

Deep Seismic Profiling in the European Continent: Cratons and Terranes

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Europe is part of the Eurasian continent and stretches from the Atlantic to the Urals and from the Polar Circle to the Mediterranean, getting younger from NE to the S. Early (controlled source) seismic surveys in central Europe used wide angle refraction. In 1975 deep reflection profiles started with marine surveys around the British Isles and the North Sea, followed by the Baltic Sea and the Skagerrak. Many onshore surveys were acquired in the Mesozoic central and western part of Europe, through the Urals in the east to the Cenozoic compressional belts (Alps and Pyrenees) in the south. Most of these reflection lines were supplemented by wide angle observations providing velocity information. NE of the long Tornquist lineament mostly wide angle - refraction lines are available on land.

While the wide angle surveys provided data on lithospheric velocity structure, the deep seismic reflection profiling revealed many structural details and geologic boundaries. These include: an Early Proterozoic suture in northern Baltica and a complex root zone below the Urals; indentations (crocodiles) and delaminations in old and young compressional belts, and complex bi-vergent boundaries between terranes. A laminated lower crust with a transparent upper crust is observed in many basins around the British Isles and in the collapsed interior of the Variscides, while their exterior shows thrust and shear patterns in the whole crust. The Mesozoic Polish - German basin shows a poor crustal reflectivity, probably because of massive mafic intrusions. Fault zones, concentrating on the rigid upper crust and sometimes on the uppermost mantle seem to reveal the evolution from collision to collapse.