Saprolites as mineral resources and significance in geochemical exploration

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Weathering transforms primary minerals into secondary phases.

Economically important mineral resources are created in weathering, as e.g. kaolin, bauxite, bentonite and sepiolite clays. Also many supergene metal deposits, as Fe, Ni and P enrichments are results of chemical weathering. This presentation gives an overview on some examples of saprolites from USA, Brasil and preglacial saprolites from Finland. Examples of kaolin deposits in Finland are Kaupinvuoma deposit in Finnish Lapland and kaolin deposits of Puolanka in Kainuu, where the saprolites are associated with N-S directed zone which at the length of 50 km hosts occasional white kaolin clay and red ferric kaolin occurrences. They are products of in situ chemical weathering of the parent rocks like arkose gneiss, meta-arenite and sericite quartzite. The weathering horizons may receive thickness of 30 meters. Sokli P-enriched weathering crust upon the 365 Ma Sokli Carbonatite Complex, hosting ca 120 Mt phosphorus ore, grade ca 13% P2O5 is a good example of a world-scale supergene metal deposits. In Brasil, Minais Gerais state in particular, there are several remarkable supergene metal deposits that are weathering derivatives of alkaline rocks and carbonatites as well of chemically precipitated phoscorites. Till deposits in formerly glaciated areas can in places include a lot of metal-rich secondary phases. The knowledge of these is important when interpreting the results in geochemical exploration. Examples of this are presented from Finland.