

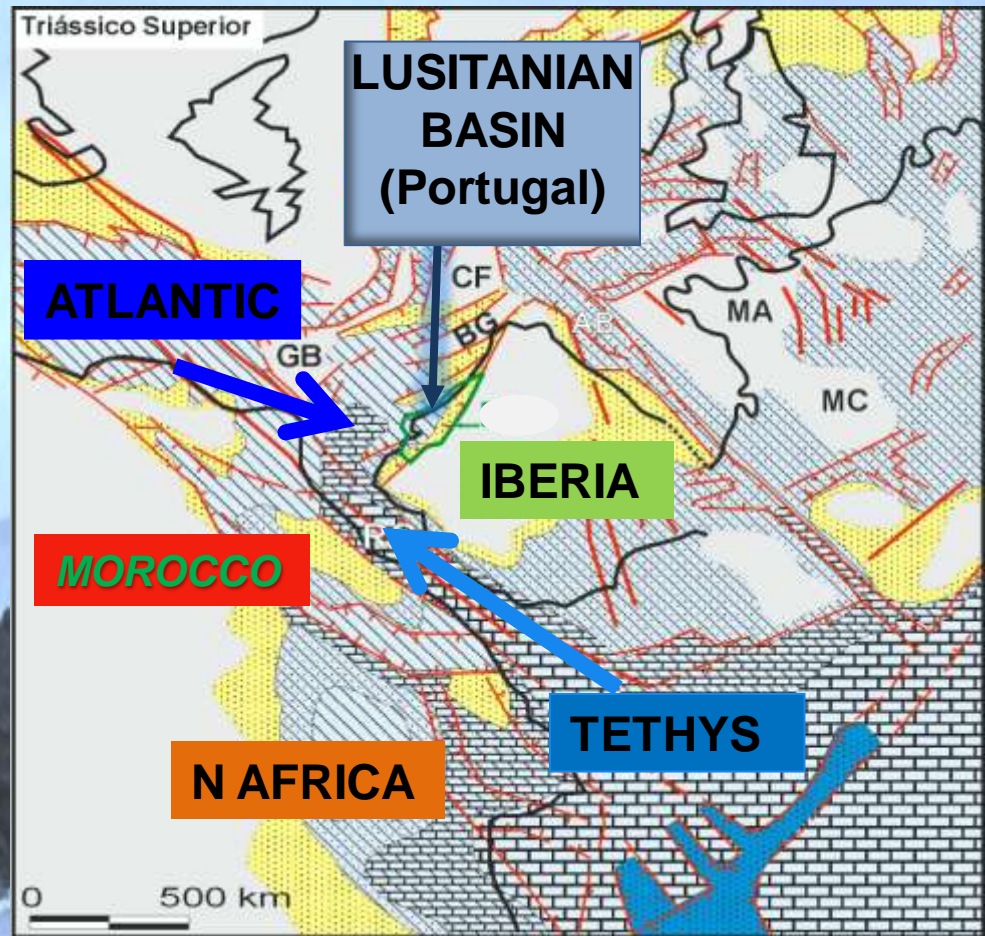
# **The evolution of the Atlantic Margin of Iberia, as recorded in the Lusitanian Basin (Portugal)**

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de coimbra



The Lusitanian Basin (LB) is located at the western façade of Europe, facing the Atlantic Ocean and North America, but close to Morrocco and the Mediterranean Sea (the former Tethys).



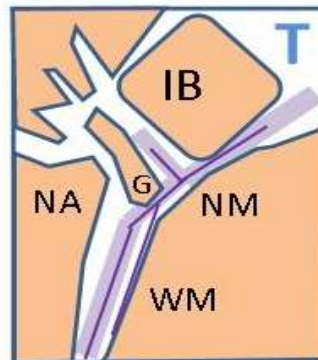
GEODYNAMIC FRAMEWORK  
OF IBERIA IN UPPER TRIASIC

Modif. Ziegler, 1988

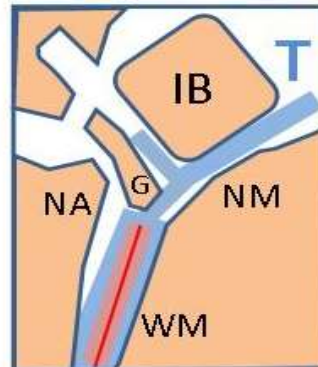


The geodynamic evolution of the Lusitanian Basin received from the Tethys and the Atlantic its controls and tecto-sedimentary influences.

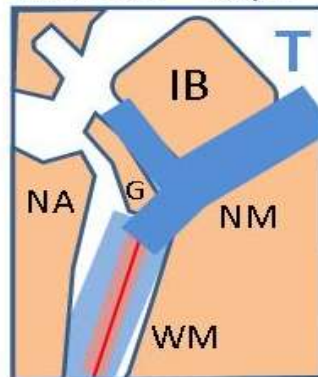
Late Triassic – Step 1



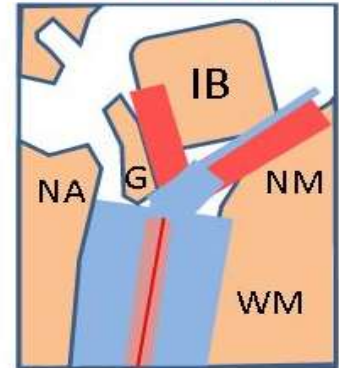
Early Liasic – Step 2



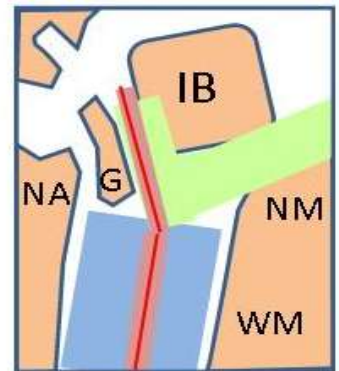
Late Liasic – Step 3



Lt. Jurassic – Step 5



Erl.Cretaceous– Step 6



IB - Iberia  
G - Grand Banks  
NA - North America  
NM - North Morocco (Atlas)  
WM - West Morocco

T  
1  
2  
3  
4  
5  
6

T – Tethys marine realm  
1 – Salt Basins and volcanics  
2 – Ocean spreading  
3 – Shallow marine carbonates  
4 – Deep marine carbonates  
5 – Alluvial to marine siliciclastics  
6 – Transitional siliciclastics and carbonates

# LUSITANIAN BASIN

- ❑ Western Iberia
- ❑ Conjugated Margin of Nova Scotia & Newfoundland
- ❑ On-shore & Offshore
- ❑ Up to 5 km thick (L.Triassic-L.Cretaceous)

## PORTUGAL

### BACIAS SEDIMENTARES MESO-CENOZÓICAS

- Quaternário
- Terciário
- Cretácico
- Jurássico
- Triássico
- Rochas magmáticas ácidas pós-hercínicas
- Rochas magmáticas básicas pós-hercínicas

### SOCO HERCÍNICO E PROTEROZÓICO

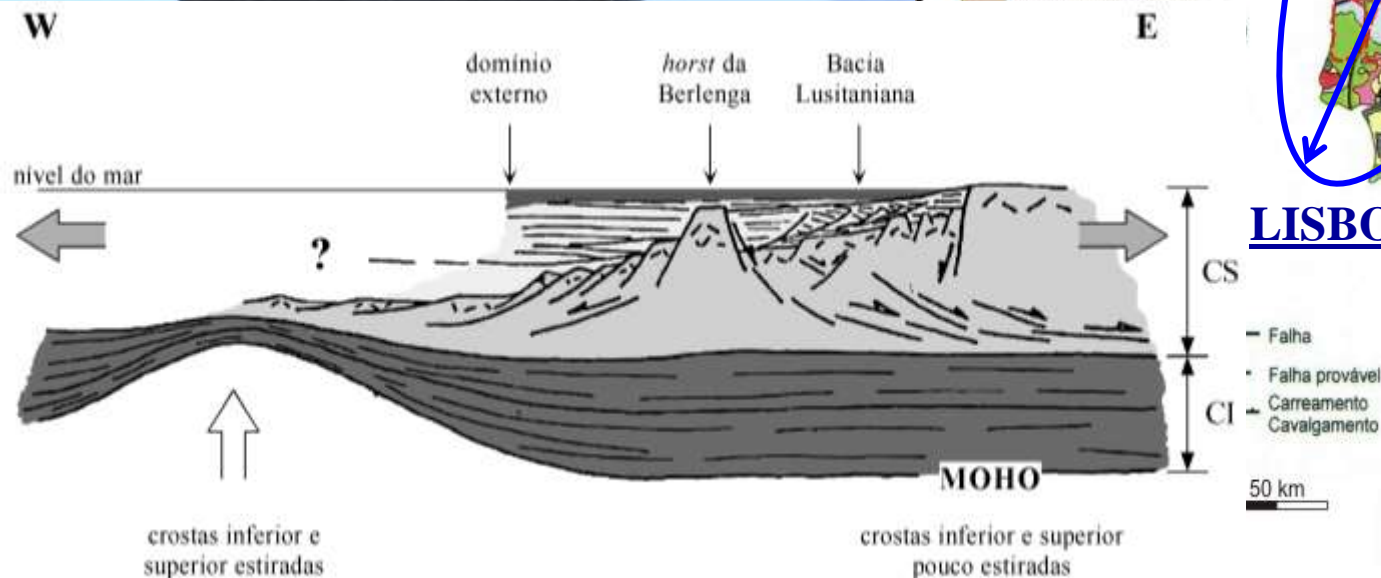
- Carbónico superior
- Devónico sup. - Carbónico inf.
- Devónico inf.
- Silúrico
- Ordovícico-Silúrico
- Ordovícico
- Câmbrio inferior e médio
- Proterozóico sup. - Câmbrio
- Proterozóico superior

250 km

80 km

COIMBRA

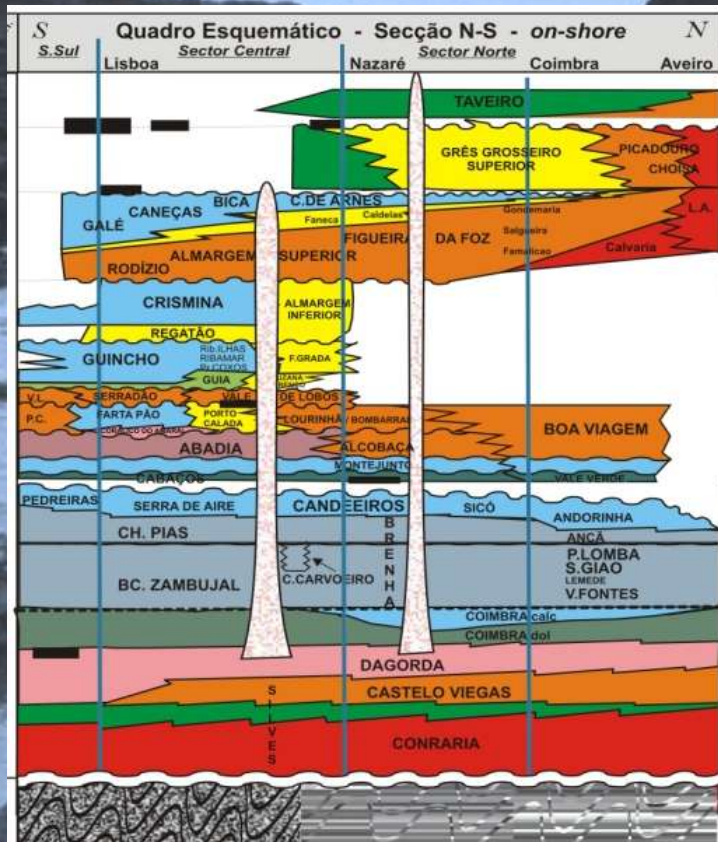
LISBOA





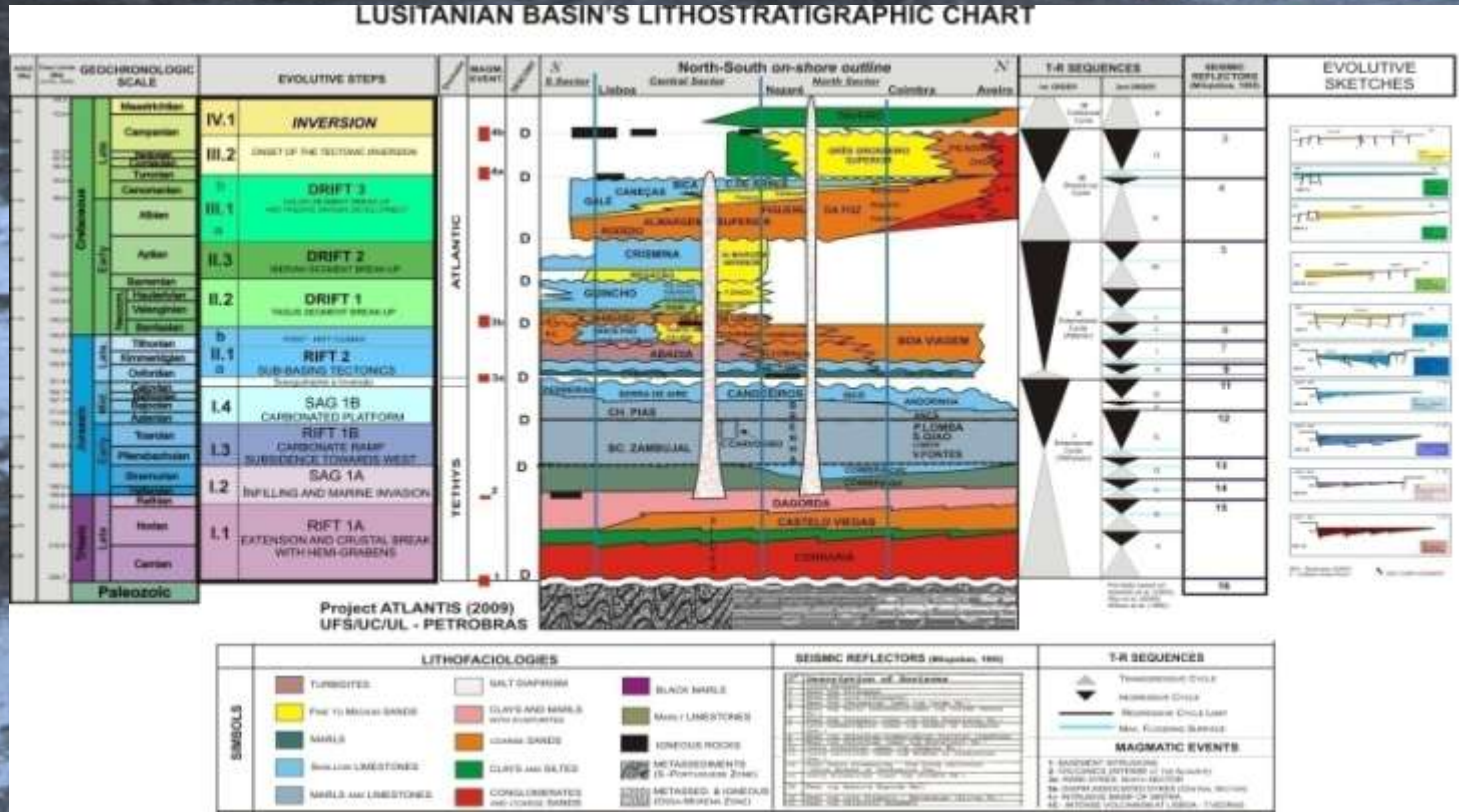
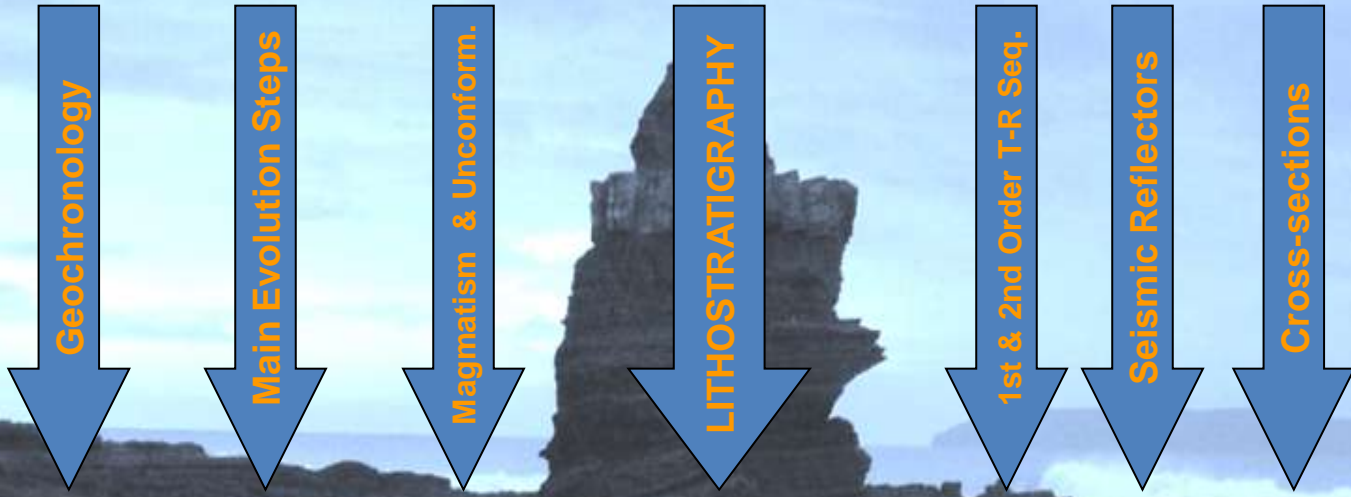
This work presents a new stratigraphic chart of the LB, focusing on the main steps and events of its evolution, since the Late Triassic crustal stretching until the Late Cretaceous inversion.

Published data have been integrated with recent studies developed within the scope of Project Atlantis (PETROBRAS - UFS/UC/UL).
























# NEW LITHOSTRATIGRAPHIC AND EVENT CHART

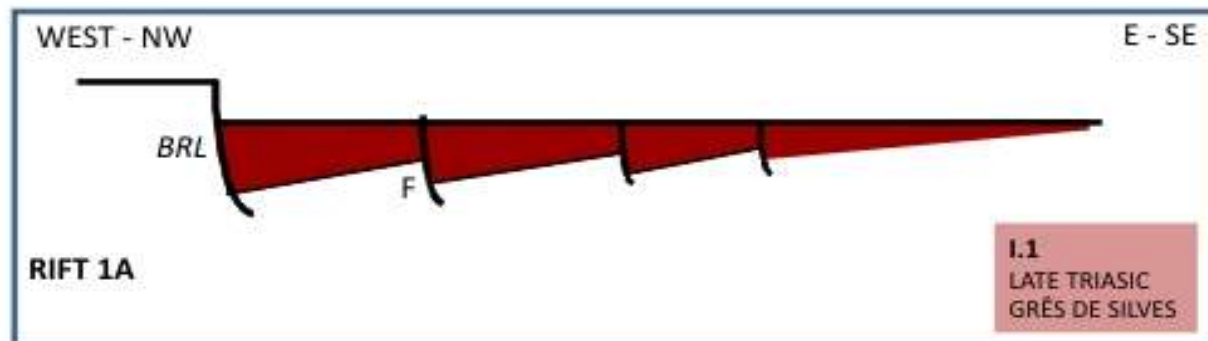


A schematic diagram of a brain region. It shows a central area labeled 'G' (GABAergic interneuron) surrounded by other structures: 'IB' (internal capsule) at the top, 'NA' (nucleus accumbens) on the left, 'NM' (nucleus medialis) on the right, and 'WM' (white matter) at the bottom. A blue 'T' is located at the top right corner of the diagram.

AGE (Ma)	GEOCHRONOLOGIC SCALE		EVOLUTIVE STEPS		MAGM. EVENT	Tectonic	North-South on-shore outline						T-R SEQUENCES		SEISMIC REFLECTORS (90degrees, 1995)	EVOLUTIVE SKETCHES
	Period	Epoch	Stage	Step			S. Sector	Liaboa	Central Sector	Nazare	North Sector	Coimbra	Aveiro	N. ORDER		
100.0	Cretaceous	Late	Maastrichtian	IV.1	D	ATLANTIC			3							
95.0			Campanian	III.2							ORSET OF THE TECTONIC INVERSION					
90.0			Santonian	b							DRIFT 3	4a	D	4		
85.0			Turonian													
80.0			Cenomanian													
75.0		Early	Albian	III.1	a	D	5									
70.0			Aptian	II.3	DRIFT 2											
65.0			Berriamian	II.2	DRIFT 1				3b	D	6					
60.0			Hauterivian													
55.0			Valanginian													
50.0	Late	Santonian	b	D	7											
45.0		Tithonian	II.1				RIFT 2									
40.0		Kimmeridgian	a				SUB-BASINS TECTONICS	3a	D	8						
35.0		Oxfordian														
30.0		Kimberley														
25.0	Mid	Barremian	1.4	D	9											
20.0		Aptian	SAG 1B													
15.0		Albian	RIFT 1B				10	D	11							
10.0		Turonian	CARBONATED PLATFORM													
5.0		Phanerozoic	1.3								CARBONATE RAMP					
0.0	Early	Phanerozoic	1.2	D	12											
5.0		Phanerozoic	SAG 1A													
0.0		Phanerozoic	1.1				INFILLING AND MARINE INVASION	13								
5.0		Phanerozoic	1.2													
0.0		Phanerozoic	1.1													
0.0	Late	Phanerozoic	1.1	D	14											
5.0		Phanerozoic	1.2													
0.0		Phanerozoic	1.1				EXTENSION AND CRUSTAL BREAK WITH HEMI-GRABENS	15								
5.0		Phanerozoic	1.2													
0.0		Phanerozoic	1.1													
0.0	Paleozoic	Phanerozoic	1.1	D	16											
5.0		Phanerozoic	1.2													
0.0		Phanerozoic	1.1													
5.0		Phanerozoic	1.2													
0.0		Phanerozoic	1.1													

SYMBOLS	LITHOFACIOLOGIES			SEISMIC REFLECTORS (Müggebae, 1995)	T-R SEQUENCES	
	 TURBIDITES  FINE TO MEDIUM SANDS  MARLS  SHALLOW LimestONES  MARLS AND LimestONES	 SALT DIAPHRISM  CLAYS AND MARLS with CARBONATES  COARSE SANDS  CLAYS AND SILTS  CONGLOMERATES and COARSE SANDS	 BLACK MARLS  MAFIC LimestONES  IGNEOUS ROCKS  METASEDIMENTS (S-Pontalimaea Zone)  METASSED. & IGNEOUS (JOSH-MENARA Zone)		 TRANSGRESSIVE CYCLE  REGRESSIVE CYCLE  REGRESSIVE CYCLE LAST  MAX. FLOODING SURFACE	<b>MAGMATIC EVENTS</b> 1. BASEMENT ERYTHRINUS 2. VOLCANISM INTENSE (at the Aloubaie) 3. RARE DYKES, North SECTOR 4. DIAPYR AGGREGATION DYKES (Central Sector) 5. INTENSIVE MAFIC OF SATYRA 6. INTENSIVE VOLCANISM AT LORONA - THERIAKOS





**LATE TRIASIC to  
EARLY JURASSIC**

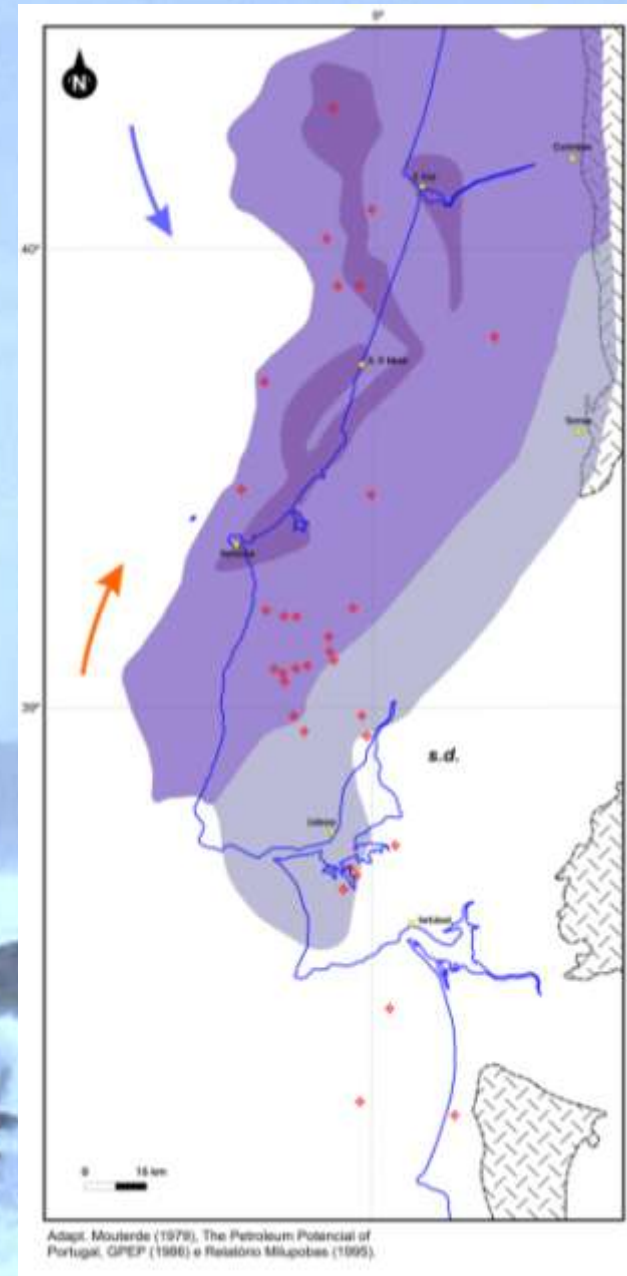
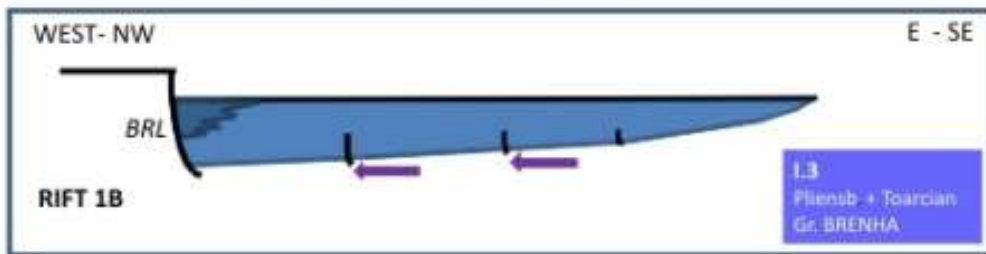
**TETHYAN FIRST  
RIFT AND SAG**





ESCALA GEOCRONOLÓGICA		INTERVALOS EVOLUTIVOS		Quadro Esquemático - Secção N-S - on-shore					SEQUÊNCIAS T-R		REFLECTORES SÍSMICOS (Miguelias, 1993)				
Idade (Ma)	Idade Lit. (Ma)	Idade Lit. (Ma)	Idade Lit. (Ma)	Evento Magn.	Evento Clim.	S. S. Sul	Lisboa	Sector Central	Nazareth	Sector Norte	Coimbra	Aveiro	YORKM	ZORKM	
20.0	20.0	20.0	20.0												
15.0	15.0	15.0	15.0												
10.0	10.0	10.0	10.0												
5.0	5.0	5.0	5.0												
0.0	0.0	0.0	0.0												
20.0	20.0	20.0	20.0												
15.0	15.0	15.0	15.0												
10.0	10.0	10.0	10.0												
5.0	5.0	5.0	5.0												
0.0	0.0	0.0	0.0												
20.0	20.0	20.0	20.0												
15.0	15.0	15.0	15.0												
10.0	10.0	10.0	10.0												
5.0	5.0	5.0	5.0												
0.0	0.0	0.0	0.0												
20.0	20.0	20.0	20.0												
15.0	15.0	15.0	15.0												
10.0	10.0	10.0	10.0												
5.0	5.0	5.0	5.0												
0.0	0.0	0.0	0.0												
20.0	20.0	20.0	20.0												
15.0	15.0	15.0	15.0												
10.0	10.0	10.0	10.0												
5.0	5.0	5.0	5.0												
0.0	0.0	0.0	0.0												
20.0	20.0	20.0	20.0												
15.0	15.0	15.0	15.0												
10.0	10.0	10.0	10.0												
5.0	5.0	5.0	5.0												
0.0	0.0	0.0	0.0												
20.0	20.0	20.0	20.0												
15.0	15.0	15.0	15.0												
10.0	10.0	10.0	10.0												
5.0	5.0	5.0	5.0												
0.0	0.0	0.0	0.0												
20.0	20.0	20.0	20.0												
15.0	15.0	15.0													

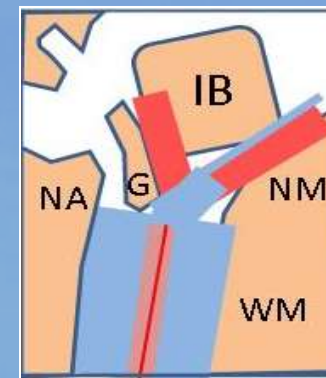
# EARLY AND MIDDLE JURASSIC TETHYAN 2nd RIFT AND SAG



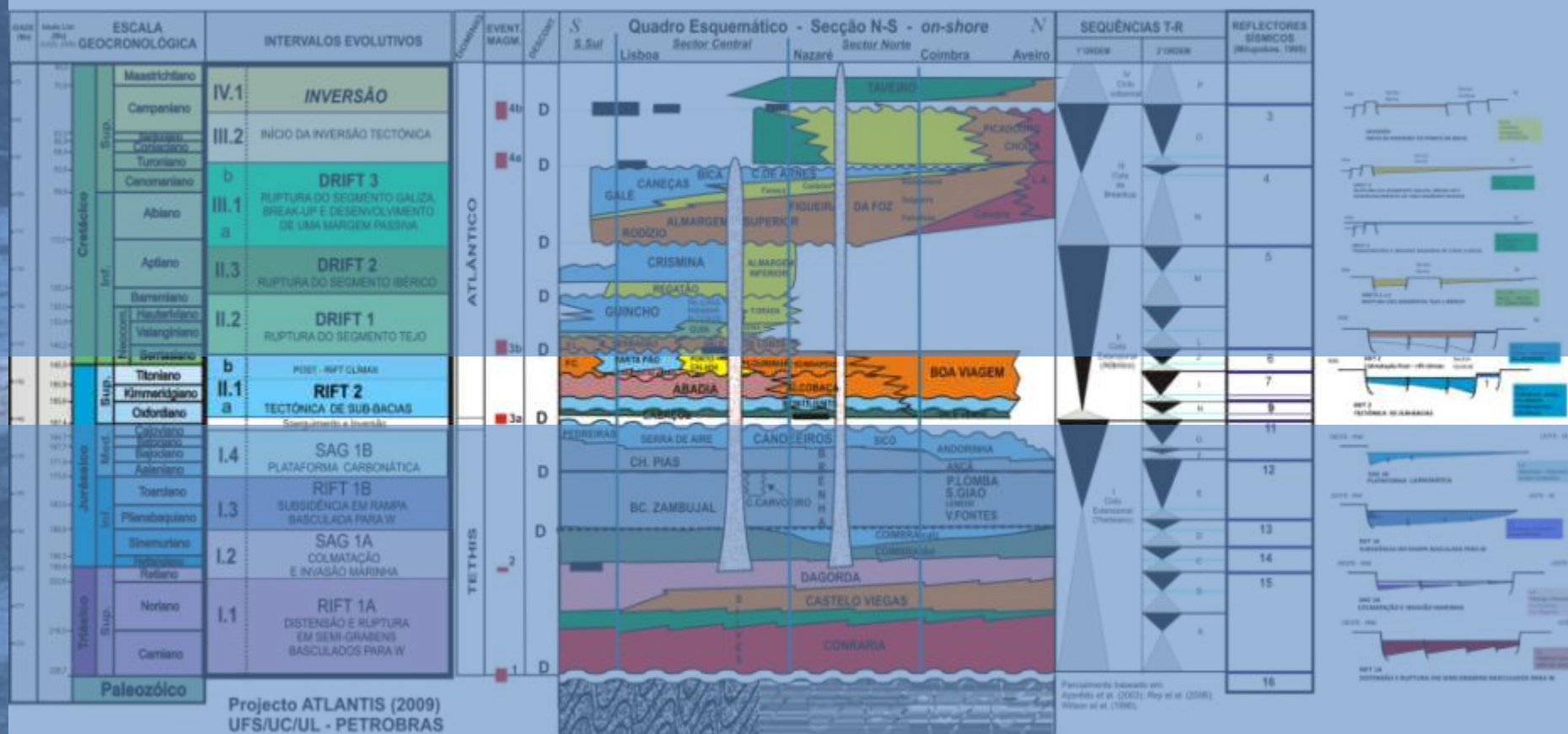


# UPPER JURASSIC

## ATLANTIC 1st RIFTING



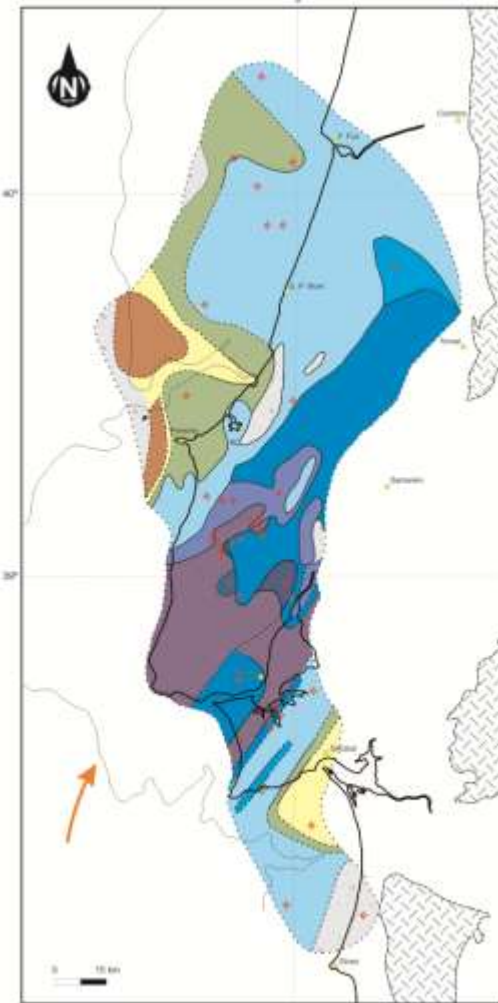
### QUADRO LITOSTRATIGRÁFICO DA BACIA LUSITÂNICA



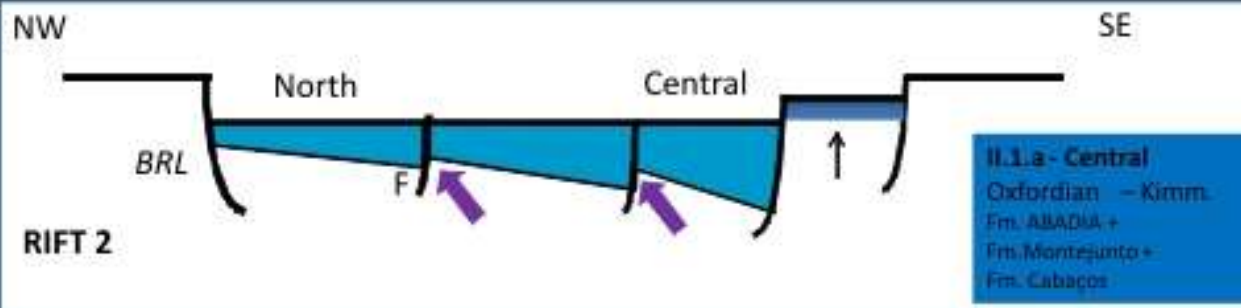


**UPPER  
JURASSIC**

**ATLANTIC  
1st RIFTING**



Adapt. Ribeiro SAG (1999)

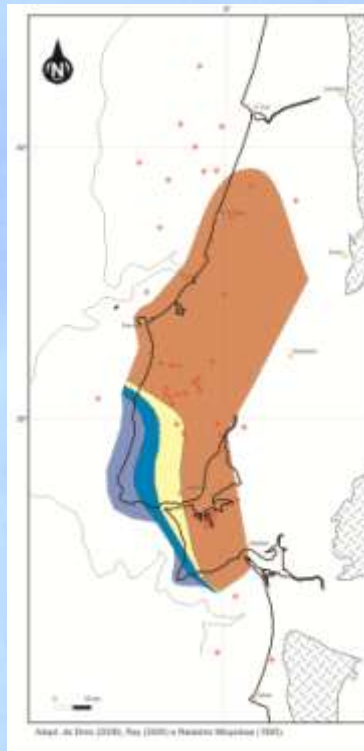
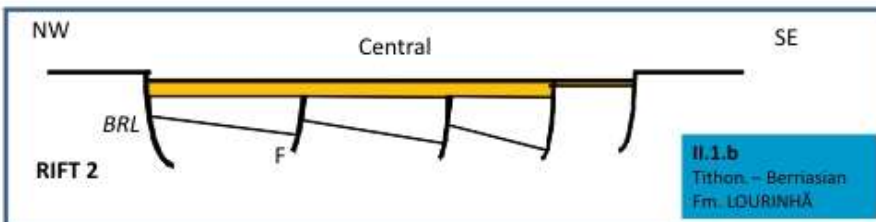
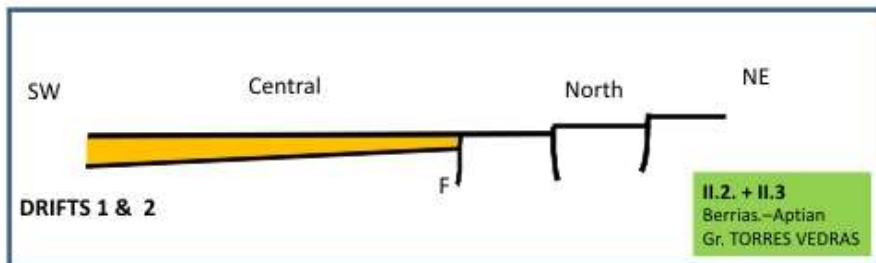






# EARLY - LATE CRETACEOUS

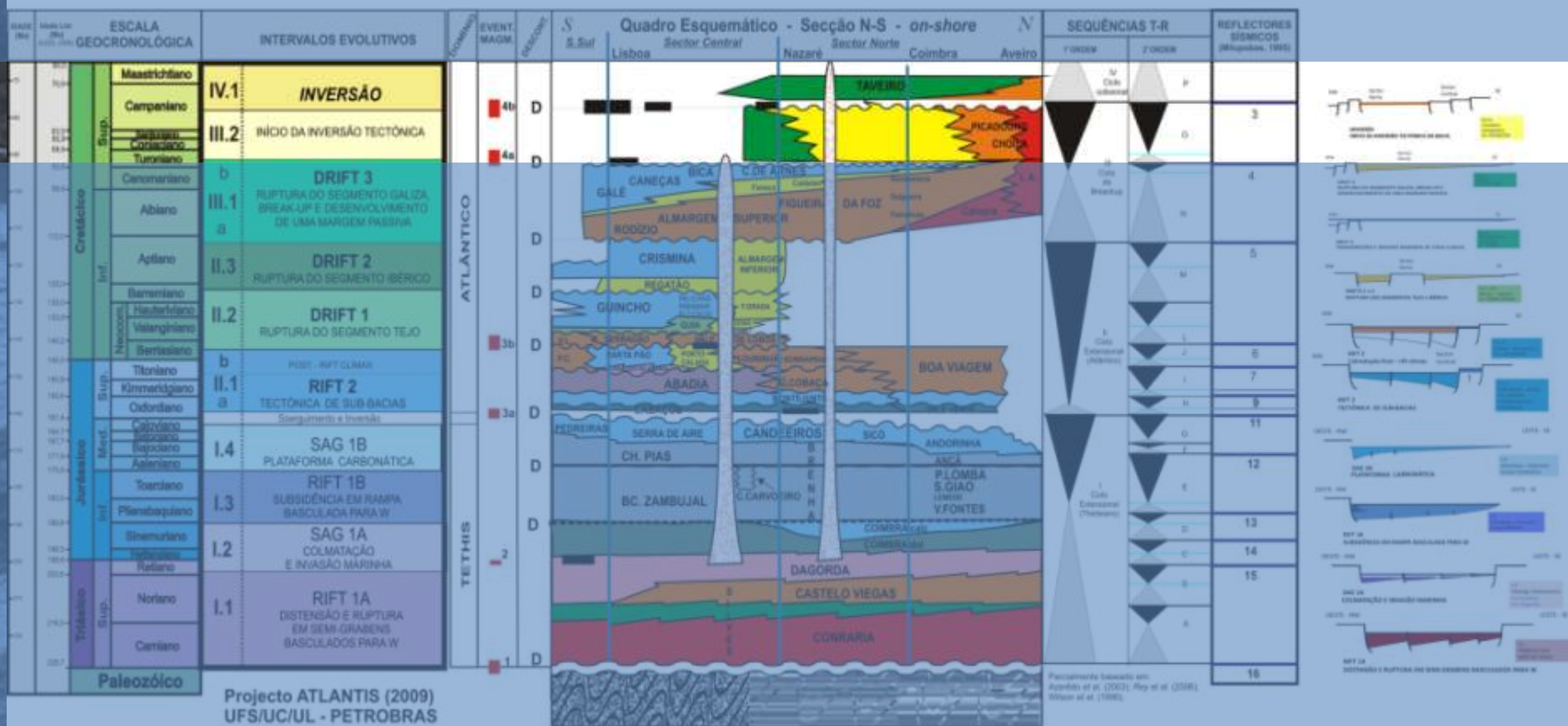
## ATLANTIC Break-ups and DRIFT





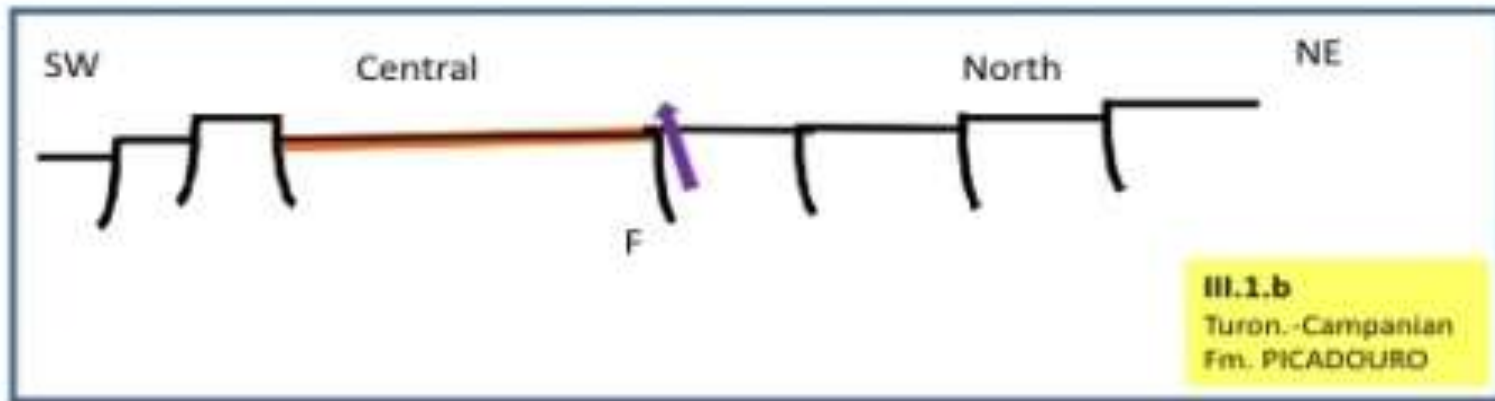
# LATE CRETACEOUS IBERIAN INVERSION

## QUADRO LITOSTRATIGRÁFICO DA BACIA LUSITÂNICA



**LATE CRETACEOUS  
AND TERTIARY**

**IBERIAN INVERSION**









THIS RESEARCH HAS BEEN DEVELOPPED  
IN THE SCOPE OF THE “ATLANTIS PROJECT”

***”Geological Evolutive Model for the Marine  
Riftings of the Lusitanian Basin (Portugal)”***

**financed by PETROBRAS**

and organized by Portuguese (UC-Coimbra UL-Lisbon)  
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