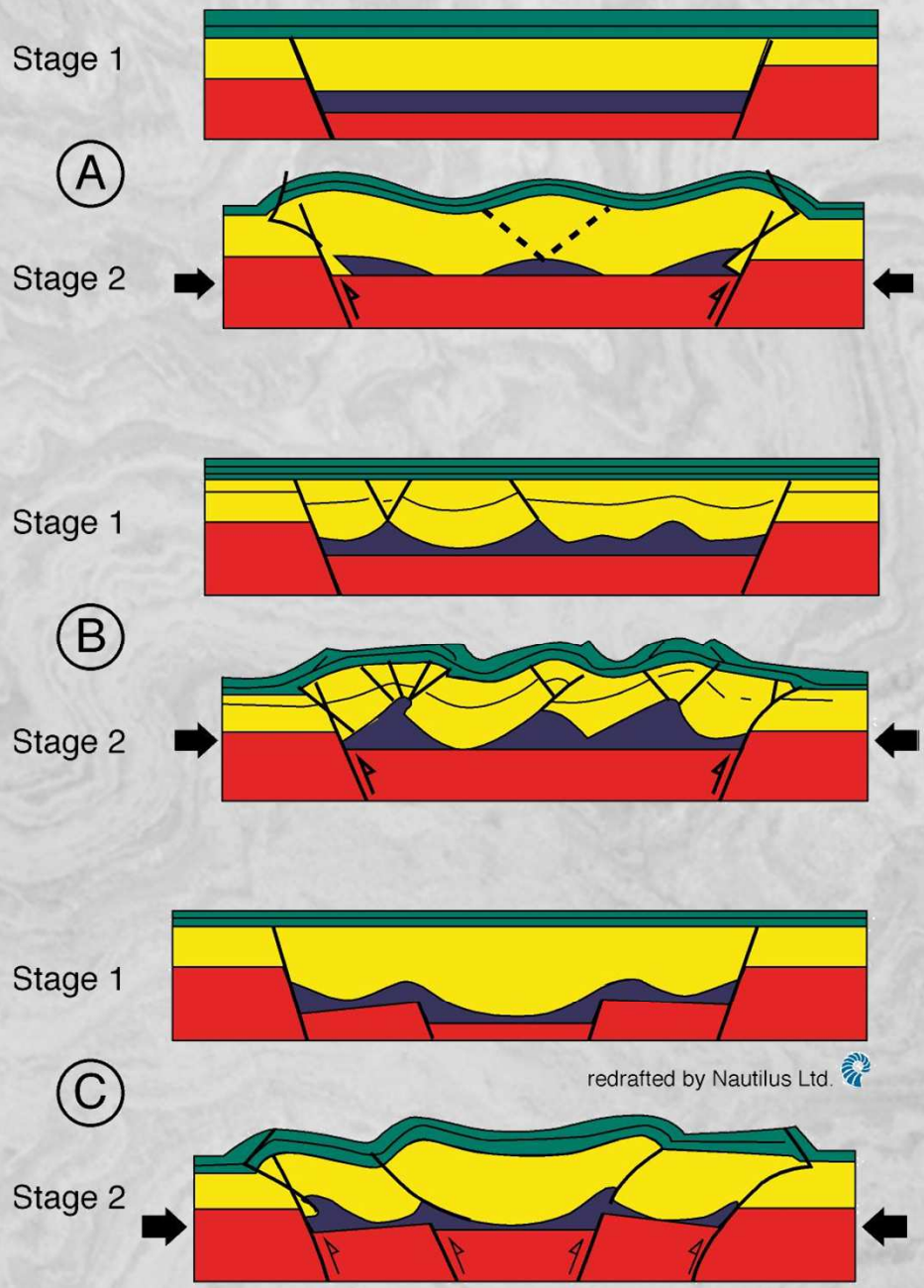


Nilsen et al., 1995 (modified in Hudec & Jackson 2011)

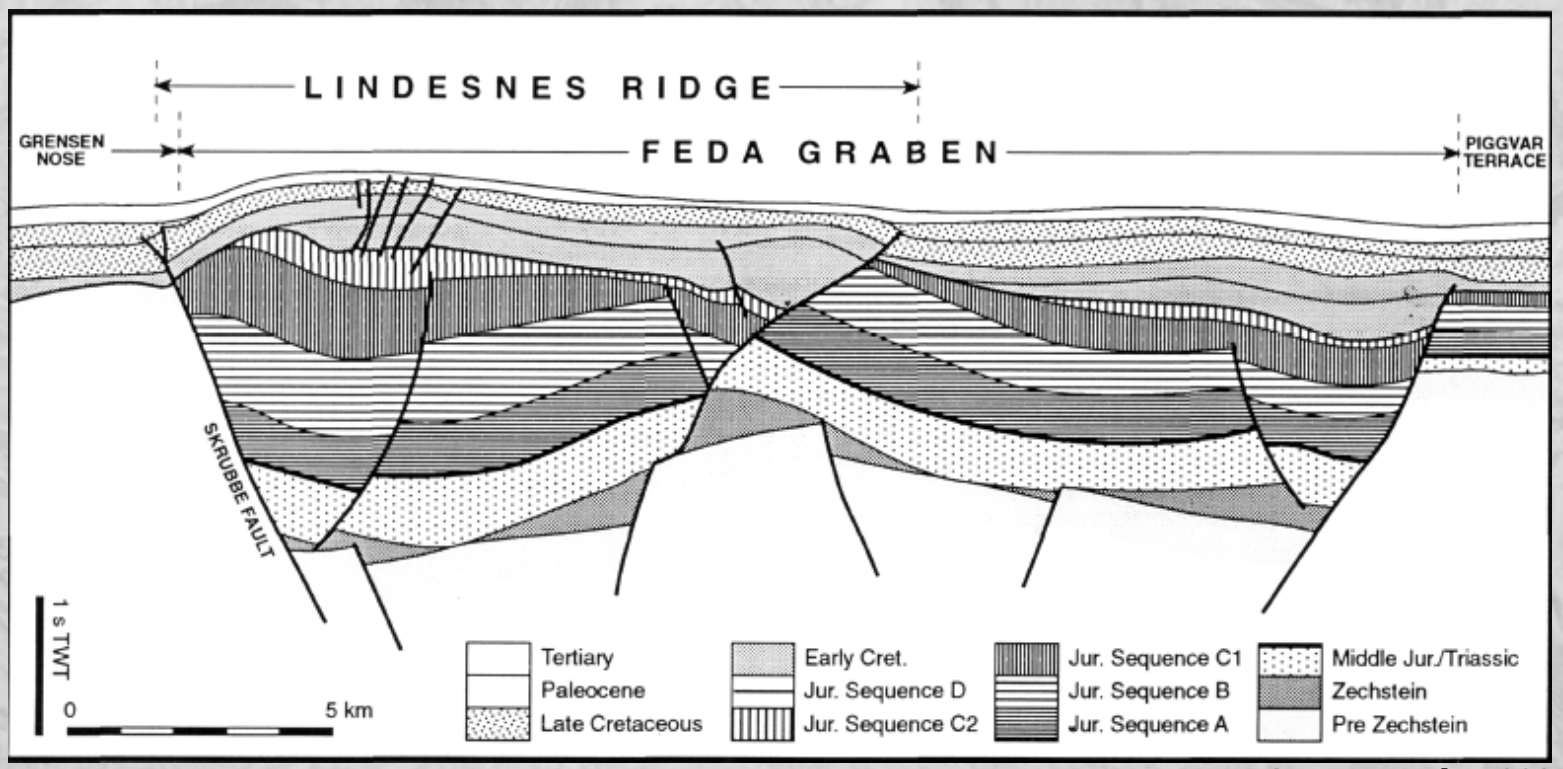


Davison et al., 2000 (modified in Hudec & Jackson 2011)

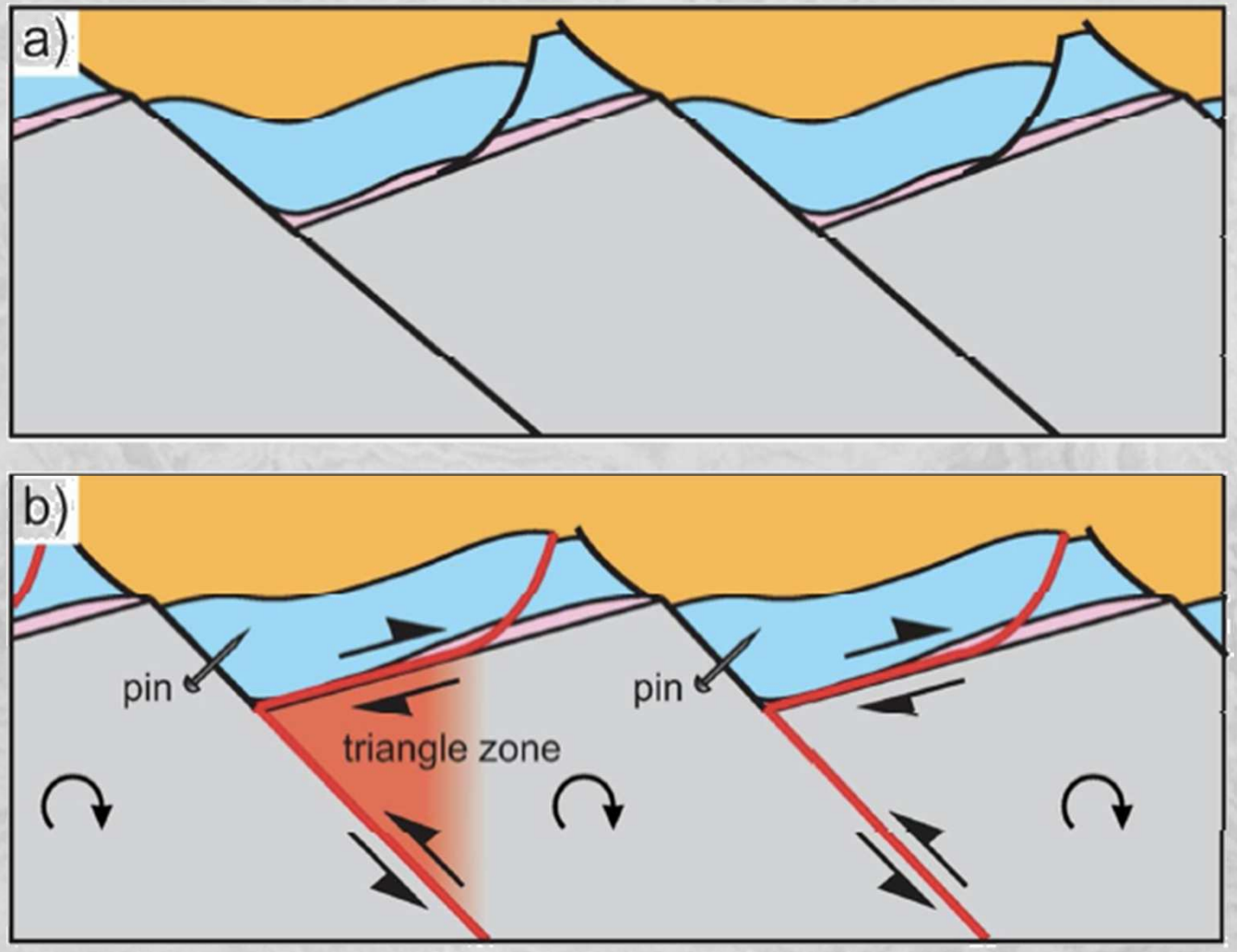
Figure removed



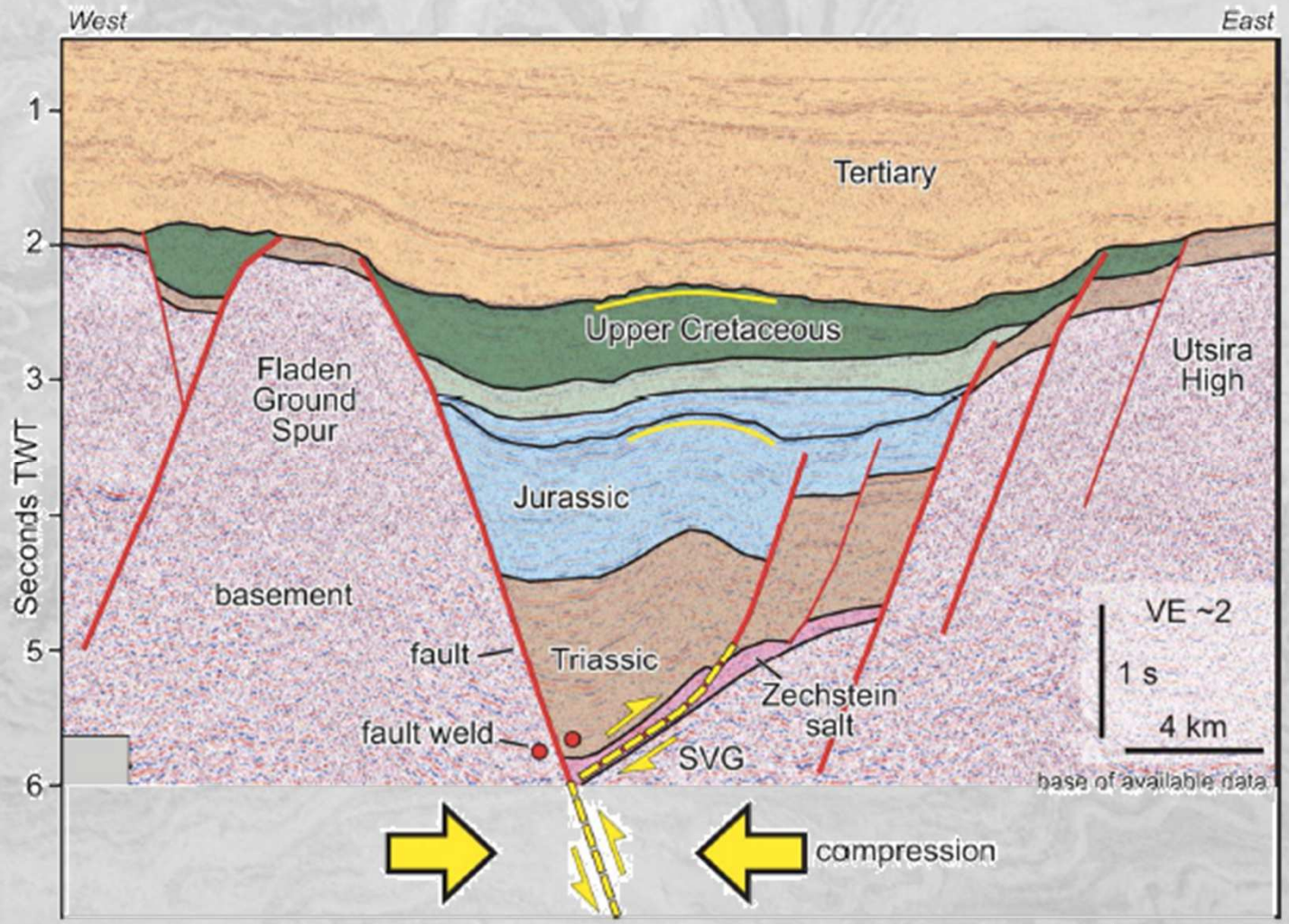
Letouzey et al., 1995



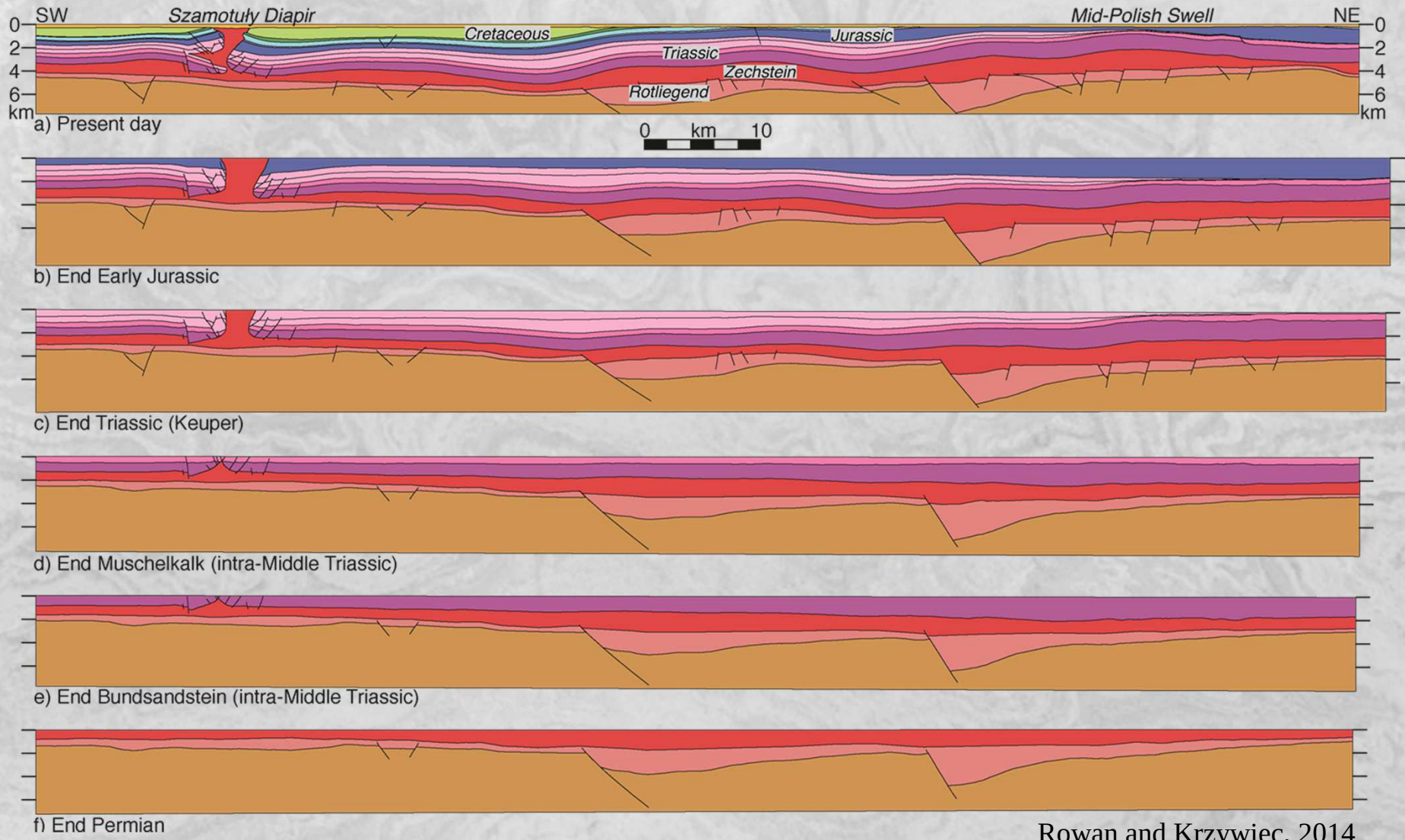
Gowers et al., 1993



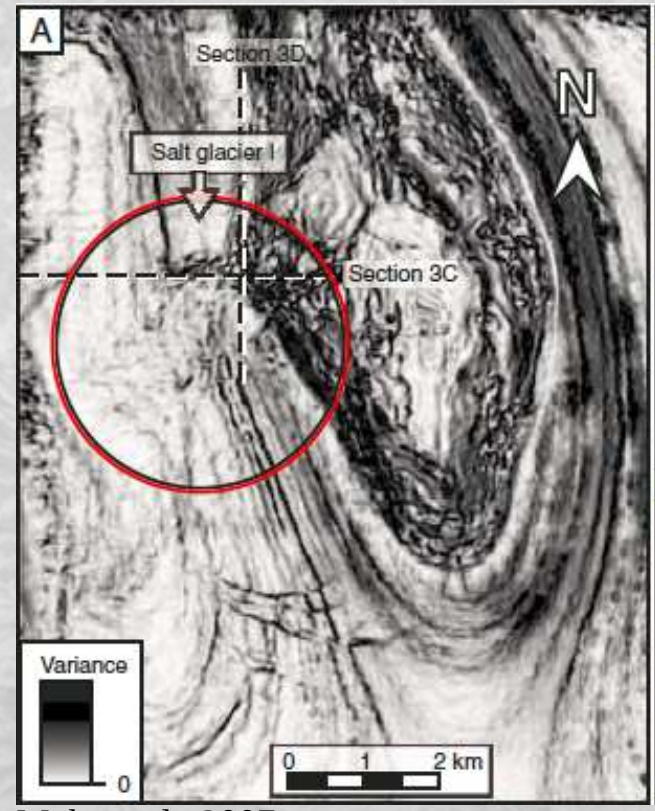
Stewart, 2014

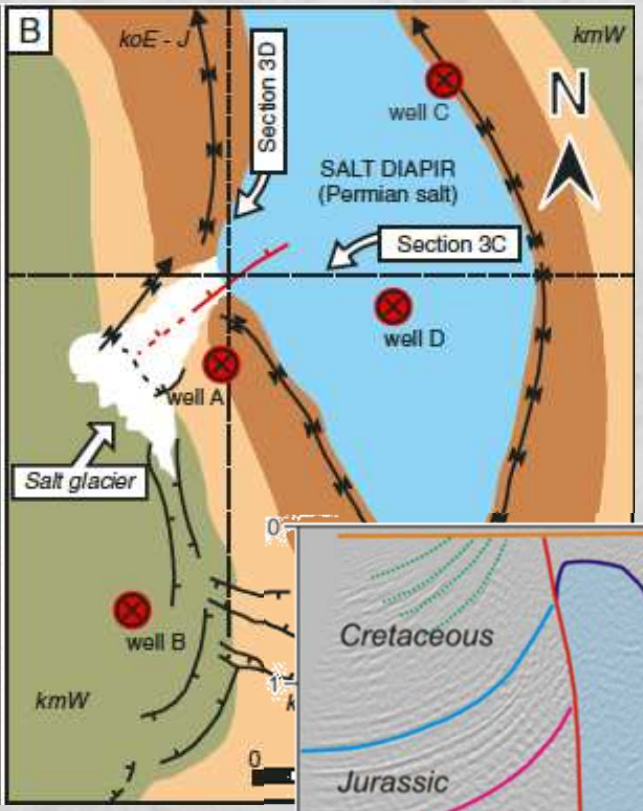


Stewart, 2014

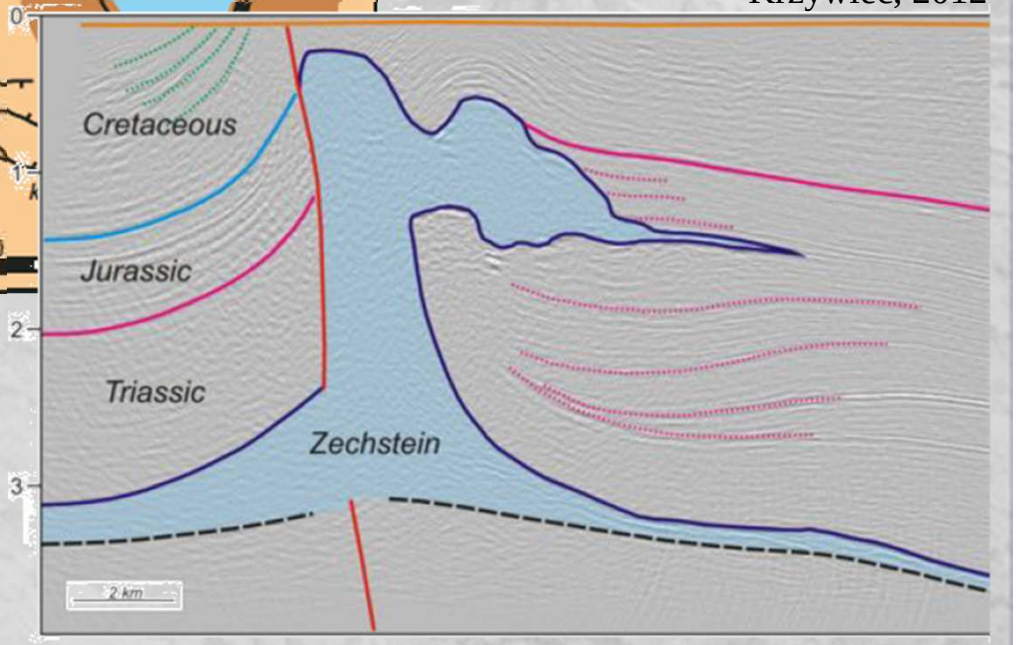


Rowan and Krzywiec, 2014

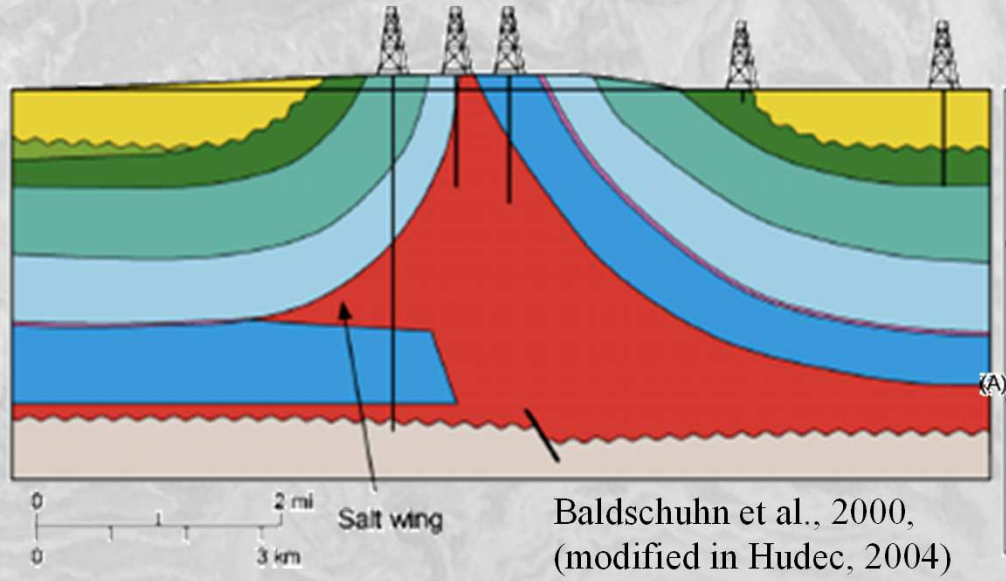




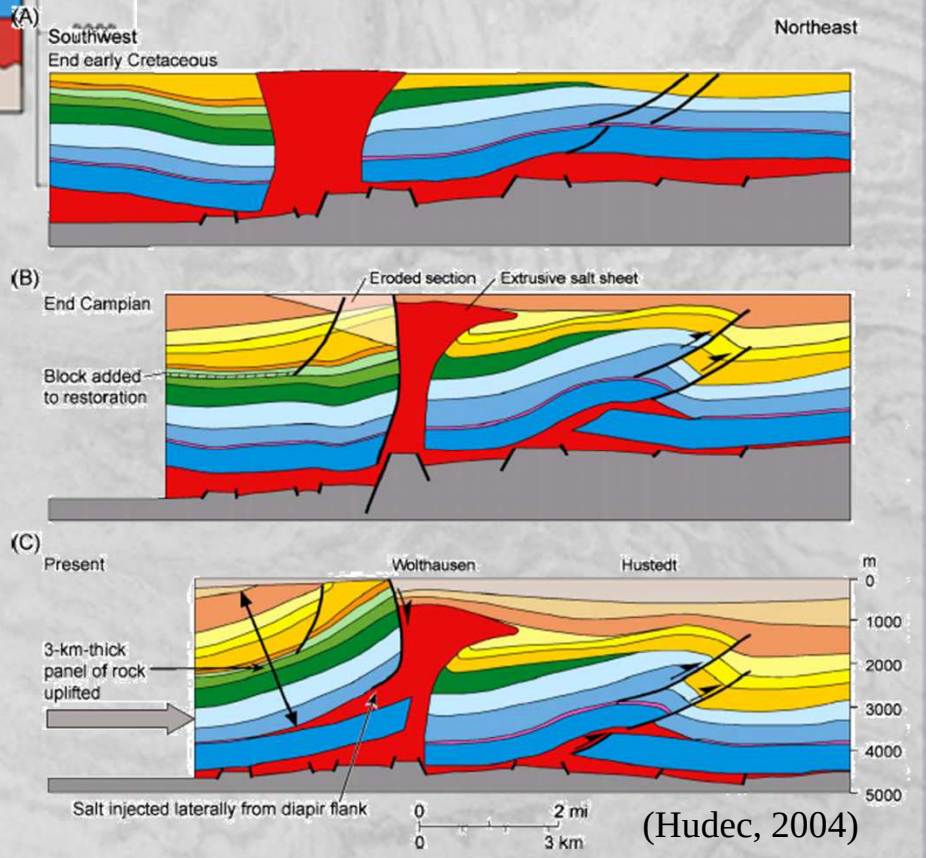
Mohr et al., 2007



Krzywiec, 2012

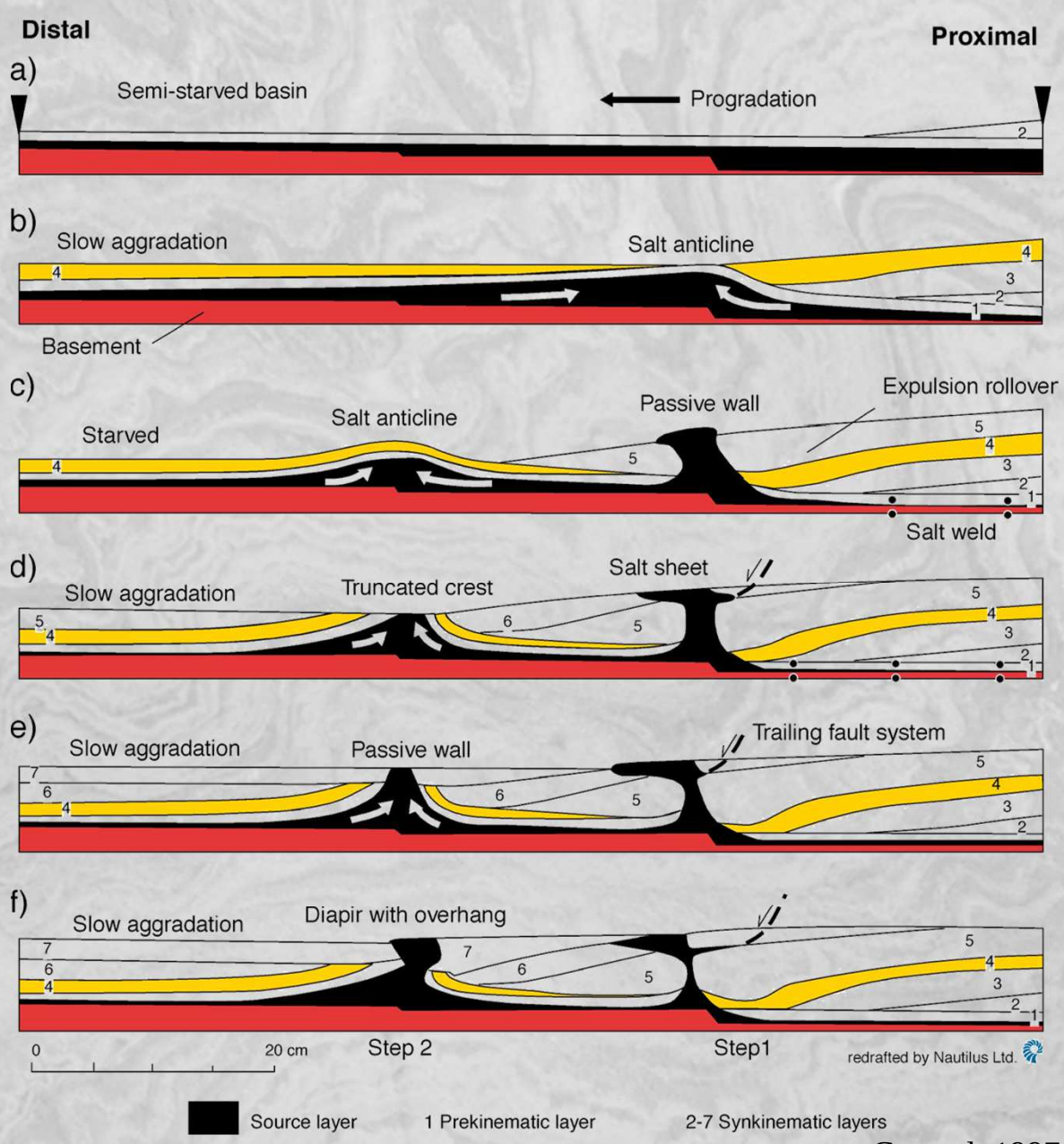


Baldschuhn et al., 2000,
(modified in Hudec, 2004)

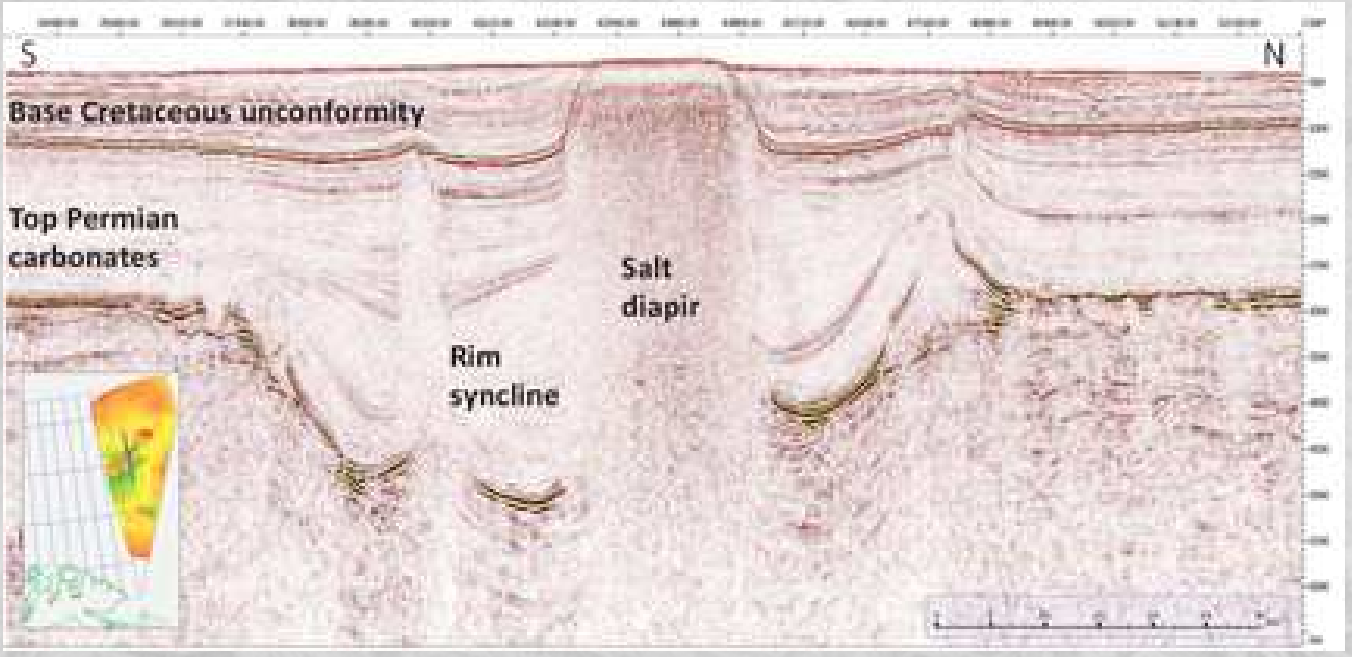


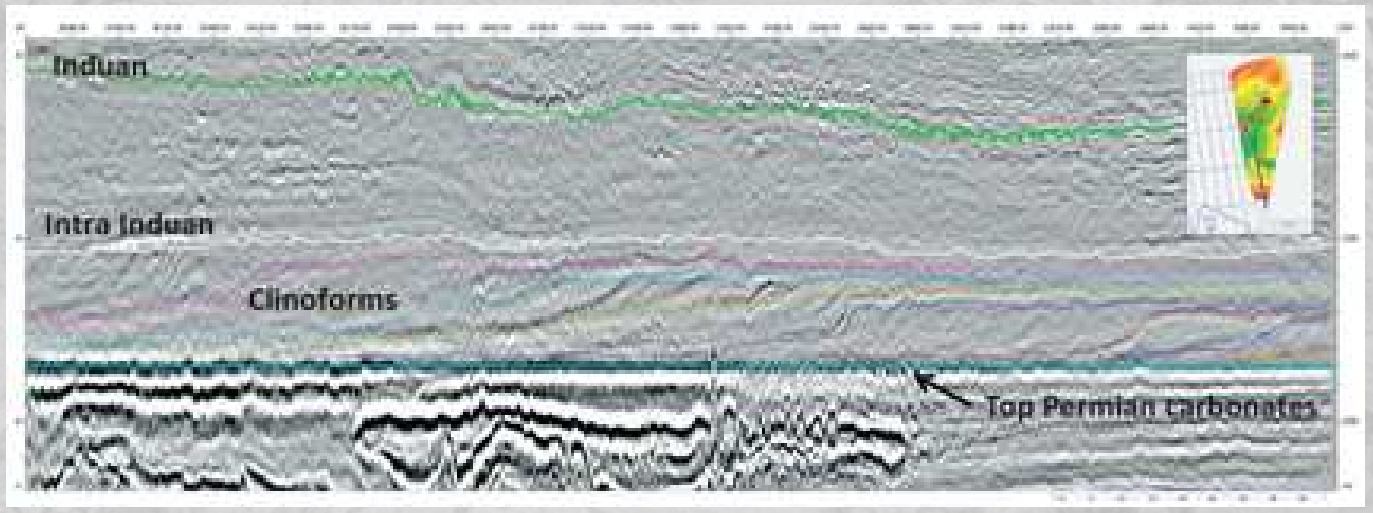
(Hudec, 2004)

Vertical salt tectonics

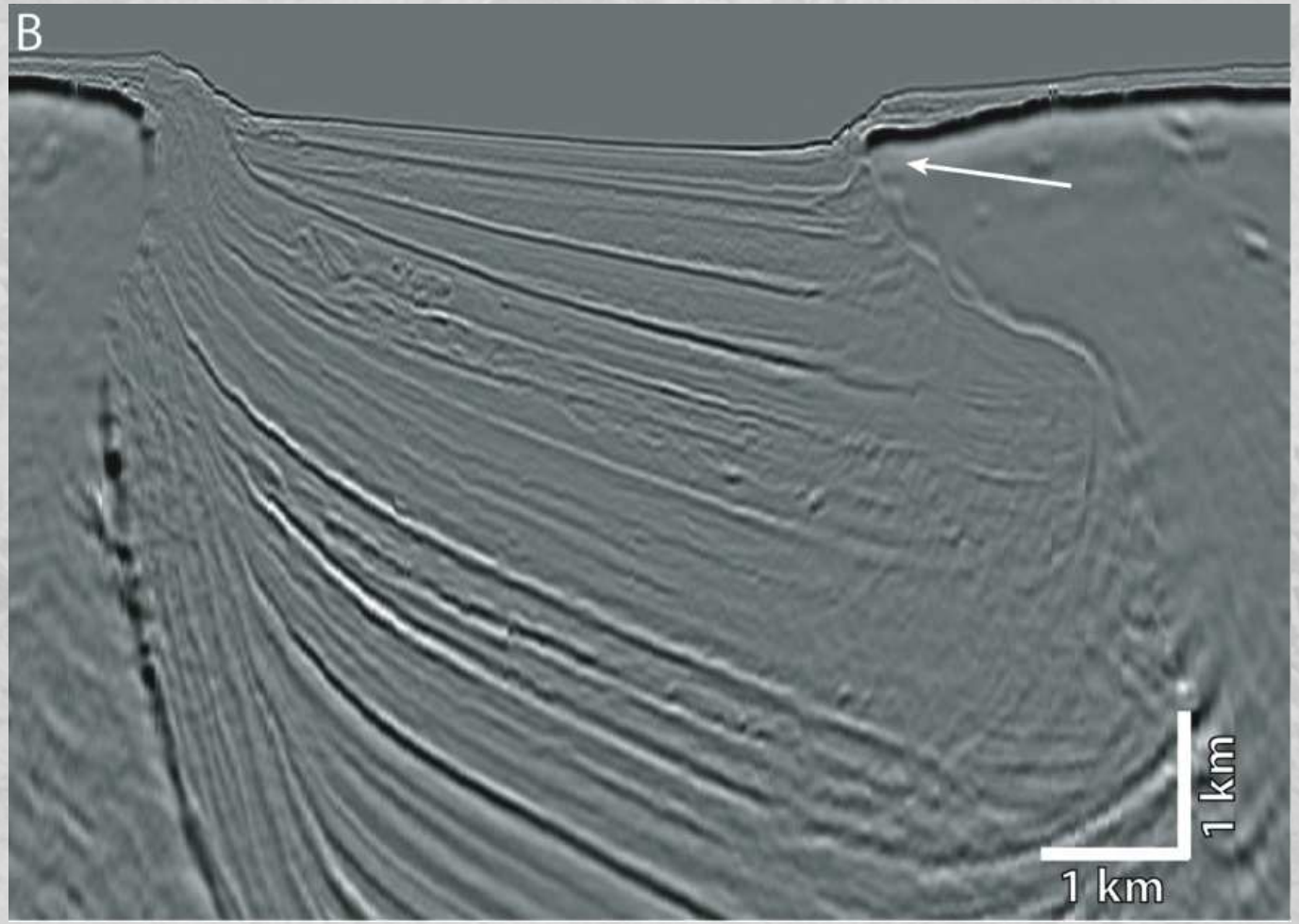

Distal
Proximal
a)
Semi-starved basin
Progradation
b)
Slow aggradation
Salt anticline
Basement
c)
Starved
Salt anticline
Passive wall
Expulsion rollover
Salt weld
d)
Slow aggradation
Truncated crest
Salt sheet
e)
Slow aggradation
Passive wall
Trailing fault system
f)
Slow aggradation
Diapir with overhang
0
20 cm
Step 2
Step1
redrafted by Nautilus Ltd.
Source layer
1 Prekinematic layer
2-7 Synkinematic layers

Ge et al. 1997



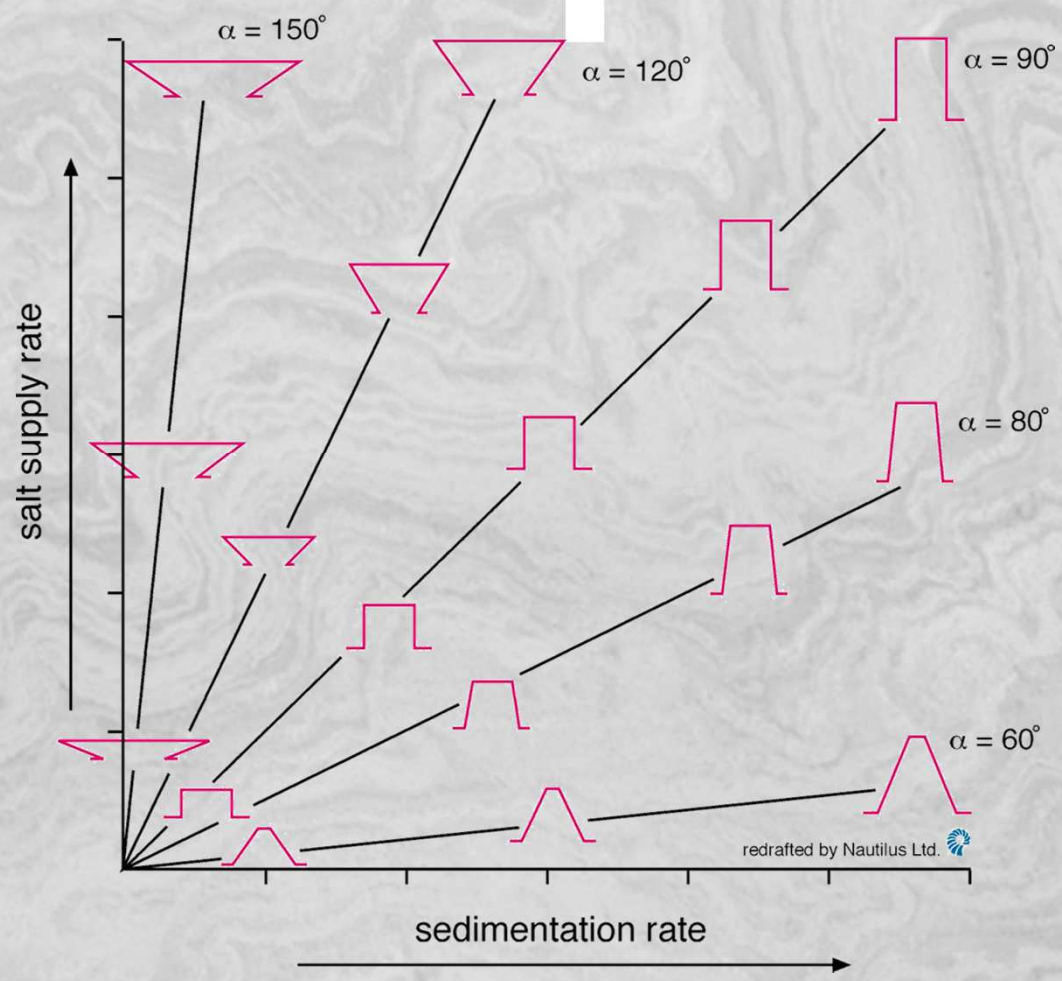


http://www.npd.no/en/Publications/Resource-Reports/2013/Chapter-6/

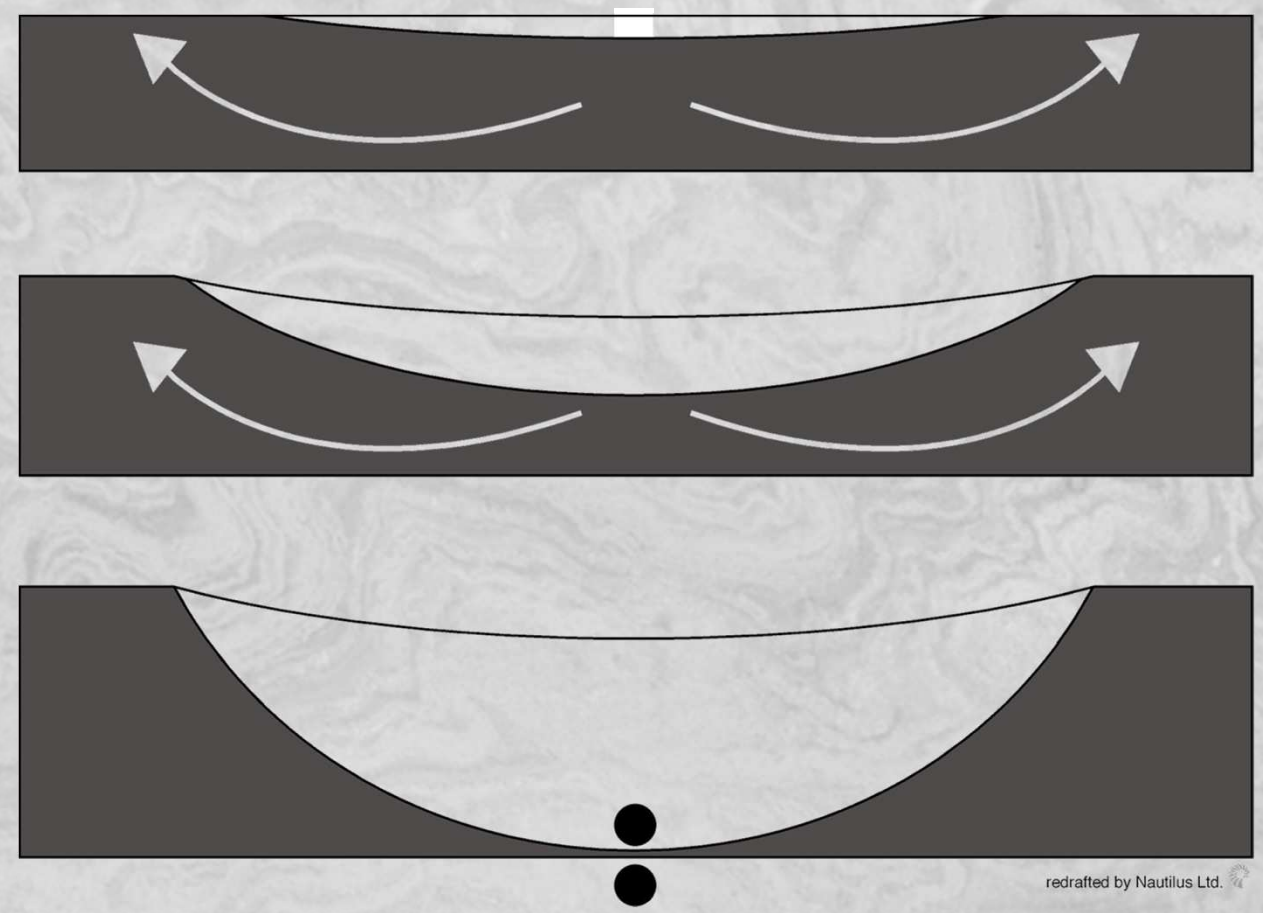


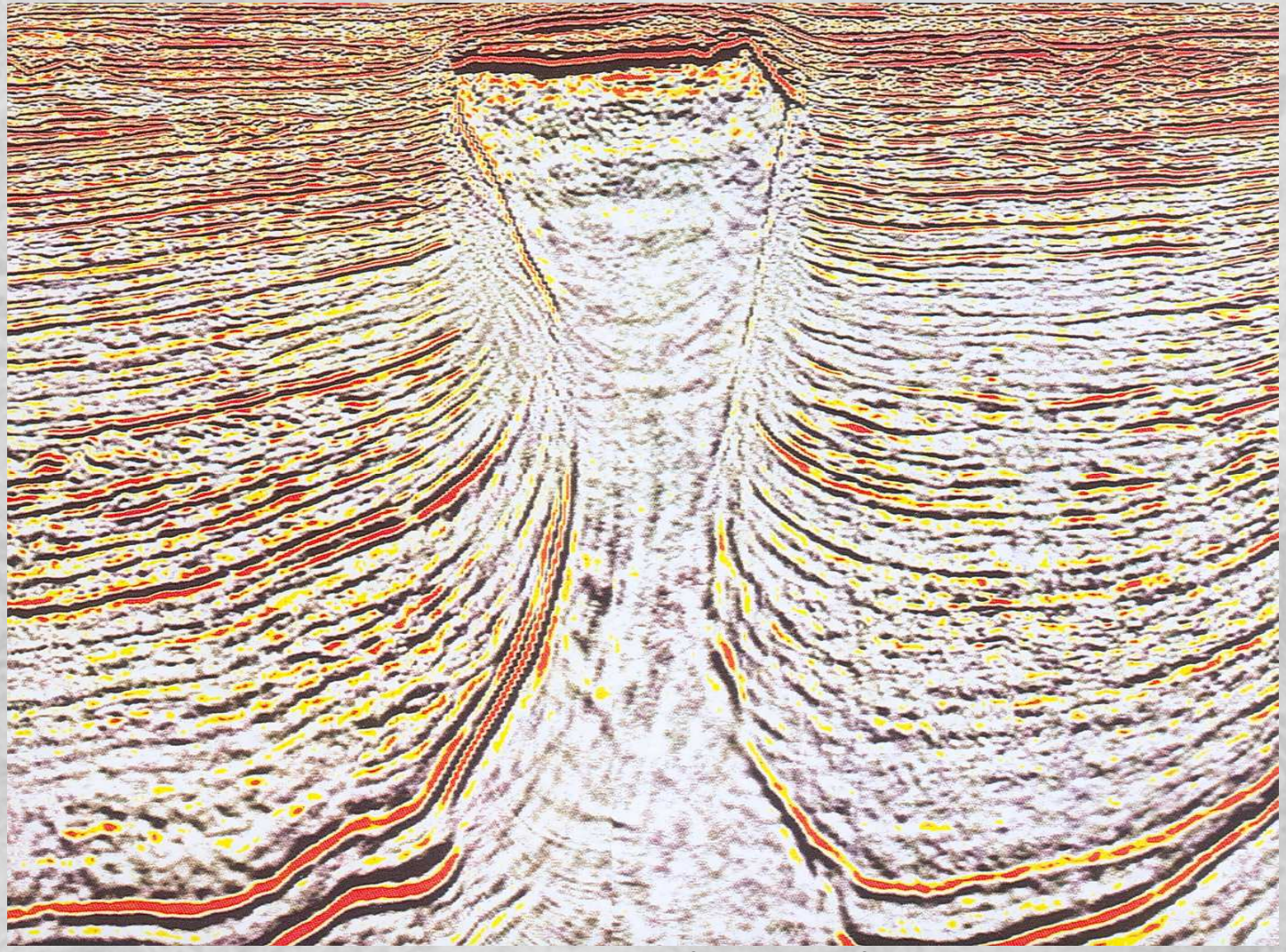
Rowan and Inman, 2011

Salt geometries as controlled by salt supply and sedimentation

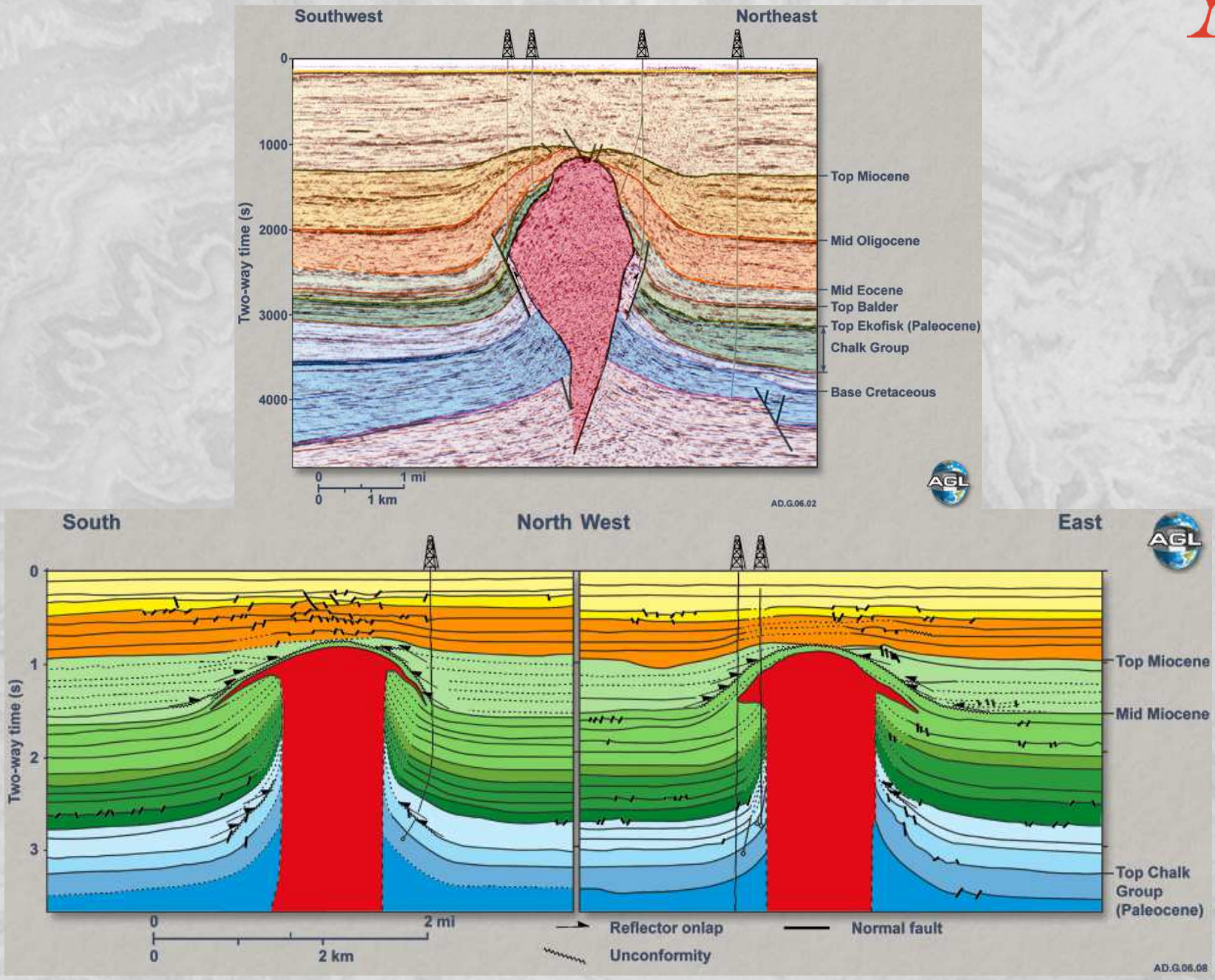


McGuinness & Hossack 1993

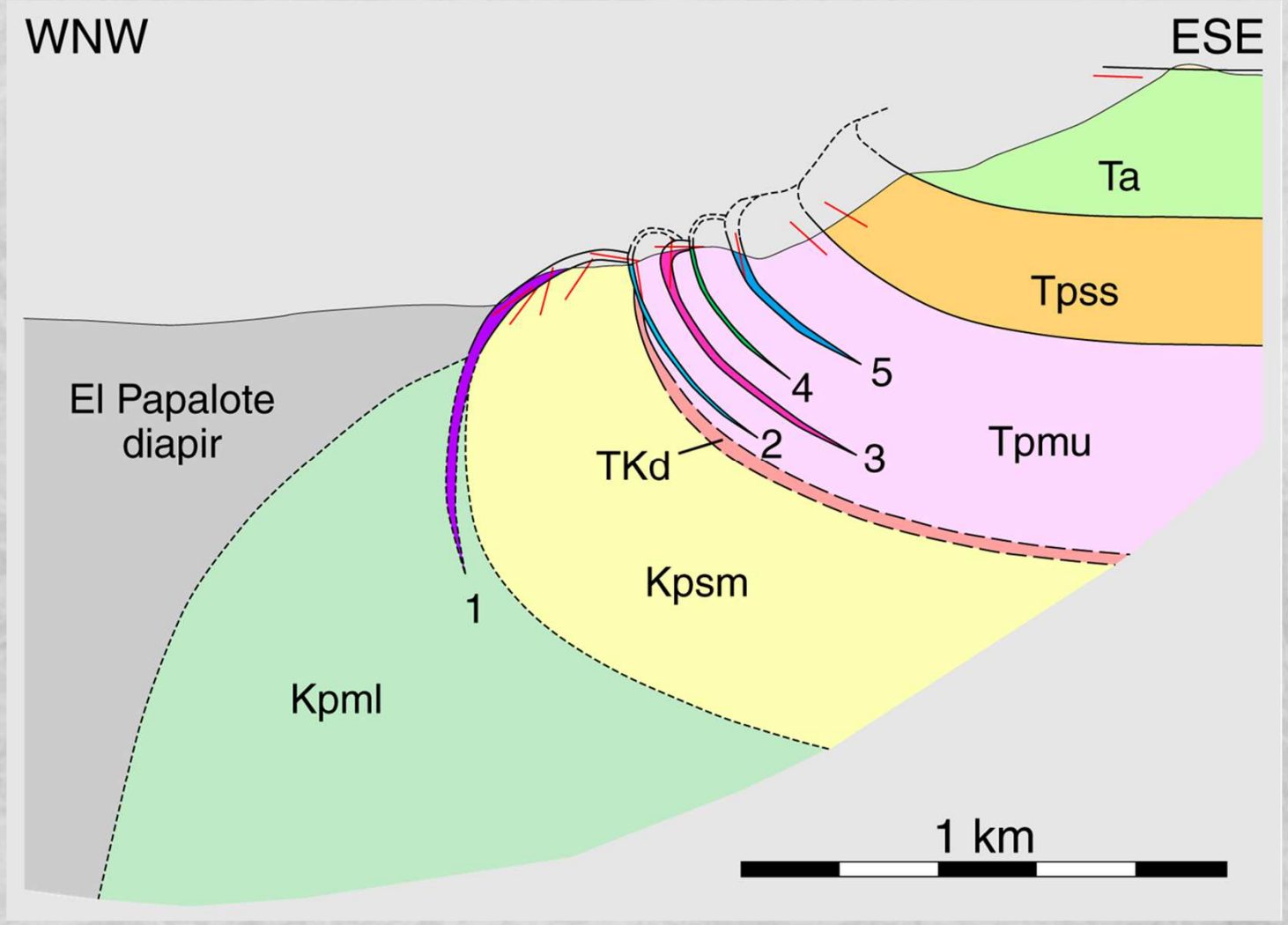

redrafted by Nautilus Ltd.



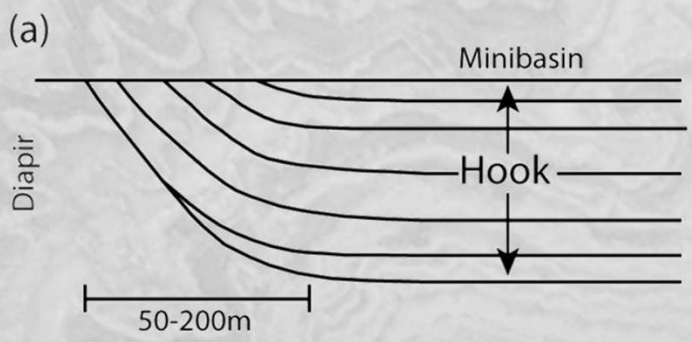
(from cover of Veritas Newsletter, Dec. 2004)

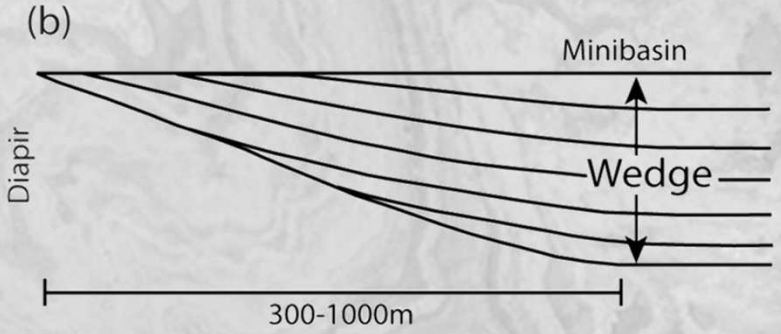


Davison et al., 2000 (modified in Hudec & Jackson, 2011)



Rowan et al., 2003



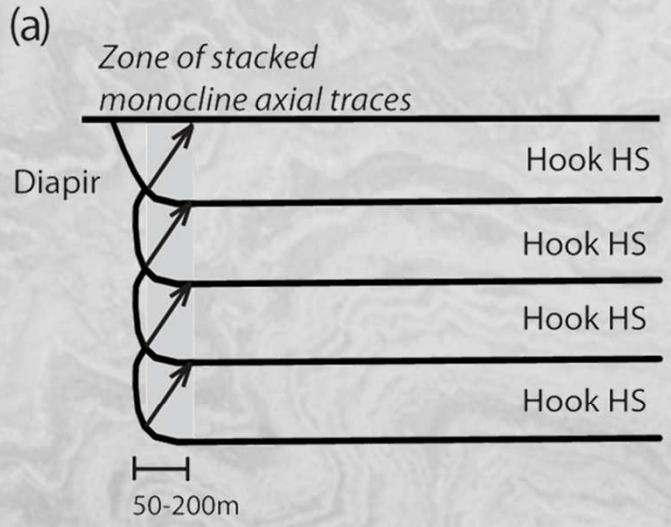


- Drape folding 50-200m from diapir.
- 90 degree angular unconformities.
- Near-diapir abrupt facies change.

- Drape folding 300-1000m from diapir.
- <30 degree angular unconformities.
- Broad zone of gradational facies changes.

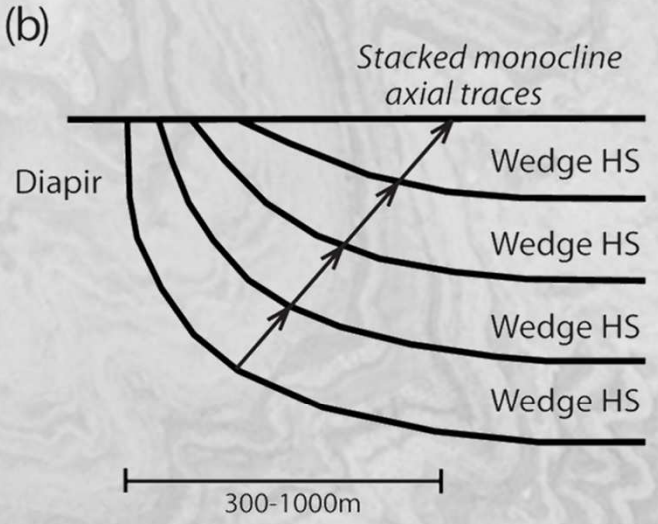
Giles & Rowan 2012

Tabular Composite



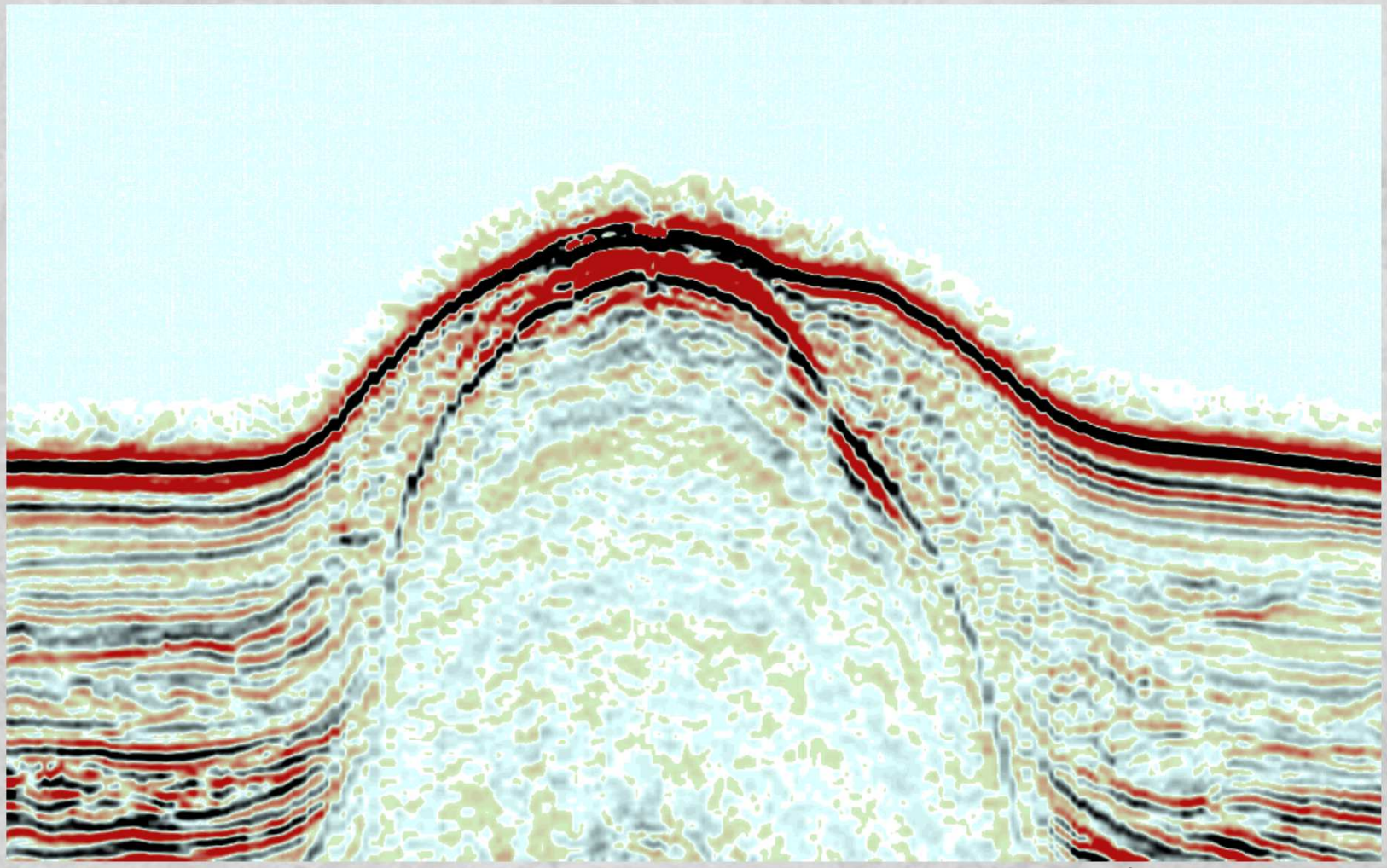
- Subparallel base and top boundaries.
- Narrow zone of thinning near diapir.
- Axial trace of monocline near diapir & forms zone parallel to diapir margin.

Tapered Composite



- Convergent base and top boundaries.
- Broad zone of thinning toward diapir.
- Axial trace of monocline progressively inclined from diapir.

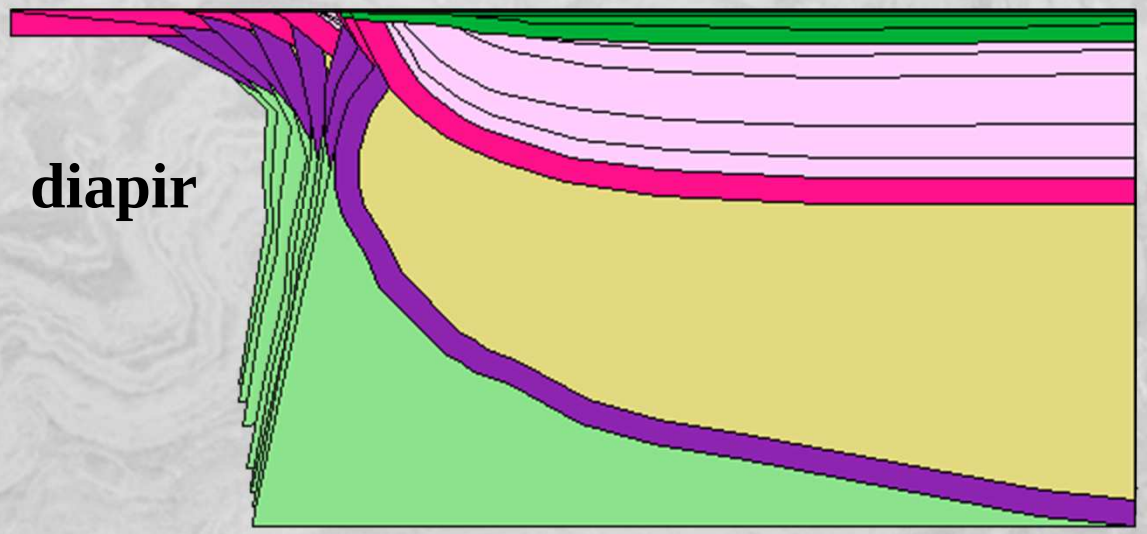
Giles & Rowan 2012



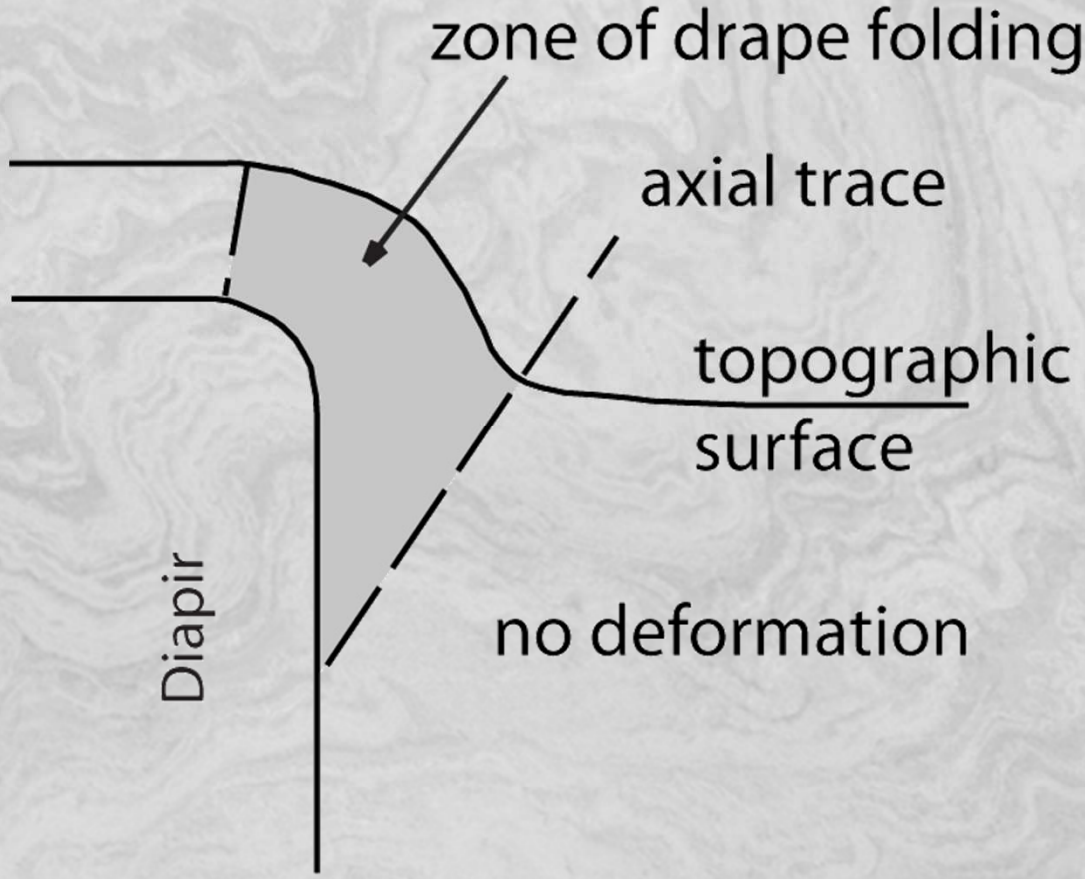
data courtesy of C. Fiduk and CGG

courtesy of C. Yielding and BP

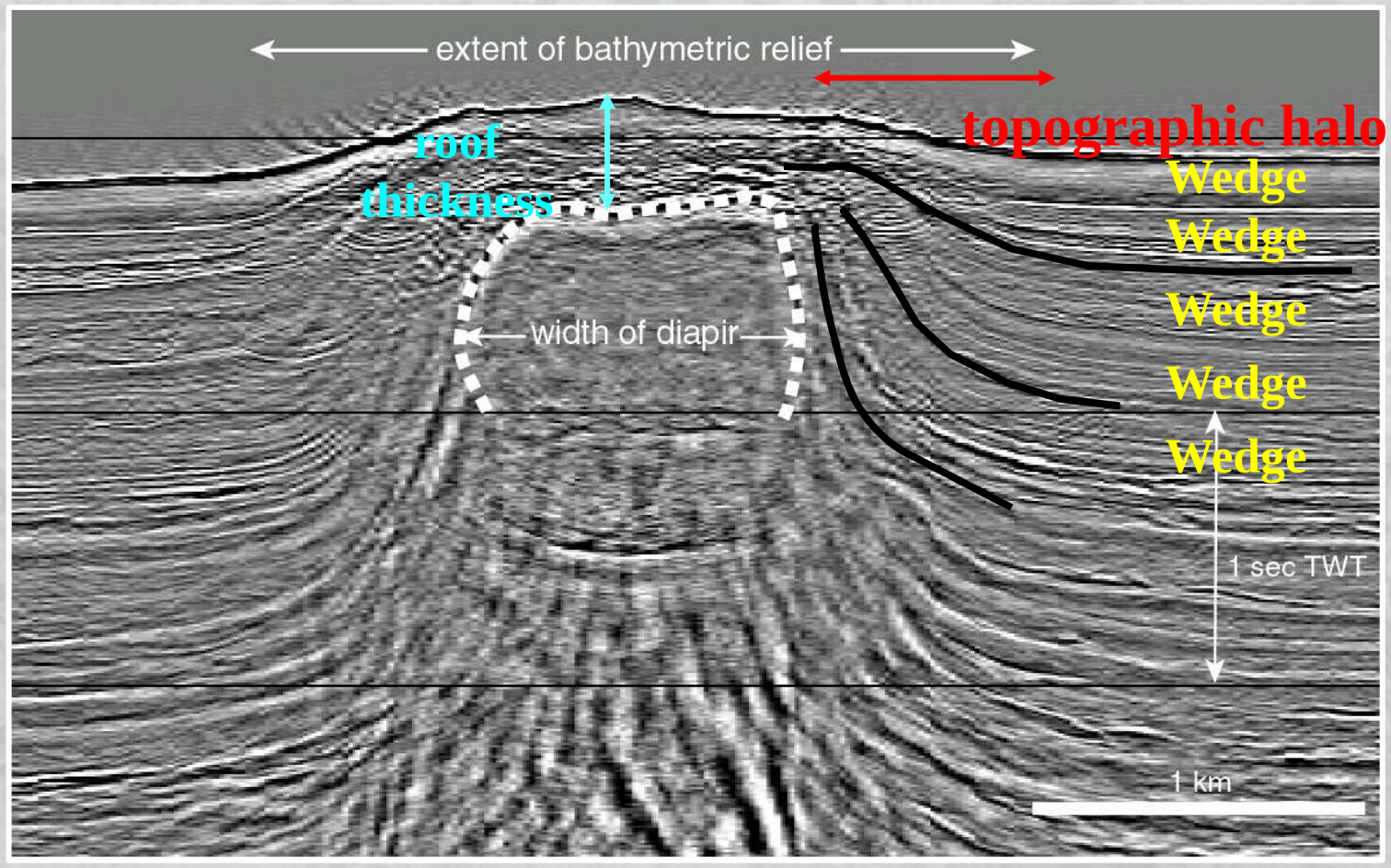
diapir



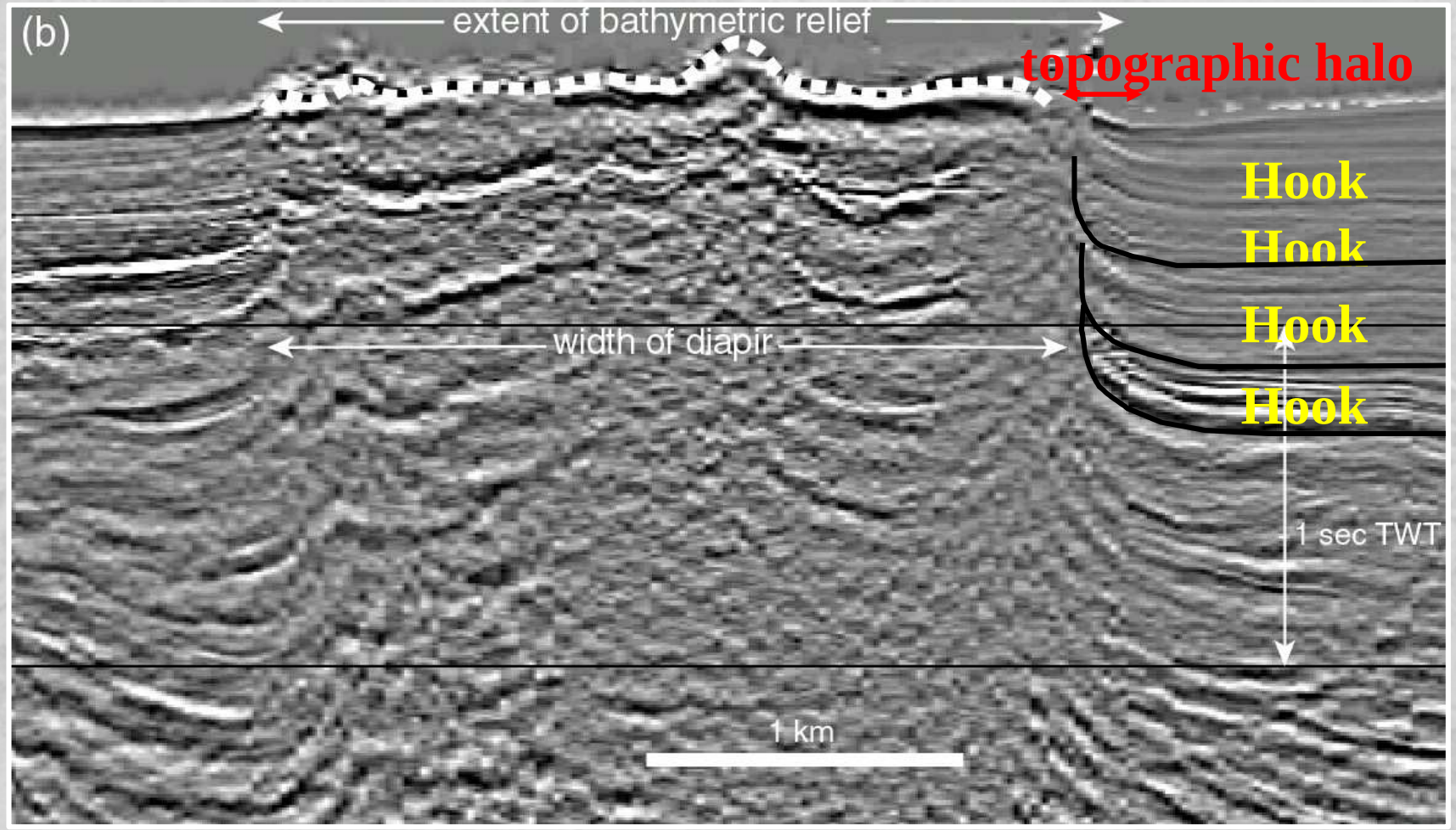
Rowan et al., 2003



Giles & Rowan 2012



modified from Rowan et al., 2003



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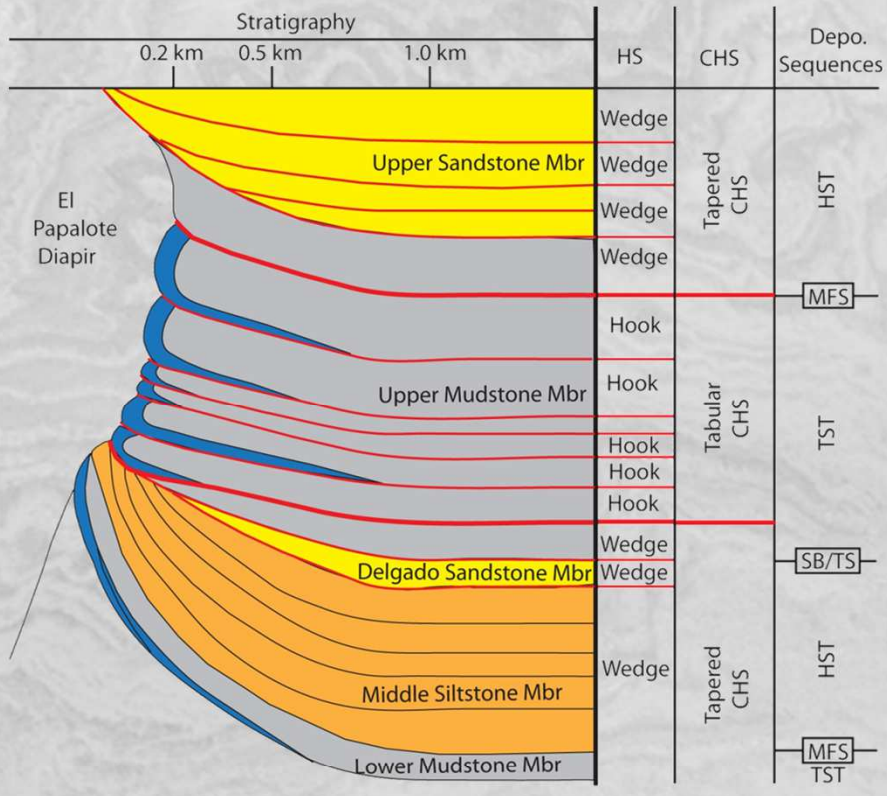
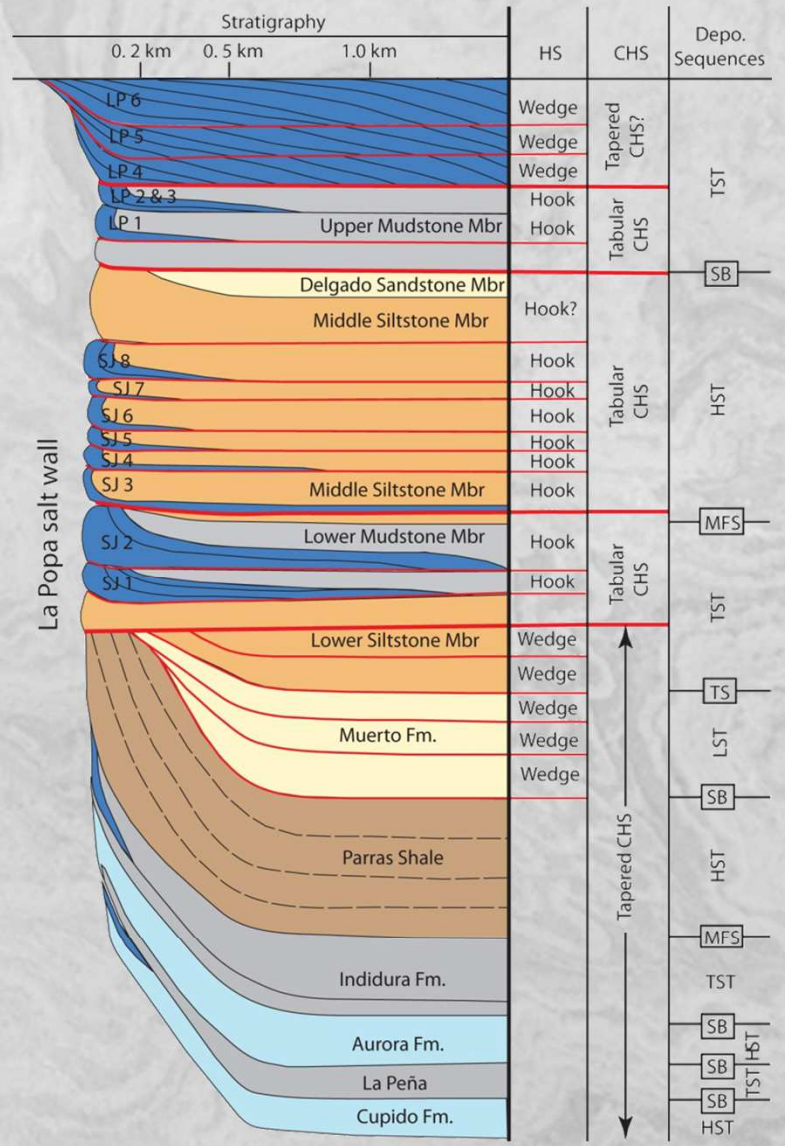
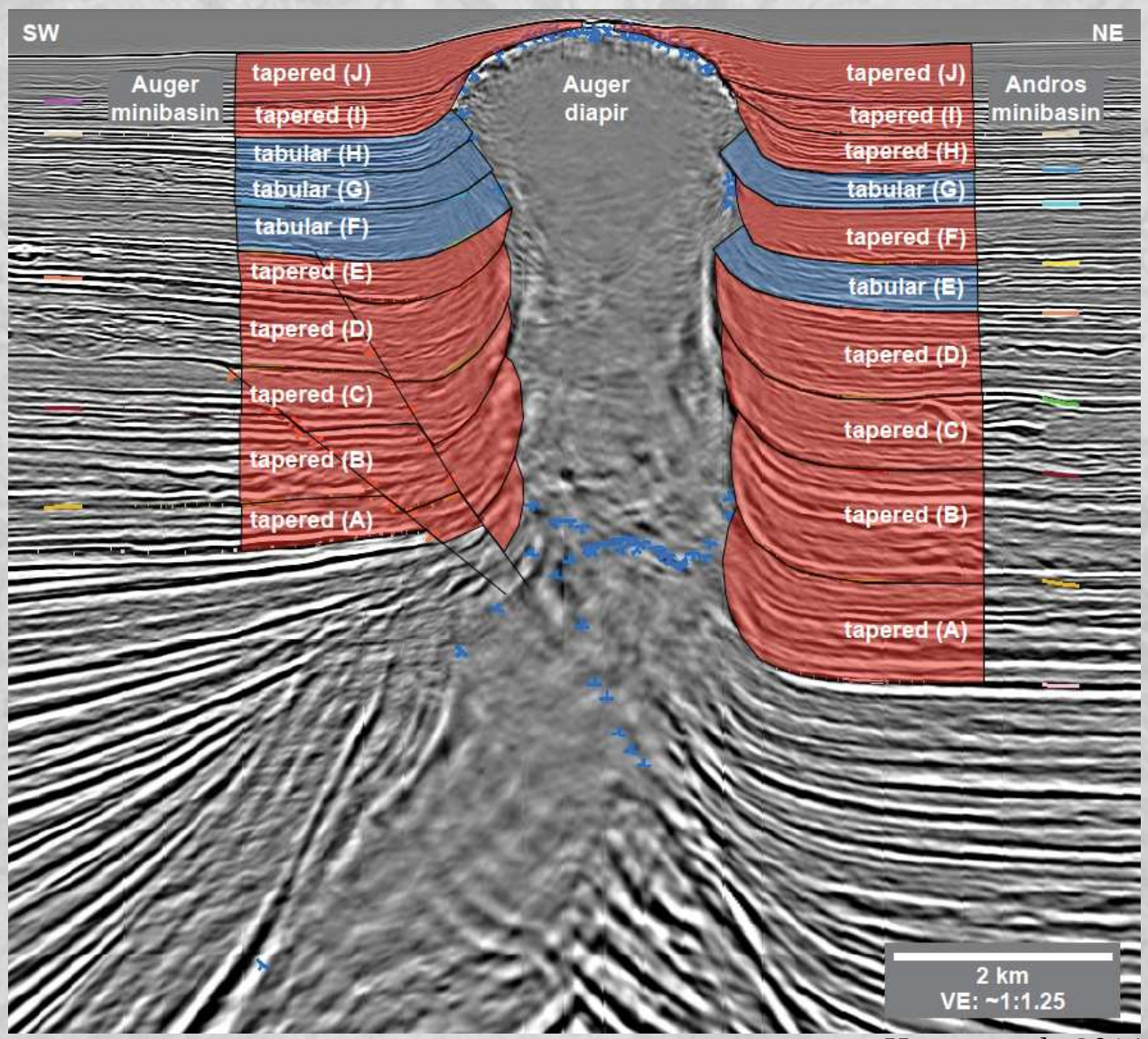
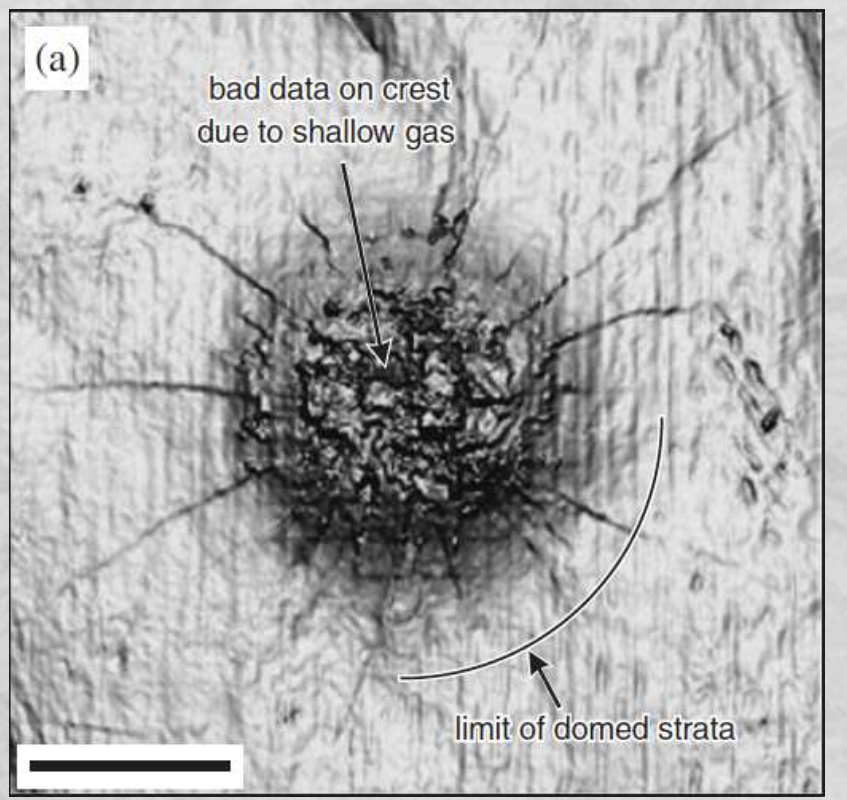




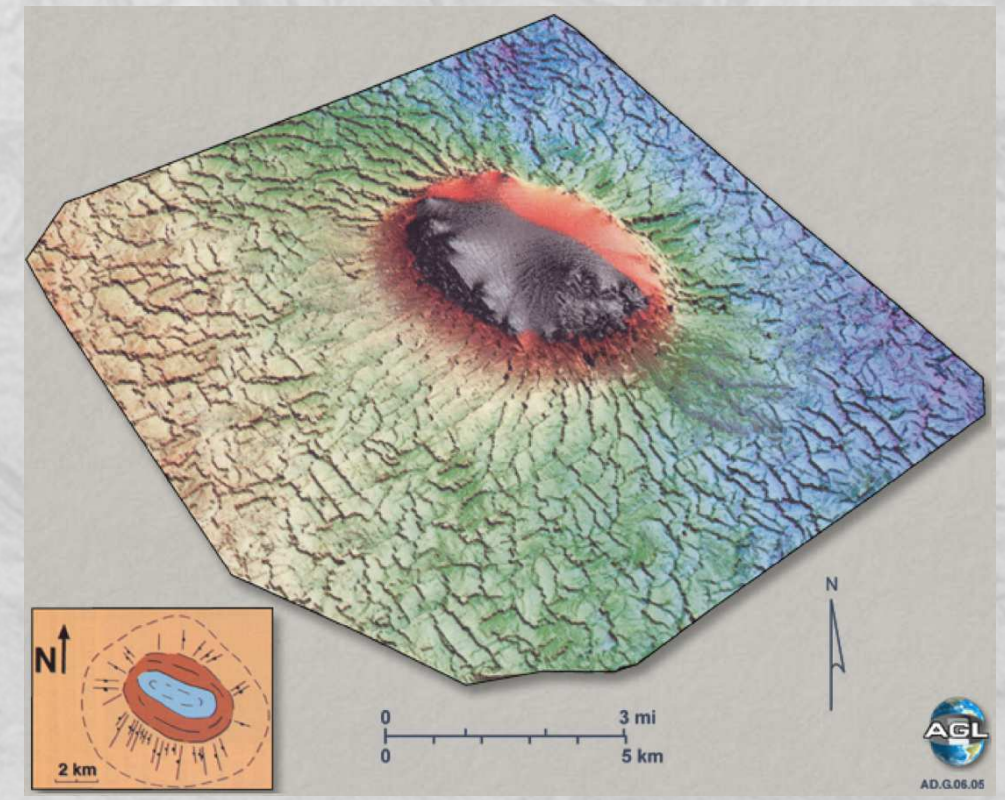
Giles & Rowan 2012



Hearon et al., 2014

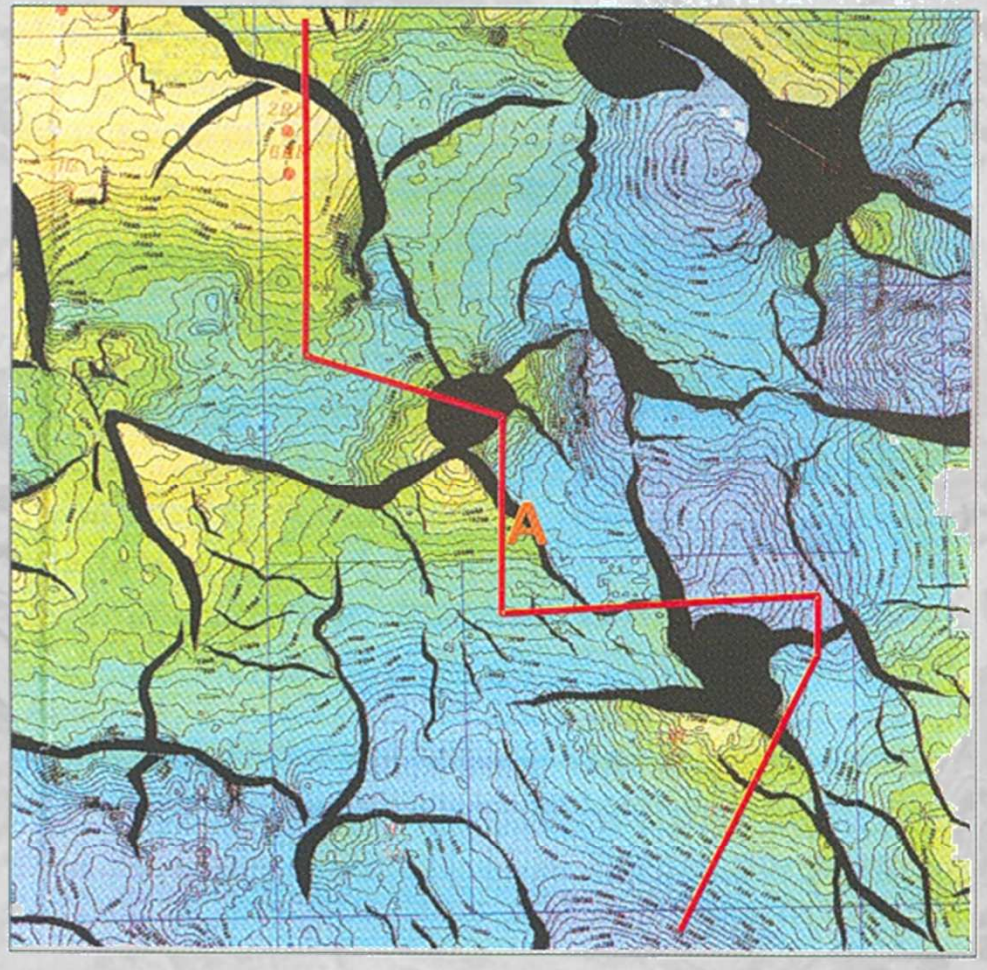


Stewart, 2006



Davison et al., 2000 (modified in Hudec & Jackson, 2011)

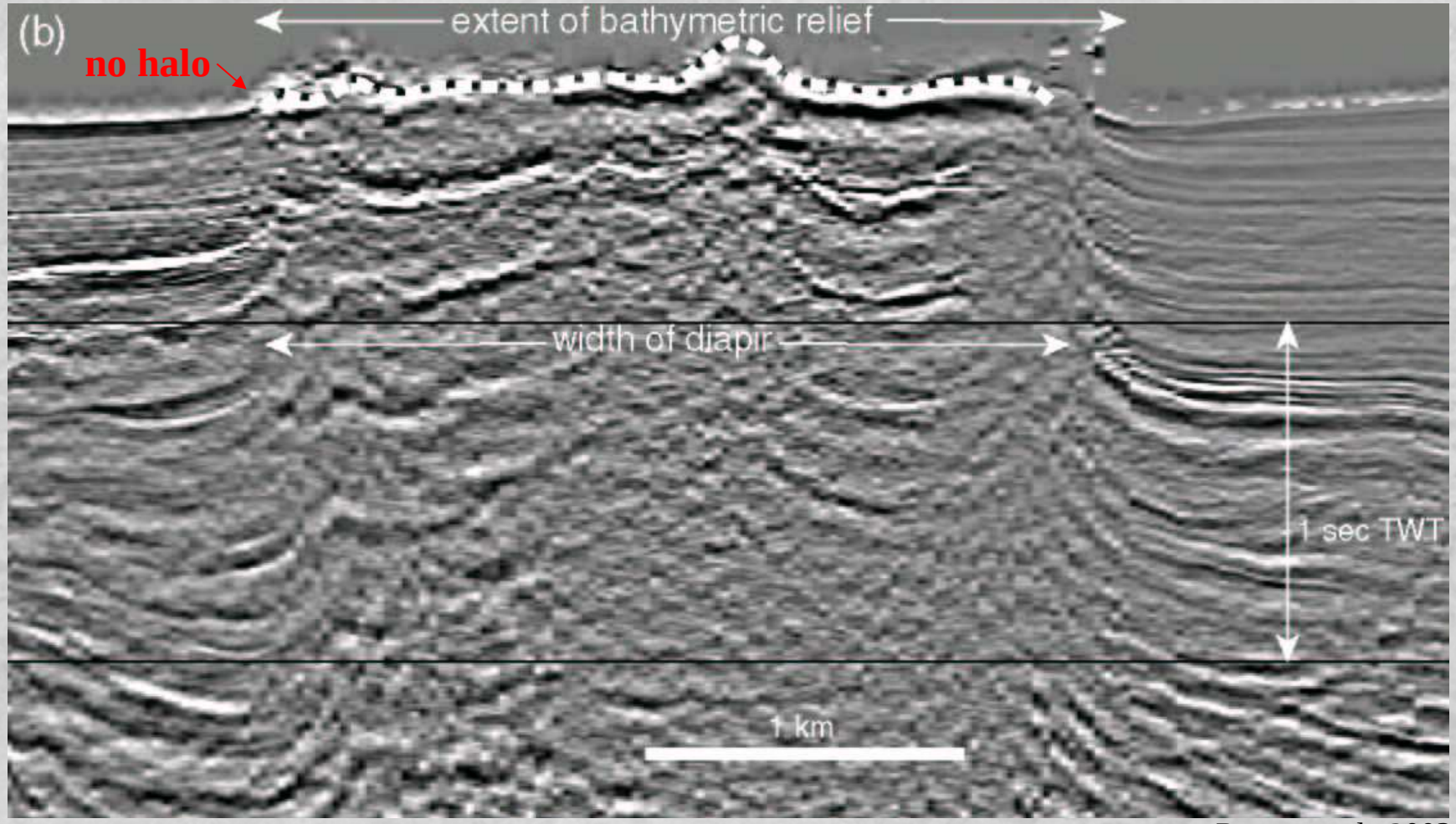
Base Upper Jurassic Pentland Fm.



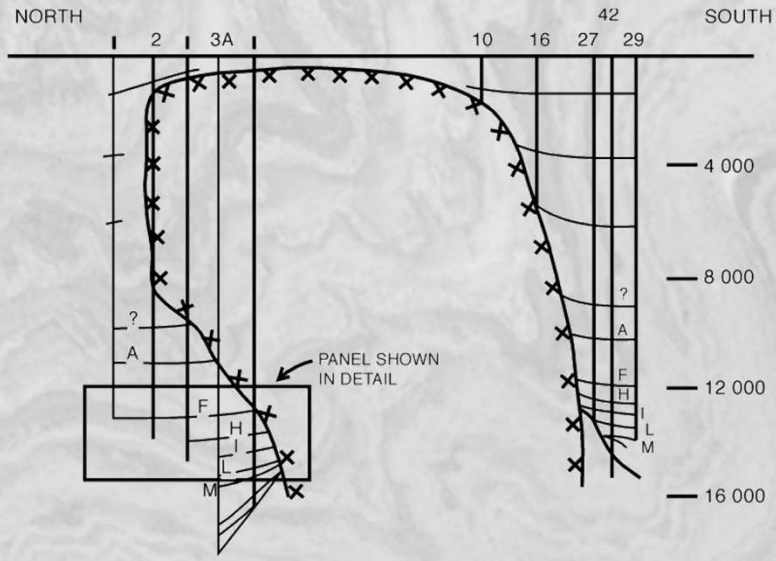
a

5 Km

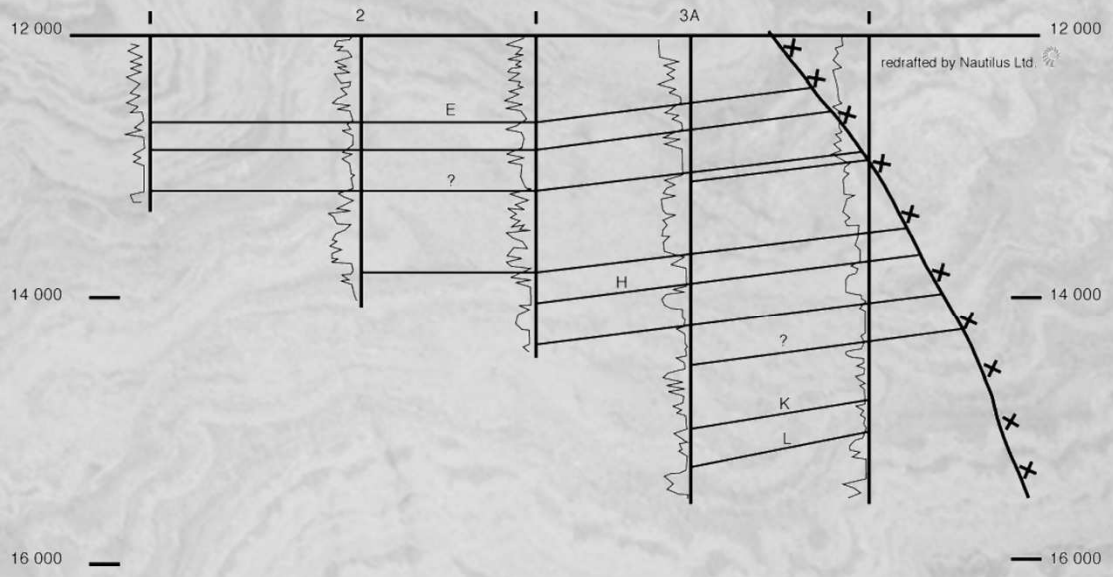
Helgeson, 1999



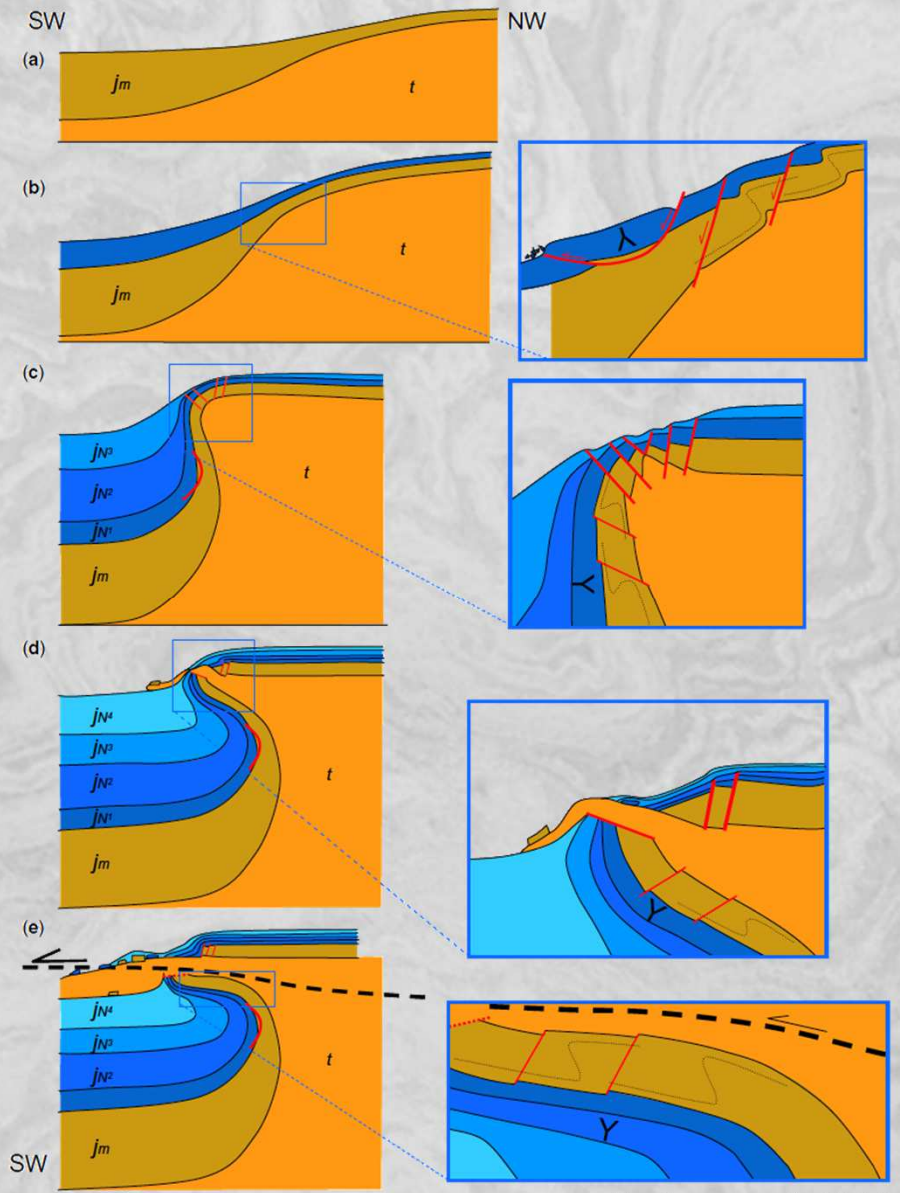
Rowan et al., 2003



INDEX SECTION



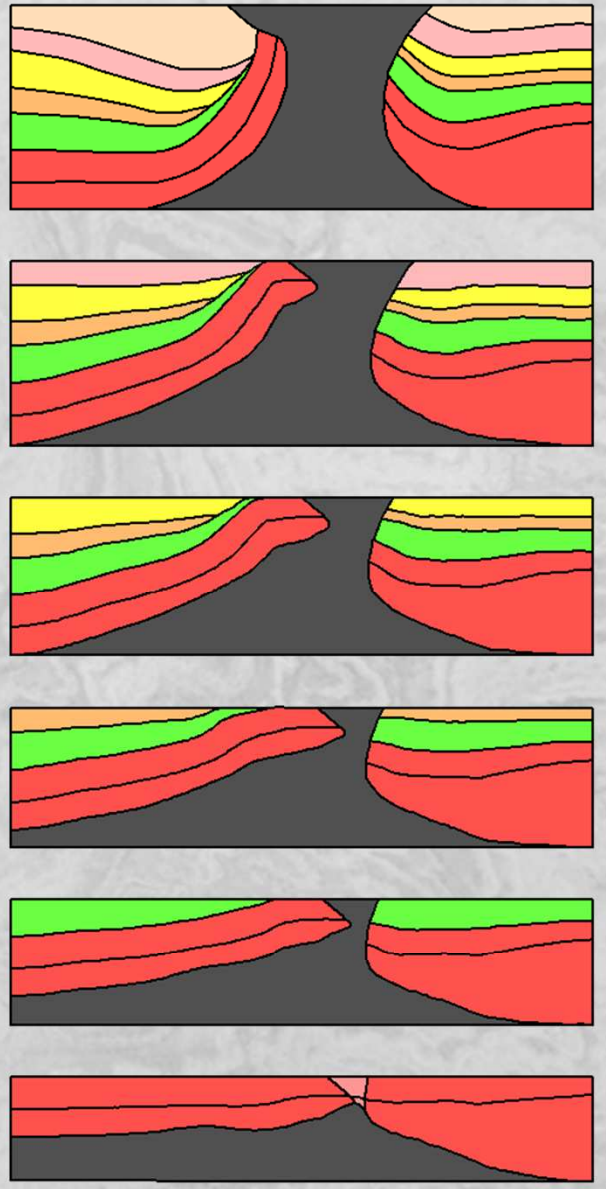
Johnson and Bredeson, 1971

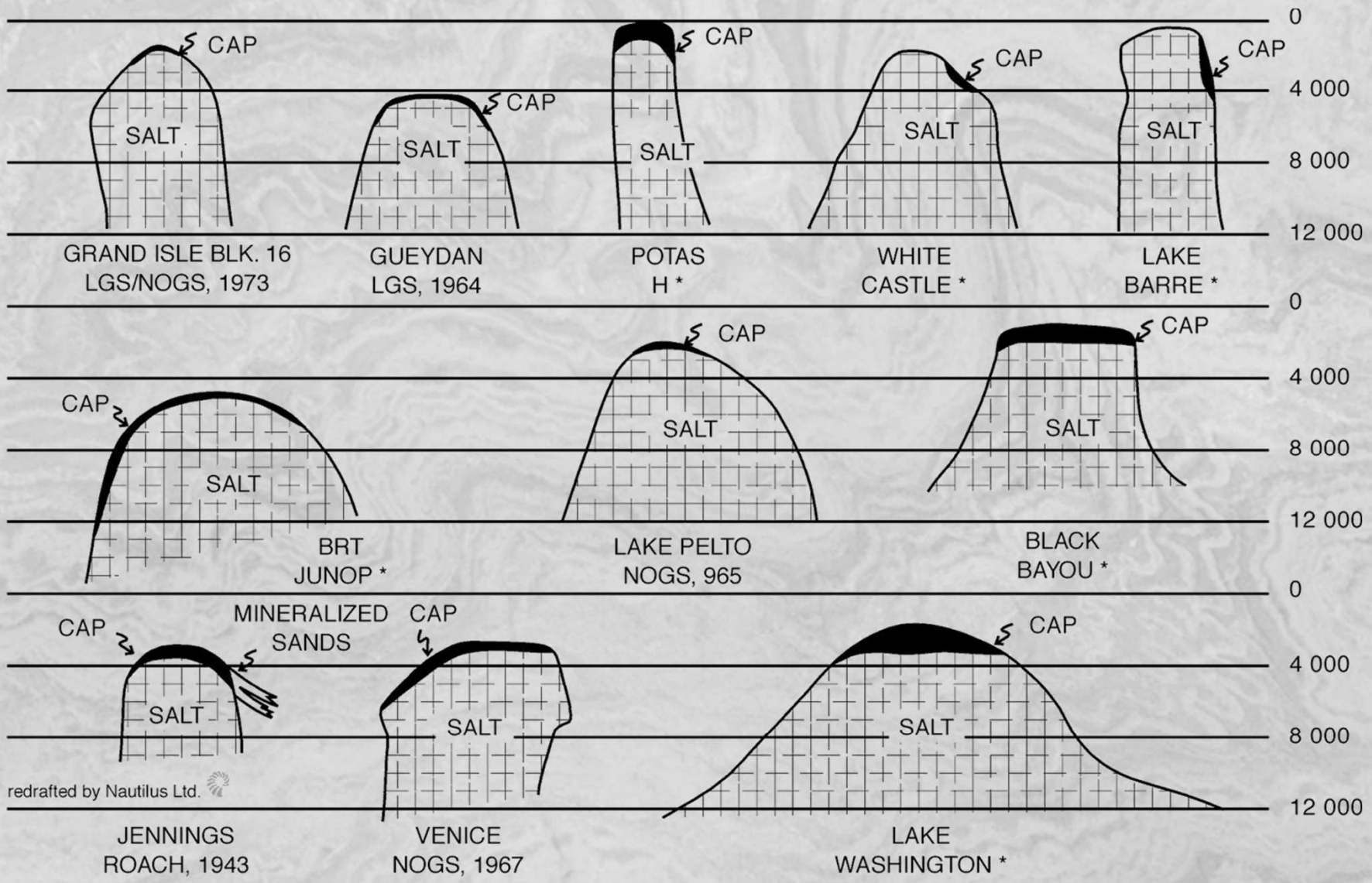


Graham et al. 2012

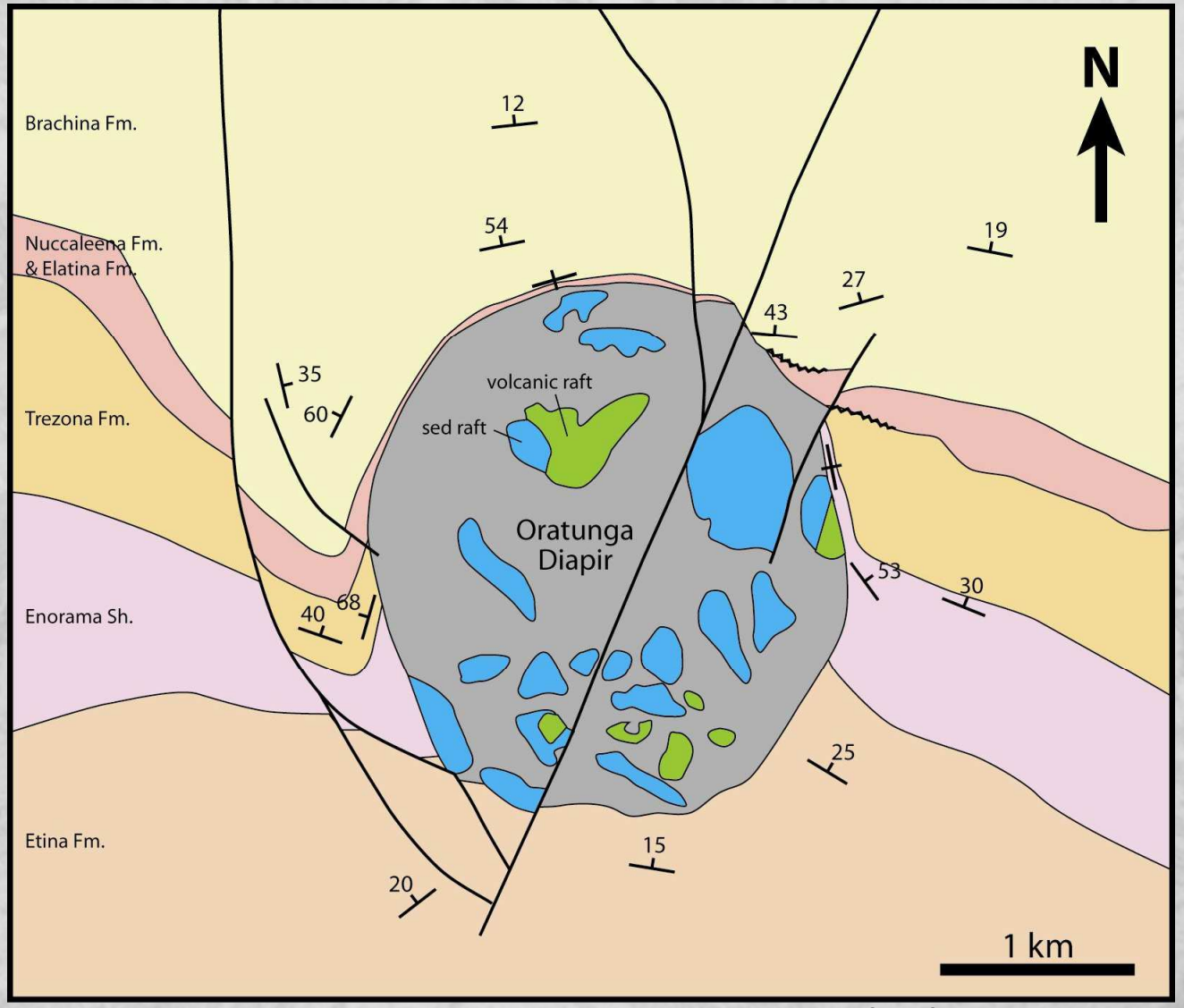
Figure removed

Figure removed

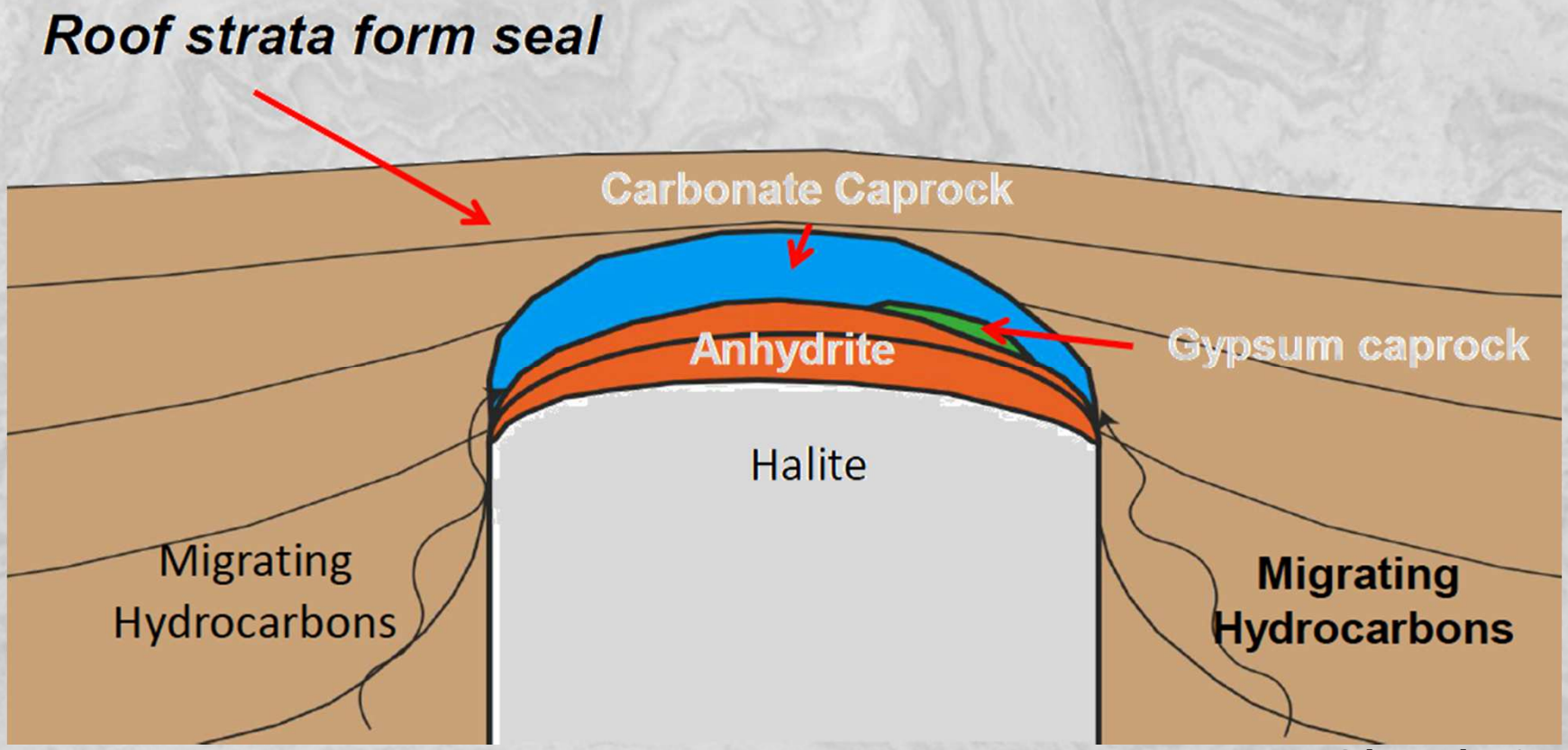




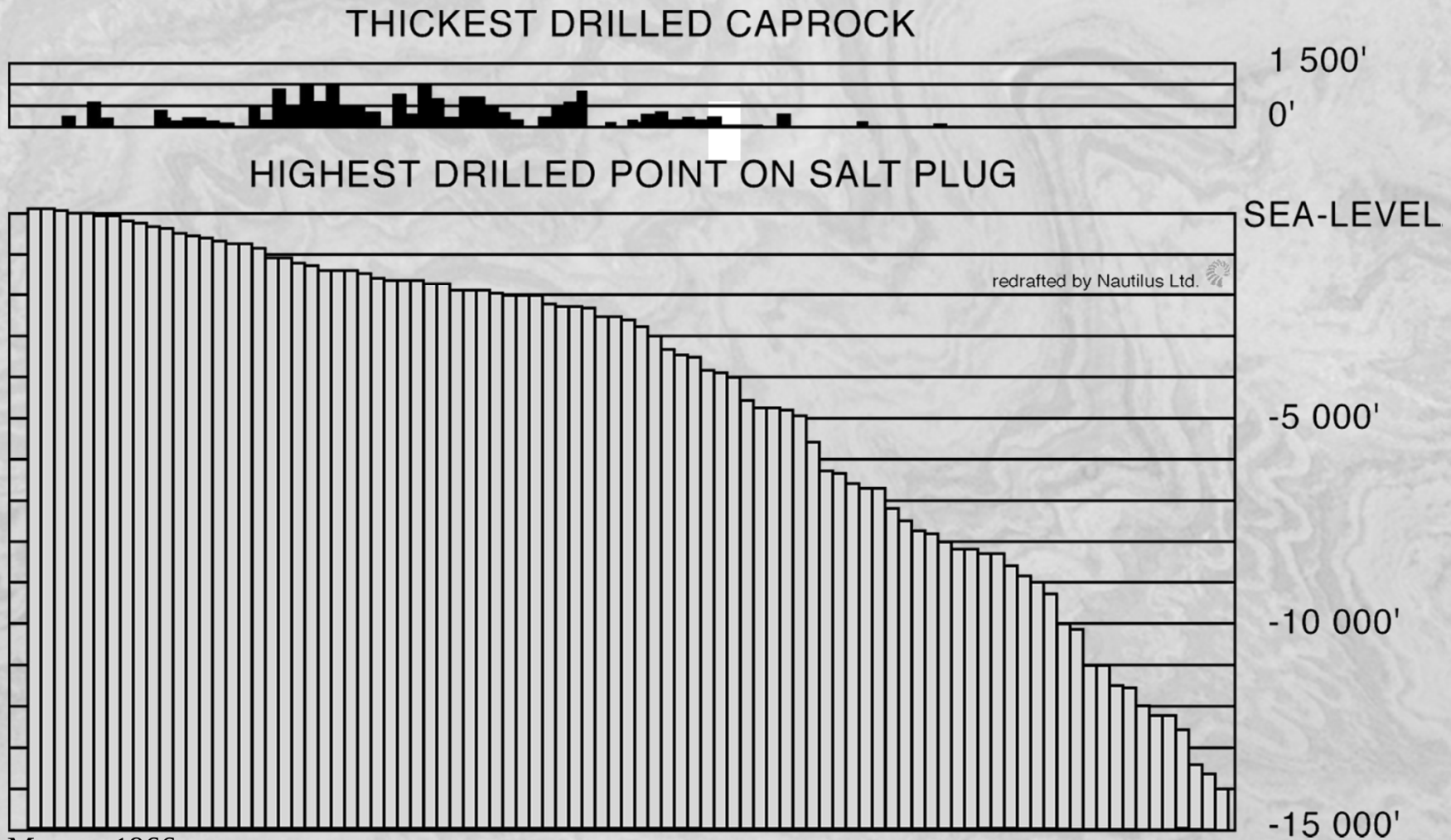
Fails et al., 1995



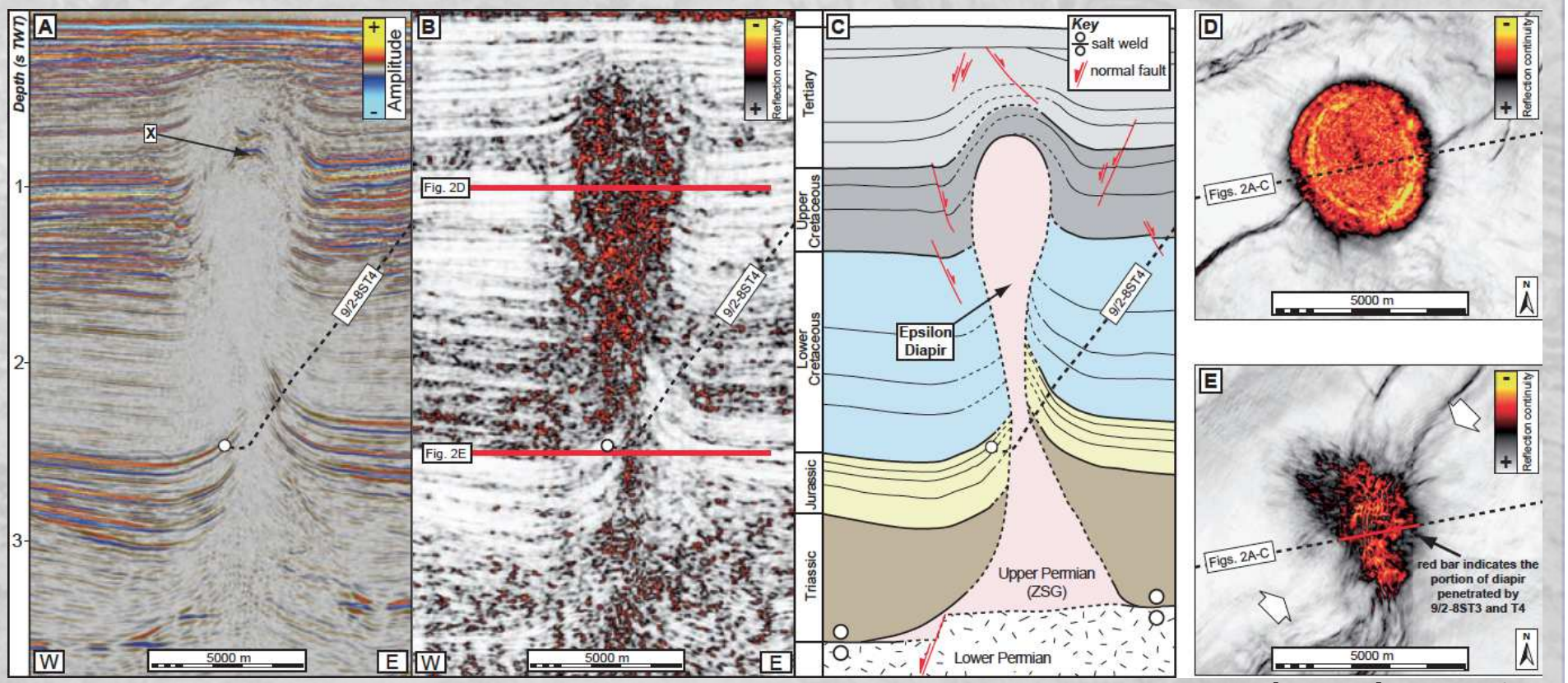
modified from Lemon, 1985



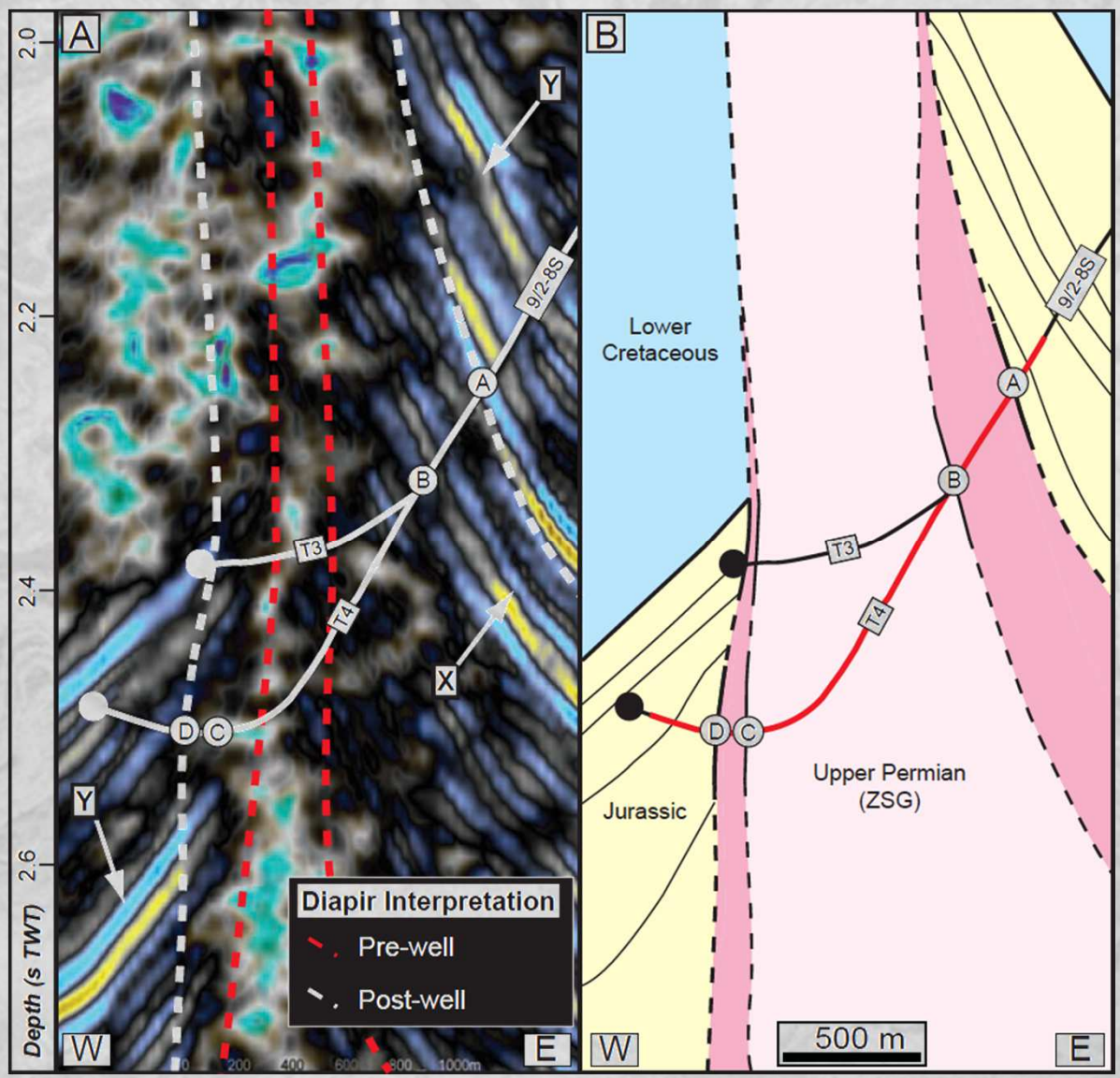
Giles et al., 2012


THICKEST DRILLED CAPROCK
1 500'
0'
HIGHEST DRILLED POINT ON SALT PLUG
SEA-LEVEL
redrafted by Nautilus Ltd.
-5 000'
-10 000'
-15 000'

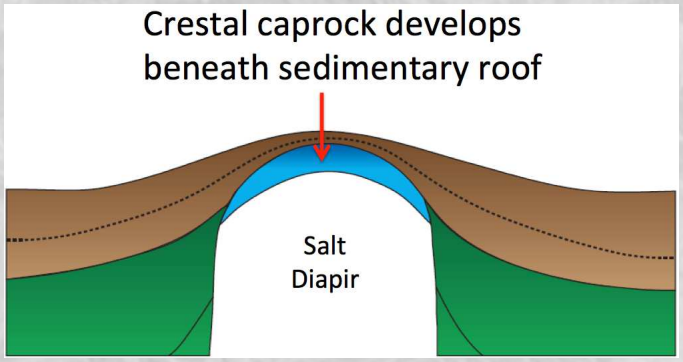
Murray, 1966

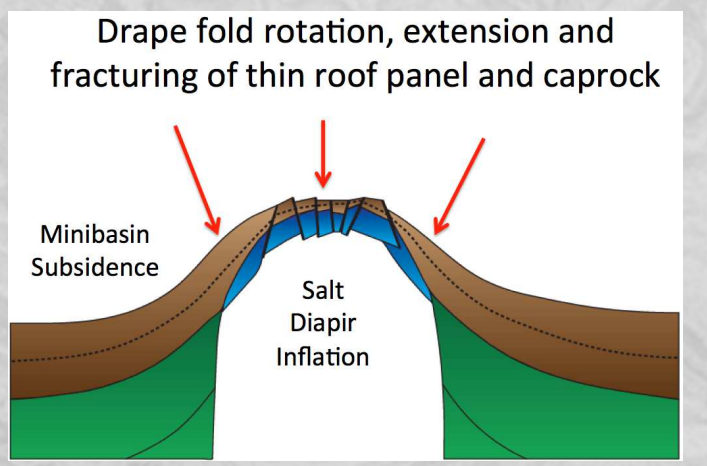


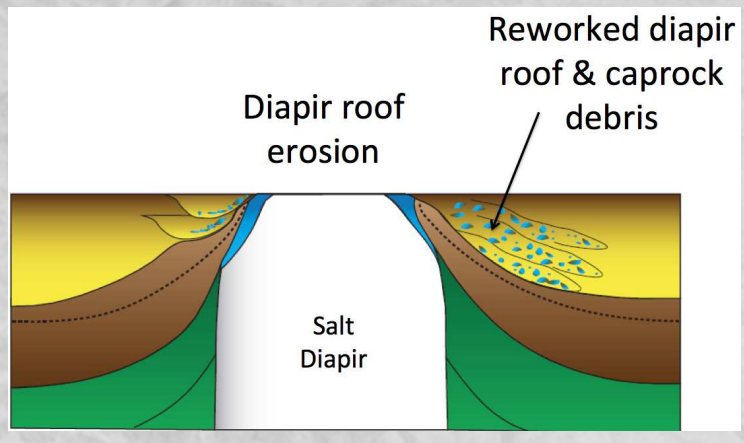
Jackson and Lewis, 2012

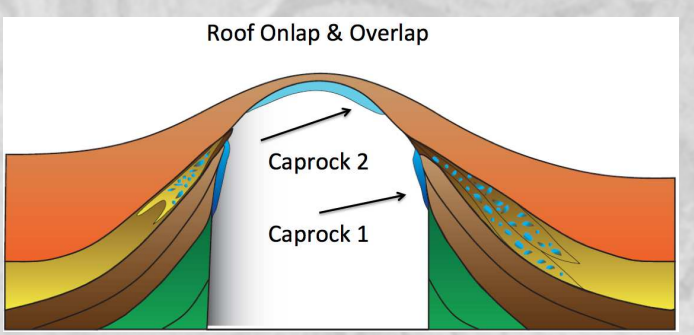


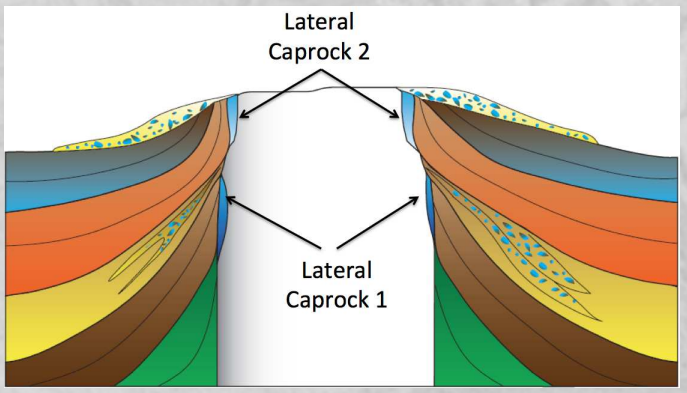
Jackson and Lewis, 2012



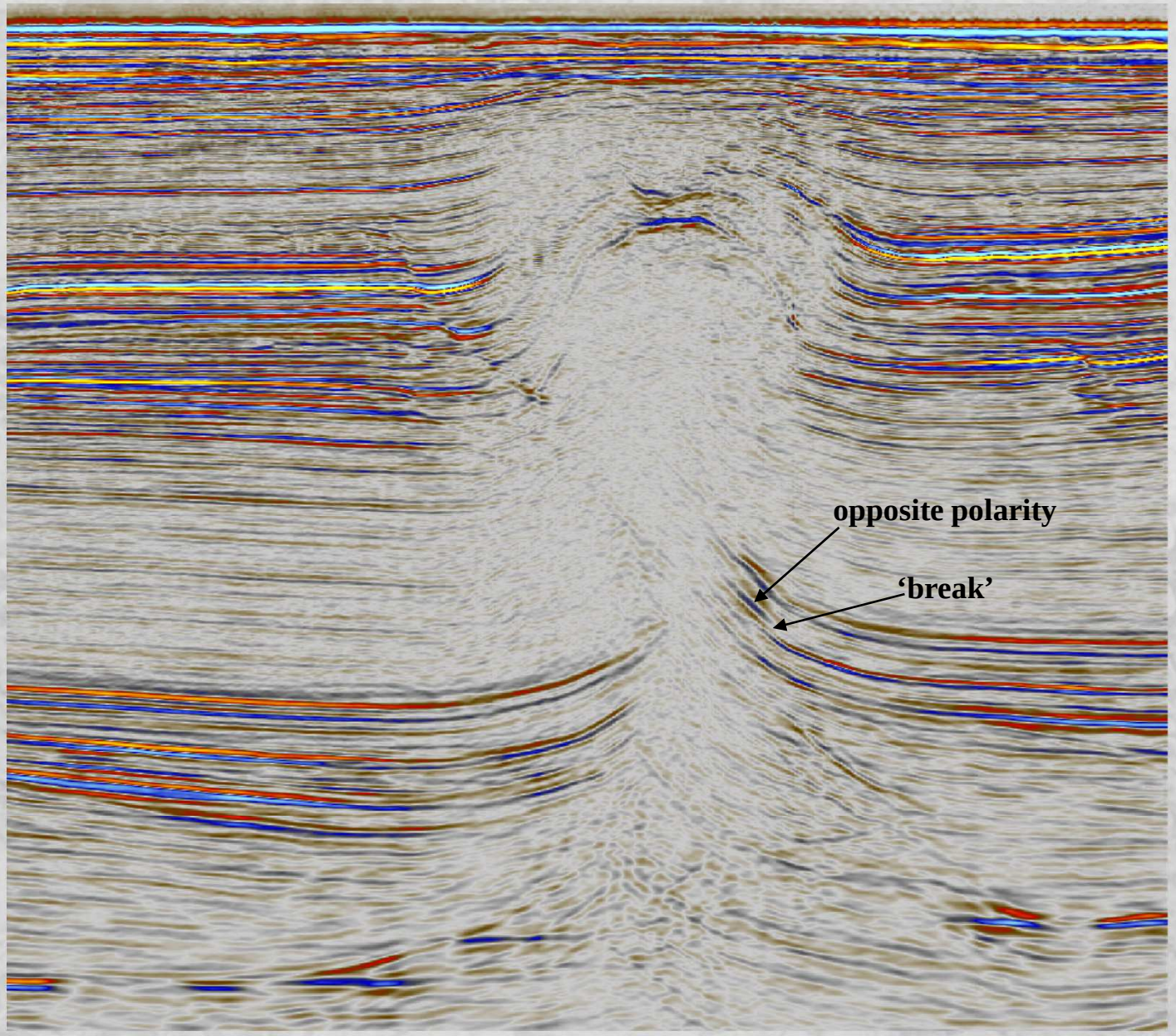




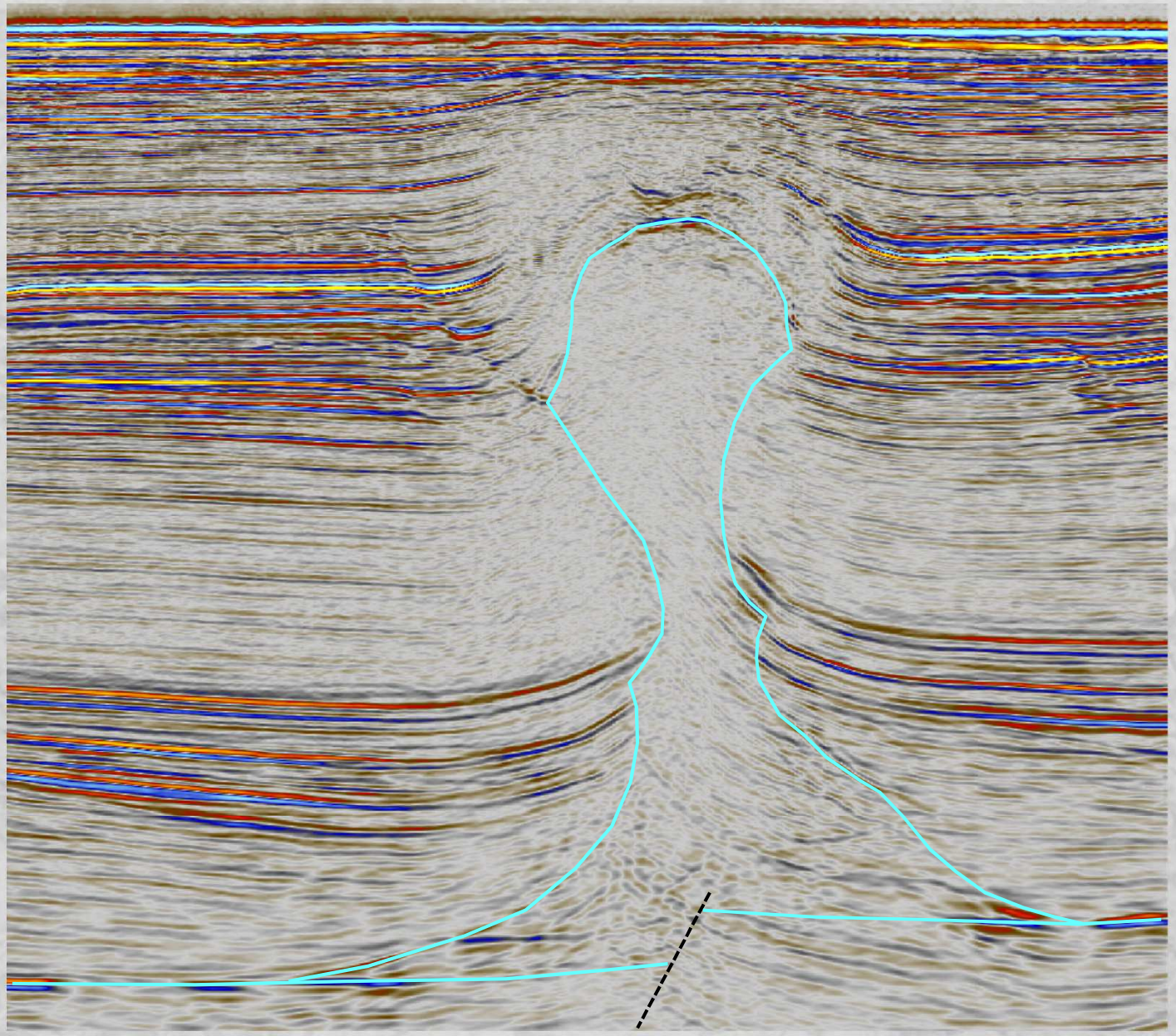




Giles et al., 2012



seismic courtesy of C. Jackson (Jackson & Lewis, 2012)



seismic courtesy of C. Jackson (Jackson & Lewis, 2012)


Tusen
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