

PRECAMBRIAN GROWTH OF THE FENNOSCANDIAN LITHOSPHERE - IMPLICATIONS OF MANTLE AND LOWER CRUSTAL XENOLITHS

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The c. 600 Ma kimberlites in eastern Finland sampled the lithospheric mantle and lower crust within the outermost edge of the continental late Archaean (3.1-2.6 Ga) craton adjacent to the oceanic Svecofennian (1.9-1.8 Ga) mobile belt. Mantle xenoliths can be subdivided into garnet-spinel facies harzburgites (derived from depths of 100-150 km), garnet facies lherzolites (180-250 km), and diamondiferous eclogites. Lower crustal xenoliths are mafic granulites with the mineral assemblage cpx-amph-plg±grt±opx±bt (30-40 km). Ion probe dating of xenocrystic mantle zircons and zircons from lower crustal xenoliths both yielded similar age groups which all have counterparts in the surface geology: the 2.65 Ga group corresponds to the late Archaean igneous event, the 2.3-2.5 Ga ages with widespread cratonic anorogenic mafic magmatism and the 1.75-1.9 Ga group covers all the major phases of the Svecofennian orogeny. I suggest that the lithospheric mantle in eastern Finland includes a) remnants of the thinned Archaean SCLM at shallow levels, b) early Proterozoic oceanic lithosphere subducted beneath the craton margin during mobile belt accretion, and c) younger underplating which resulted from delamination of the stacked and subducted oceanic lithosphere followed by its replacement by asthenospheric material during the postorogenic stage. The lower crust includes mafic granulites formed in every major event of crustal growth, but probably attained most of its present thickness at the postorogenic stage.