Primary deformation phases during "magma-poor" rifting

with special focus on the tectono-thermal evolution during the necking process

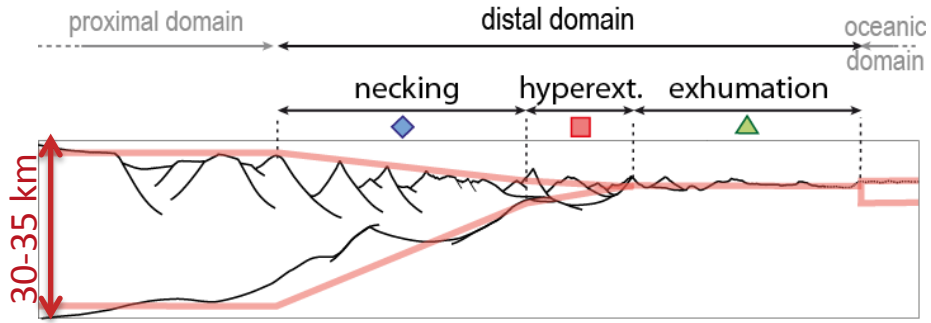
Pauline CHENIN

in collaboration with

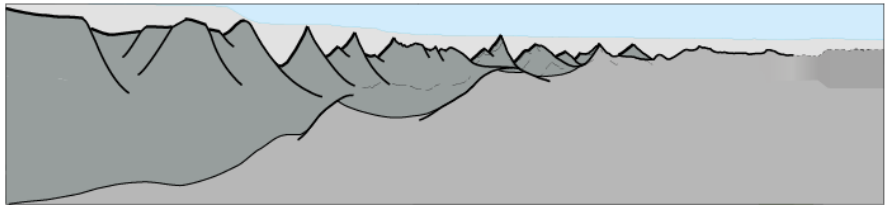
Stefan SCHMALHOLZ, Gianreto MANATSCHAL & Thibault DURETZ

The architecture of rifted margins

Architecture of the distal domain



Chenin et al. (2017)



Sutra et al. (2013)

Proximal domain: flat top basement parallel to Moho; un-thinned continental crust

Necking domain: significant crustal thinning; top basement deepening and decrease in Moho depth

Hyperextended domain: decrease in top basement and Moho dip

Exhumation domain: flat surface; top basement = Moho

Oceanic domain: flat top basement parallel to Moho; constant thickness oceanic crust

➔ **Definition of rift domains based on morphological criteria**

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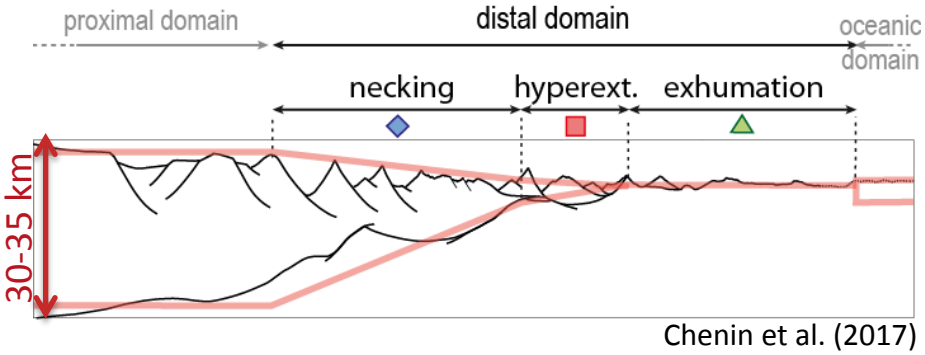
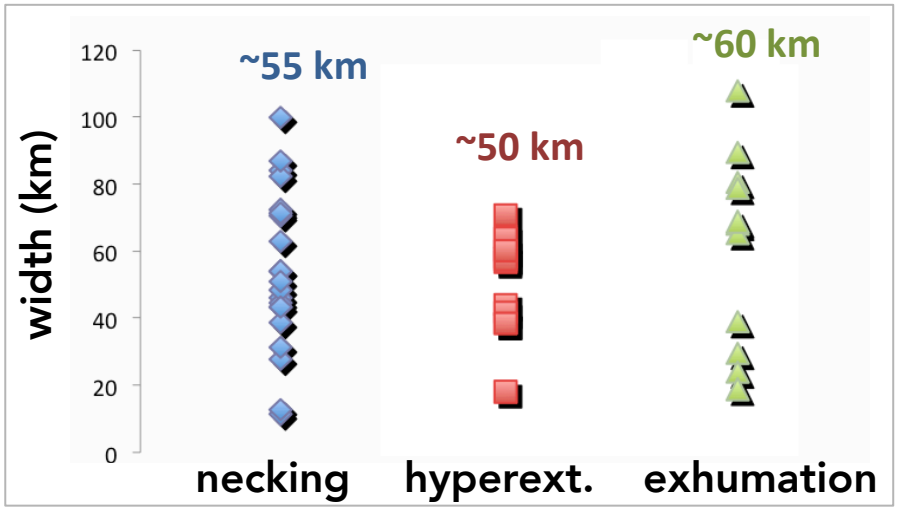


Chenin et al. (2017)



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➔ **Range and average of the distal domains width**

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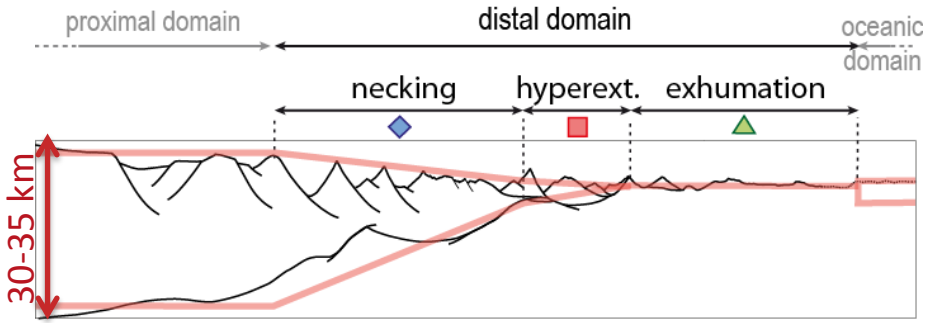

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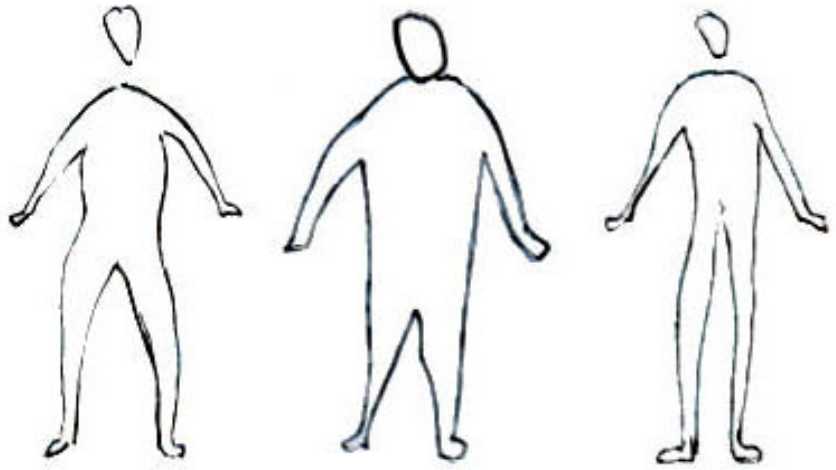
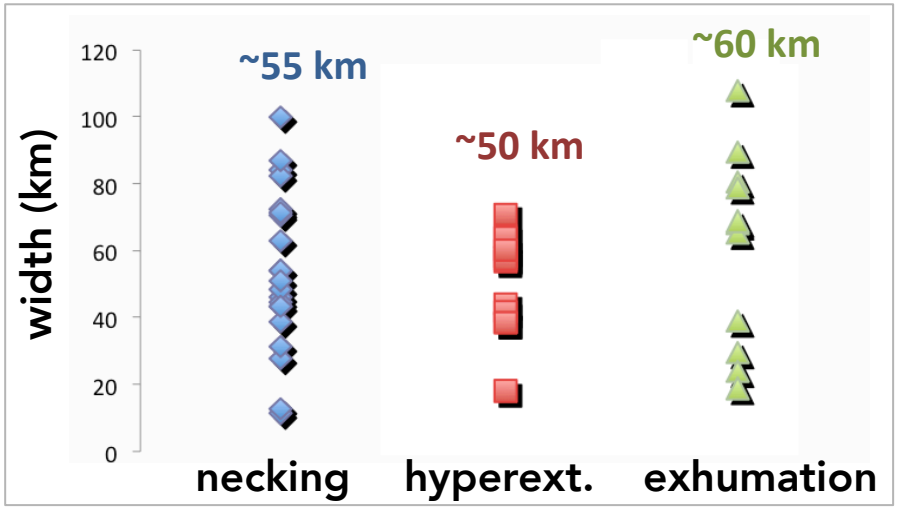
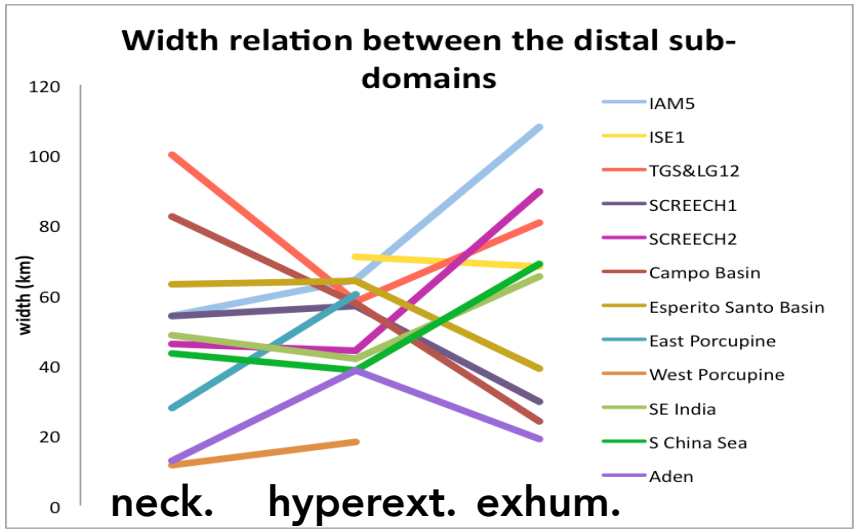
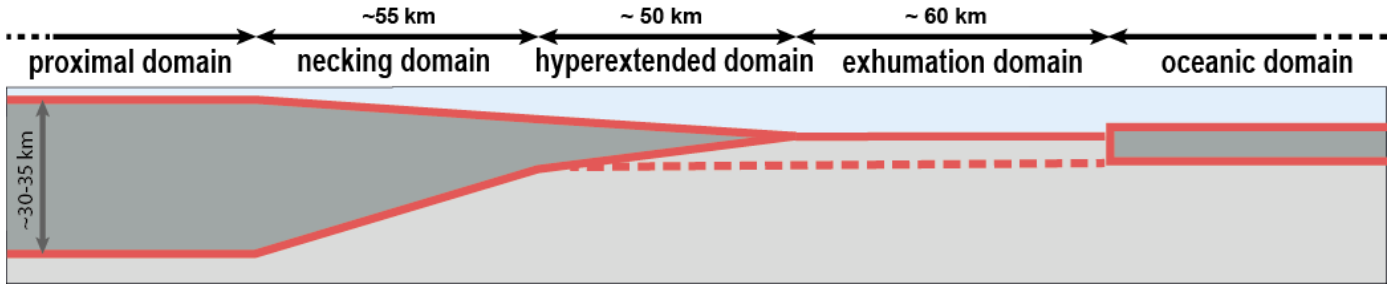






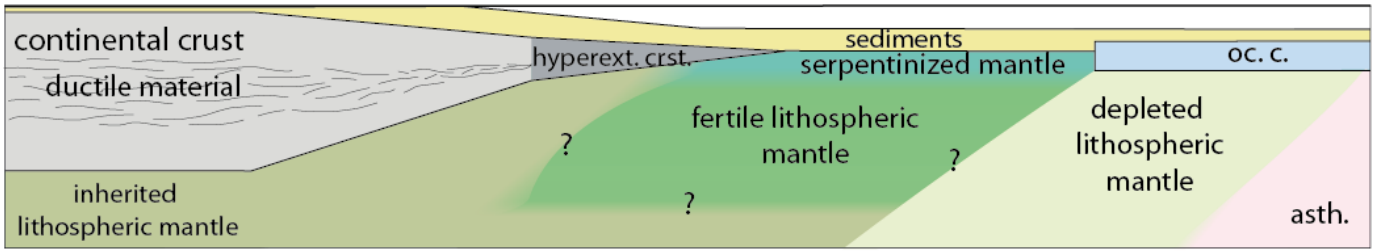
➔ No relationship among the width of the different distal domains
i.e. to one margin size can correspond different morphologies

The lithology of rifted margins



Chenin et al. (2017)

Lithological/compositional architecture



➔ **The lithology/composition of rift system rocks is increasingly modified as extension progresses, both in the crust and in the mantle**

Stretching: depth-uniform thinning; little physico-chemical modification.

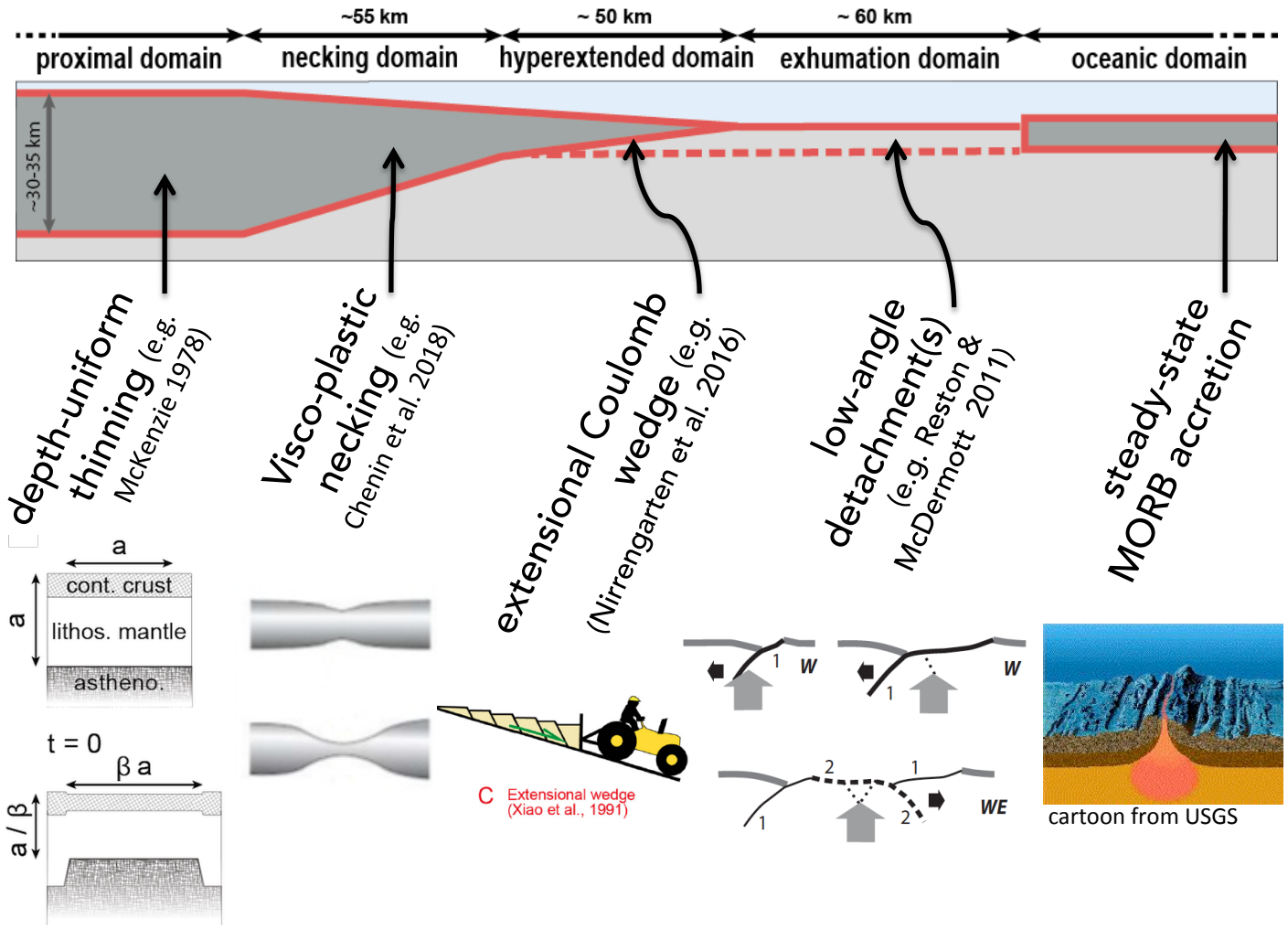
Necking: visco-plastic necking of the lithosphere.

Hyperextension: phyllosilicates formation; melt impregnation; Coulomb wedge.

Mantle exhumation: melt impregnation; serpentinization; low angle detachment(s).

Seafloor spreading: steady-state MORB formation; depleted oceanic lithosphere.

Successive deformation modes at play during rifting



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➔ **Each rifted margin domain may be primarily controlled by one dominant deformation process**