SW IBERIAN AND NW MOROCCAN ONSHORE BASINS

- *MESOZOIC EVOLUTION AND GEODYNAMIC FRAMEWORK*

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Algarve Basin, SW Portugal

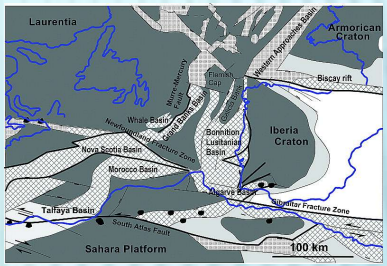
Presentation Outline

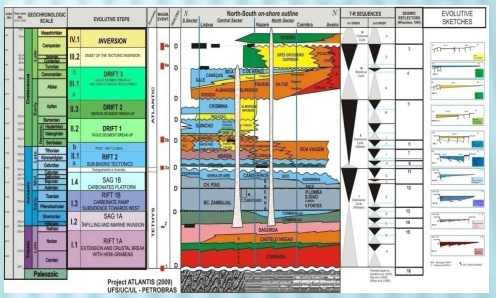
I. **GEODYNAMIC FRAMEWORK** of the Iberian-Moroccan Mesozoic Basins.

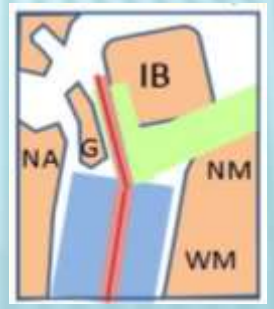
II. **BASIN'S OVERVIEW** Sedimentary infill & geodynamic steps

III. **REGIONAL TECTONO-SEDIMENTARY APPROACH**

IV. **CONCLUSIONS**





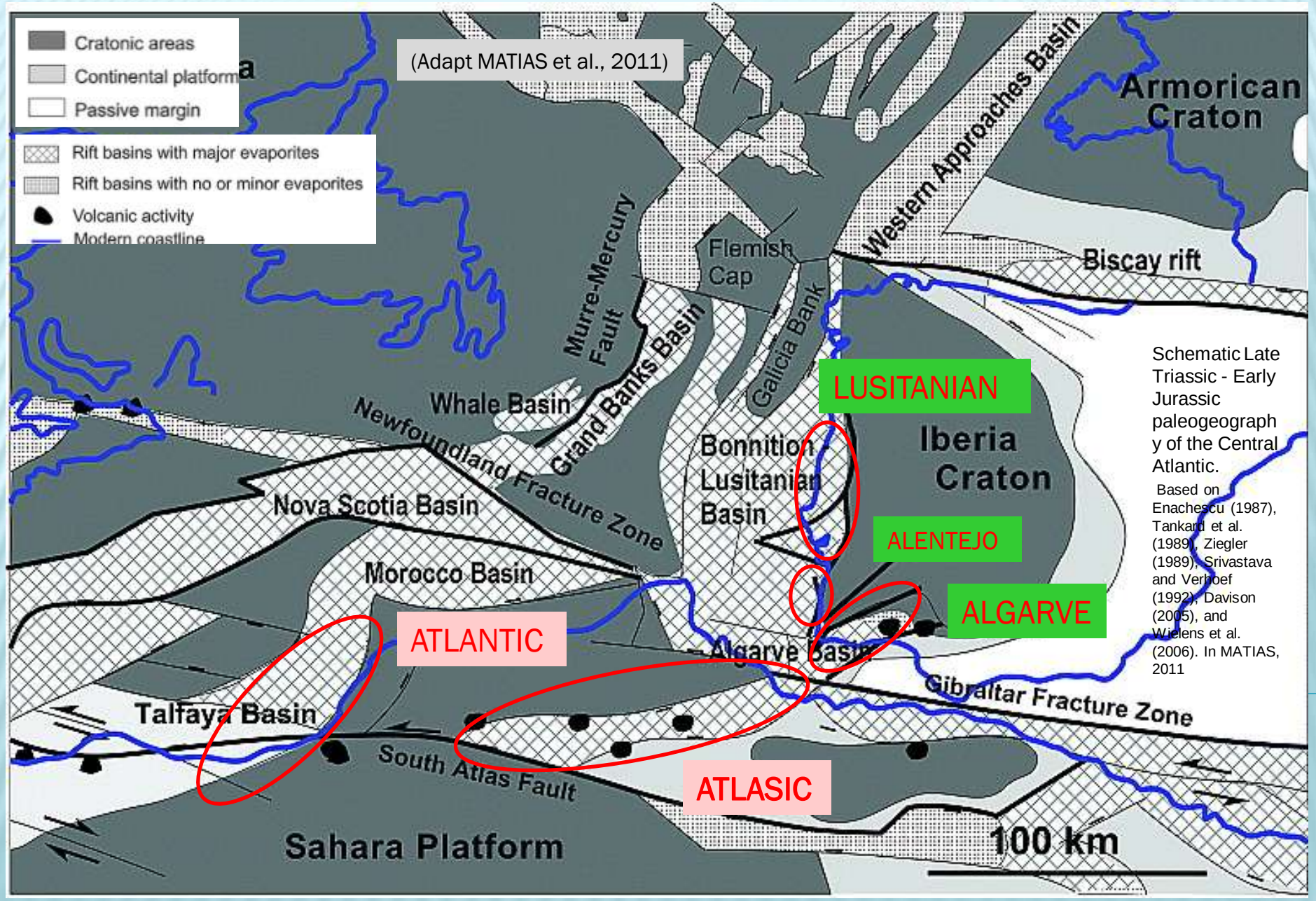


SW IBERIAN and
NW MOROCCAN BASINS
ARE NEARBY MESOZOIC
BASINS RELATED WITH

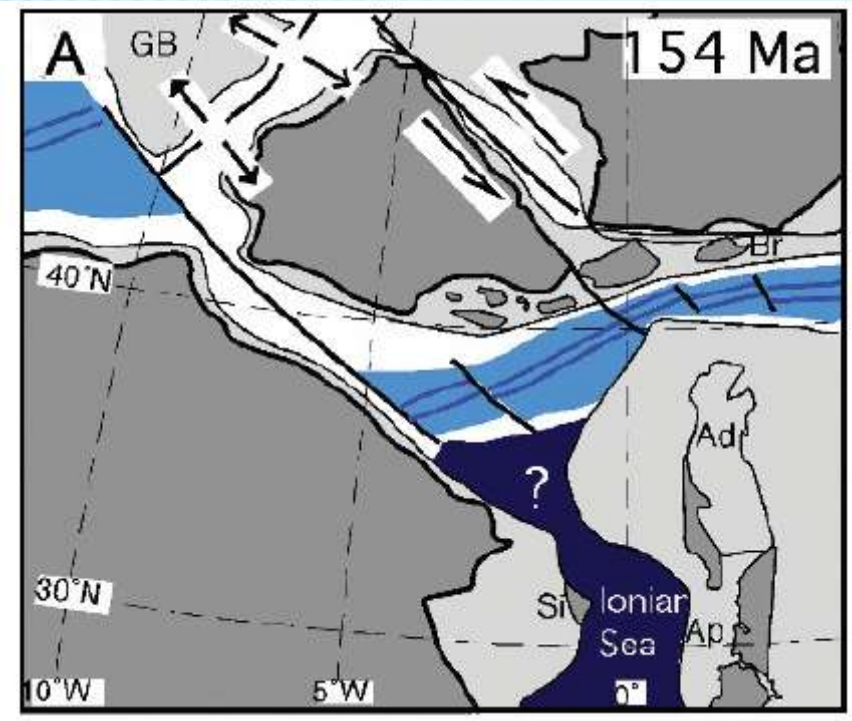
- TETHYS CLOSURE
- Central & North
  ATLANTIC OPENING
- ALPINE COLLISION

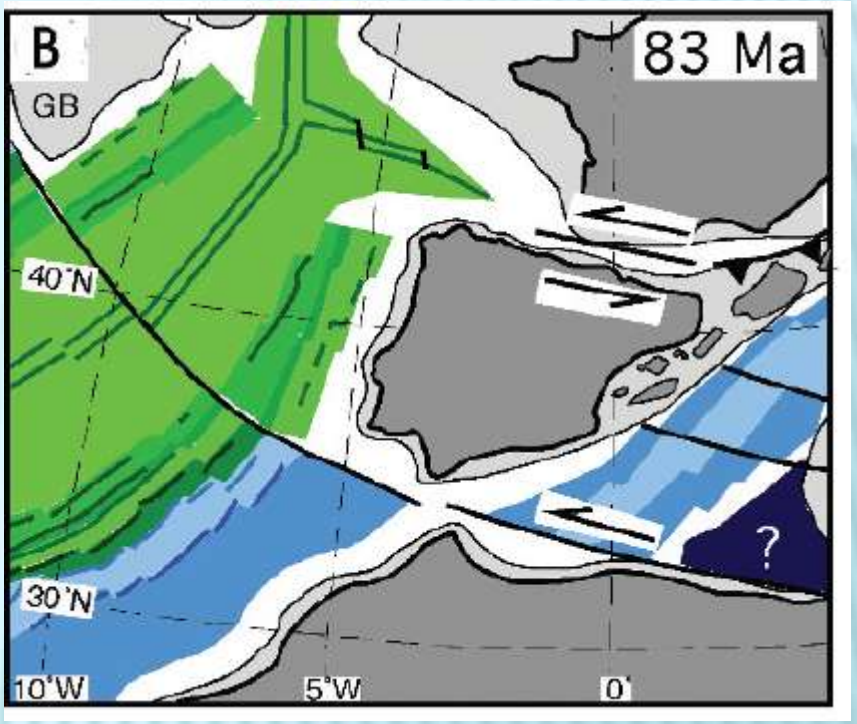
GEODYNAMIC FRAMEWORK

THE BASIN'S INITIAL CONFIGURATION
- INDEPENDENT ARMS OF A BREAKING PANGEA



Rosenbaum et al., 2002

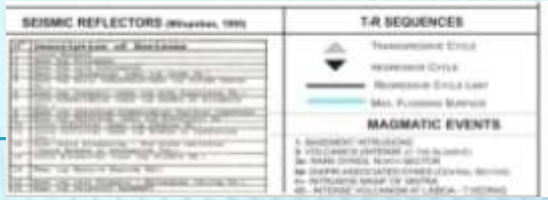


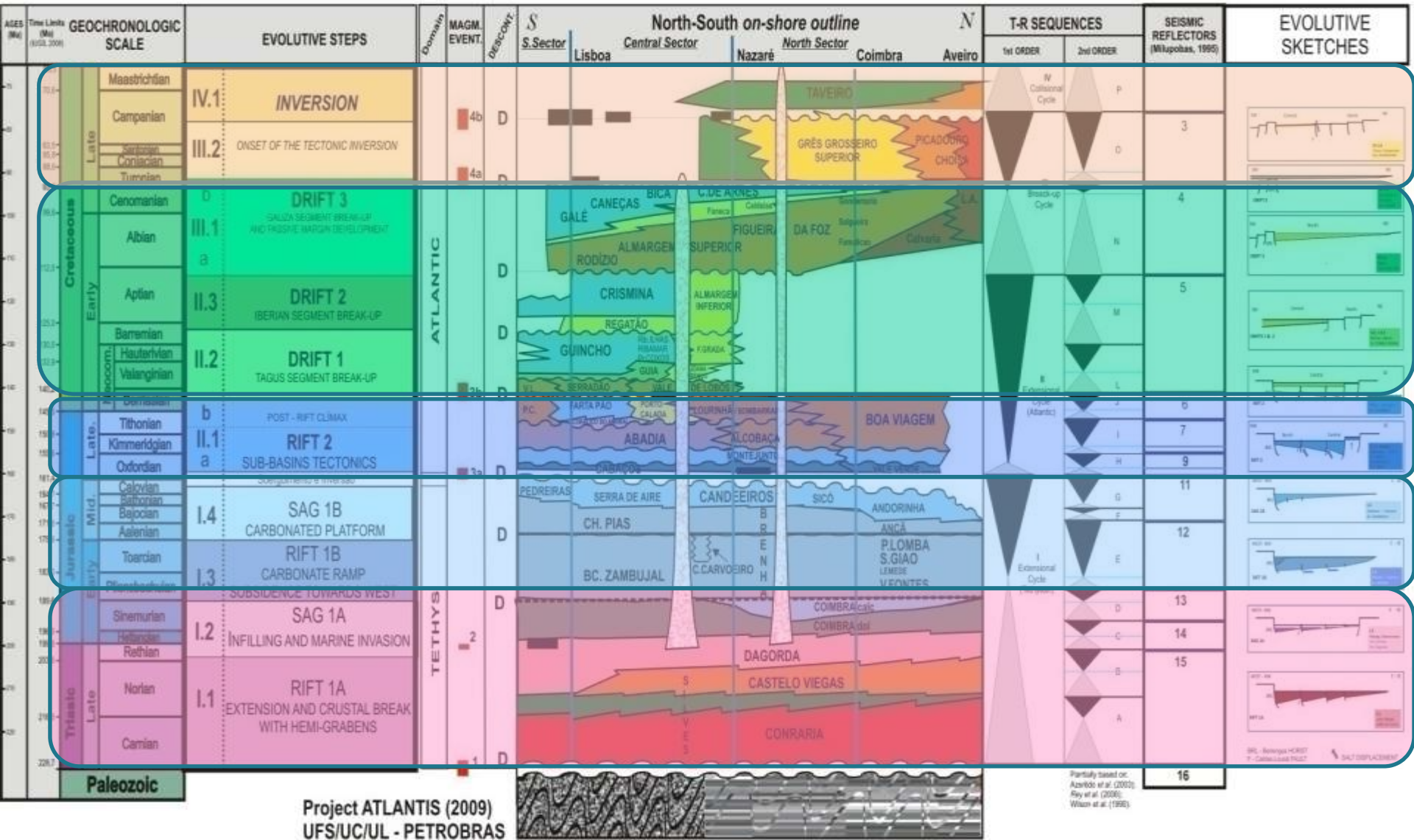


LATE JURASSIC –
TOWARDS AXIAL ATLANTIC BASINS
vs. ABANDONED TETHYAN BASINS

CRETACEOUS –
TOWARDS ATLANTIC PASSIVE MARGINS

LUSITANIAN BASIN
Western Iberia, On-shore





Cenozoic inversion (Betic)

Beggining of Inversion (Pyrenean)

Post-Rift thermal subsidence

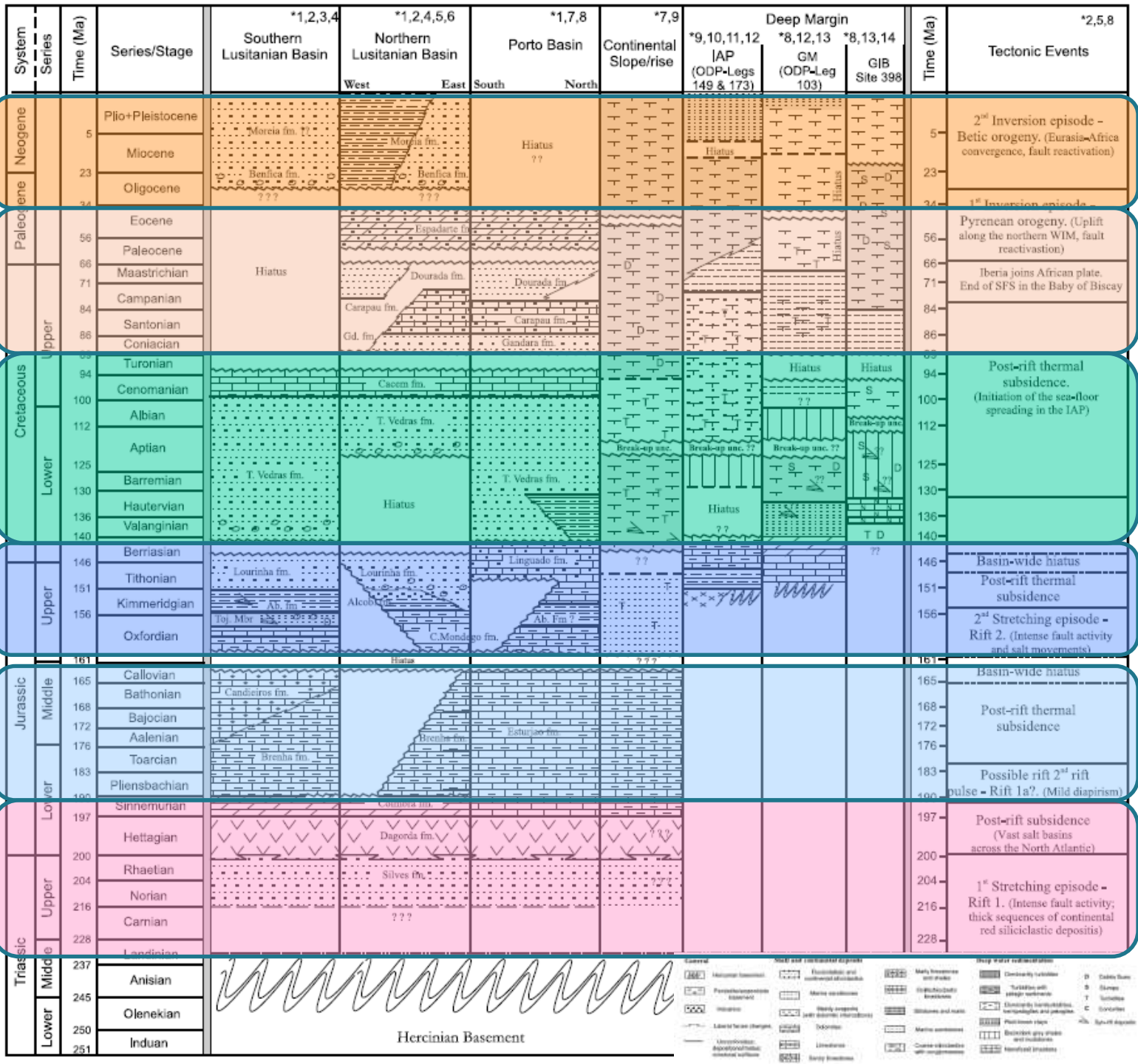
Basin-wide hiatus

Atlantic Rifting and Post-rift subsidence

Post-rift subsidence

Intra- continental Rifting

In T.Cunha, 2009



ALGARVE BASIN
Southern Iberia

Westwards thrusting of allochtonous units (Betic-Rif)

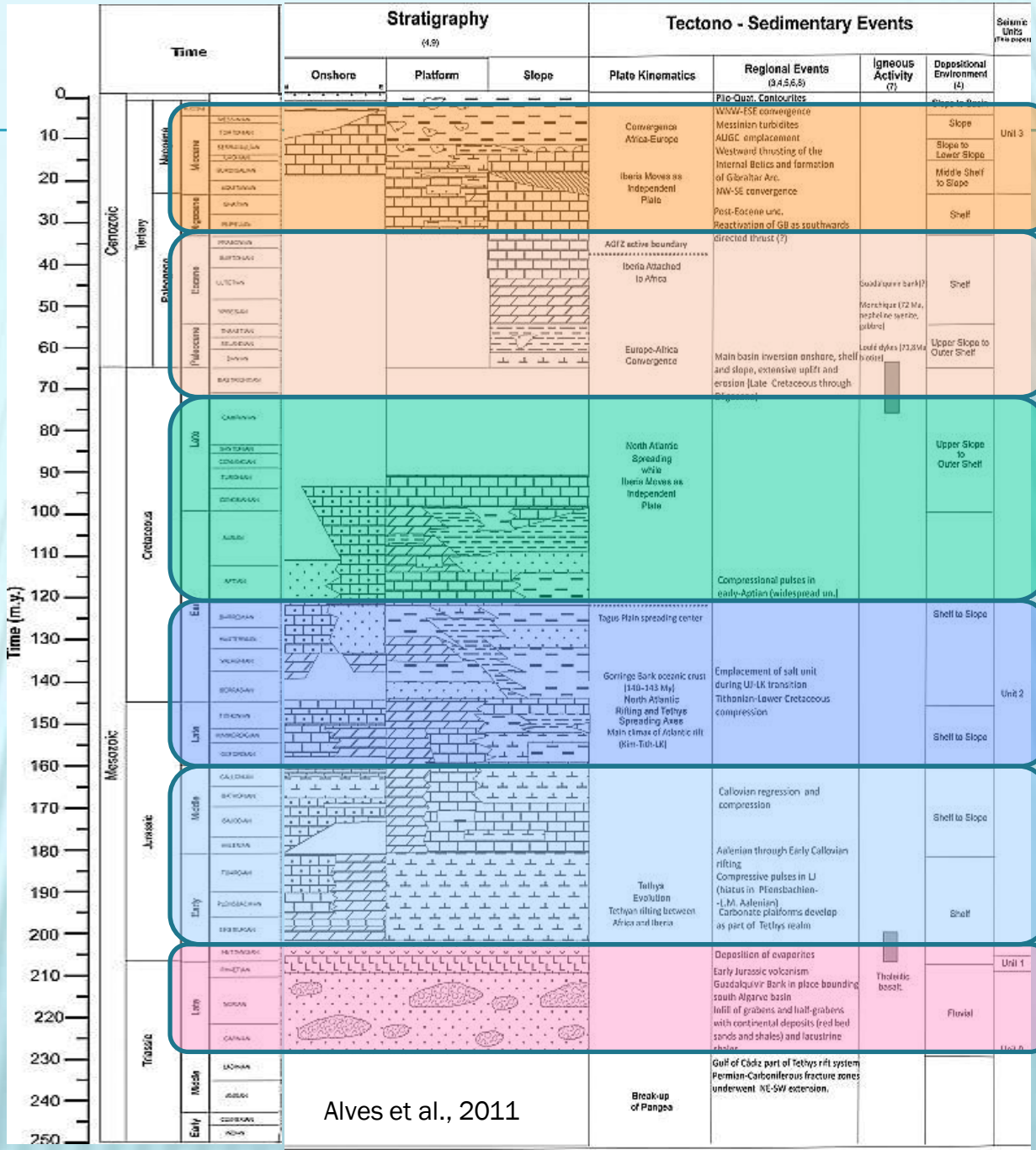
Eur-Afr convergence, bains's inversion & up-lift

North-Atlantic Drift & independent Iberia plate

North-Atlantic Rifting and W Tethys spreading

Tethyan marine filling betwwen Iberia and Africa

Intra-continental grabens infill



Alves et al., 2011

ALENTEJO BASIN
Southwestern Iberia

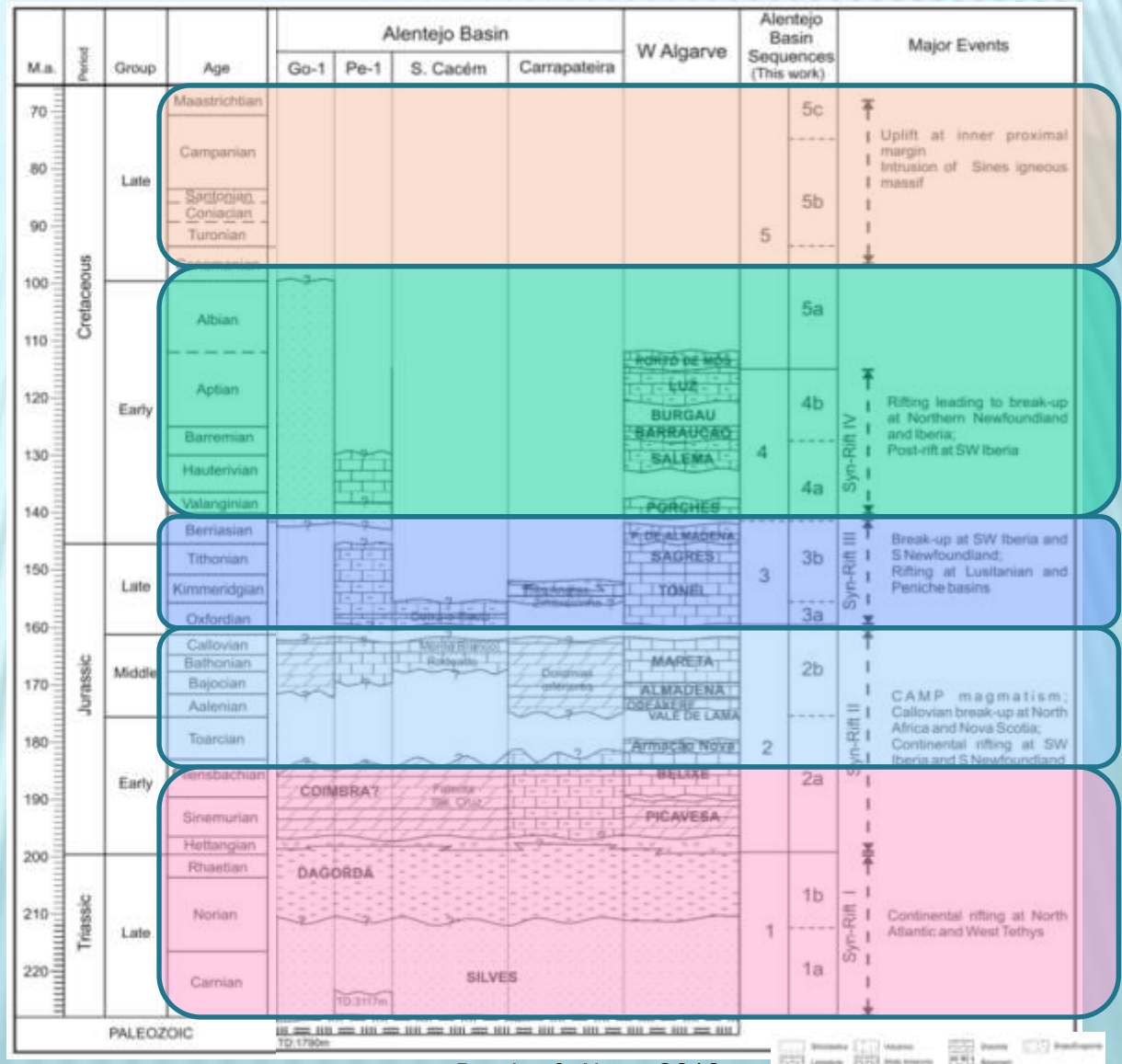
Inversion and
Up-lift

Post-Rift in
SW Iberia

Break-up at SW
Iberia and S NFL
Callovian Break-up in Morocco and N.Scotia

Continental Rifting at
SW Iberia and S NFL
CAMP related Magmatism

Continental Rifting at N
Atlantic and W tethys



Pereira & Alves, 2010

ATLASIC BASINS
Northern Morocco

Africa – Europe collisiona and compression

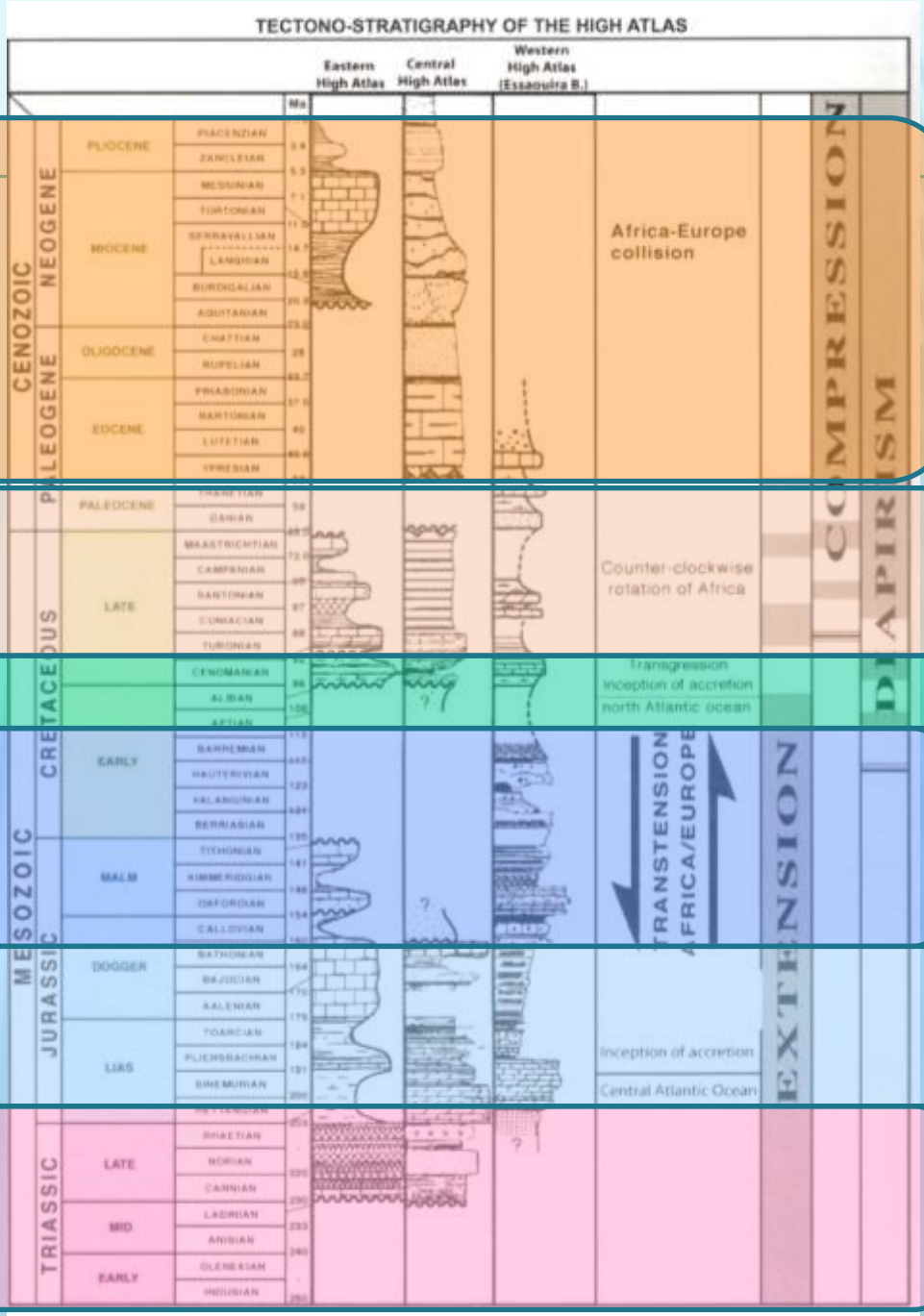
Rotation of Africa and beggining of compression

Tethyan and Atlantic marine transgression

Basin senility - compression, up-lift and terrigenous infills

Tethyan Carbonate Platform and hemipelagic basin

Intra-continental rifting with evaporites



ATLANTIC BASINS
NW Morocco

Tertiary infill and intense compressional folding

Eur-Africa collision and basin's mild inversion

Transgression; Marine platform development; Berriasian-Barremian regression.

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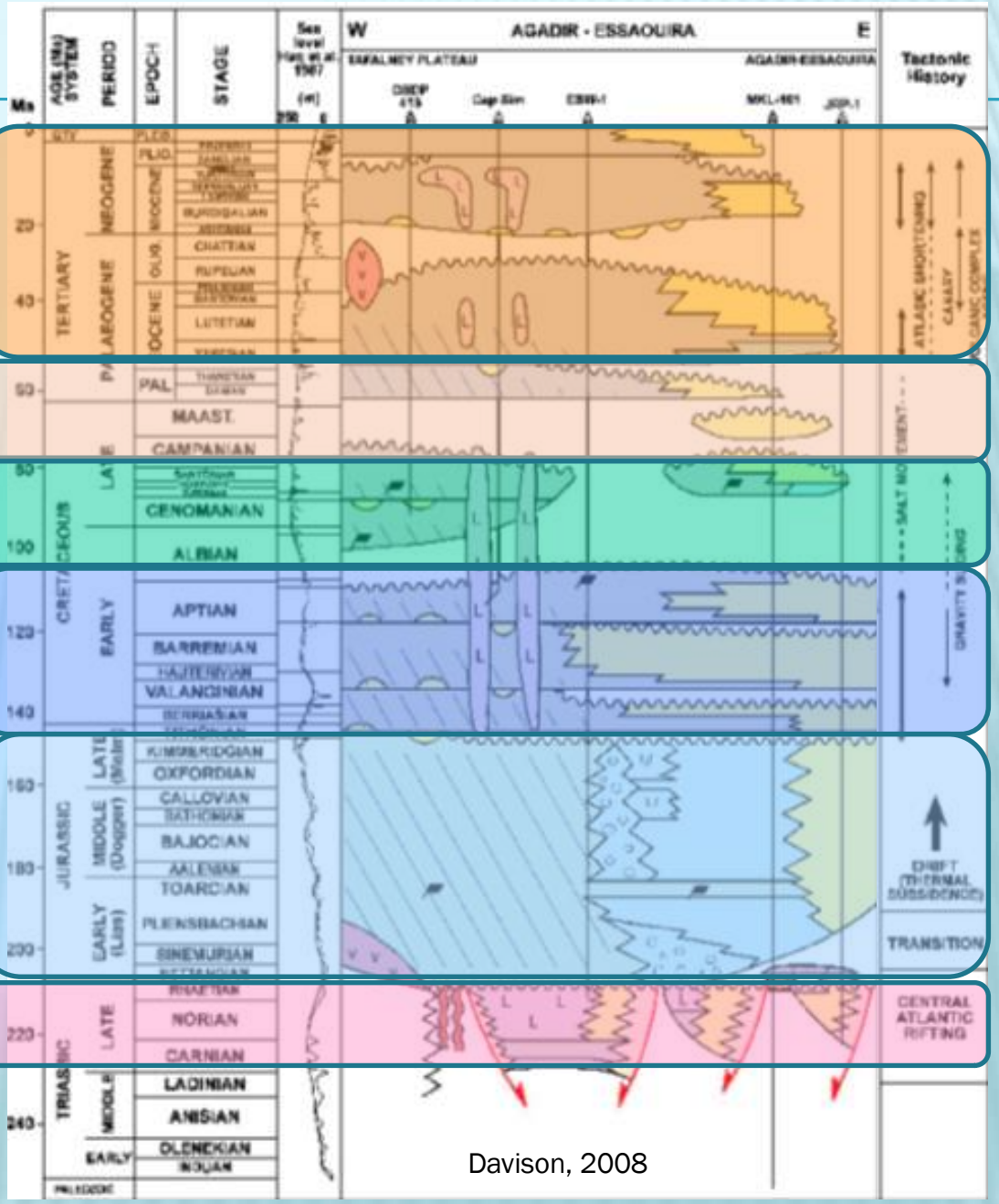
Central Atlantic spreading, and thermal subsidence

Central Atlantic Rifting

(Hafid et al., 2010)



Davison, 2008

REGIONAL TECTONO-SEDIMENTARY APPROACH

	LUSITANIAN	ALENTEJO	ATLANTIC	ALGARVE	ATLASIC
TERTIARY Late CRETACEOUS	Up-lift and Inversion	Up-lift and Inversion	Up-lift and Inversion	Up-lift and Inversion	Up-lift and Inversion
Late CRET. Early CRET.	Atlantic DRIFT	Atlantic DRIFT	Atlantic DRIFT	Transtension; Atlantic shall. Platform	Transtension; Tethyan shall. Platform
Early CRETAC. Late JURASSIC	North Atlantic RIFT Deep Marine	North Atlantic RIFT Deep Marine	Atlantic DRIFT	Transtension; Atlantic shall. Platform	Transtension; up-lift and terrig.prograd.
Mid. JURASSIC Early JUR.ASSIC	SAG – Deep Marine Boreal Tethys Transgr.	SAG – Shallow Marine Atlantic Transgression	SAG: Shallow Marine Atlantic Transgression	SAG – Shallow Marine Tethys Transgression	SAG: Shallow to deep Marine Tethys Transgr.
Early JURASSIC Late TRIASIC	Intra-continental Rifting	Intra-continental Rifting	Central Atlantic RIFT	Intra-continental Rifting	Intra-continental Rifting

CONCLUSIONS

All the basins share an Upper Triasic initial configuration, related to the Pangea break-up and intra-continental rifting,
followed by an Early Jurassic Sag phase with marine invasion, either from the SW (W Morocco & Alentejo), from the East (Atlas & Algarve) or from the NW (Lusitanian).

Around the Middle to Late Jurassic limit, Western Morocco continues as a passive margin, whereas the Alentejo and Lusitanian basins experience intense Atlantic rifting;
towards East, the Tethyan Algarve and Atlas basins decrease their subsidence and infill.

In the Early Cretaceous, Atlantic Break-up and Drift extend northwards, to Western Portugal and the global effects of Cenomanian transgression are felt regionally,
followed by Late Cretaceous increased inversion in all the basins and collisional up-lift throughout the Tertiary.

THIS REGIONAL GEODYNAMIC CORRELATION FRAMEWORK IS EXPECTED TO IMPROVE THE PREDICITIVE PERSPECTIVES ON THE PETROLEUM SYSTEM ELEMENTS AND REGIONAL EXPLORATION EFFORTS IN THIS AREA.