Structure and tectonic evolutioN of the Cantabrian Margin of the Bay of Biscay: results from MARCONI multichannel seismic data

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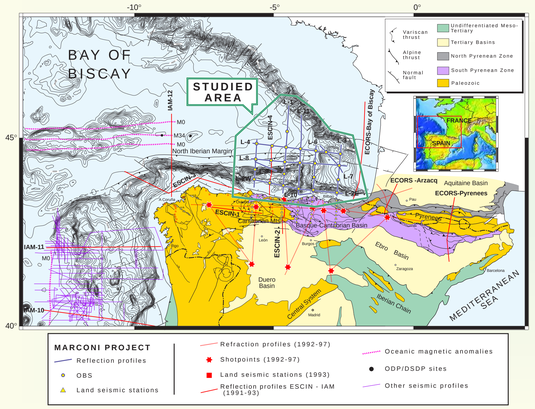
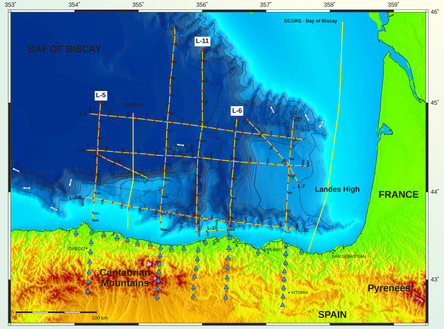
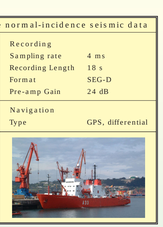
INTRODUCTION

The Bay of Biscay formed during the Cretaceous as a consequence of the opening of the North Atlantic. The newly formed Cantabrian Margin remained stable until the beginnning of Tertiary convergence between the Iberian and Eurasian plates, which led to the building of the Pyrenean-Cantabrian Mountains on land, and the partial closure of the Bay of Biscay. The main part of the shortening and deformation concentrated in the North Iberian Margin. Convergence stopped at an early stage, making this area a unique place to study the initial stages of deformation in a passive margin.



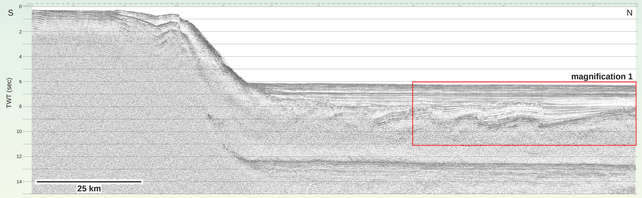


Acquisition parameters for the normal-incidence seismic data			
Source		**Recording**	
Type	Air-guns Bolt	Sampling rate	4 ms
Volume	1935-2690 ci	Recording Length	18 s
Depth	8 m	Format	SEG-D
Shot interval	40 s	Pre-amp Gain	24 dB
Receiver		**Navigation**	
Group interval	25 m	Type	GPS, differential
Number of groups	96		
Streamer length	2400 m		
Group lenght	25 m		
Depth	10 m		

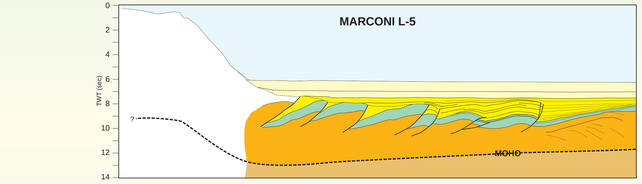


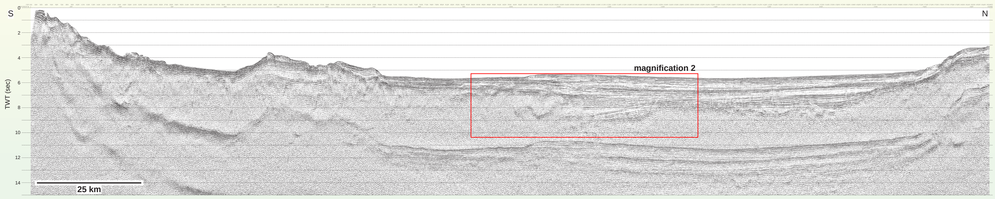
During summer 2003, 11 deep seismic reflection profiles were acquired in the MARCONI seismic experiment, aboard the Spanish R.V. Hespérides. They provide a new 3D image of the structure at the south-easternmost part of the Bay of Biscay. The project also included the recording of the signal in 24 OBS and OBH and in 46 land stations.

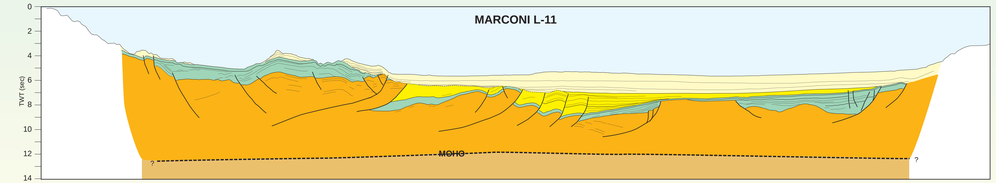
Preliminary results and interpretations of selected reflection profiles are presented here (Lines 5, 6 and 11).

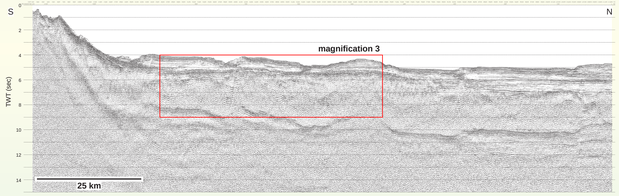


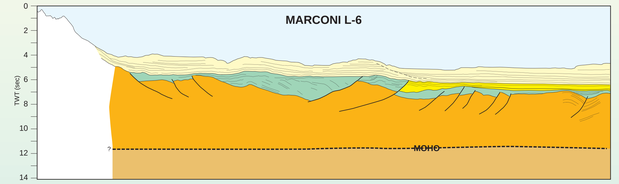
Initial processing sequence applied to MARCONI data
Reading of SEG-D and transform to SEG-Y
Resample to 8 ms
Edit and install geometry
Spherical divergence correction (average velocity function)
Band-pass filter
CDP sorting (CDP spacing: 12.5 m)
Brute stack, constant velocity
Velocity analysis
NMO correction
Stack
Mixing of traces: 1:3:5:7:5:3:1
Stolt migration
AGC for plotting (2000 ms)









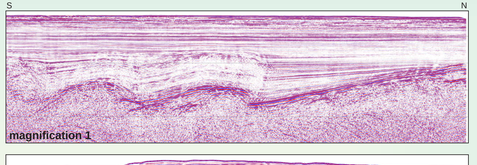


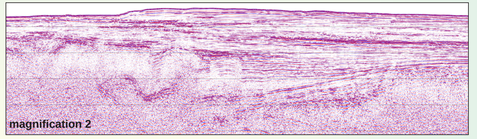
DEEP SEISMIC REFLECTION PROFILES

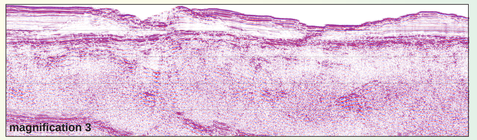
The preliminary interpretation of this set of reflection seismic data shows that the structure of this margin is characterized by a thick sequence of Tertiary sediments (up to 3 sec TWT) partially deformed by northward vergent thrusts and related folds. The kinematic analysis of growth structures in the syntectonic Tertiary units allows the detailed establishment of the tectonic evolution of the margin.

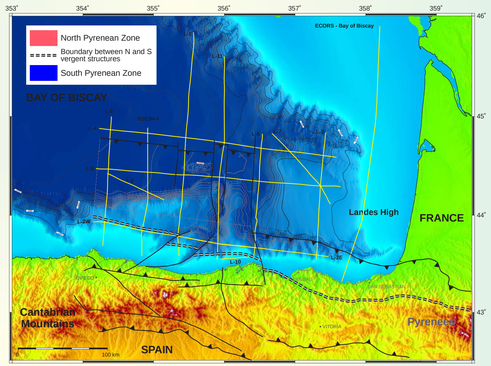
Some remarkable Mesozoic basins were imaged below Tertiary sediments. They show features related to three main tectonic rifting event: (1) normal faults and asymmetric basins from the Late Jurassic-Early Cretaceous rifting stage; (2) Upper Albian-Lower Eocene sediments deposited under stable conditions during the passive margin stage; and (3) inversion structures related to Eocene-Miocene compression.

Another relevant feature inferred from the seismic images is the development of very recent episodes of deformation affecting the sea floor, which in some places could be partially related to salt activity.









CONCLUSIONS

The overall crustal structure of the south-easternmost part of the Bay of Biscay has been interpreted as a thinned continental crust underthrusted to the S below the extremely steep North Spanish continental slope. The new MARCONI multichannel seismic images together with the coincident refraction/wide angle reflection data acquired during the cruise might give more support to this interpretation and reveal the transition of the North-Pyrenean structural units towards the eastern part of the Bay of Biscay.

RELATED REFERENCES

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