Abstract

Two passive seismic experiments have been carried out across the Trans−European Suture Zone (TESZ) from northern Germany to southern Sweden (TOR) and across the Proterozoic−Archean suture in Finland (SVEKALAPKO) to improve our understanding of the processes involved in the creation of the European continent. Teleseismic earthquakes recorded by the two networks and stations of the GRSN and GEOFON permanent networks have been used for studies of the crust−mantle, and upper mantle seismic discontinuities with the receiver function method. Along the TOR network the depth to the Moho increases from 30 km at the southern edge of the profile to 40 km at the Elbe Line. Between the Elbe Line and TESZ the Moho branches off and whereas the deeper branch continues at 40 km depth to the TESZ a second branch appears at 30−35 km depth. The upper branch descends beyond the TESZ to below 55 km under the northern end of the TOR profile. The crustal thickening north of the TESZ is accompanied by an increase in average Vp/Vs values, appearance of intracrustal conversion zones and north dipping features which are interpreted as remnants of the collision between Avalonia and Baltica. In southern Finland beneath the SVEKALAPKO network the Moho starts in the south at the depth of 40−45 km, plunges to about 65 km depth south of the Archean−Proterozoic suture. It is coincident with a north dipping intracrustal structure apparently related to the collision of the Proterozoic and Archean provinces in Proterozoic. North of the APSL the Moho rises smoothly to a depth of 45 km across the Archean orogeny in the north. Along the TOR profile, 410 and 660 discontinuities were hard to detect. However, manyfold stacking of receiver functions revealed that the conversions from the two discontinuities arrive more or less according to IASP91 predicted time. Across the SVEKALAPKO network 410 and 660 discontinuities arrive markedly earlier than IASP91 theoretical arrival times. In particular north of the Archean−Proterozoic

suture in Finland the 410 and 660 km conversions arrive about 2 sec earlier, indicating about 5% higher average upper mantle velocities and lower temperatures than IASP91 global model predicts.