Isotopic studies on ore potential granitoid rocks in the Häme belt, Finland

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The Häme belt in southwestern Finland hosts several types of ore formations. Among others, Cu, Au, W, Li and La mineralizations have been identified. These mineralizations are linked with various types of granitoid rocks within the Paleoproterozoic Svecofennian bedrock. We have studied the granitoids and equivalent hypabyssal rocks by whole-rock geochemistry, U-Pb zircon geochronology and Sm-Nd isotope analysis. Geochemically, the granitoids show a wide range from adakitic to arc-type, implying that they had different source environments. New age data show that different types of granitoids (tonalitic, leucogranitic, granodioritic etc.) were emplaced simultaneously: the samples have ages from 1888 Ma to 1883 Ma and are coeval within the error limits. Nd isotopic results show slightly depleted compositions with initial epsilon values around +1, in line with most of the previously published data. An exception is the Cu-Au bearing Arolanmäki granite, which indicates a juvenile origin with an initial epsilon value of +3.2.

Overall the sources of granitoid magmatism vary considerably, and the overlapping ages indicate either a very rapid sequence or a simultaneous existence of varying types of magmatism. The ages coincide with the main stage of the Svecofennian orogeny in the area. Later tectonic and hydrothermal activity is demonstrated by <1.80 Ga monazite and titanite ages as well as pegmatites. The granitoid magmatism of the Häme belt is related to several types of ore forming processes. The 1.88 Ga granitoids are hosting Cu-Au and W-Au-deposits, some of them interpreted as porphyric type deposits. The 1.80 Ga pegmatites include several LCT pegmatites hosting Li-deposits. The orogenic gold deposit of the Jokisivu-type in Häme belt have been interpreted to be controlled by the shear zones related to the 1.80 Ga granitoid magmatism.