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Depth to main crustal interfaces calculated through potential field data analysis and modelling: Implications for the study of inherited structures in Southern Taiwan

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The Taiwan thrust-and-fold belt results from the oblique arc-continent collision between the Eurasian Plate and the Luzon Volcanic Arc. In this context, inherited structures from the E-directed underthrusting Eurasian continental margin are being reactivated, causing uplift of crystalline basement rocks and the formation of transverse zones that influence the evolution of the structure, seismicity and topography of the Taiwan thrust-and-fold belt. The depth and geometry of the crystalline basement-cover interface of the continental margin are partly constrained by seismic velocities and the locations of earthquake hypocenters. However, further constraints are needed in order to obtain a better resolved location and geometry of this interface since this would improve the understanding of the deep structure of the thrust belt.

In this work, we investigate the geometry and position of first-order discontinuities of the underthrusting Eurasian continental margin to understand i) the role of the crystalline basement and the inherited structures in the deformation and, ii) the overall crustal geometry resulting from this collision. The approach we use is based on FFT and derivative based analyses, and 2D modelling of absolute gravity and magnetic anomalies. Techniques such as the calculation of the averaged power spectra have allowed us to infer the depth to the top of the most important discontinuities through the analysis of their gravity and magnetic wavelength signature. Results, obtained over different datasets show an upper interface at ~6 km depth and a lower at ~13 km depth. These are average values that we have better constrained through modelling, integration with other structural studies and comparison with tomography and seismic data. Results have helped us to improve the comprehension of the crustal structure of Taiwan and the Eurasian continental margin.

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