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New gravity data on the Central Pyrenees (NE Spain). First interpretation results.

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Post-orogenic Permo-Carboniferous magmatism of the Central Pyrenees generated large amount of coeval intrusive and volcanic rocks of calc-alkaline composition and orogenic affinity. The time relationship between these plutonic and volcanic rocks has been recently established through accurate U-Pb dating in zircons, but the structural constraints of this magmatism, especially the tectonic controls on the emplacement of volcanic and plutonic rocks, are still under debate. While the location of volcanism and emplacement of volcanic rocks was controlled by the opening of pull apart basins along transtensional strike slip fault systems, the emplacement of granodioritic bodies and their geometry is still not well established.

The GeoPiri3D Project (financed by the Spanish Ministry of Science, Innovation and University) aims characterizing the geometry and kinematics of the Permo-Carboniferous batholiths by means of a combined structural and gravimetric data. During 2018 we have acquired 824 new gravity stations and 83 rock samples. The gravity data were processed and integrated into the IGME database and a new Bouguer anomaly map were calculated. The rock samples were analyzed to obtain its density and magnetic susceptibility for modelling purposes.

The new Bouguer anomaly map is characterized by a long wavelength elongated minimum occupying the central part that seems to continue towards the W and closes to the E depicting a positive gradient with short and medium wavelength minima and maxima superimposed.

The two main granitic bodies (Maladeta and Andorra Mount Louis) provide different gravimetric responses. The anomaly over the Maladeta granite outcrop is almost flat (-100 mGal). The petrophysical data provides density values of c. 2.7 g/cm3 that are consistent with its granodioritic composition. The outcrop of the Andorra Mount Louis pluton is characterized by a relative minimum (< -120 mGal) thus suggesting granitic composition. Moreover, the minimum extends in an oblique NE direction indicating that part of the pluton is buried. The relative minimum (< -120 mGal) to the SW is likely related to the accumulations of Triassic evaporites.

A residual Bouguer anomaly was calculated assuming a 3rd degree polynomial regional anomaly. The main patterns are little conditioned by the batholiths except for a prominent relative minimum NE of the Andorra Mount Louis, that seems to confirm the hypothesis of a buried granitic body, and a N-S trend relative maximum that splits the long wavelength elongated minimum limiting the Maladeta and Andorra Mount Louis bodies. Also the amplitude of the negative anomaly to the SW is more prominent.

The gravity gradients show a weak zonation over the Maladeta granodiorite whereas the outcrop of the Andorra Mount Louis and its hypothetical NE buried extension are clearly delimited as one body.

Euler solutions with structural index 2 suggest the base of the batholiths at 6 to 15 km and the bottom of the evaporitic body at depths between 4 and 8 km.

About 500 new gravimetric stations and petrophysical data are expected to be acquired during 2019. Together with structural cross sections, their interpretation will shed new light on the geometry and kinematics of this region.