An Isostatic Residual Gravity Map of the Iberian Chain and the Significance of Isostatic Residual Anomalies

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An isostatic gravity map of the Iberian Chain and surrounding areas has become possible with the compilation of a gravity data base of the University of Barcelona Gravitimetric Prospection Geologic Group.

The relief of the Iberian Chain is a direct consequence of the tectonic structure. The isostatic gravity map allows us to observe a good correspondence between relief and the distribution of isostatic residual anomalies.

In this way, the central and NW sectors of the Iberian Chain display two WNW-ESE high anomaly areas (up to 40 mGal) which match the structurally uplifted basement structures (more than 100x50 km) giving rise to the topographic elevated areas. These high anomalies are separated by a low anomaly area that coincides with the Tertiary Almazán piggy-back basin displaying a synclinal structure. Moreover, these highs also display a linear NW-SW trend, which was possibly caused by a basic deep pluton below the Iberian Chain. This pluton intruded simultaneously with the opening of the oceanic N Atlantic and Bay of Biscay Basins during the Mid-Late Cretaceous and gave rise to a regional thermal event and a significant aeromagnetic anomaly along the Iberian Chain.

Nevertheless, in the SE sector of the Iberian Chain, despite the high topography of the area, low anomalies (up to –25 mGal) affecting a broader area of the Chain (150 x 200 km) were calculated. This low area also contains a NNW-SSE linear low, which is oblique to the NW-SE trend of the Alpine structures.

Other relevant features are the very low anomalies (up to –60 mGal) calculated in the Tajo and Duero Tertiary basins (more than 25x100 km), both separated by the low anomaly area of the Sistema Central Ranges basement uplift.