Geophysical Research Abstracts, Vol. 8, 04148, 2006
SRef-ID: 1607-7962/gra/EGU06-A-04148

The evolution of the high velocity lower crust beneath the Fennoscandia-Sarmatia Suture Zone (FSSZ), the crust-mantle transition and AMCG magmatism

S. Bogdanova(1), E. Kozlovskaya (2), T. Janik (3), L. Taran (4), L. Shumlyanskyy (5) and J. Yliniemi (2)

(1) Department of Geology, Lund University, Sölvegatan 12, SE-22362 Lund, Sweden (Svetlana.Bogdanova@geol.lu.se), (2) Sodankylä Geophysical Observatory/Oulu Unit, University of Oulu, FIN-90014 Oulu, Finland, (3) Institute of Geophysics, Polish Academy of Sciences, Ks. Janusza 64, PL-01-452 Warsaw, Poland, (4) Institute of Geochemistry and Geophysics, Kuprievich 7, 220141 Minsk, Belarus,(5) Institute of Geochemistry, Mineralogy and Ore Fomation, NAS, Ukraine

Two kinds of lower crust have been disclosed by the EUROBRIDGE'96 and '97 seismic profiling and gravity-seismic modelling in the southwestern part of the East European Craton. One is "normal" lower crust with Vp $<$ 7.0 km/s and densities of 2.8-3.0 g/cm3, the other is high-velocity lower crust (HVLC) with Vp reaching 7.8 km/s and densities around 3.15 g/cm3. Extending laterally for more than 250 km, the HVLC rests atop an uneven Moho that features numerous offsets. Most commonly, HVLCs are interpreted as mafic mantle underplates. EUROBRIDGE research has also shown that the studied HVLC is associated with the Fennoscandia-Sarmatia collisional suture zone (FSSZ) and the 1.80-1.74 Ga Korosten AMCG (anorthosite-mangerite-charnockite-granite) Pluton (KP) in the adjacent parts of Sarmatia. The active continental margin of that crustal segment is marked by the 2.0 Ga Osnitsk-Mikashevichi Igneous Belt (OMIB). According to chemical modelling and Sm-Nd isotopic data, the formation of the KP most probably involved polyphase melting of the lower crust of the OMIB along postcollisional zones of detachment. That process also caused intense bimodal magmatism and attendant granulitic metamorphism within the crust of the FSSZ at ca. 1.8 Ga. Notably, the petrophysical properties of the HVLC and its character are different beneath the FSSZ and the KP. Beneath the FSSZ, thickness is higher, while the Vp and density values are 7.2-7.4 km/s and 3.0-

3.1 g/cm3, respectively. The component rocks are mafic granulites with or without garnet, amphibolites, and gabbro-norites. This part of the HVLC was developed at ca. 1.8 Ga. Beneath the polyphase KP, the HVLC took longer time to form. Here, it consists of two different layers. The upper one (HVLC I) has petrophysical characteristics that are similar to those of the HVLC beneath the FSSZ, while the lower layer (HVLC II) features higher Vp values and densities that suggest more eclogitic and mantle-like compositions. The total thickness of the HVLC is apparently relatively low beneath the KP, while the Moho is uplifted and the older lower and middle crust has been replaced by the voluminous stock-like magma chamber of the 1.76-1.74 Ga KP intrusions. Altogether, the available data indicate that the HVLC in the studied region has a restite origin and was formed at the expense of 2.0-Ga lower crust during its multiple melting and removal of the arising melts. This created the successively increasingly "restitic" compositions of the residues. In contrast, no indications of mantle-derived mafic underplating exist in this case.