3. STRUCTURAL MAP OF THE GALICIA MARGIN[1]

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ABSTRACT

All available seismic data have been used to establish a new structural map of the Galicia passive margin. The north-south syn-rift normal faults that bound the tilted fault blocks are interrupted and/or slightly offset by a discrete pattern of transverse faults oriented N55°–N70° and N115°–N135°.

INTRODUCTION

The western Galicia margin (Fig. 1) is one of the world's best examples of a starved passive continental margin. It is characterized by a series of parallel tilted blocks, formed during the rifting stage of the margin (Berriasian–late Aptian; see "Site 638" chapter; Boillot, Winterer, et al., 1987) and overlain by a thin post-rift sedimentary cover (latest Aptian–Present). The purpose of this short paper is to consider the entire seismic data set collected separately by the Institut Français du Pétrole, IFREMER, and Paris University (Montadert et al., 1979; Sibuet, Ryan, et al., 1979; Groupe Galice, 1979; Boillot et al., 1979, 1986; Sibuet et al., 1987; Mauffret and Montadert, 1987) and to establish an up-to-date structural map of the area drilled in 1985 during Leg 103 of the Ocean Drilling Program (ODP).

STRUCTURE OF THE GALICIA MARGIN

A total of about 5000 km of seismic profiles was used to establish the new structural map presented in this paper. Figure 2 shows the locations of these track lines. The 1250 km of multichannel seismic data allows us to interpret unambiguously the 3750 km of single-channel seismic profiles. In developing this structural map (Fig. 3), we chose to delineate only those features that appear on all of the seismic profiles. These features include:

1. The normal faults mapped at the top of the syn-rift sequence (i.e., at the level of the break-up unconformity).
2. The axes of the half-graben basins, also identified at the level of the top of the syn-rift sequence. These axes could locally differ from the half-grabens axes, but we chose this definition because the lowermost sedimentary section of the basins cannot be identified on all of the single-channel seismic profiles.
3. The summit of tilted blocks or ridges.
4. The horizontal projection of fault escarpment, from the top to the break-up unconformity.

Several observations can be made from the structural map, including:

1. The tilted fault blocks are continuous over distances up to 60 km and are oriented N0° ± 20°. Spacing between blocks has a mean value of 16.3 km and varies from 7.2 to 35.7 km (measurements made along east-west profiles at intervals of 10 nmi from 41°50'N to 42°40'N).
2. The north-south tensional features are interrupted and/or slightly offset over short distances (~20 km) by transverse faults oriented N55°–N70° or N115°–N135° (Fig. 4). Some of the vertical offsets along the transverse faults are equivalent to those along the north-south normal faults. As most of the seismic profiles are oriented east-west, perpendicular to the margin trend (Fig. 2), the north-south features are well defined. On the contrary, the transverse features that slightly offset the tilted block trend can only be partly constrained. Note that transverse faults are not continuous across the entire margin (Le Pichon and Sibuet, 1981). Normal and transverse faults were active during the Early Cretaceous rifting stage, and the transverse faults seem to have accommodated latitudinal variations of extension.
3. The peridotite ridge to the west of the Galicia margin (Fig. 3) is composed of serpentinized harzburgite or lherzolite ("Site 637" chapter; Boillot, Winterer, et al., 1987; Boillot et al., 1980, 1986, 1987; Sibuet et al., 1987). The ridge runs parallel to the tilted blocks and seems to be unaffected by the transverse faults. At least locally, its morphology is similar to that of the tilted fault blocks (Mauffret and Montadert, 1987). Syn-rift deposits overlie its eastern flank, suggesting that the ridge was emplaced at the end of the rifting stage of the margin, probably at the rift axis.

CONCLUSIONS

The new structural map established from the available seismic data recorded on the western Galicia margin gives a precise picture of the principal features that were active during the rifting stage of the margin. It provides a basic structural framework for interpretation of ODP Leg 103 data presented in this *Proceedings*.

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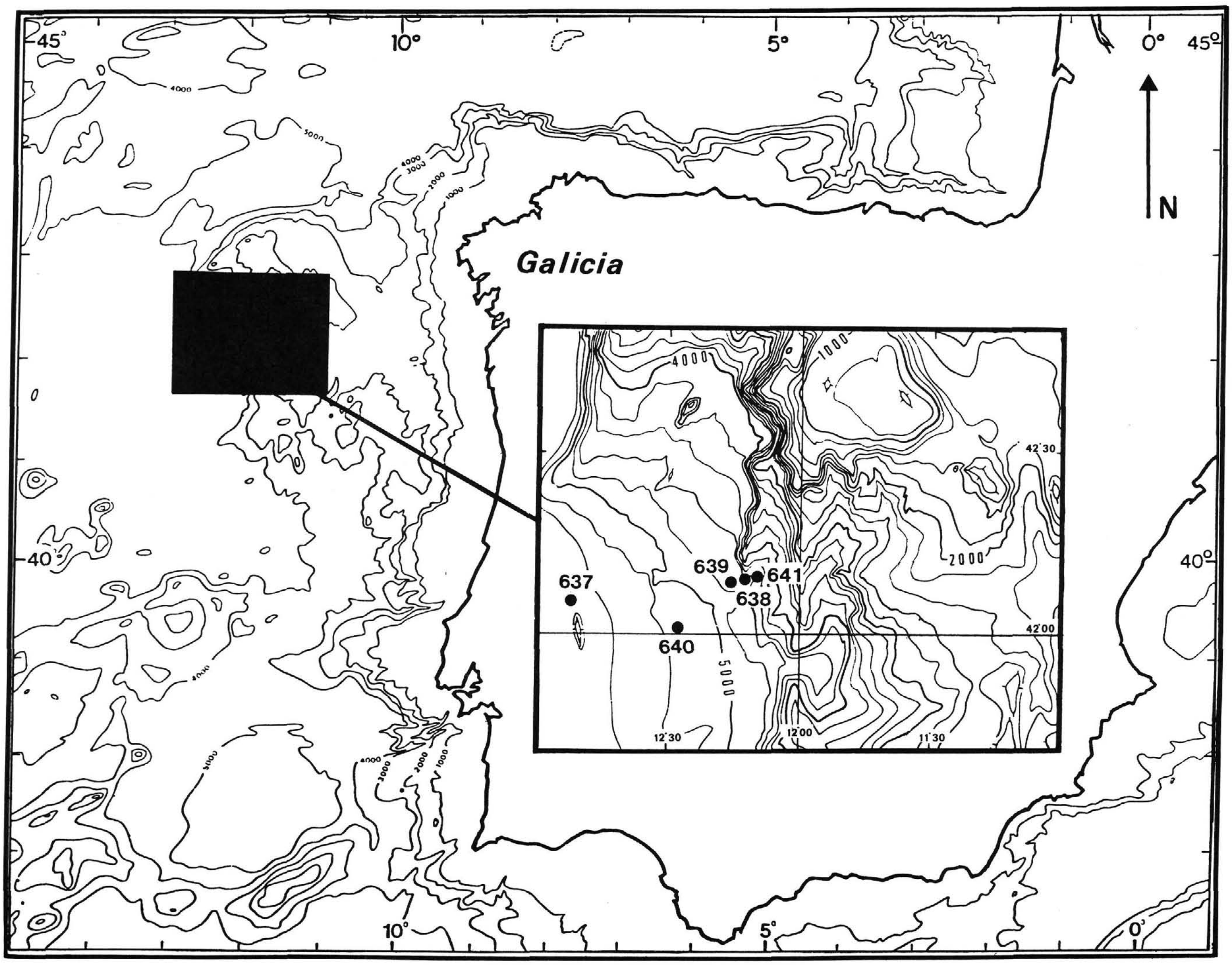

Figure 1. Location of the studied area. Black box is the location of Figures 2 and 3. Bathymetry in meters, after Laughton et al. (1975). The positions of the ODP Leg 103 drill sites are plotted on the Sea Beam data for the area, after Lallemand et al. (1985).

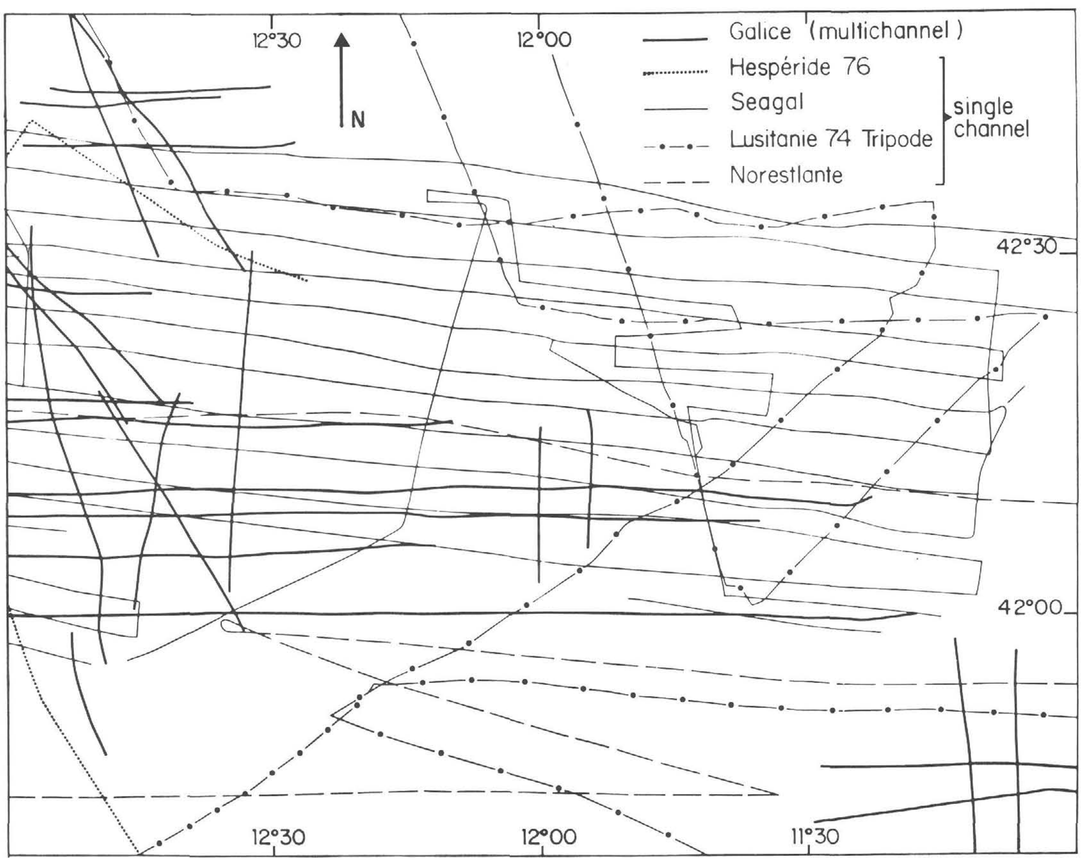

Figure 2. Location of the seismic lines used in this study. Galice profiles were recorded by the Institut Français du Pétrole; Norestlante and Seagal profiles were recorded by IFREMER, Centre de Brest; and Hesperides, Lusitanie, and Tripode profiles were recorded by University of Paris.

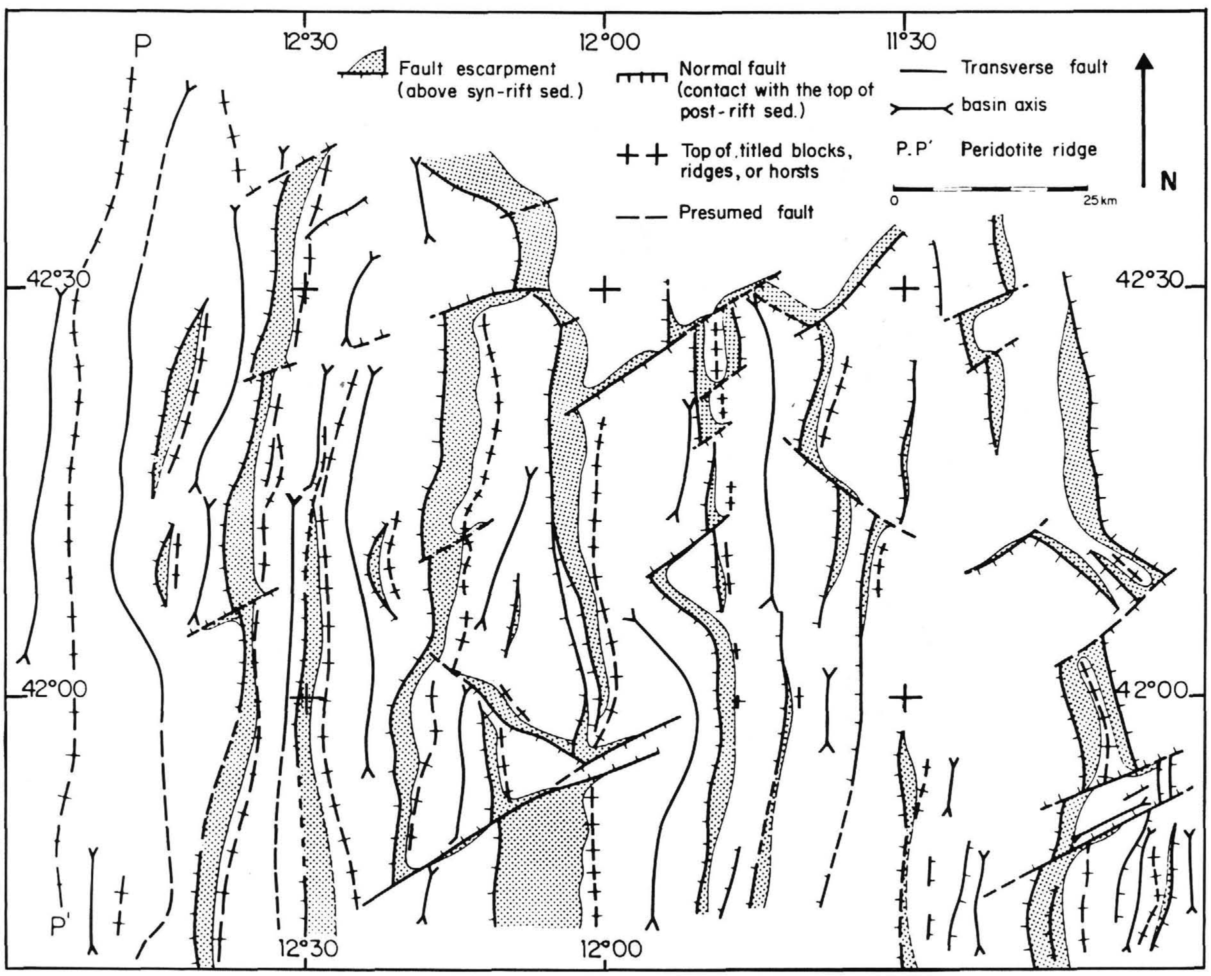

Figure 3. Structural map of the deep Galicia margin (location on Fig. 1). This map was established from interpretation of the seismic lines shown in Figure 2.

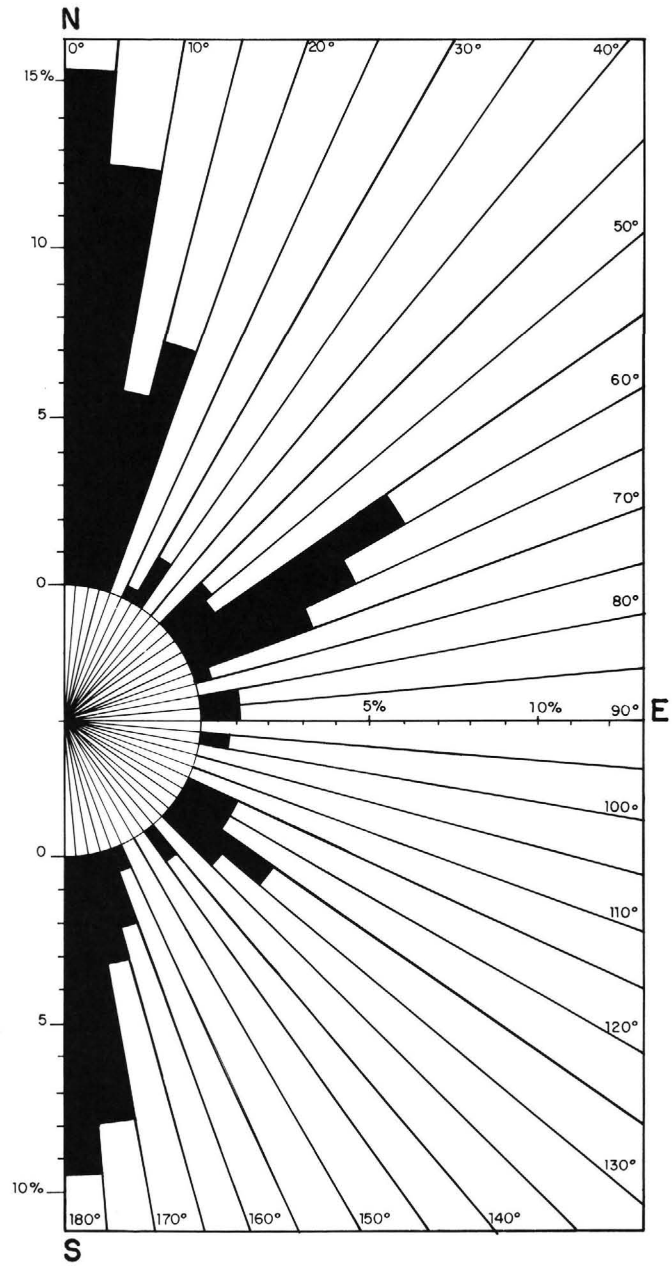

Figure 4. Diagram showing the trend of faults delineated on Figure 3. Faults were classified according to their direction by steps of 5°, and each fault contributed to the cumulative diagram according to its length on the map. The diagram shows three main directions of faults: N340°-N020°, N55°-N70°, and N115°-N135°.