



North European Transect

Annakaisa Korja (1), Pekka J. Heikkinen (1), Yuri Roslov (2), Nina Ivanova (2), Marc Verba (2), and Tamara Sakoulina (2)

(1) University of Helsinki, Institute of Seismology, Helsinki, Finland (pekka.j.heikkinen@helsinki.fi), (2) Sevmorgeo, St. Petersburg, Russia

A nearly continuous, 3600 km long, NE-running North European Transect (NET) is combined from the existing deep seismic reflection data sets in the Baltic Sea (BABEL, 1600 km), Northern Finland (FIRE 4-4A, 580 km) and Barents Sea (1-AR, 1440 km;). The reflective image of the deep crust is highly dependent on the thickness of the sedimentary cover. The cover is few hundred meters in the Baltic sea, few tens of meters in the land areas and few kilometers in the Barents Sea area. In the Barents Sea area, the seismic image is dominated by the layered structure of the sedimentary basins and the middle and lower crust are poorly imaged. Therefore the Moho boundary in the Barents Sea has been determined from wide-angle reflections. Geologically the transect covers the transition from Phanerozoic Europe to Precambrian Europe and back to the Phanerozoic Barents Sea Shelf. It displays how Northern Europe grew around Baltica in several tectonic episodes involving the formation and destruction of Columbia/Hudsonland, Rodinia and Pangea supercontinents. The paleo plateboundaries are traversed by subvertical transparent zones suggesting transpressional and transtensional environments. The BABEL lines image how the core of Baltica was formed by sequential accretion of microcontinents and arc terranes at the old continental margin during the Svecofennian Orogeny ~ 1.9 -1.8 Ga. When Baltica joined the Columbia supercontinent, new terranes were added to its southern edge in the Sveobaltic Orogeny (~ 1.8 Ga). During the dispersal of the Columbia, the Baltic Sea failed rift was formed, rapakivi granitoids were intruded and sedimentary basins were developed. An extended plate margin structure has been imposed on the Rodinian (Sveconorwegian) and Pangean additions (Variscan-Caledonian). Major crustal thinning takes place along a series of subvertical faults across the Trans-European Suture Zone marking the transition from Phanerozoic to Proterozoic Europe. The FIRE lines in Northern Finland image a collage of older continental fragments and intervening basins that have been welded together in Svecofennian and Lapland-Kola orogenies. The Lapland-Kola orogen record the collision of Baltica and Laurentia during the compilation of the Columbia supercontinent. The collisional structures were overprinted by extension associated with the dispersal of Columbia. The Russian Arctic line 1-AR focuses on the Phanerozoic sedimentary cover of the Barents Sea Basin. The line images the transition from Paleoproterozoic Baltica to Neoproterozoic Barentsia. As part of the Rodinia supercontinent formation, Baltica collided with Barentsia resulting in Timanide orogeny. During the break-up of Rodinia an aborted rift was formed within the Barentsia. Later peripheral tectonic events modified the interior parts of Barentsia that acted first as a back arc basin and later as a foreland basin to the Uralian and Caledonian orogen during the formation of the Pangea supercontinent.