Lead isotope constraints on two Archean anorthosite complexes, southwest Greenland

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Archean anorthosite complexes are thought to form from mantle-derived melts that may have had little to no interaction with crust. Isotopic analysis of primary igneous phases preserved in these anorthosite complexes can be used to better define the isotopic signature of the Archean mantle and the petrogenetic histories of these complexes. The (~2.9 Ga) Fiskenaesset and Nunataarsuk anorthosite complexes are two distinct layered bodies found in southwest Greenland consisting of anorthosites, leucogabbros, gabbros and ultramafic rocks. Field and geochemical evidence suggests that the Fiskenaesset anorthosite complex was derived from mantle melt, emplaced as a sheet-like body into oceanic crust and subsequently intruded by granitoids and deformed. Despite amphibolite to granulite facies metamorphism affecting both the Fiskenaesset and Nunataarsuk anorthosite complexes, igneous mineralogy, textures and structures as well as contact relationships are preserved. Ca-rich (An_{75-90}), plagioclase megacrysts up to 30 cm in diameter are distinctive of Archean anorthosite complexes. Plagioclase megacrysts from the best-preserved, least-deformed anorthosites, leucogabbros and gabbros from both the Fiskenaesset and Nunataarsuk anorthostie complexes were chosen for *in situ* lead isotope analysis by laser-ablation multi-collector indictively coupled plasma mass spectrometry (LA-MC-ICPMS) ultilizing multiple ion counters to similtaneous measure all lead isotopes and ^{202}Hg. Prior to isotopic analysis, thin section petrography, BSE imaging and *in situ* trace element analyses were employed to aid in identifying the best-preserved primary igneous regions of each plagioclase megacryst. Results from the Nunataarsuk anorthosite complex indicate the parent magma is isotopically heterogeneous with μ-values ranging from 6.2 – 9.3 at 2.9 Ga. The parent magma to the Fiskenaesset complex is also heterogeneous with μ-values at 2.9 Ga between μ ~ 7- 10. In general, the Fiskenaesset complex has higher ^{207}Pb/^{204}Pb and ^{206}Pb/^{204}Pb ratios, suggesting crustal assimilation or replenishment from a more radiogenic source.

The F-Pb-Zn-(Ba-Sr) deposits in Northern Tunisia: A regional genetic model based on REE and Sr isotope geochemistries

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The F-(Ba-Pb-Zn) deposits of the Zaghouan district, NE Tunisia, consist of stratabound to stratiform bodies, either at the top or immediately above Jurassic reef limestones, along unconformity surfaces that separate them from the overlying sequence. Mineralization may also occur within fractures crosscutting the Jurassic limestone uplifted blocks and their overburden. In the Dome Zone, NW Tunisia, the Pb-Zn-(Ba-Sr) concentrations run along the contact between the Triassic salt domes and the unconformably overlying Upper Cretaceous formations, occurring as stratabound orebodies or lodes. Results show that in the district of Zaghouan, the REE patterns of the early fluorites (Stah, Oust, Jedidi) show a slight enrichment in LREE with respect to HREE, while the subsequent generations are depleted in LREE (Stah, Oust, Sidi Taya, Oued M'tak). However, all the REE patterns of the epigenetic dolomites as well as fluorite are characterized by both weak negative Ce and Eu anomalies, with the exception of the deposits in contact with the Triassic evaporites, where both fluorite (Sidi Taya) and celestite (Hammam Jedidi) patterns show strong positive Eu anomalies. In the Dome Zone, all the REE patterns of celestite display a strong positive Eu anomaly, along with a strong negative Ce one for the Boukhil, Lakhouat and Kebbouch deposits. The ^{87}Sr/^{86}Sr ratios (0, 708127 to 0, 710225±8), show that the Sr of the ore minerals is more radiogenic than that of the country rocks; the highest values being recorded for the Dome Zone celestites. These ratios indicate that the Paleozoic series is the preferred source of the fluids. The deposition of the ores results from the decrease in temperature along with the dissolving of carbonates (fluorite in the district of Zaghouan) or the mixing with a sulphate-rich solution associated with the Triassic evaporites (celestite in the Dome Zone).