

Constraints on crustal structure in SW-Ireland from shear-wave refraction and density data

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VARNET-96 was an international, multidisciplinary project, designed to examine the 'Variscan Front' in southwest Ireland. The seismic experiment consisted of two lines running approximately SSE-NNW. Along line A eight in-line shots were recorded over a length of ca 200 km. Line B is ca 140 km long and recorded 13 inline shots. Results from ray-tracing and travel-time inversion of refracted and reflected S-waves indicate a multiplayer crust that can be subdivided into a sedimentary layer, an upper crust, a middle crust, a lower crust, and the uppermost mantle. The sedimentary and upper crustal layers show strong vertical and lateral velocity variations along the profiles. Throughout the middle crust velocities increase, and reach maximum values of up to 4.1 km/s in the lower crust. The central part of the lower crust along line B shows a strong anomaly. This area was modelled as a low velocity region with values of $V_s=3.90$ km/s. The P- and S-wave crustal velocities define variations in Poisson's ratio, giving better constraints on the likely petrological composition of the crust. This is further constrained by density variations derived from the P- and S-wave velocities that are correlated with changes in Bouguer gravity anomaly across southwest Ireland.