

Mineral Systems and Mineral Prospectivity in Finnish Lapland

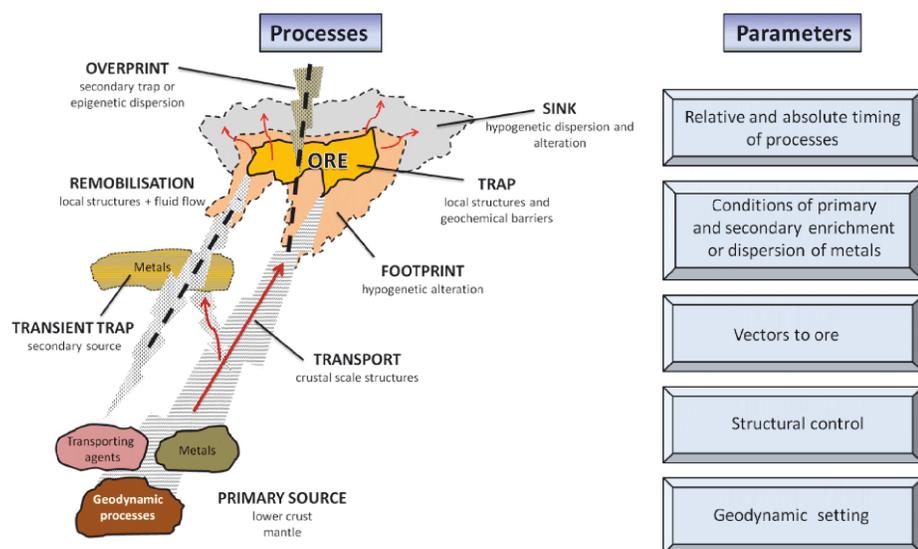
MINSYSPRO - 2014-2018

Development of knowledge-based, environmentally friendly and cost-effective exploration methods which are capable of predicting mineral resources under cover.

Background

Finland's mineral strategy aims to develop sustainable extractive industry and achieve European leadership in mining by 2030. Finnish Lapland is the major area of current exploration and mining boom in Finland. Recent discoveries (e.g. Sakatti, magmatic Cu-Ni-PGE) and development of economically important mines (e.g. Kevitsa magmatic Cu-Ni-PGE, Kittilä orogenic Au) clearly demonstrate the growth potential of extractive industry in this region. Similarity in geology with mineral giants like South Africa, Western Australia and Canada suggests an enormous untapped mineral potential, particularly for Au, Ni, Cu, PGE, Cr, Co and V.

The mineral system approach

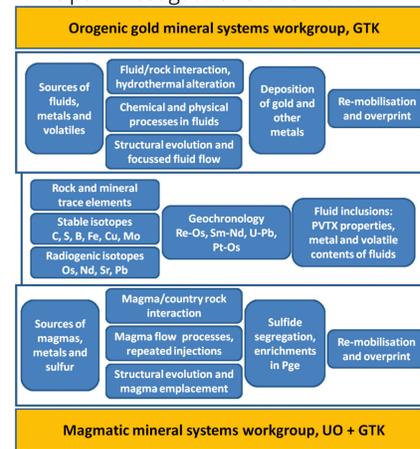


Objectives of the project

- 1) Gathering new knowledge of critical processes of ore formation in orogenic gold and magmatic mineral systems by application of cutting edge research methods.
- 2) Refinement of mineral system models for orogenic gold magmatic mineral systems.
- 3) Conversion of mineral systems' critical processes into parameters applicable to mineral prospectivity mapping.
- 4) Development methods of computer-based conceptual and empirical mineral prospectivity mapping by using results of research on mineral systems.

The research consortium and tasks

Principal investigator: Ferenc Molnár



Principal investigator: Eero Hanski

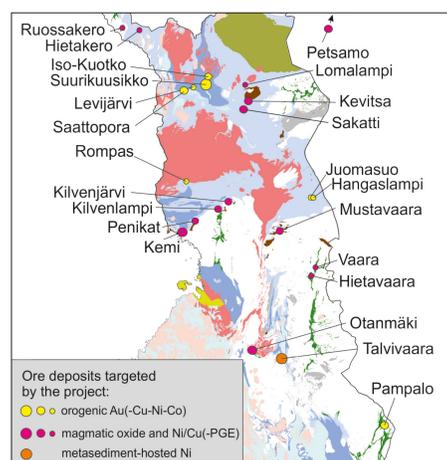
International collaboration:

University of Cardiff, University of Stockholm, University of Colorado, St. Andrews University, University of Lorraine, Hungarian Academy of Sciences, Karlsruhe Institute of Technology

Targets of studies

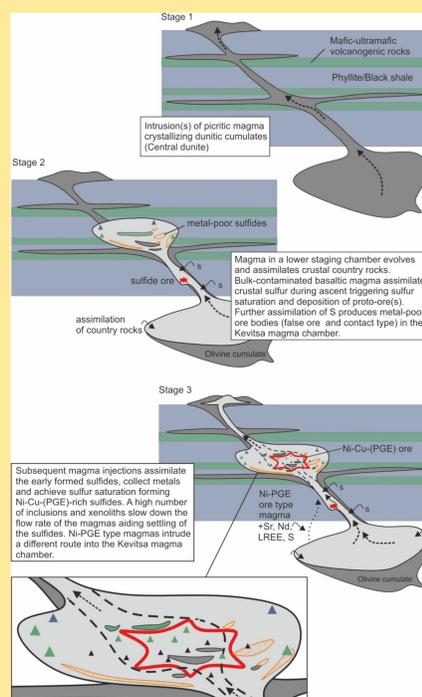
Magmatic sulphide and oxide deposits in volcanic rocks and layered intrusions.

Orogenic gold deposits with typical and atypical metal associations

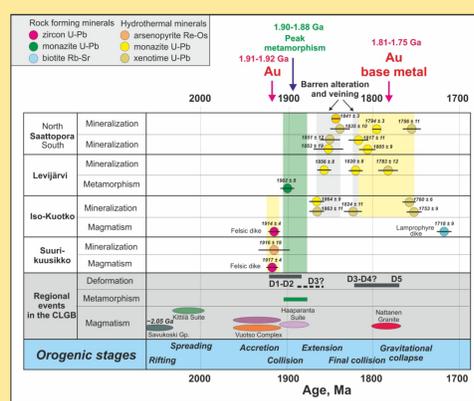


Selected results

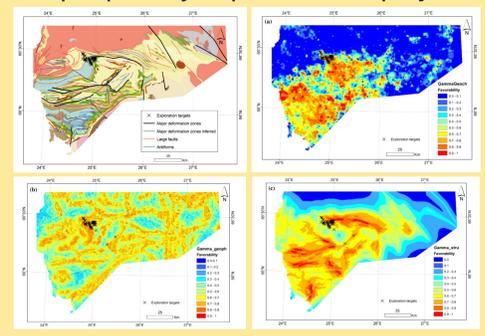
Magma evolution and ore deposition in the Kevitsa Layered Intrusion



Geochronology of hydrothermal processes in the Central Lapland Greenstone Belt



Gold prospectivity maps for the Peräpohja Belt



Publications

Composition of iron oxides in Archean and Paleoproterozoic komatiite-hosted Ni-Cu-PGE deposits in Finland
 Marko Moilanen, University of Oulu, Finland
 Jukka Komunaho, Geological Survey of Finland
 Eero Hanski, University of Oulu, Finland

Mantle source of the 2.44-2.50-Ga mantle plume-related magmatism in the Fennoscandian Shield: evidence from Os, Nd, and Sr isotope compositions of the Monchepluton and Kemi intrusions
 Shang-Hang Yang¹, Eero Hanski¹, Chao Li², Wang-Jiang D. Mao³, Hama Huhner⁴, Aron V. Mikolajczyk⁵, Ron Lopez⁶, Yanshan Li⁷, Hugh O'Brien⁸, Wei-Jia Qiu⁹

The Paleoproterozoic komatiite-hosted PGE mineralization at Lomalampi, Central Lapland Greenstone Belt, northern Finland
 T. Törnänen¹, J. P. Komunaho², E. Hanski³, M. Moilanen⁴, P. Heikura⁵

Empirical constraints on partitioning of platinum group elements between Cr-spinel and primitive terrestrial magmas
 Jung-Woo Park^{1,2}, Vadim Kamenetsky^{3,4}, Ian Campbell⁵, Gyuseung Park⁶, Eero Hanski⁷, Evgeny Pushkarev⁸

The Hietajarvi PGE-enriched komatiite-hosted sulfide deposit in the Archean Suomussalmi greenstone belt, eastern Finland
 J. Komunaho¹, E. Hanski², B. Wyne³, A. Bekker⁴, S. Lakkari⁵, T. Hietalahti⁶

Multi-stage hydrothermal processes and diverse metal associations in orogenic gold deposits of the Central Lapland greenstone belt, Finland
 Ferenc Molnár, Hugo O'Brien, Yanshan Li, Matti Kurhela, Alexander Mödler, Bo Johansson

Optimizing a Knowledge-driven Prospectivity Model for Gold Deposits Within Peräpohja Belt, Northern Finland
 V. Nykänen^{1,2}, T. Niiranen³, F. Molnár⁴, I. Lahti⁵, K. Korhonen⁶, N. Cook⁷, and P. Skyyti⁸

Association of gold with uraninite and pyrobitumen in the meta-volcanic rock-hosted hydrothermal Au-U mineralization at Rompas, Peräpohja Schist Belt, northern Finland
 Ferenc Molnár, Harry O'Brien, Nils B. C. Cook, Eva Pakkilahti, Aron V. Mikolajczyk, Yanshan Li, Jukka Komunaho, Eero Hanski, Hugh O'Brien, and Yanshan Li

Signatures of Multiple Mineralization Processes in the Archean Orogenic Gold Deposit of the Pampalo Mine, Hietalahti Schist Belt, Eastern Finland
 Ferenc Molnár, Hugh O'Brien, Yanshan Li, Aron V. Mikolajczyk, Eero Hanski, Matti Kurhela, and Yanshan Li

Boron, sulphur and copper isotope systematics in the orogenic gold deposits of the Archean Hietalahti schist belt, eastern Finland
 Ferenc Molnár, Hugh O'Brien, Yanshan Li, Aron V. Mikolajczyk, Eero Hanski, Matti Kurhela, and Yanshan Li

Geological Survey of Finland

Ferenc Molnár, Research Professor, Ore Geology and Mineral Economics

University of Oulu

Eero Hanski, Professor, Oulu Mining School

