

2-D MT and gravity modeling of La Maladeta and Andorra-Mont Lois granitic massifs (Central Pyrenees)

P. Piña-Varas¹, R. Soto², P. Clariana², C. Ayala³, F. Rubio⁴, J. Ledo⁵, C. Rey-Moral⁴, A. Martí¹, P. Queralt¹, A. Marcuello¹.

¹ Departament de Dinàmica de la Terra i de l'Oceà, Facultat de Ciències de la Terra, Universitat de Barcelona, Barcelona, Spain. p.pina@ub.edu

² Instituto Geológico y Minero de España (CN IGME-CSIC), Unidad de Zaragoza, Zaragoza, Spain.

³ Geosciences Barcelona-CSIC, Barcelona, Spain

⁴ Instituto Geológico y Minero de España (CN IGME-CSIC), Madrid, Spain.

⁵ Departamento de Física de la Tierra y Astrofísica, Facultad de Física, Universidad Complutense de Madrid, Spain.

SUMMARY

The Central Pyrenees have undergone a complex geodynamic evolution, including the intrusion of large granitic complexes in the central zone of the chain (Axial Zone) during the Late Variscan stage. Despite being an area extensively studied and where numerous geophysical surveys have been carried out through the application of different methods, fundamental questions remain unresolved about the basement and cover architecture. In particular, the depth, geometry and lateral extension of the Late Variscan granitic intrusive bodies remain unclear.

To address these questions, a joint magnetotelluric (MT) and gravimetric survey has been carried out along two 60 km long transects, crossing the Axial zone in the vicinity of the major granitic bodies outcropping in the Central Pyrenees. The westernmost transect crosses the La Maladeta batholith, revealing that it is not a single granitic body but two independent bodies located at different depths, interpreted as related to different intrusive pulses. The eastern transect has been carried out between the granitic massifs of La Maladeta and Andorra-Mont Louis, in an area where no granitic bodies have been mapped. The relative gravity low observed in this area could indicate the lateral continuity at depth of these intrusive bodies, which would have important implications for understanding the geodynamic evolution of the area. The new MT data acquired in the area will help to resolve this uncertainty.

In addition, important Triassic evaporitic accumulations at depth have been identified and characterized in the southernmost part of the study area, providing valuable information about the limit between the Axial and South Pyrenean Zones and allowing the characterization of a series of faults and folds that affect the entire sequence.

Keywords: Magnetotelluric 2-D inversion, Gravity modeling, Joint interpretation, Multiple magma pulses.
