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Palaeoproterozoic East-Scandinavian large igneous province (ESCLIP) as results of interplate mantle magmatism (plume)

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There are two 300–500 km long belts of Palaeoproterozoic layered intrusions in the Baltic (Fennoscandian) Shield; the Northern (Kola) Belt and the Southern (Fenno-Karelian) Belt. New U–Pb (TIMS) ages and radiogenic isotopic (Nd–Sr–He) data have been determined for mafic-ultramafic Cu–Ni–Ti–Cr and PGE-bearing layered intrusions of the Kola Belt. U–Pb zircon and baddeleyite data from gabbronorite and anorthosite bodies of the Fedorovo-Pansky, Monchepluton, Main Ridge (Monchetundra and Chunatundra) and Mt Generalskaya intrusions, and from gabbronorite intrusions and dykes associated with the Imandra lopolith; yield ages from c. 2.52–2.39 Ga. The age range of 130 Ma recorded in the Kola Belt samples, associated with at least four intrusive phases (three PGE-bearing and one barren), is significantly greater than that for intrusions of the Southern (Fenno-Karelian) Belt which clusters at 2.44 Ga. Nd isotopic values for the Kola Belt range from -1.1 to -2.4 and indicate an enriched mantle 'EM-1 type' reservoir for these layered intrusions. Initial Sr isotopic data for the Kola intrusions are radiogenic relative to bulk mantle, with ISr values from 0.703 to 0.704, but geochemical data and 4He/3He isotopic ratios of various minerals record a significant contribution from a mantle source rather than simply crustal melting. The geological and geochronological data indicate that in the eastern part of the Scandinavian province (ESCLIP), mafic-ultramafic intrusive magmatism was active over a pro¬tracted period and was related to plume magmatism associated with continental breakup that also involved the Superior and Wyoming provinces (Heaman, 1997) or oldest Kenorland supercontinent (Ernst at all., 2008).
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