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Serial gravity-constrained cross-sections in the Central Pyrenees validating its structural style

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Cenozoic contractional deformation in the Central Pyrenees generated several basement thrust sheets involving Paleozoic rocks and decoupled Mesozoic and Cenozoic cover units detached on the main décollement level, the Triassic evaporites. The overall geometry and structural architecture of the chain have already been established based on numerous geological and geophysical data obtained during several decades. This work aims to validate the overall accepted geometry of the Central part of the chain by the construction of six serial cross-sections constrained by gravity data and 2.5D gravity modelling. The study area comprises the southern half of the Axial Zone between La Maladeta and Andorra-Mont Louis granites and its southern leading edge as well as the northernmost part of the South-Pyrenean Zone.

New gravity data were acquired and combined with previous existing databases to obtain Bouguer anomaly and residual anomaly maps of the study area. Six serial gravity-constrained cross sections have been built using available geological maps, previous published works, new geological and gravity data and 2.5D gravity modelling. Density values for gravity modelling were derived from 231 laboratory measurements of rock samples collected in the field from non-weathered outcrops that include all rock types outcropping in the study area. The residual anomaly map shows a good correlation between basement thrust sheets and gravity highs whereas negative anomalies seem to correspond to (1) Mesozoic basins, (2) Triassic evaporites and (3) Late Variscan igneous bodies. The 2.5D gravity modelling along the six cross sections highlights: (i) strong along-strike variations on the gravity signal due to lateral differences of the surficial and subsurface occurrence of Triassic evaporites, (ii) different geometry at depth of the Late Variscan igneous bodies outcropping in the study area and (iii) geometric lateral variations of the basement thrust sheets and their relationship with the Mesozoic-Cenozoic units.

