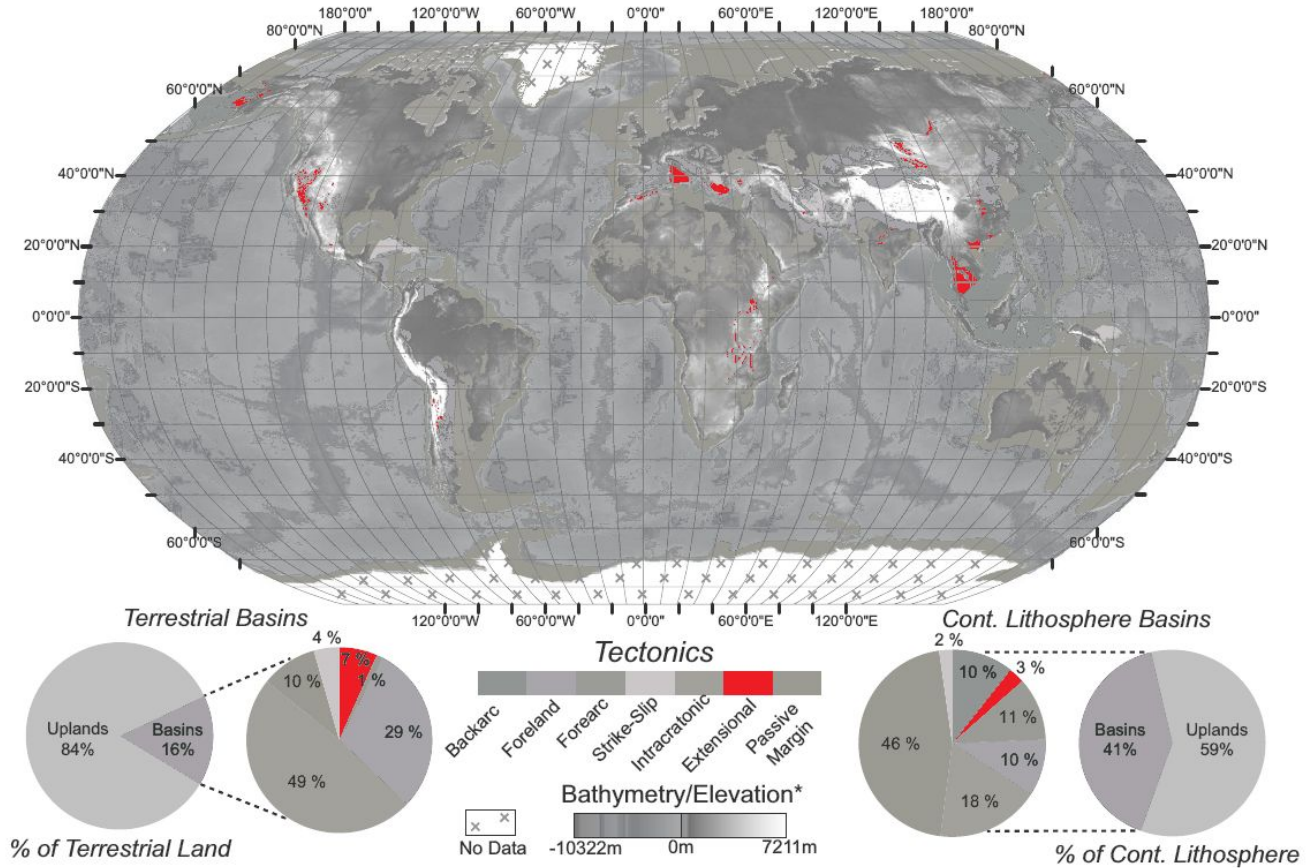

Variabilidade de estilos de rifts e margens continentais distendidas

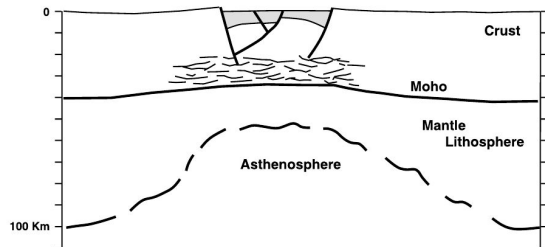
Rifts continentais ativos

Modificado de:
Nyberg, B., Holwell, J.A. (2015)
Geology **43**, 643-646.



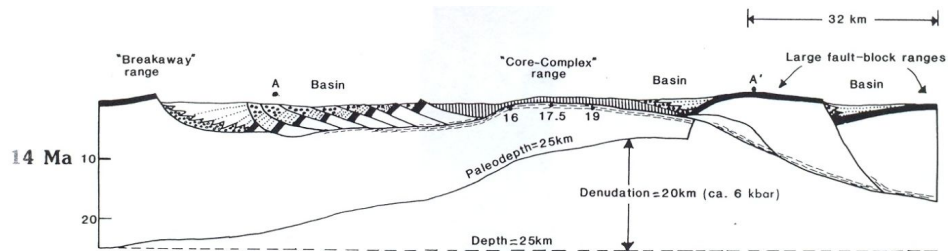
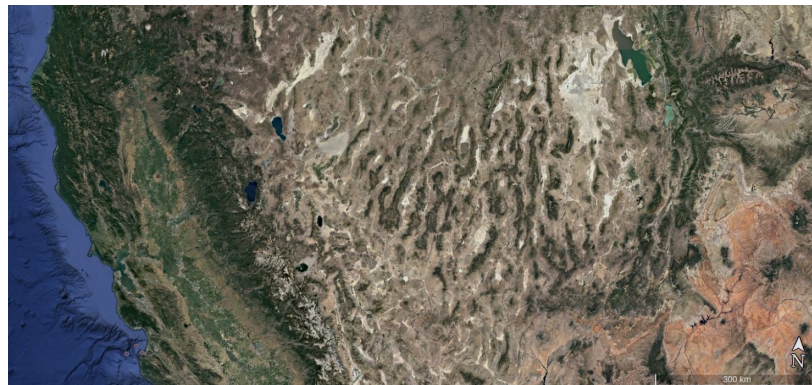
Tipos de rifts

Afrotipe *sensu* Sengor (1995)



Morley, C.K. et al. (1999)
AAPG Studies in Geology. **44**,
1-18.

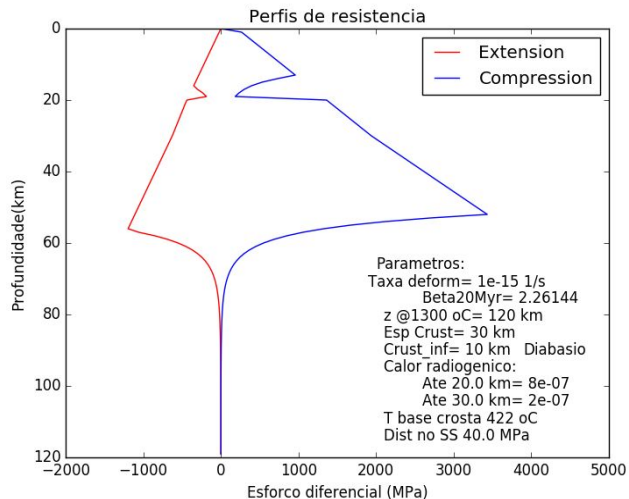
Amerotipe *sensu* Sengor (1995)



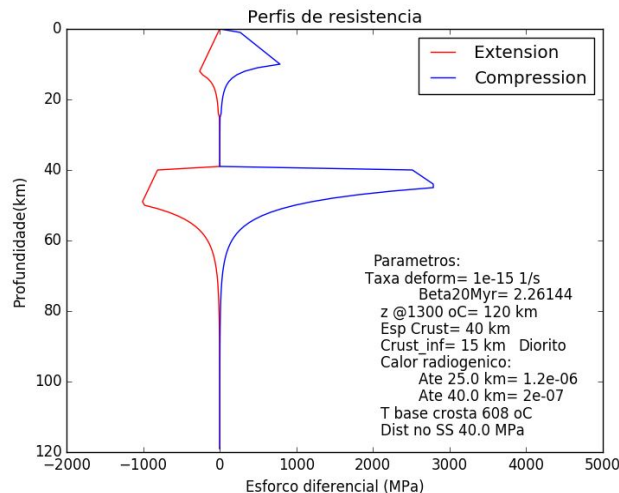
Wernicke, B. (1985) *Can. J. Earth
Sci.* **22**, 108-125.

Resistência litosférica e arquitetura

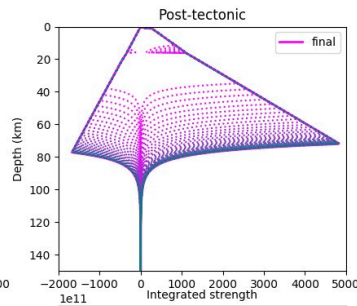
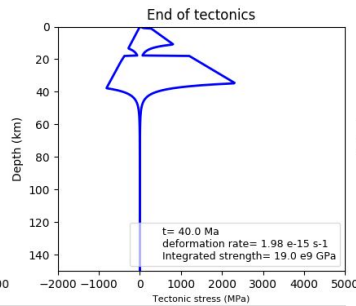
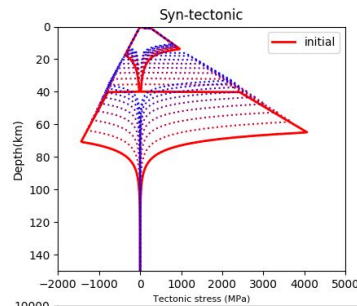
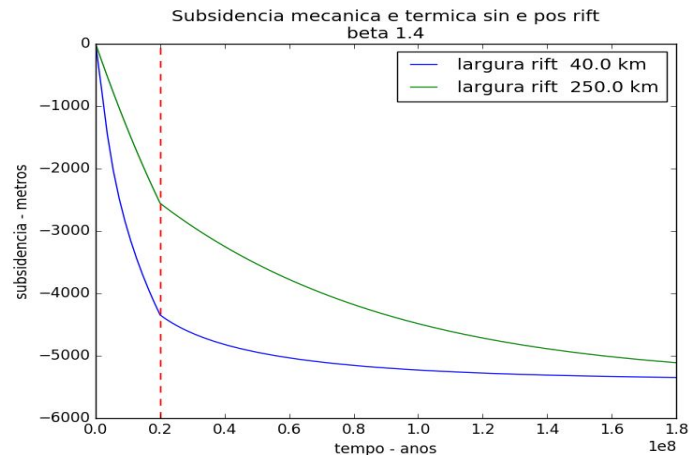
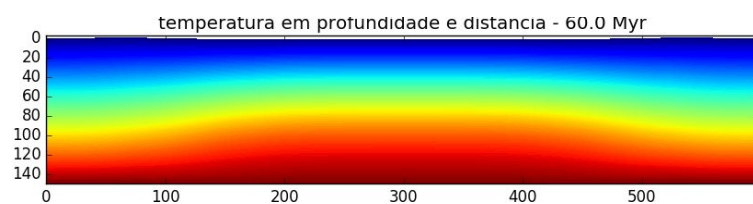
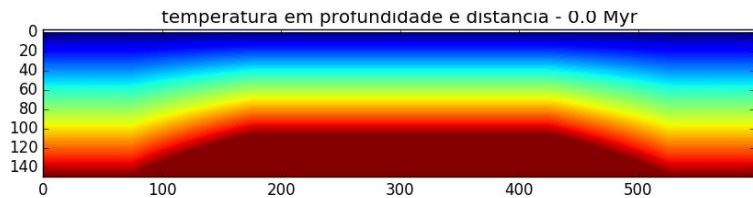
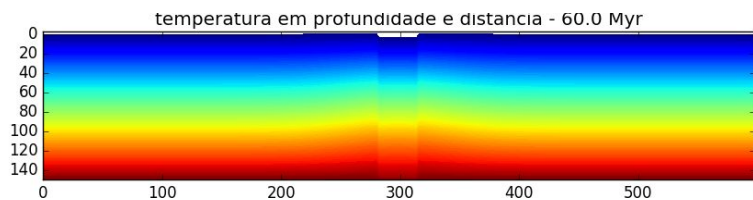
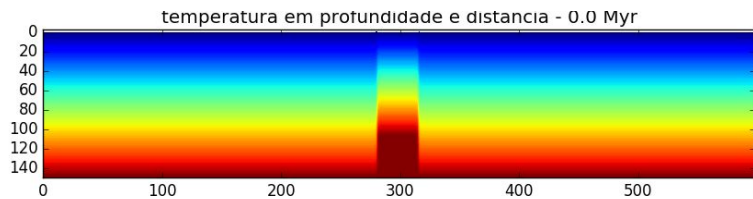
Afrotypes *sensu* Sengor (1995)



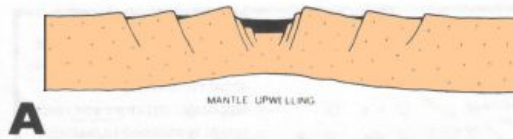
Amerotypes *sensu* Sengor (1995)



Implicações para a evolução da subsidência



Fim da subsidência mecânica



Como a crosta inferior e a litosfera apresentam comportamento dúctil com a deformação, a área de ascensão astenosférica é maior que a de distensão na crosta superior.

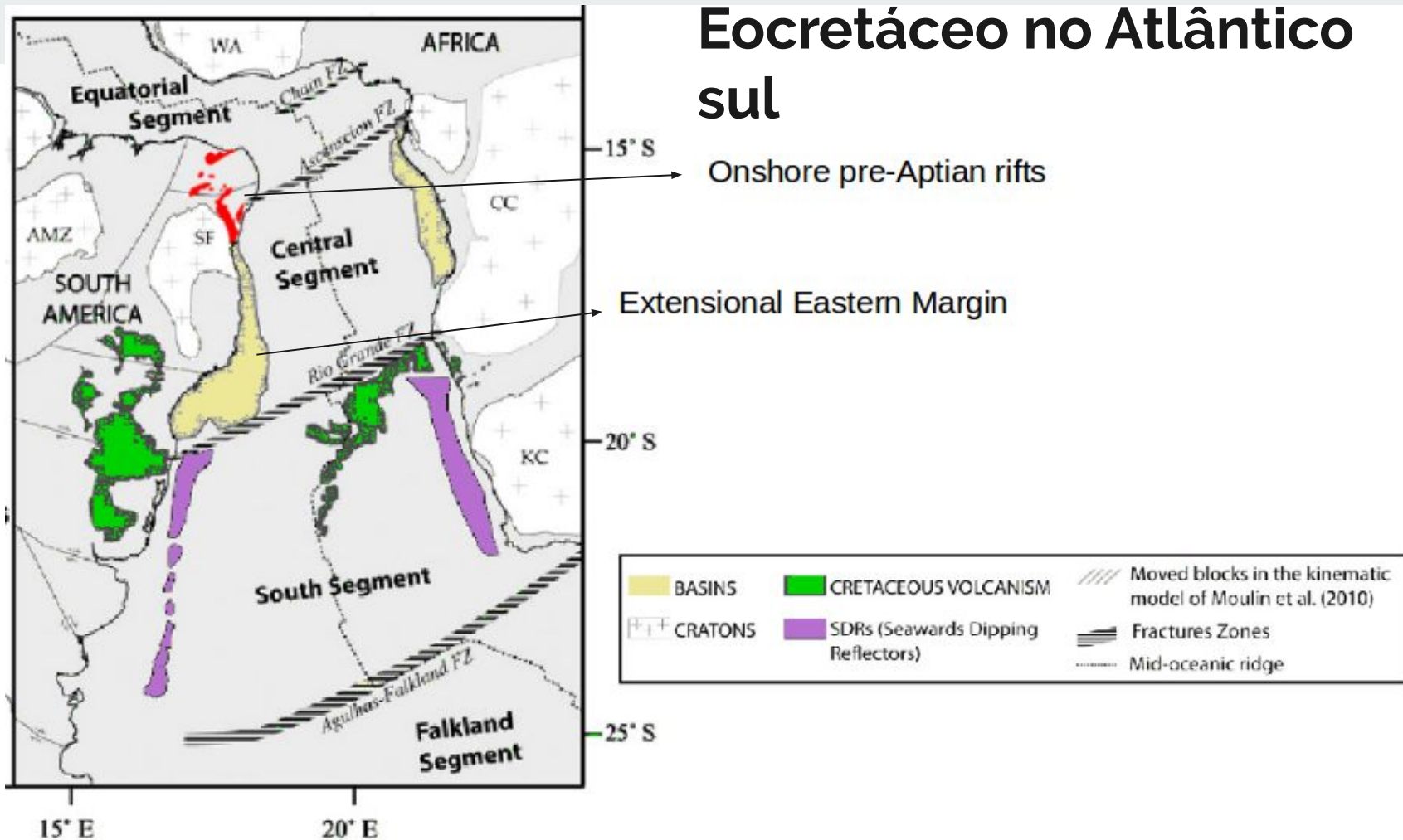
Assim, a subsidência térmica afeta uma área maior que a subsidência mecânica por ela responsável.

- Redução da produção sedimentar local.

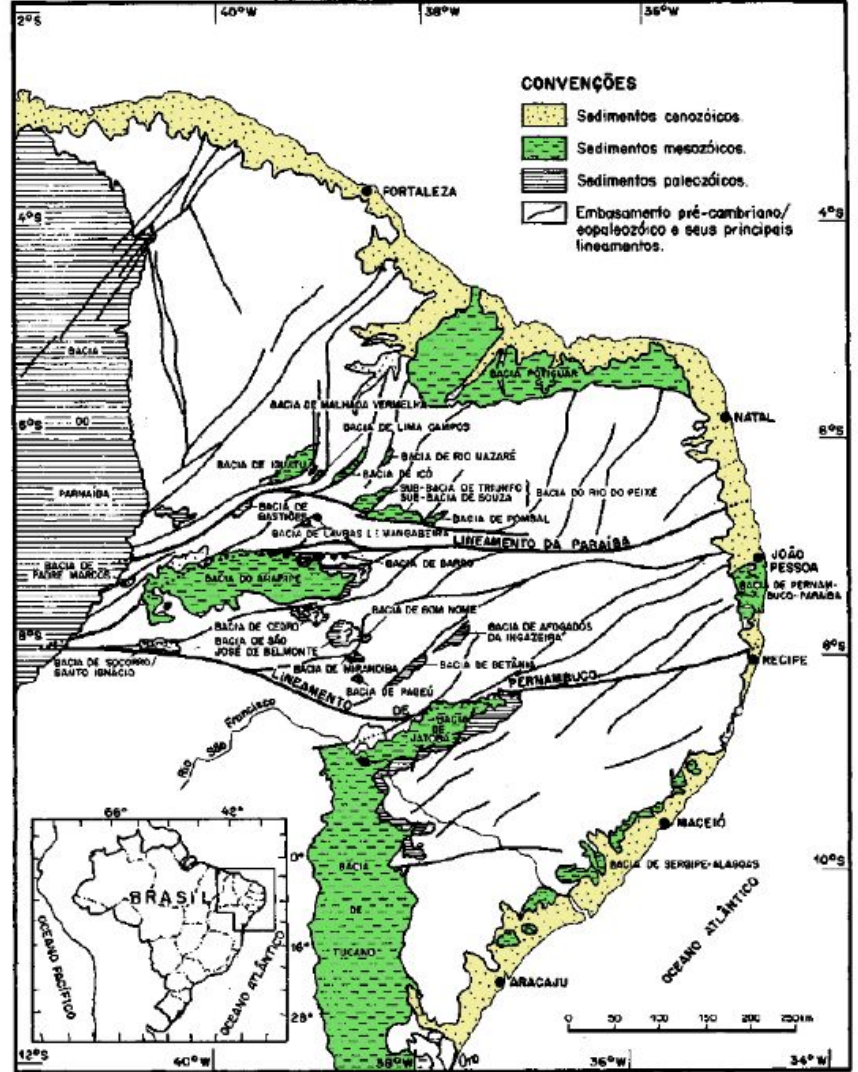
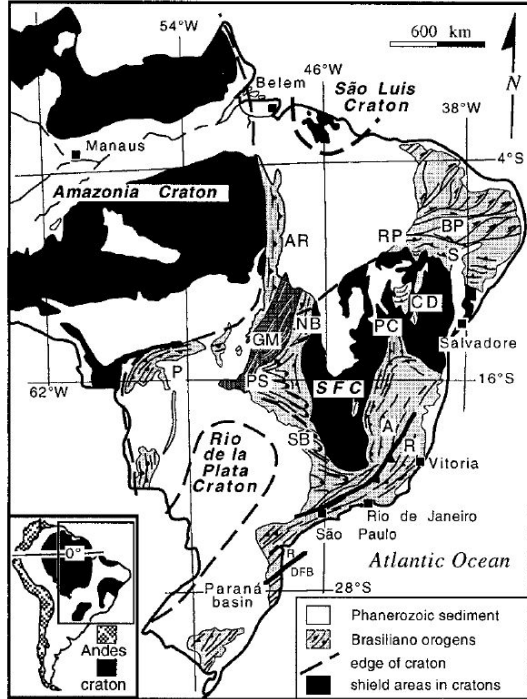
- Aumento da área de captação

Qual a evolução do aporte?

Eocretáceo no Atlântico sul

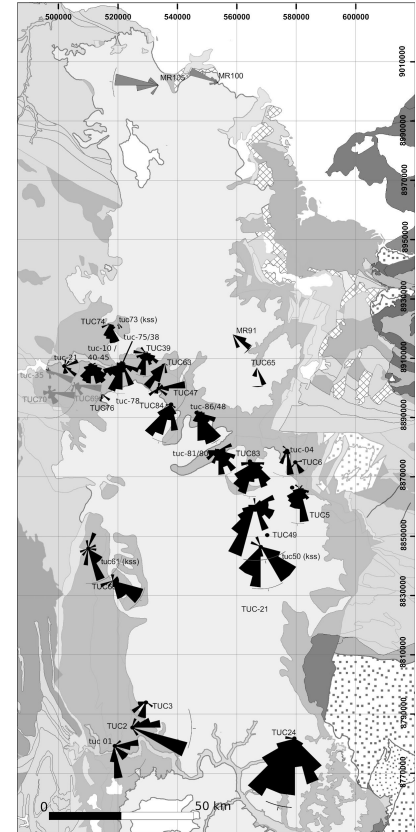
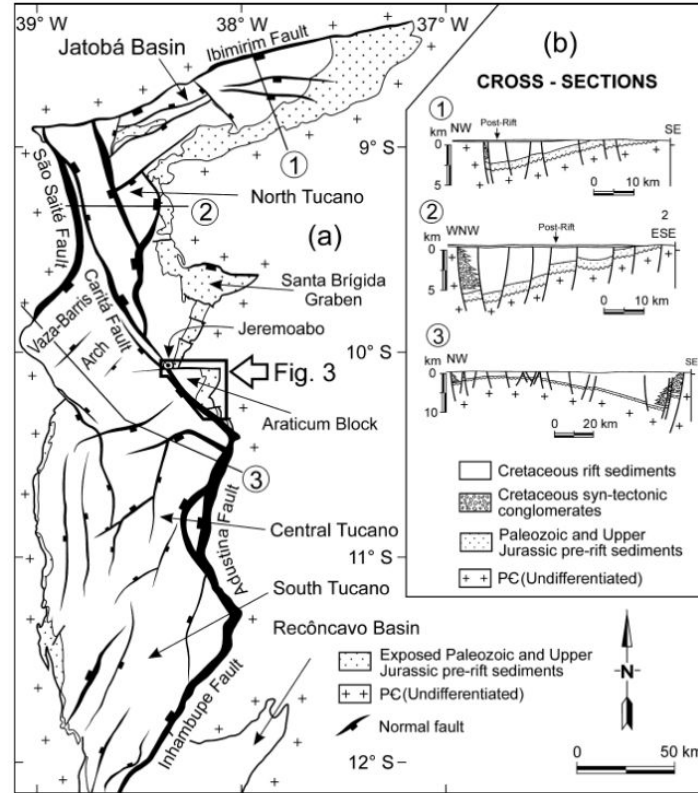


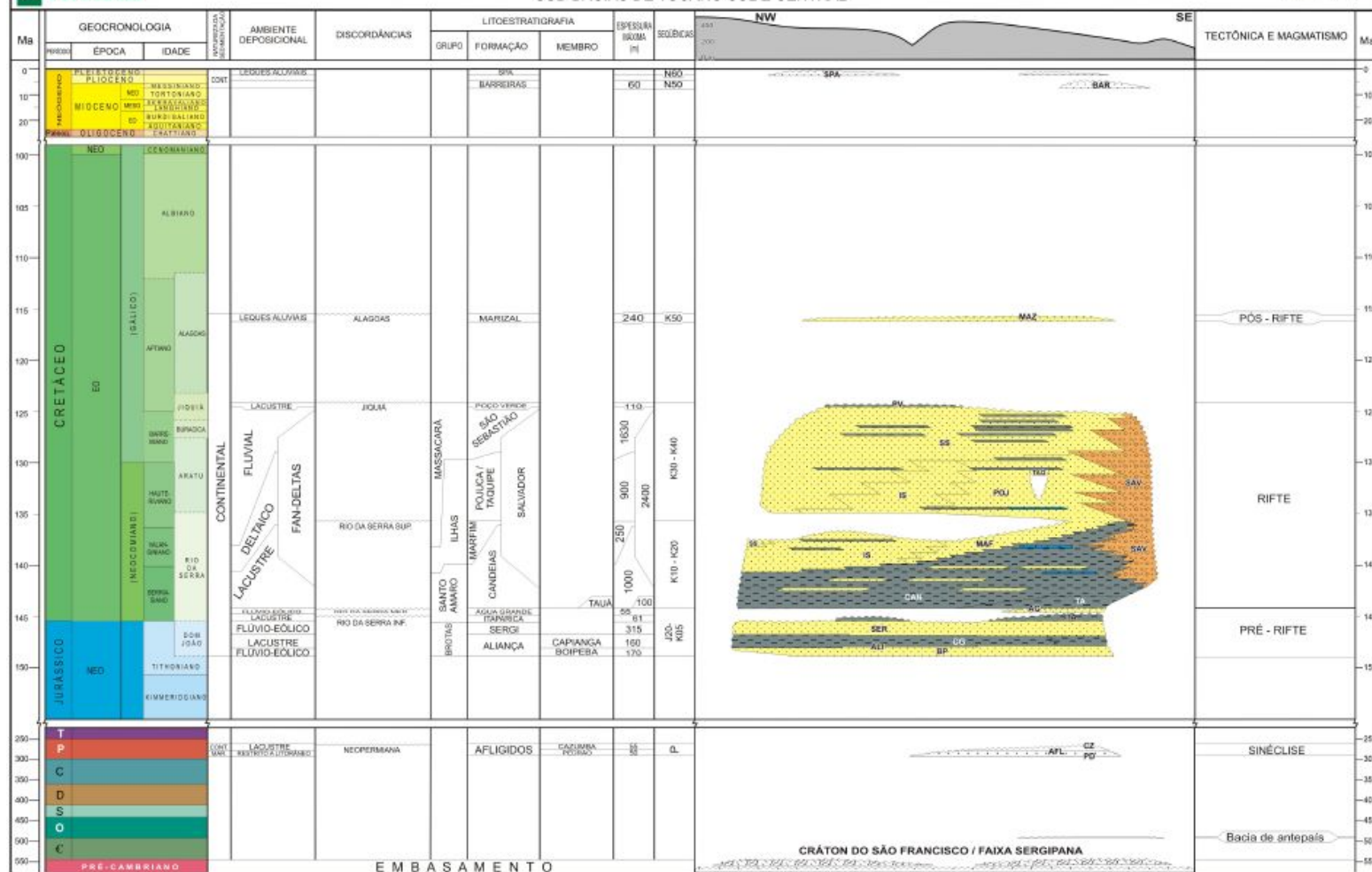
Bacias Eocretáceas onshore NE Brasil

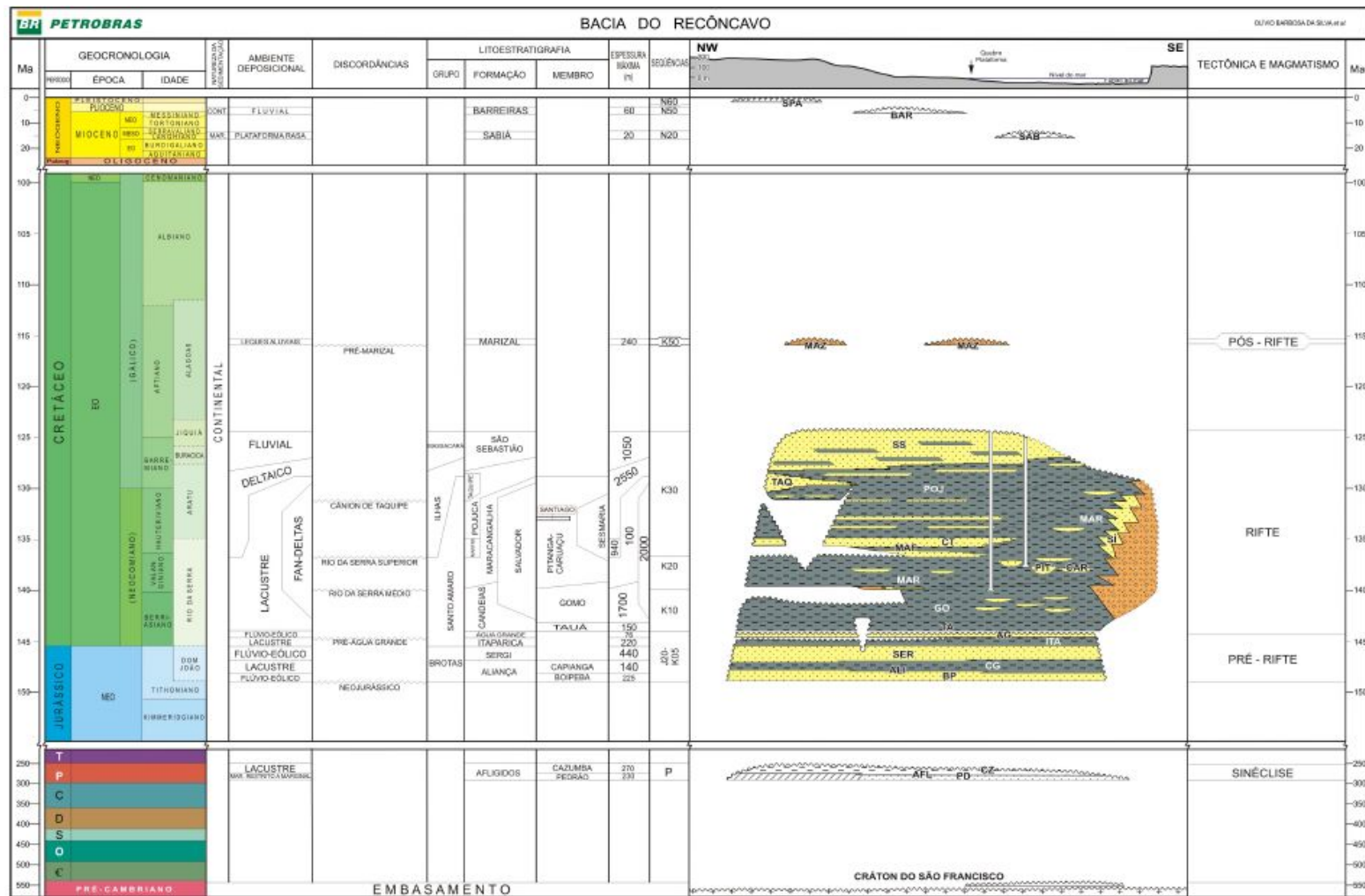


O rift estreito do Recôncavo-Tucano-Jatobá

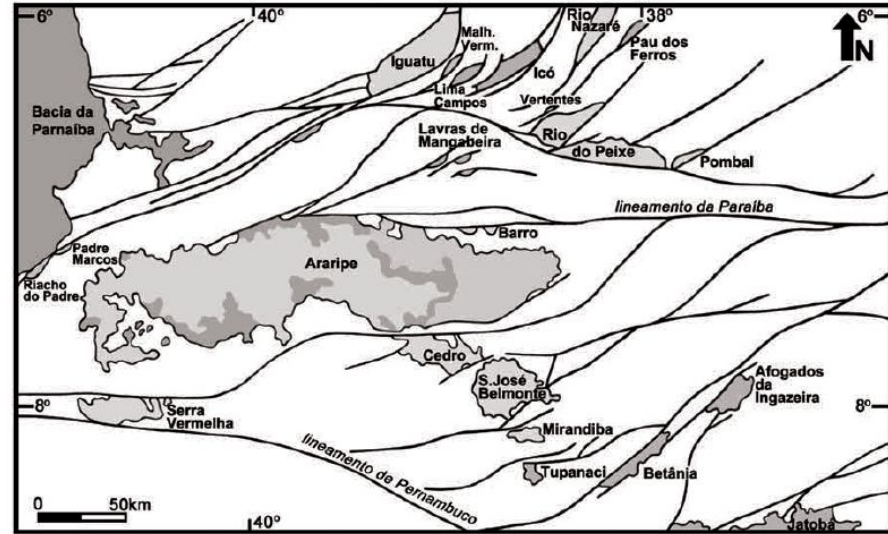
N. Destro et al. / Journal of Structural Geology 25 (2003) 1263–1279







Basins on the Borborema Province: wide rift

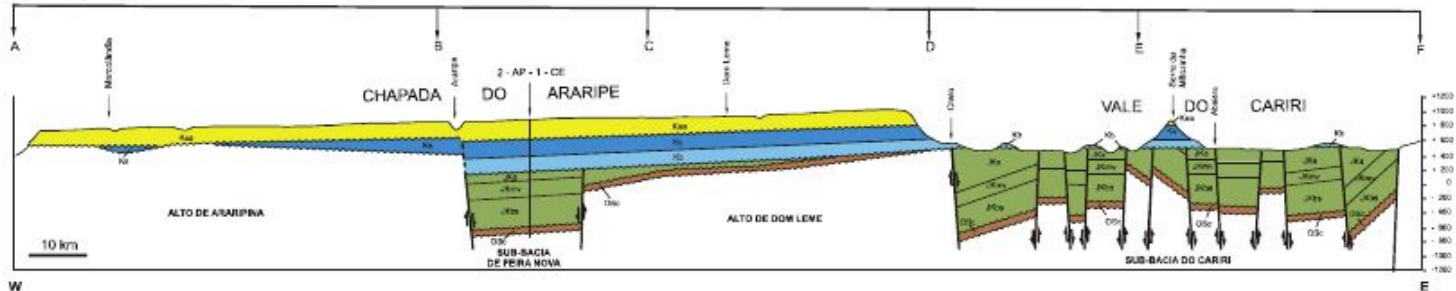


Hessel et al.

Revista de Geologia, Vol. 19, nº 2, 187-206, 2006

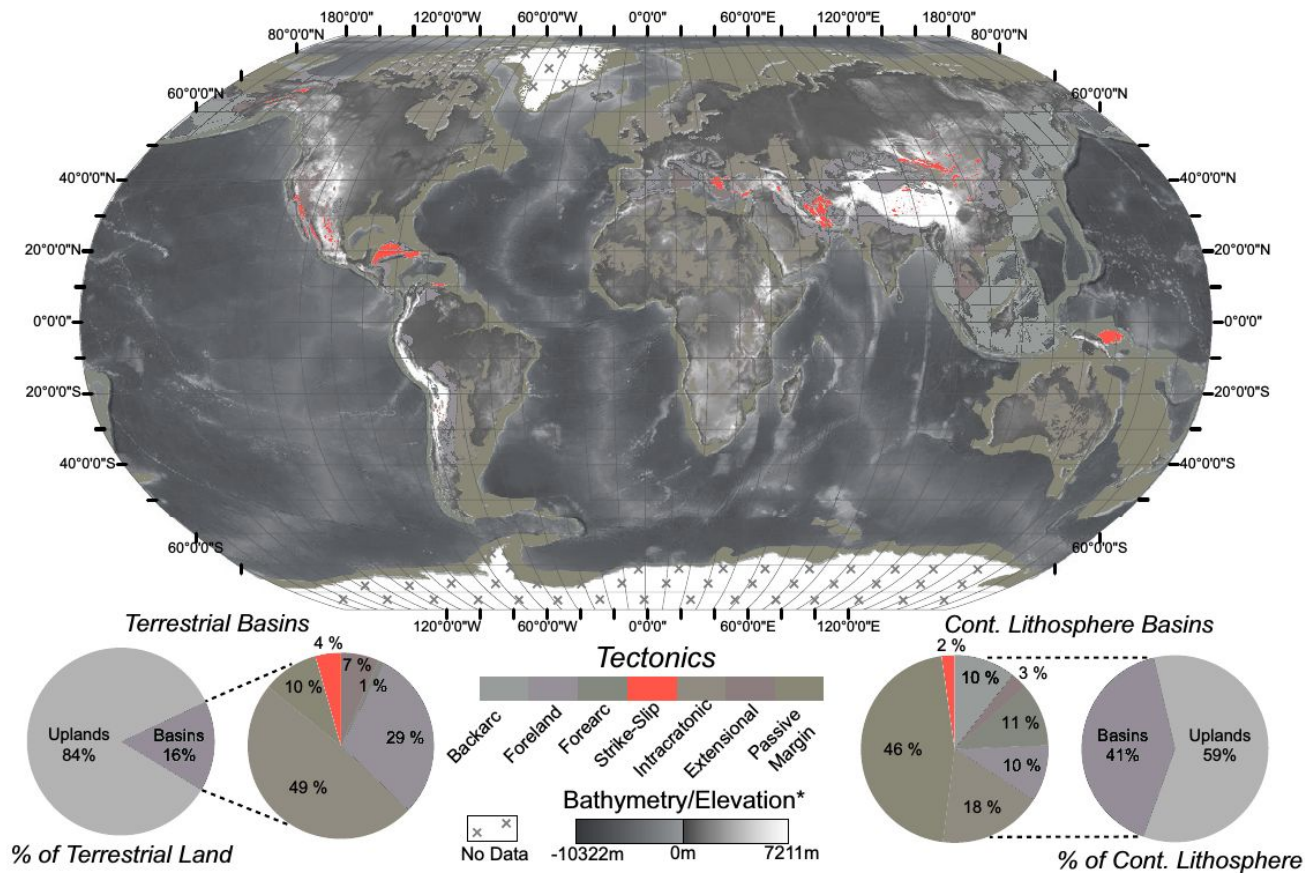
B. Geoci. Petrobras, Rio de Janeiro, v. 15, n. 2, p. 371-389, maio/nov. 2007

LITOSTRATIGRAFIA	SEQUÊNCIAS
Fm. Zé	PDS-RFT II
Fm. Santana	PDS-RFT I
Fm. Barroalha	RPT
Fm. Alcantara	PRC-48T
Fm. Mado Velho	PRC-48T
Fm. São Bento	PRC-48T
Fm. Cariri	PRC-48T
Enxameamento	PRC-CAMBRIANO

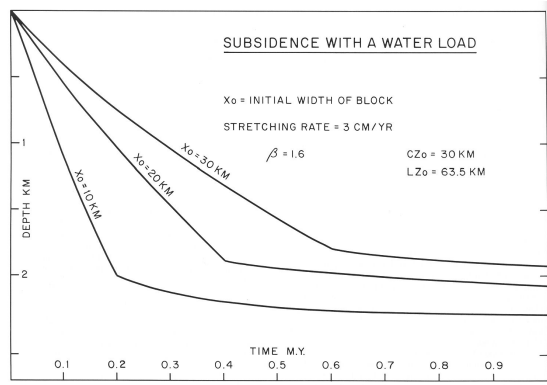


Strike-slip basins vs. oblique rifts

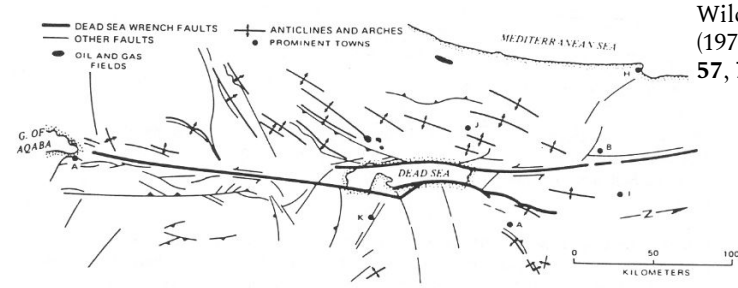
Modificado de:
Nyberg, B., Holwell, J.A. (2015)
Geology **43**, 643-646.



Strike-slip basins

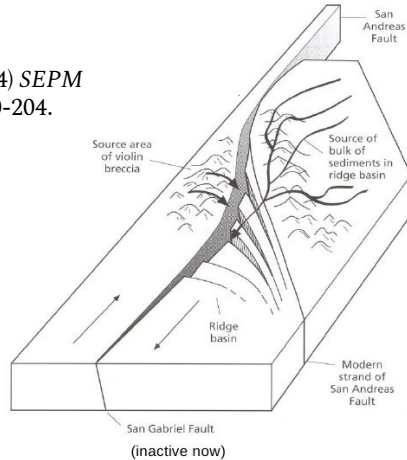


Pitman, W.C. & Andrews, J.A. (1985) *SEPM Spec. Publ.* 37, 45-49.

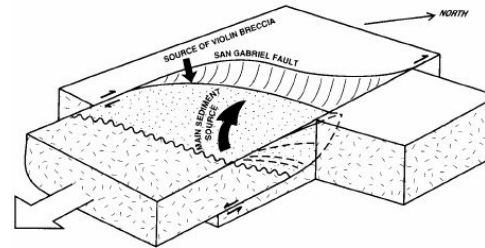


Wilcox, R.E. et al. (1973) *AAPG Bull.* 57, 74-95.

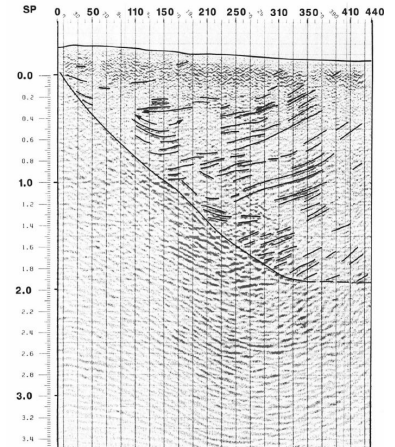
Crowell, J.C. (1974) *SEPM Spec. Publ.* 22, 190-204.



Ridge Basin

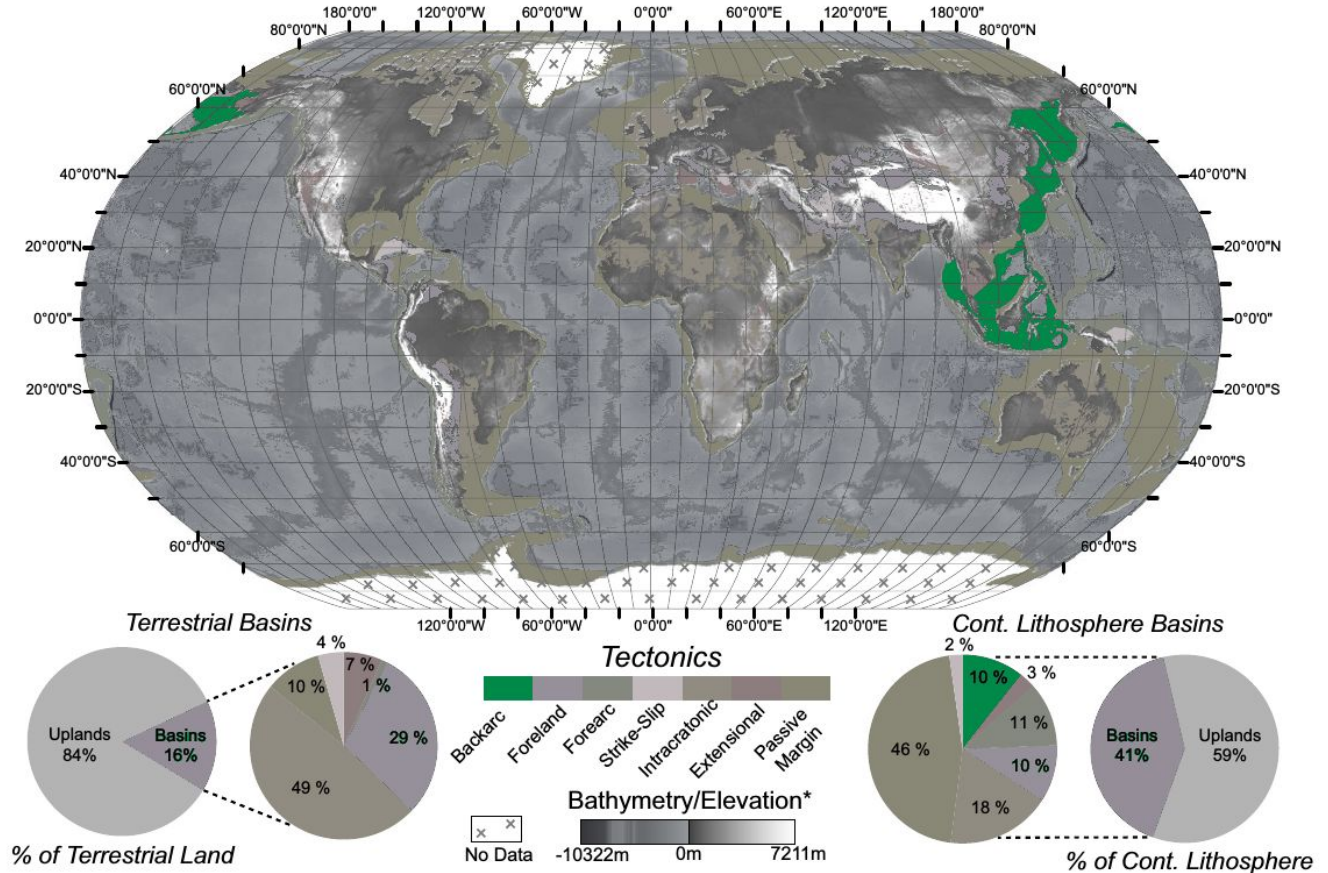


May, S.R. (1993) *GSA Bull.* 105, 1357-1372.

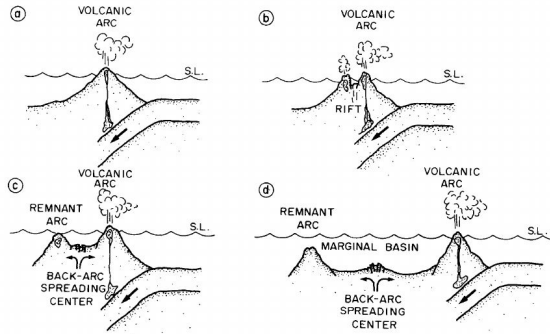


Backarc basins and oceanic lithosphere

Modificado de:
Nyberg, B., Holwell, J.A. (2015)
Geology **43**, 643-646.



Intrarc extension



Carey, S. & Sigurdsson, H. (1984)
Geol. Soc. London Spec. Publ. **36**, 17-58.

Baseado em:
 Karig, D.E. (1971) *J. Geophys. Res.* **76**, 2542-2561.

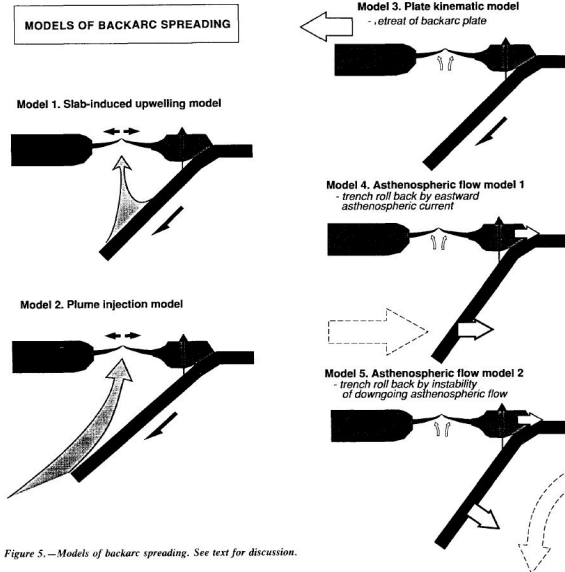
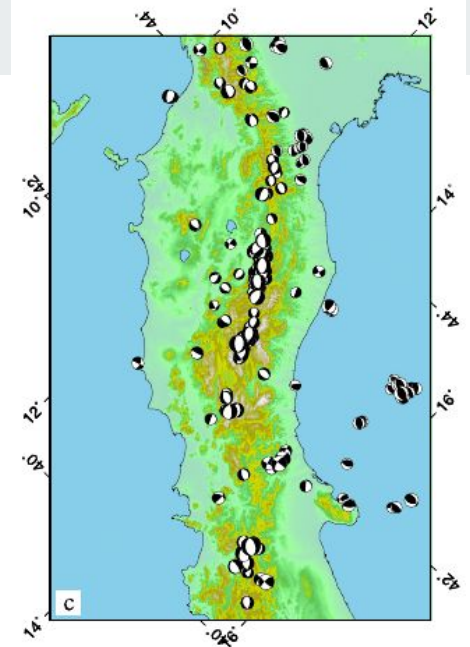


Figure 5.—Models of backarc spreading. See text for discussion.

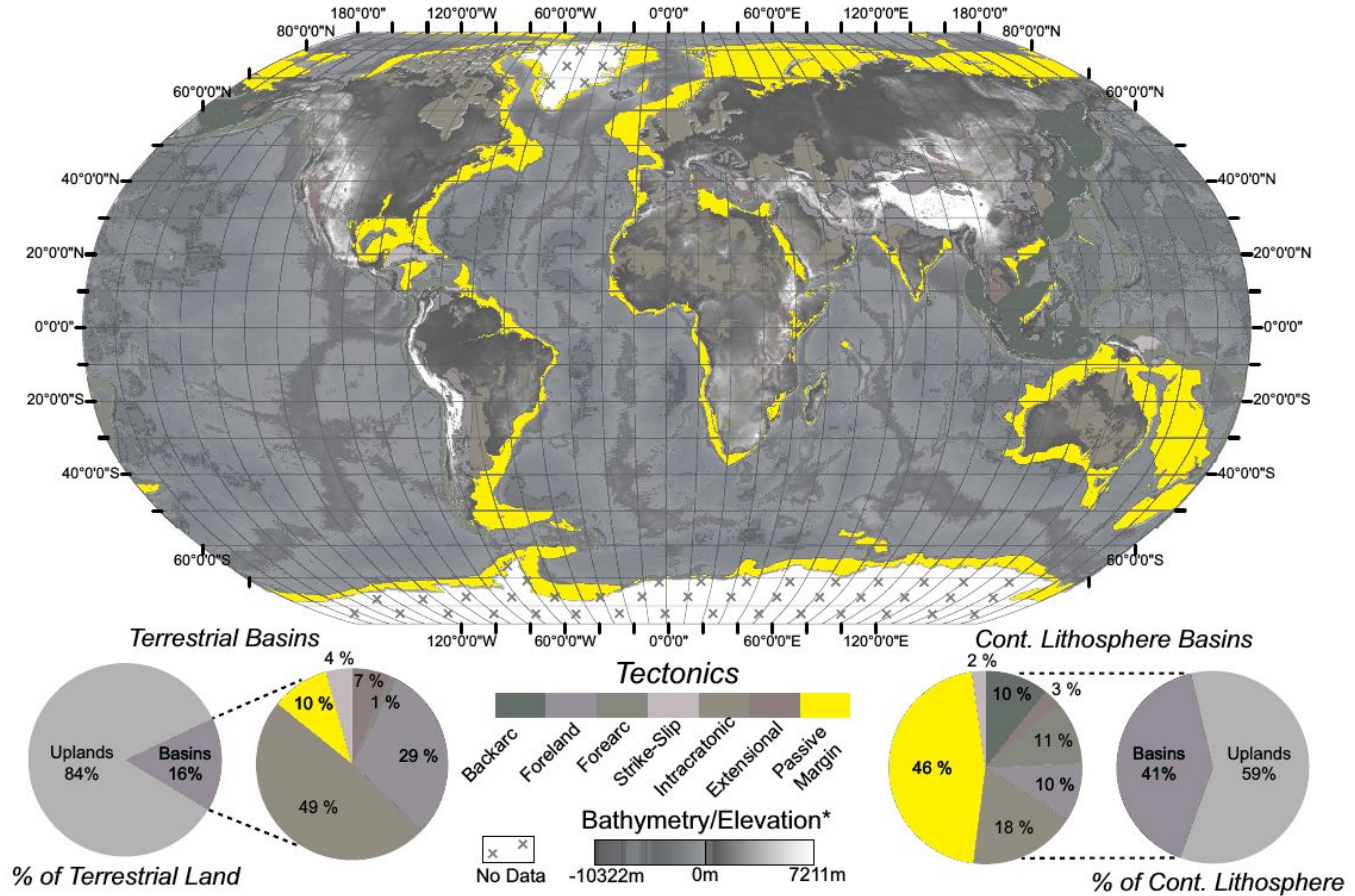
Tamaki, K. & Honza, E.
 (1991) *Episodes* **14**, 224-230.



D'Agostino, N. (2014)
Earth Planet. Sci. Lett. **397**, 121-132.

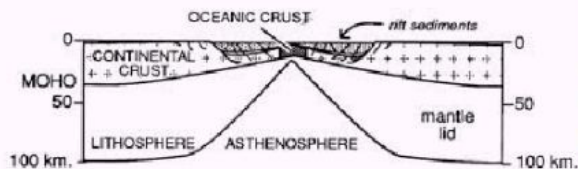
Margens distendidas ativas hoje

Modificado de:
Nyberg, B., Holwell, J.A. (2015)
Geology **43**, 643-646.

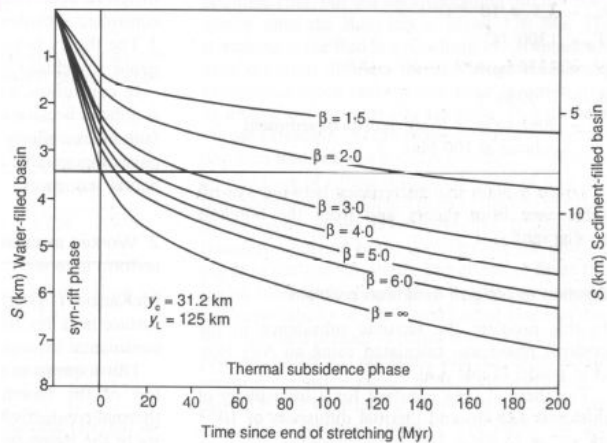
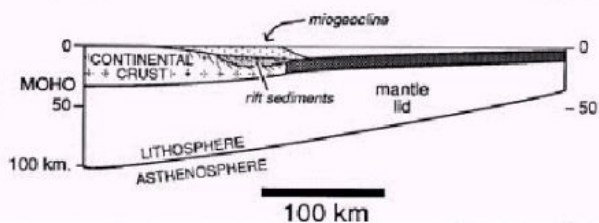


Subsidência pós mecânica

NASCENT
OCEAN
BASIN
($\beta = 2.2$)



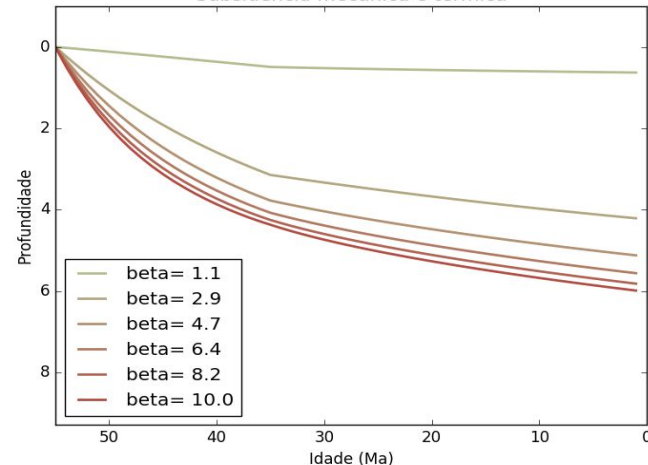
PASSIVE
MARGIN



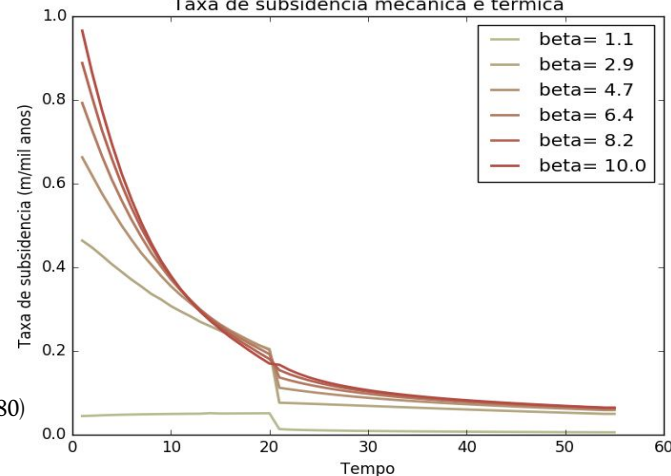
Diferentes taxas de
distensão em
diferentes posições
da margem =
Diferentes curvas de
subsidência

Baseado em:
Jarvis, G.T. & Mackenzie, D. P. (1980)
Earth Planet. Sci. Lett. **48**, 42-52.

Subsidencia mecanica e termica



Taxa de subsidencia mecanica e termica



Tipos de marges passivas

 Com relação à geodinâmica da abertura:

- Margens vulcânicas
- Margens pobres em magma

Com relação à cinemática da deformação:

- Margens ortogonais
- Margens transformes

Margens Vulcânicas e Pobres em Magma – *End Members*

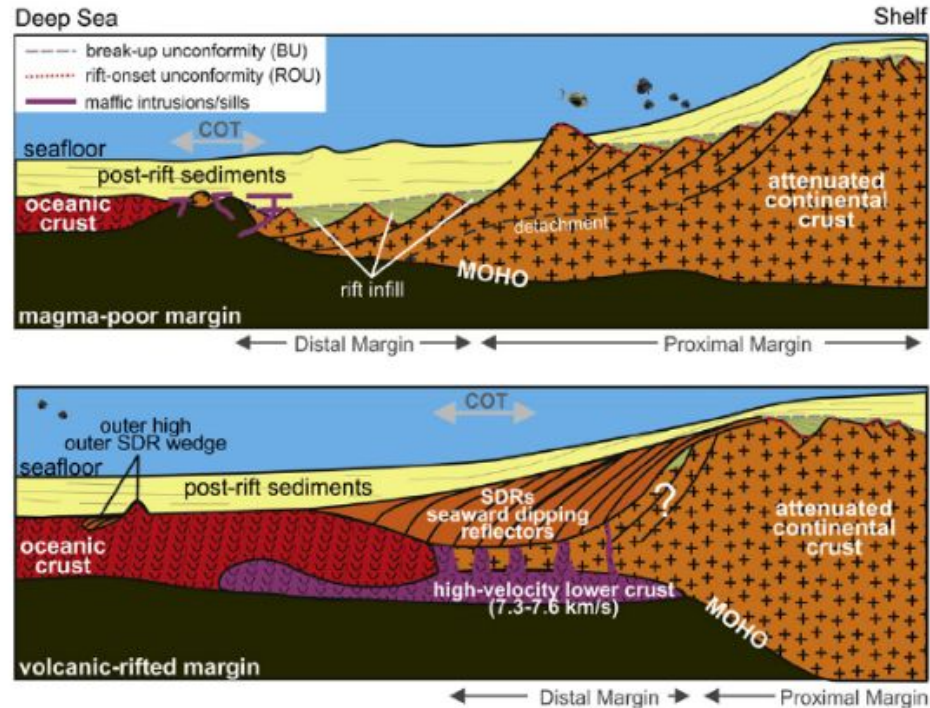


Figure 1. Schematic sketch of the end-member extremes of passive continental margins. Top: The magma-poor margin is defined by a wide area of highly attenuated continental crust where the upper crust is deformed by deep-reaching listric faults that may sole out on a common detachment surface, the proximal margin. In the distal margin the listric faults may cut across the entire crust leading to a detachment at the Mohorovičić (MOHO) discontinuity. Further seaward extensional allochthones may be situated on exhumed mantle before relatively thin oceanic crust is reached. Bottom: Volcanic rifted margins show a comparably narrow proximal margin with considerable crustal thinning over a short distance, thick wedges of syn-rift volcanic flows manifest in seismic reflection data as seaward dipping reflectors (SDRs), and wide high-velocity ($V_p > 7.3$ km/s) lower-crust seaboard of the continental rifted margin. The oceanic crust is comparably thick at those margins, especially close to the continent-ocean transition (COT). ROU is the rift-onset unconformity; BU the breakup unconformity.

Margens vulcânicas

- 
- São mais frequentes que as pobres em magma
 - Área de distensão crustal mais estreita que as pobres em magma (50 a 100 km de extensão)
 - Espessos derrames na fase rift (até 15 km), compondo refletores de grande amplitude inclinados para o oceano (SDRs)
 - Apresentam uma crosta inferior de alta velocidade (>7.3 km/s), geralmente interpretada como *underplating* de magma básico
 - Geralmente apresentam COT (transição entre crosta continental e oceânica) abrupta
 - O magmatismo implica em grande fusão de manto.
Relação com as LIPs (Large Igneous Provinces)
Plumas ou não (grande debate)

Margens vulcânicas

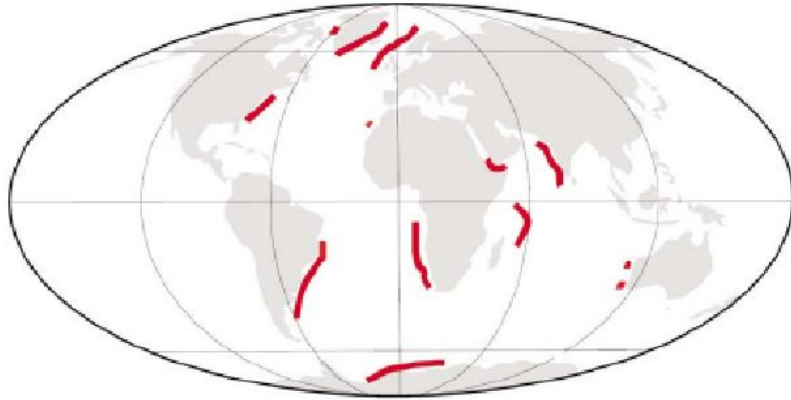
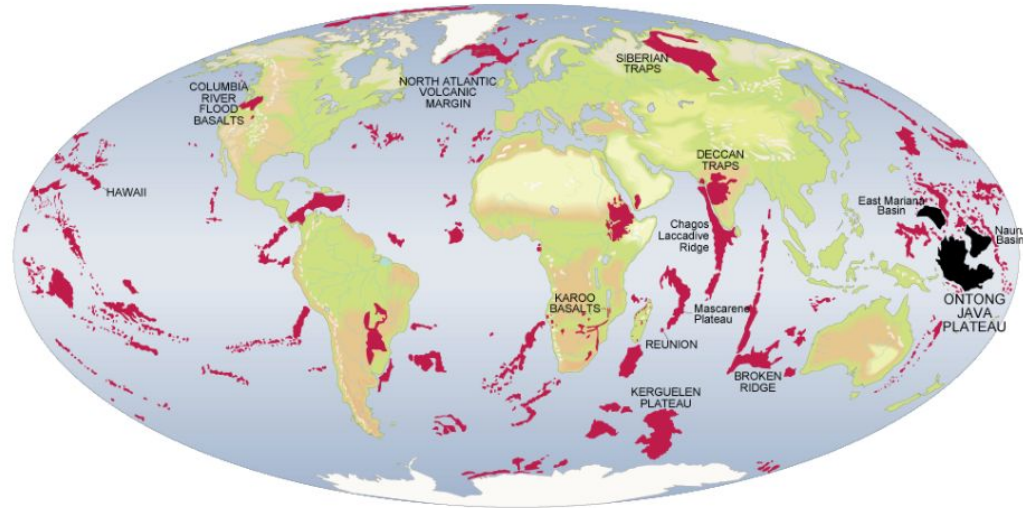
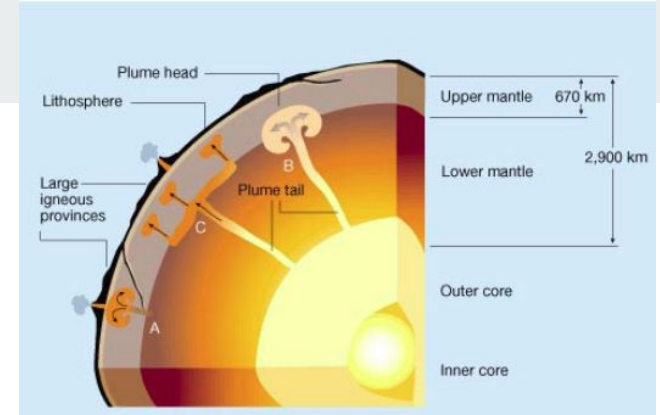


Fig. 2. Worldwide distribution of volcanic passive margins (in [14 after [16]).

L. Geoffroy / C. R. Geoscience 337 (2005) 1395–1408



Coffin & Eldholm (1993)

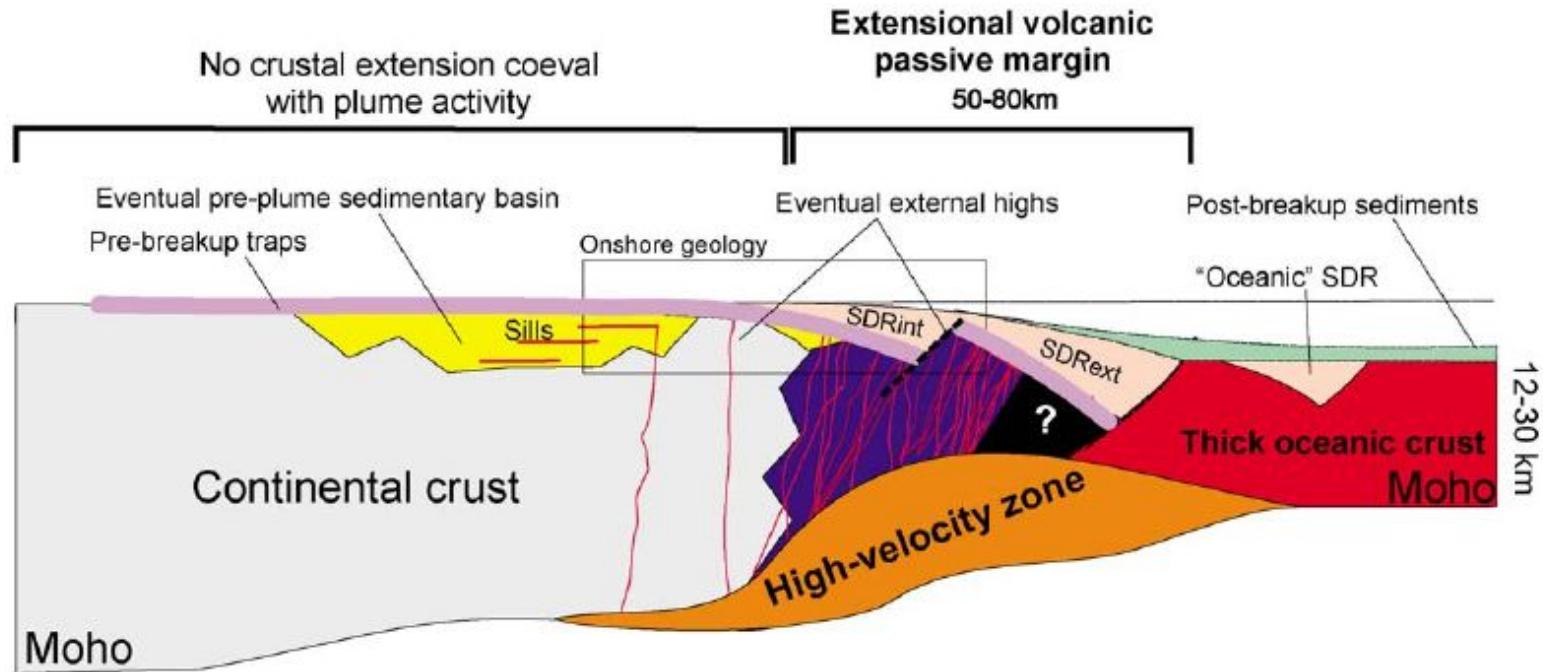


Fig. 1. Across-strike section of a volcanic passive margin. The presence of internal sedimentary basins is not the rule. SDRint and SDRext: respectively, internal and external seaward-dipping lavas and volcanic projections (i.e. 'Seaward-Dipping Reflectors' in offshore studies).

SDRs

L. Geoffroy / C. R. Geoscience 337 (2005) 1395–1408

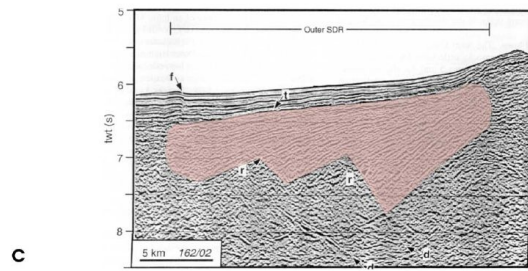
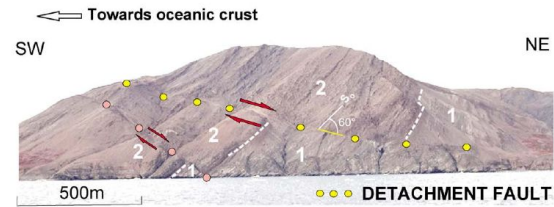
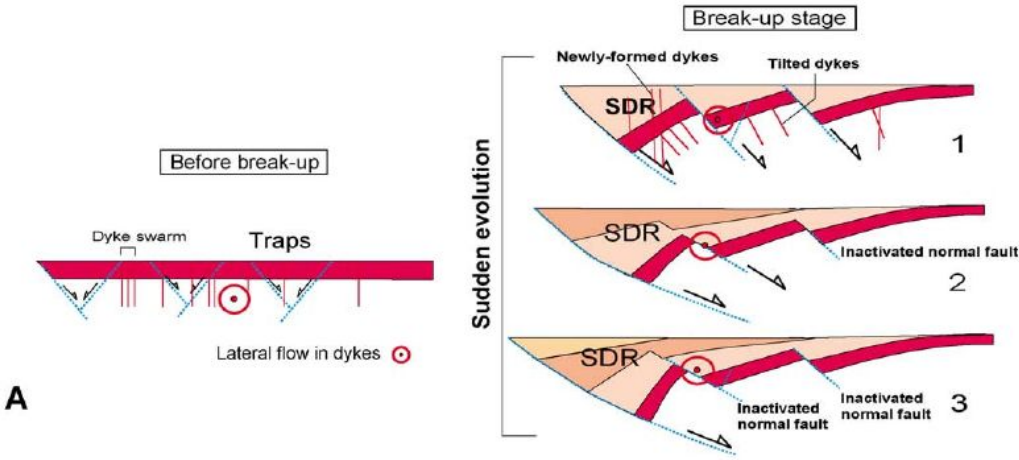
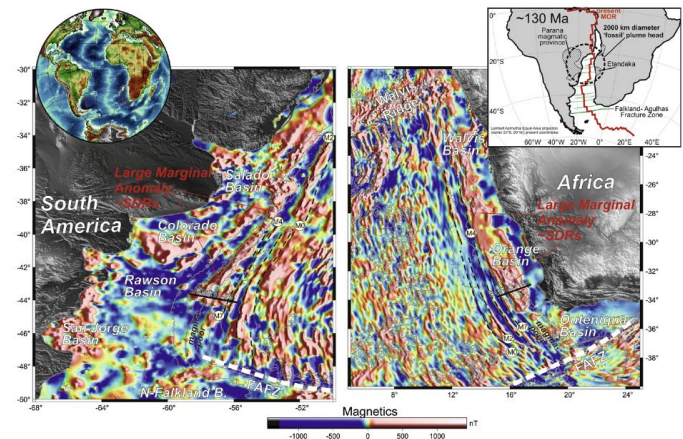


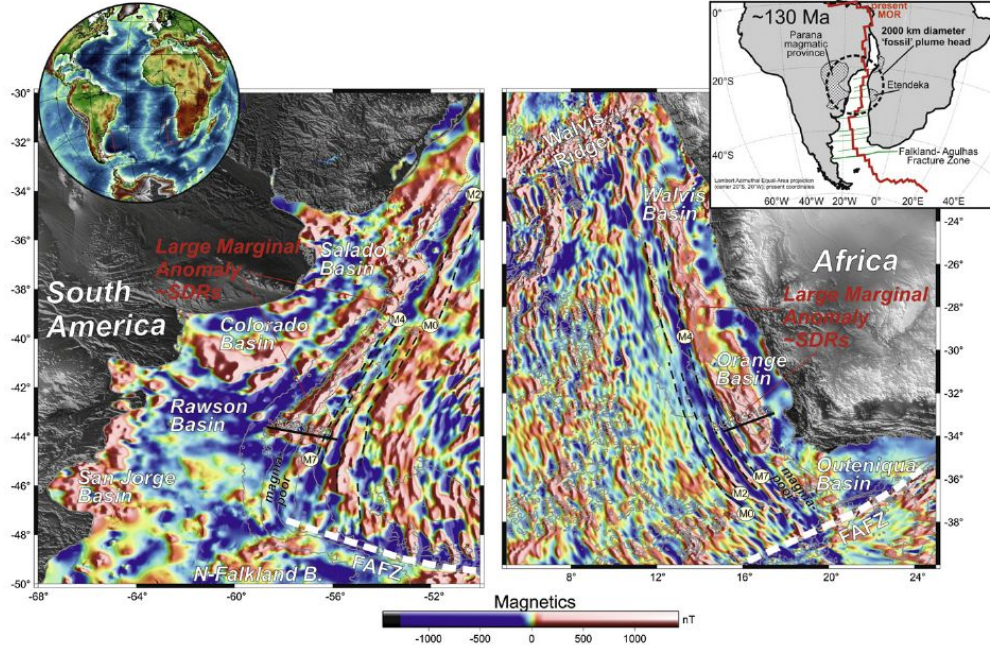
Fig. 6. (A) Formation of SDR at VPM [30]. SDR are syn-magmatic roll-over flexures accommodated by continentward-dipping normal faults. (B) Example of tilted continentward-dipping normal fault (yellow dots) in the internal SDR of SE-Baffin Bay (Svartenbuk Peninsula, see [31]). Note also the reactivation of a dyke as a secondary normal fault during the seaward-tilt of the lavas and projections (red dots). (C) Outer SDR-prism west of Australia [68]. Note the structure analogue to (A) and the existence of continentward-dipping faults (d) here interpreted as magma-injected normal faults.

D. Franke / Marine and Petroleum Geology 43 (2013) 63–87

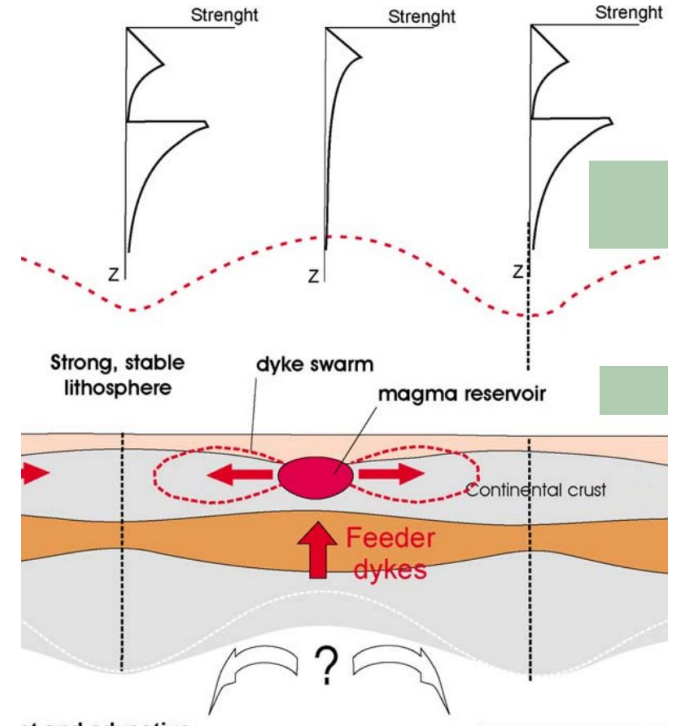
77



Magmatismo e resitência

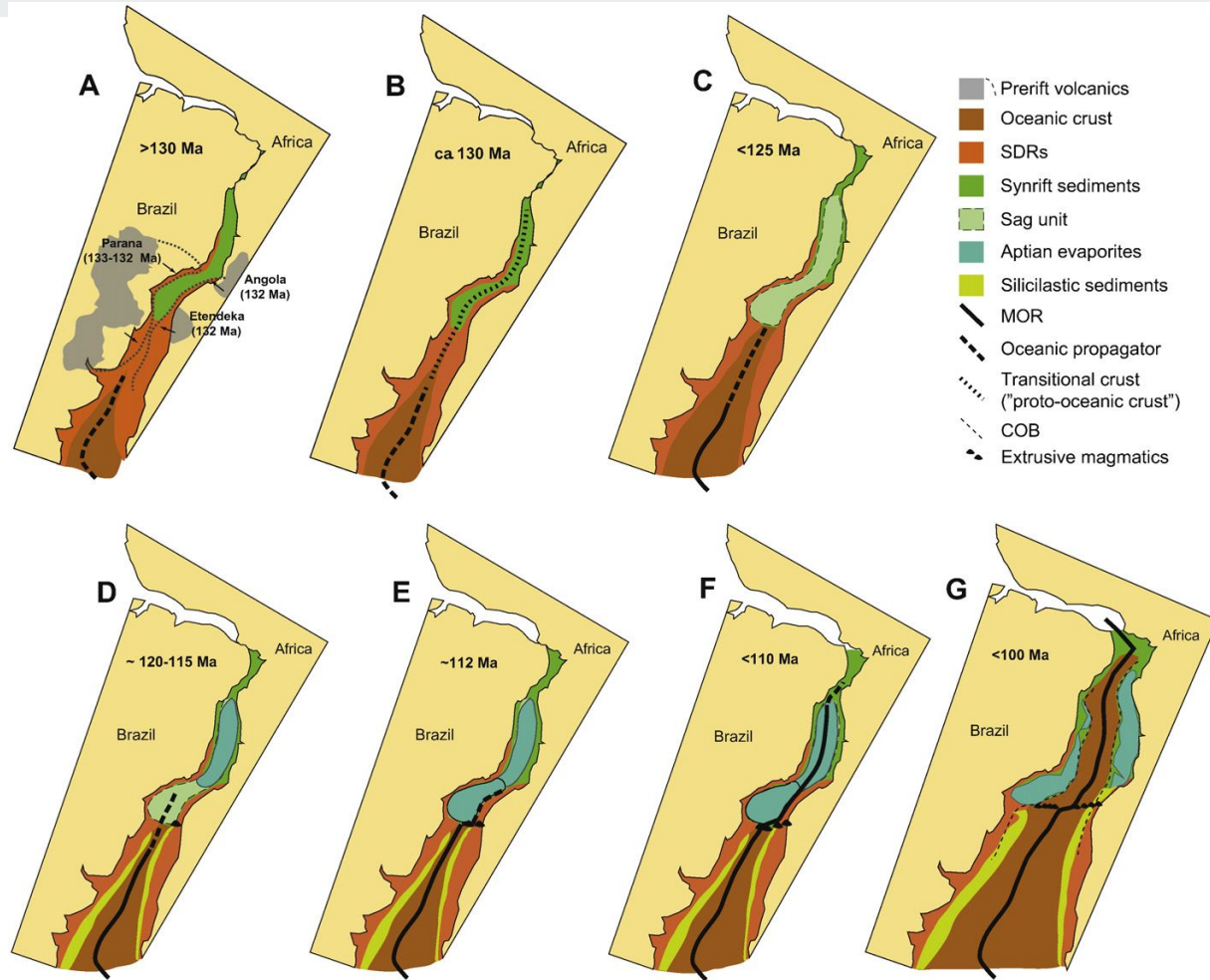


Franke, D., (2013) *Mar. Pet Geol* **43**, 63-87.



Geoffroy, L. (2005) *Geoscience* **337**, 1395-1408.

Propagação da dorsal

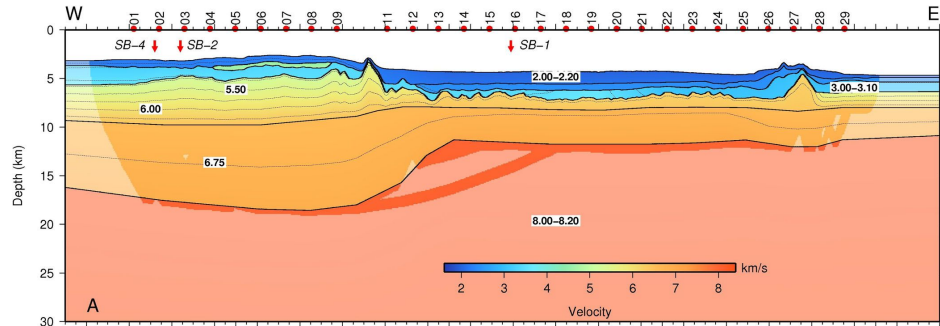


Kukla, P.A. (2018) *Gond. Res.* 53, 41-57.

Margens pobres em magma

- 
- São menos frequentes que as pobres em magma
 - Área de distensão crustal de várias centenas de km, com zonas com diferentes estilos e taxas de deformação
 - Sucessão vulcânicas na fase rift apenas restritas
 - Geralmente apresentam COT (transição entre crosta continental e oceânica) gradual ou mal definido
 - Área mais distal hiperdistendida (fator Beta muito alto, chegando a 10)
 - Pode haver exumação de manto

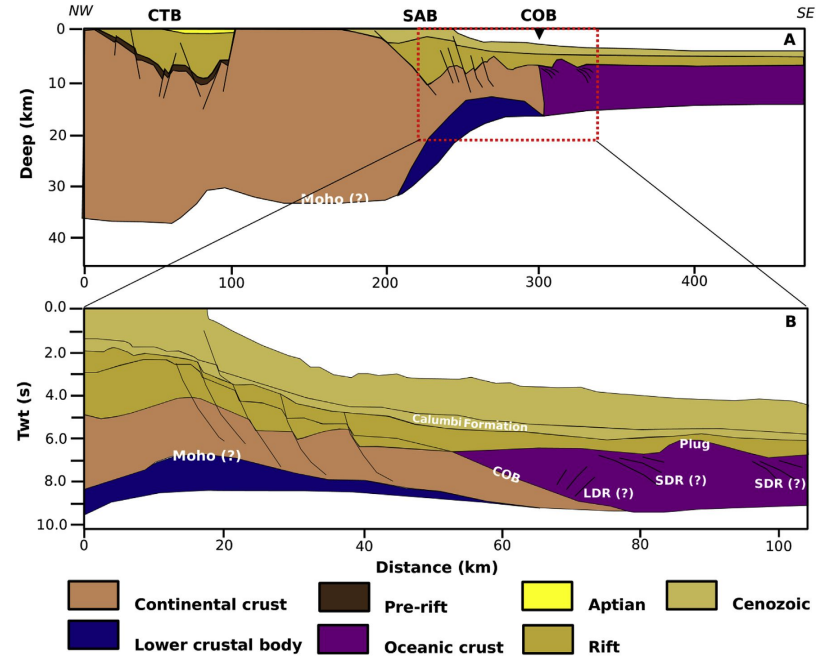
Hyper-extended margins



Santos Basin

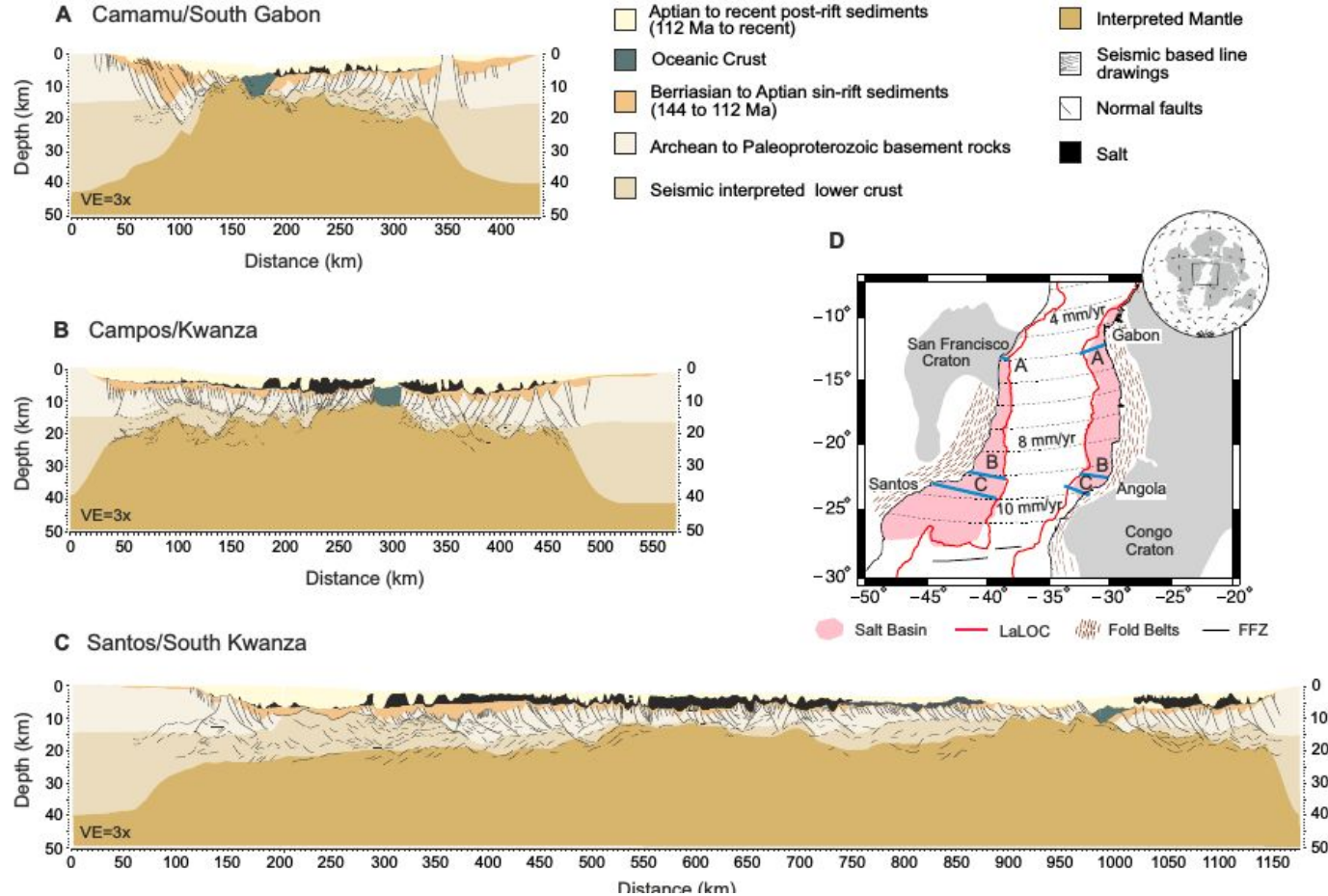
Klingelhoefer, F. et al. (2015)
Geophys. J. Int. **200**, 471-488.

Narrow margins



Pinheiro, J.M. et al. (2018) *J. S. Am. Earth Sci.* **88**, 649-672.

Margens estreitas vs. amplas

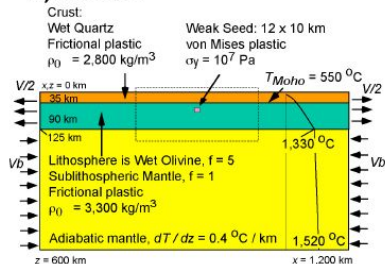


Ros, E. et al. (2017) *Geochem. Geophys., Geosys.* **18**, 4538–4557

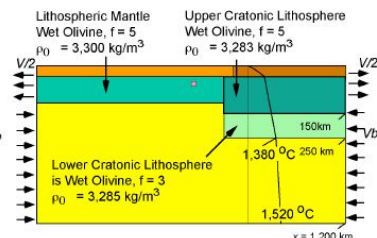
Resistência e arquitetura

Huismans, R. & Beaumont, C. (2011)
Nature **473**, 74-78.

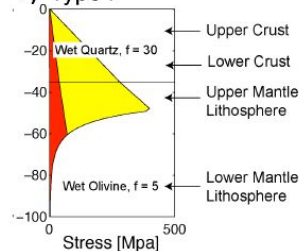
a) Model I



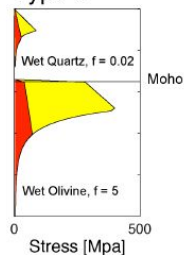
b) Model II-A and Model II-C



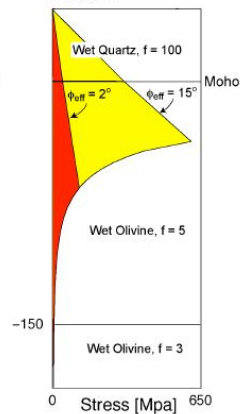
c) Type I



Type II

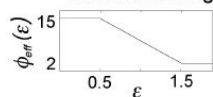


Craton

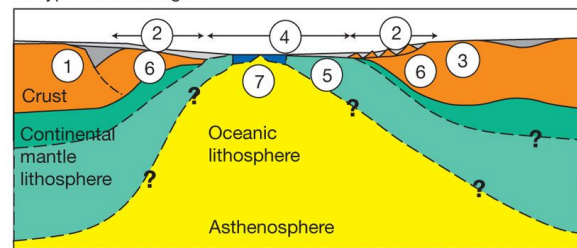


d)

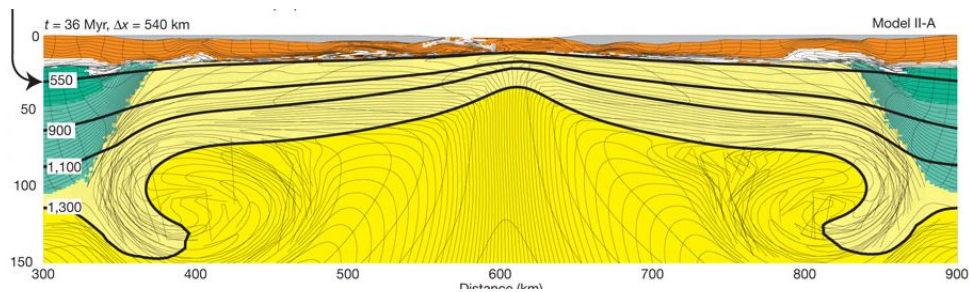
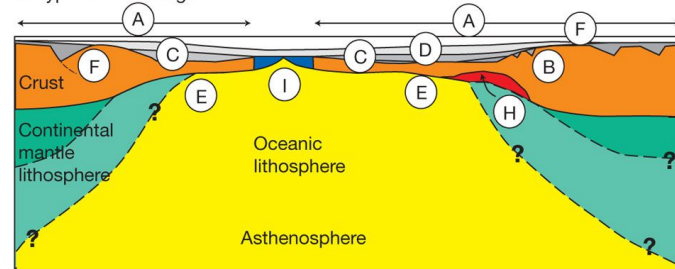
Strain softening



a) Type I rifted margins

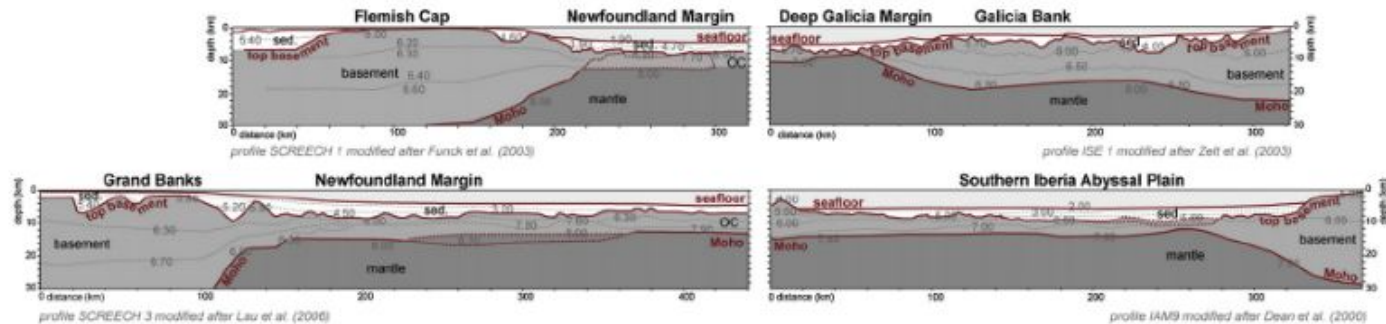


b) Type II rifted margins

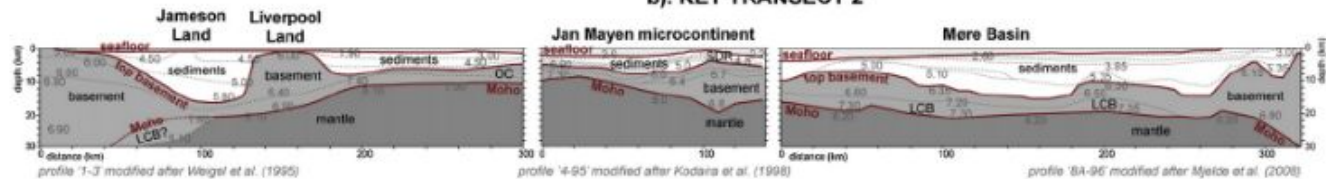


Margens pobres em magma

a). KEY TRANSECT 1



b). KEY TRANSECT 2



c). KEY TRANSECT 3

(seismic refraction)

- water
- sedimentary rocks
- basement
- mantle

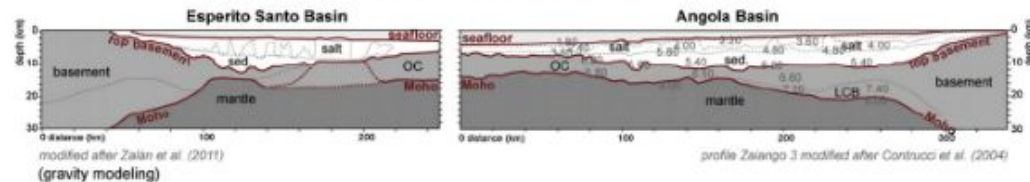


Figure 2. Compilation of published seismic refraction models along the key transects considered in the contribution. Vertical exaggeration ~ 2 . OC: oceanic crust. sed.: Sedimentary rocks. a: Conjugate seismic refraction profiles illustrating the geometries of the northern segment (up) and the central segment (down) of the Iberia–Newfoundland system (data are from Funck et al., 2003; Zelt et al., 2003; Lau et al., 2006a,b; Dean et al., 2000). b: Conjugate seismic refraction profiles illustrating the geometries of the Norwegian–Greenland Sea system (data are from Weigel et al., 1995; Kodaira et al., 1998; Mjelde et al., 2008). c: Conjugate seismic refraction profiles illustrating the geometries of the South Atlantic system (data are from Zalan et al., 2011; Contrucci et al., 2004). The location of the profiles is shown in Figures 4–6. The red segments underline the major refraction horizons: the seafloor, top–basement and Moho.

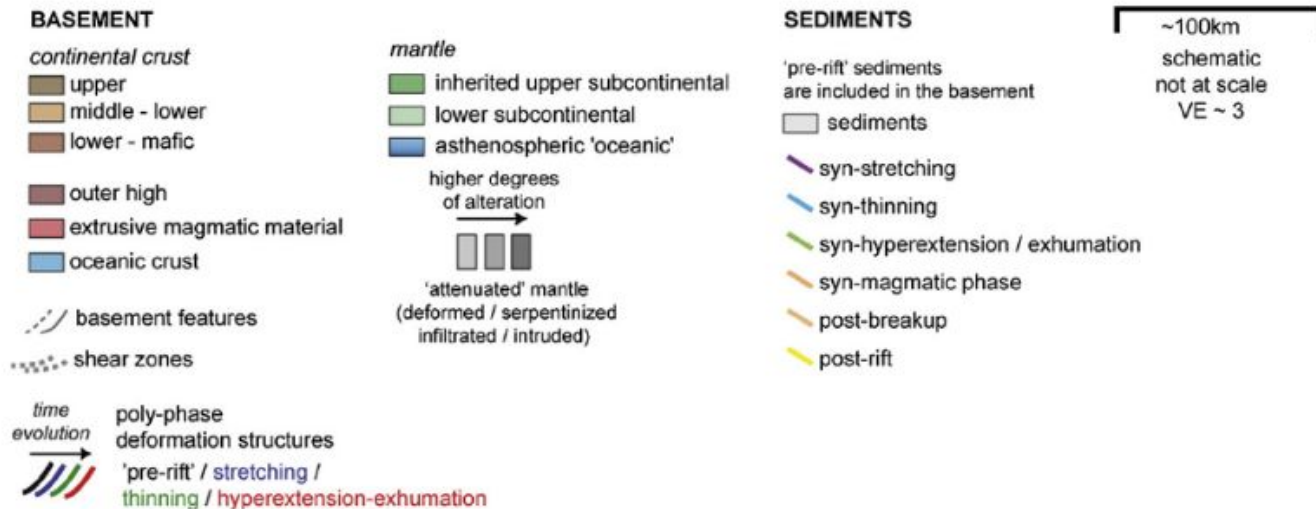
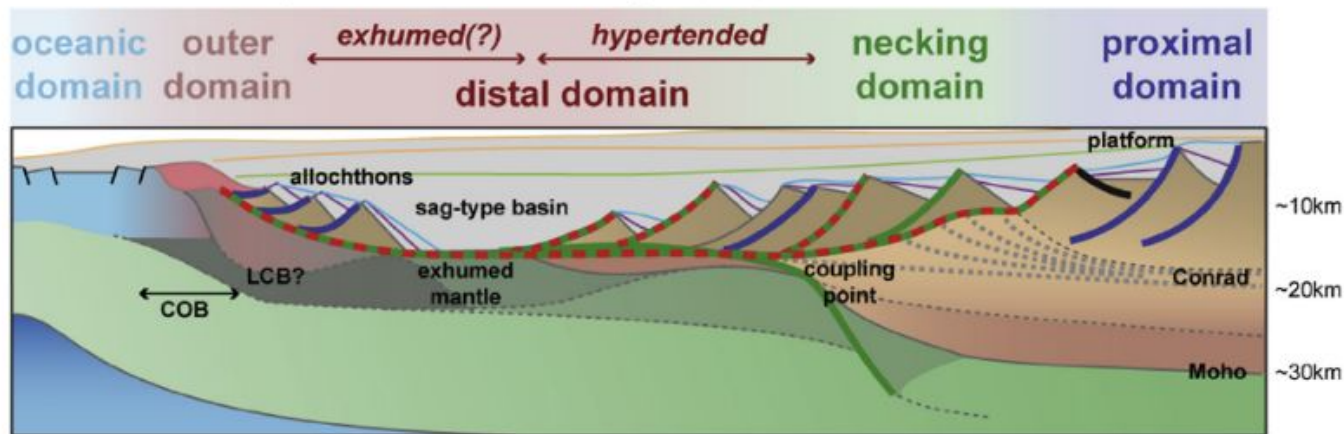


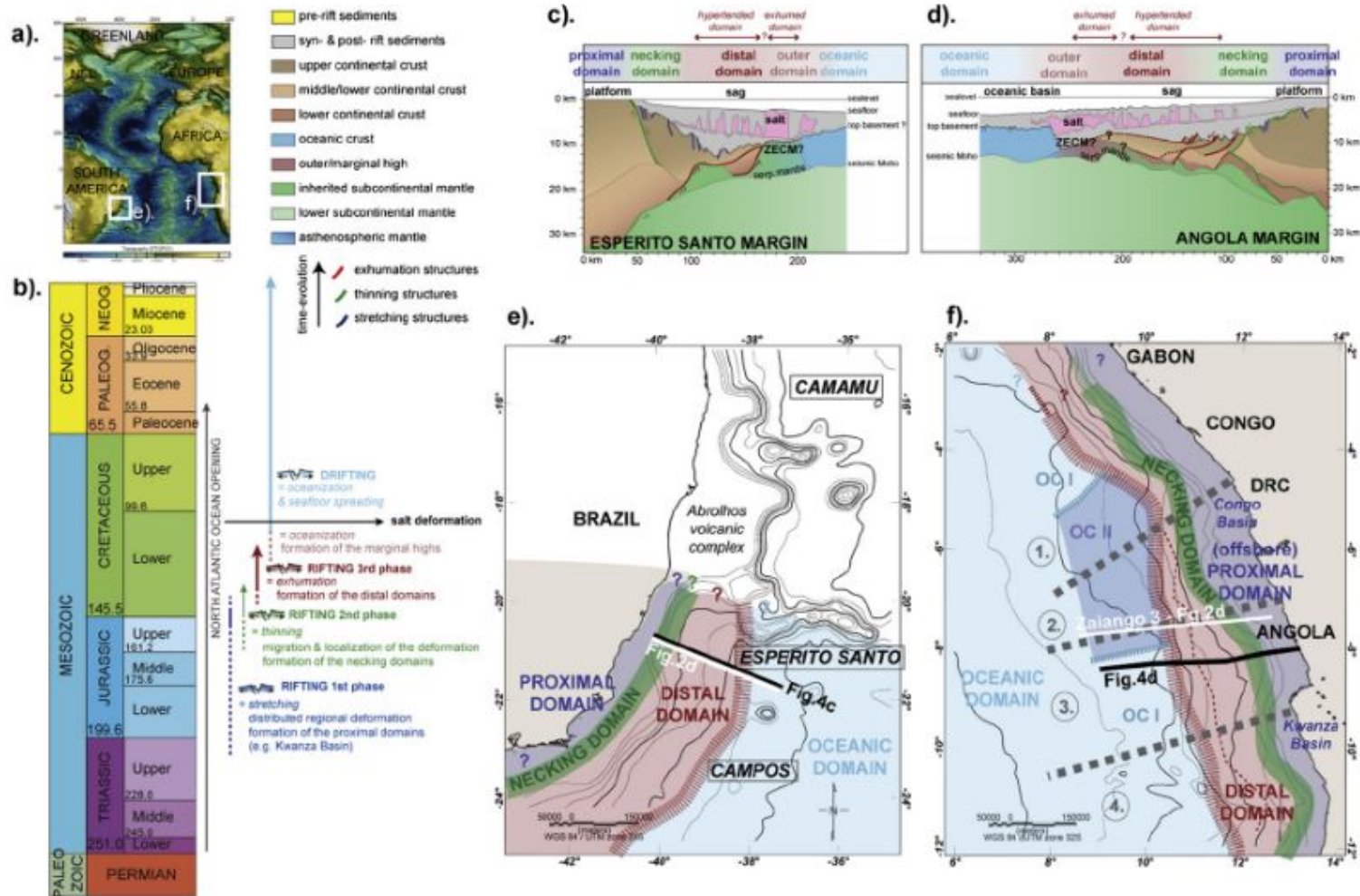
Figure 3. Schematic section of a typical rifted margin illustrating the various terms used in this contribution.

The proximal domain - The proximal domain corresponds to the inboard continental crust that has been stretched at low values of extension.



The necking domain - The necking domain corresponds firstly to a specific wedge shape of the crust: this is the zone of the margin where the (seismic) Moho defines an inflection point associated with a drastic crustal thinning from 30 km to less than 10 km.

The distal domain - Depending on the study area and on the terminology, the distal domain corresponds to and/or includes the proximal and distal OCT (oceancontinent transition), the transitional domain and/or the ZECM (zone of exhumed continental mantle). The distal domain is also regularly referenced as the **hyperextended domain** where seismic refraction shows that basement has been thinned down to <10 km.



O sag sin-rift

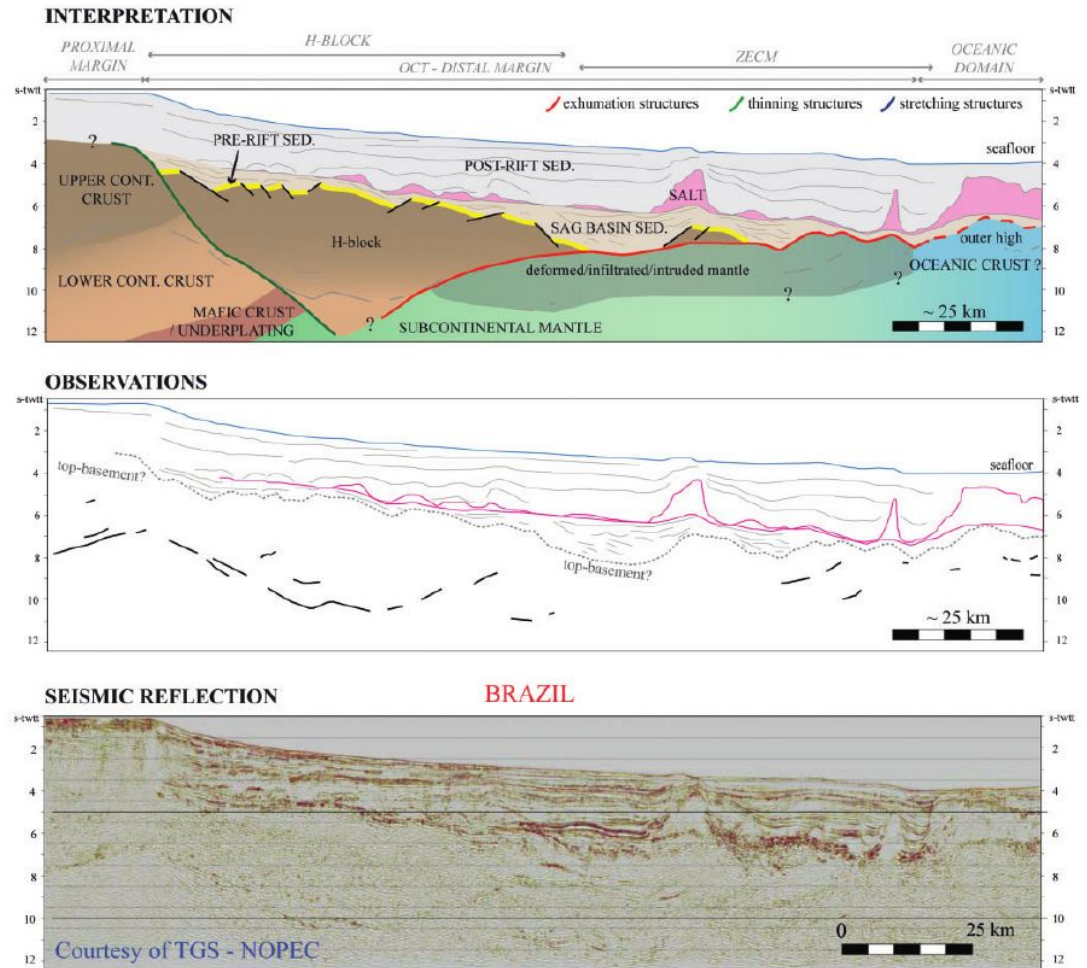


Fig. 4. The TGS line across the Campos Basin offshore Brazil. From bottom to top, a depth migrated reflection seismic line, a line drawing and a geological interpretation of one and the same line are shown.