

PLUME PROCESSES FROM ARCHAEOAN TO PALAEOZOIC IN THE EASTERN BALTIC SHIELD

BAYANOVA, T. B. and MITROFANOV, F. P. Geological Institute of Kola Science Centre, Apatity, Russia

The Early Precambrian Kola collision structure is situated in the eastern Baltic Shield. The largest alkaline province (5000 sq.km) occurs in the Keivy terrane. The alkaline granites were dated by the U-Pb method on zircon and titanite to show 120 million year-long duration of this Archaean alkaline magmatism: 2.75 – 2.63 Ga ago. There are two 350 km-long belts of Proterozoic layered intrusions hosting PGE and Co-Ni-Cu deposits. The oldest intrusions of the Northern Belt have been analyzed by the U-Pb method on zircon and baddeleyite from gabbro-norite to give an age of 2.5 Ga. Zircon and baddeleyite from the anorthosites of these intrusions yielded a younger age, 2.45 Ga, which is close to the time of formation of the Finnish and Karelian groups of intrusions (Southern Belt). The youngest intrusion, Imandra lopolith, has a U-Pb zircon age of 2.4 Ga. Therefore, the duration of the formation of these intrusions is 100 million years. More than 40 Palaeozoic alkaline massifs with carbonatites are known in the region. Precise U-Pb (zircon and baddeleyite) and Rb-Sr (whole rock and minerals) isotope data for the Sebljavr and Kurga alkaline ultrabasic intrusions give an age of 410 Ma. A younger age, about 360 Ma, was obtained for the Khibina and Lovozero intrusions. The duration of the plume activity is estimated at 50 million years. Therefore, three different large plume processes acting from Archaean to Palaeozoic are distinguished: Archaean alkaline (2.75 – 2.63 Ga), Proterozoic ultramafic-mafic (2.5 – 2.4 Ga) and Palaeozoic alkaline-ultrabasic (410 – 360 Ma).