



## **First order faults of the Iberian Peninsula: PRIOR project results.**

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The integration of geophysical, geological and geomorphologic information to compatible scales, has allowed us to construct, for the Iberian Peninsula, a First and Second order faults map to scale 1:4.000.000. There are included, besides, those who have showed some type of Pliocene and Quaternary activity, as well as its more recent movement senses.

The Spanish sponsoring agencies have been:

- Council of Nuclear Security (CSN)
- Domestic enterprise of Radioactive Residues (ENRESA)
- Geographical National Institute (IGN)

The Universities and respectively developed tasks were:

- Universidad Complutense Madrid, Departamento de Geodinámica. Applied Tectonophysics Laboratory (Coordination):

Geophysics: Gravimetry, Magnetometry, Seismic analysis, I.G.S and geomorphologic analyses. Tectonic analysis.

- Universidad Autónoma Madrid, Departamento Q.A y Geología: I.G.S. and geomorphologic analysis.
- San Pablo C.E.U, CC. Experimentales y Salud. isopac analysis, paleoseismicity.

- Universidad Politécnica Madrid, Departamento de Matemática Aplicada: Earthquakes alignments and fractal analysis.

-Free University of Amsterdam, Department of Earth and Life Sciences: Fission tracks analysis, large radius global deformation analysis. Basin infill analysis.

We have cartographed 22.345 fault segments. The rectilinear traces lengths of the mapped faults range between 1 and 50 km, though the most abundant correspond to the rank between 2 and 6 km length faults (50 %). We have filtered the largest ones, which must offset the entire upper crust, following the next criteria:

***Representation criteria.*** To realize the First order faults map, there have been selected a number of not very raised criteria: The first one is not to construct an excessively complex map, and the second one, that it were useful for later analyses, especially in relation to seismic risk analysis. The finally chosen criteria are the following ones:

- Topographic criterion: All those first order faults with a topographic relevant expression and / or clear influence in the topography to scale 1:1,000,000. have been black colour plotted.

- Geophysical criterion: We have blue cartographed those faults that present geophysical main anomalies (gravimetric and / or magnetic) to scale 1:1,000,000 associated with its trace.

- Recent tectonic activity criterion: We have double thickness mapped those faults that have seismic or paleoseismic recent activity demonstrated evidences from tectosedimentary, basins asymmetry and / or apatite fission tracks information.

When superposed more than one criterion, the plot thickness is increased for the recent activity supporting the colour. A red plot was assigned when there were coinciding the topographic and geophysical criteria. Finally those fractures or fault segments to 1:1,000,000 scale, with no previous criteria, were grey plotted (mainly, secondary faults).

***First order faults distribution orientation analysis.*** The fault pattern of the Iberian Peninsula first order faults shows a few very well definite orientations. We can mainly recognized two principal directions (NE-SW, NW-SE) and two less marked ones (E-W and N-S).

NE-SW and NW-SE faults appear almost everywhere, presenting large lengths occasionally up to several hundreds of km with predominant strike-slip movements, and thrusts (especially NE-SW faults). These structures dominate in Galicia and Portugal, the Betic Chains, the Central System and segments the Catalan Coastal Ranges. NW-SE faults are more abundant in the Iberian Chain, the Betic Chains and less in the

Pyrenees and into the Iberian Massif.

For what it concerns to other two families, with some exception, they turn out to be very segmented by the previous ones and show, therefore, minor length traces. Those of E-W trend are domineering in Pyrenees, Central System, Cantabrian Mountains and Betic Chains, mainly with reverse slip movements. N-S fault orientations are the least abundant and fundamentally appear in the proximities of the Atlantic margin (Galicia and Portugal) and some dispersed sectors of the Central System and Betic Chains. These faults movements have mainly strike-slip displacements with frequent extensional components.