3D P-wave velocity model of Ireland's crust from controlled source tomography

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We present a 3D P-wave velocity model of the crust and uppermost mantle below Ireland. In the absence of local earthquakes, we used quarry and mining blasts recorded on permanent stations in the Irish National Seismic Network (INSN) and during various temporary deployments. We compiled a database of 1,100 events and around 20,000 P-wave arrivals, with each event associated with a known quarry. The source location uncertainty is therefore minimal. Both source and receiver locations are fixed in time and we used repeating events to estimate the travel time uncertainty for each source-receiver combination. We created a starting 1D velocity model from previously available data, and then used VELEST to calculate a preliminary minimum 1D velocity model. The 1D velocity model enabled us to remove outliers from the data set, and to calculate the final minimum 1D model used as the initial model in the 3D tomographic inversion. The resulting 3D P-wave velocity model will shed new light on the 3D crustal structure of Ireland.