

SRD043-01

会場:201A

時間:5月22日 09:00-09:15

イオン吸着型希土類鉱化作用の地球化学的・鉱物学的特徴：タイ王国プーケットの例

Geochemical and mineralogical characteristics of ion-adsorption type REE mineralization: A case of Phuket, Thailand

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イオン吸着型希土類 (REE) 鉱床は温暖・湿潤な気候で形成された風化花崗岩を鉱体としており、軽希土類 (LREE) のみならず重希土類 (HREE) 資源の重要な供給源である。REE は風化花崗岩中の粘土などの風化物に化学的に吸着しており、電解質溶液を用いたイオン交換反応によって回収されるという特徴がある。鉱床は中国南部でのみ開発されており、同様の鉱化作用は中国国外で局所的にしか確認されていない。イオン吸着型鉱床の成因、特に風化過程における REE の移動と吸着作用を明らかにするために、本研究ではタイ王国プーケット島の Kata Beach 花崗岩の上部に発達する風化殻において、REE の地球化学的挙動と REE 含有鉱物の産状について調べた。

Kata Beach 花崗岩はチタン鉄鉱系黒雲母花崗岩であり、I タイプと S タイプの中間の特徴を持ち (アルミナ飽和度 = 1.01), REE に富む (595 ppm)。REE は主にフッ素炭酸塩鉱物に含まれており、その次に褐簾石とチタン石に多く、少量のリン灰石とジルコンにも含まれる。原岩花崗岩の REE パターンは重希土類 (HREE) に比べて軽希土類 (LREE) に富み、Ce 異常を示さない。風化断面上部 (地表から 4.5 m 深まで) は正の Ce 異常が特徴的であり、低い REE 含有量 (178 - 548 ppm) と低い REE 吸着率 (吸着性 REE/全岩 REE × 100 = 34 - 68 %) を示す。対照的に風化断面下部 (4.5 m 深 - 12 m 深) は負の Ce 異常を持ち、高い REE 含有量 (578 - 1084 ppm) と高い REE 吸着率 (53 - 85 %) を示す。これらの REE 含有量、REE 吸着率、風化殻の厚さは中国のイオン吸着型 REE 鉱床に匹敵する。風化断面上部は、酸化的環境で Ce の多くが CeO₂ として固定され、Ce に乏しい REE が酸性土壌水中に溶脱した溶脱帯である。風化断面下部は、上部から運ばれた Ce に乏しい REE が風化物に吸着されるカラドフェーンなどの二次鉱物中に分配されることによって固定された集積帯である。REE の固定は土壌水に比べて pH が大きい地下水との接触に起因するものと考えられる。イオン吸着型 (REE 吸着率 > 50 % の風化花崗岩) においては、REE の多くが鉱物中ではなく負の Ce 異常を持つイオン吸着相に多い。その結果、イオン吸着型鉱床の全岩化学組成もまた負の Ce 異常を示す傾向がある。したがって、REE 吸着率と全岩化学組成が示す負の Ce 異常との間には正の相関が確認される。LREE と HREE の分別は、REE 含有鉱物の産状や風化物への吸着能力などに支配されるため簡単には説明できないが、La/Yb 比は LREE が HREE に比べ吸着されやすい傾向にあることを示す。

本研究結果は、花崗岩中に易溶解性の REE フッ素炭酸塩が産出することがイオン吸着型鉱床の形成にとって重要であることを示唆している。風化花崗岩の全岩化学組成が示す負の Ce 異常はイオン吸着型 REE 鉱化作用を示唆しており、鉱床探査に有効な地球化学的指標である。風化作用によって LREE が HREE に比べて吸着される傾向があるため、HREE に富むイオン吸着型鉱床を探査するためには HREE に富む原岩を特定する必要がある。

キーワード: 希土類, 花崗岩, 風化, 吸着, 鉱化作用, プーケット

Keywords: REE, granite, weathering, adsorption, mineralization, Phuket

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南米ウユニ塩原のリチウムの起源：Li 同位体比からの制約 Origin of lithium in Uyuni salt flat, Bolivia: constraints from Li isotope ratio

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リチウム (Li) イオン二次電池は高エネルギー密度・高電圧・高サイクル寿命等の優れた特性から広く利用されている。今後、さらに自動車をはじめとする電力貯蔵の需要によって、Li 資源獲得競争がさらに激化することが予測される。特にアタカマやウユニといった南米の塩湖に世界のリチウム埋蔵量の半分以上が集中するとされる。これら高 Li 含有量の南米の塩湖は、流入した数 ppmLi 以上と高 Li 含有量の河川水が効率的に蒸発することで形成されたと考えられている (Rettig et al., 1980; Alonso and Risacher, 1996)。例えば、ウユニ塩原に流れ込むグランデ川の河川水中の Li は 3.1±26ppmLi で、特にウユニ塩湖手前のデルタ地帯では 142±611ppmLi と極めて高濃度である (Rettig et al., 1980)。平均的な河川水の Li 濃度は 1.5ppbLi (Huh et al., 1998) であり、単純に雨水と岩石が地表付近の温度で接触させただけでは、南米の塩湖に流れ込む河川水の高 Li 濃度は説明することはできない。よって、南米の塩湖の Li の起源として、比較的高濃度に含まれる (1) 火山性流体や (2) 非火山性深部流体 (有馬型深部流体) が期待される。本研究では、特に南米の塩湖の 1 つであるウユニ塩湖の Li の起源を明らかにするために、ウユニ塩原の塩やかん水の Li 同位体組成を分析した。得られた分析結果を、火山性流体や有馬型深部流体や泥火山流体の Li 同位体組成と比較することで、ウユニ塩原の Li の起源に関する制約条件について議論する。

参考文献：

Rettig et al., 1980, Chem. Geol. 30, 57-79.

Alonso and Risacher, 1996, Revista Geol. Chile 23, 113-122.

Huh et al., 1998, GCA 62, 2039-2051.

キーワード: リチウム同位体, 地殻流体, ウユニ塩原, 火山性流体, 有馬型深部流体, 泥火山

Keywords: lithium isotope, geofluid, Uyuni salt flat, volcanic fluid, Arima-type deep fluid, mud volcano

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花崗岩質マグマ活動と金属鉱床形成の関係-中部日本、苗木花崗岩体の例- Relationship between granitic magmatism and formation of hydrothermal ore deposits: An example from Naegi granitic body

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Late Cretaceous to Paleogene granitoids located in the Inner zone of Southwest Japan are classified into three belts: the Sanin-Shirakawa belt, the Sanyo-Naegi belt and the Ryoke belt (Ishihara, 1971). W-Sn-Cu mineralizations are characteristically associated with the granitoids of the Sanyo-Naegi belt. Although numerous geochemical studies have been made for the hydrothermal ore deposits accompanied with these granitoids, the entire process from the granitic magma crystallization to the formation of hydrothermal ore deposits is still in debates.

The Naegi granitic body in the eastern part of the Sanyo-Naegi belt and related ore mineralizations have been investigated in this study to clarify detailed chemical characteristics of ore forming fluids for a future discussion of the process.

The Naegi granite intrudes into the felsic ignimbrites called the Nohi rhyolite. A high Rb/Sr ratio and an REE pattern with a distinct negative Eu anomaly were reported from the granite (Ishihara et al., 2001), implying its origin as a highly fractionated magma. The granitic body is associated with numerous hydrothermal ore deposits, from center of the body to the surroundings: (1) U-Th-REE-bearing pegmatites, (2) W-Sn-Bi-Be deposits, (3) W-As-Bi deposits, and (4) Cu-Pb-Zn-As deposits. Compositions and the physicochemical conditions of ore fluids have been estimated from detailed petrographic studies, EPMA analyses of minerals and LA-ICP-MS microanalyses of fluid inclusions for 14 elements (Na, K, Mn, Fe, Cu, Zn, Rb, Mo, Sn, Sb, Cs, W, Pb and Bi). Temporal relations of fluid inclusions trapped in quartz and topaz crystals were investigated by microscopic observations. Characteristics of the deposits are as follows:

(1) U-Th-REE-bearing granitic pegmatites are consisted of quartz, feldspar, biotite, muscovite and trace amounts of REE minerals. Fluid inclusions show homogenization temperatures of 200-470°C with salinities ranging 1-7wt%. Base metal (Cu, Pb, Zn) concentrations in fluid inclusions are 2-3 times higher than those of W, Sn and Bi concentration, while Sb concentrations are relatively stable.

(2) W-Sn-Bi-Be deposits are of wolframite-cassiterite-native bismuth-topaz-beryl-quartz veins in the granite and the ignimbrites. Fluid inclusions show homogenization temperatures of 250-430°C with salinities ranging 1-33wt%. Base metal concentrations are higher than those of W, Sn and Bi.

(3) W-As-Bi deposits are of wolframite-loellingite-arsenopyrite-native bismuth-quartz veins in the ignimbrites with silicification. Fluid inclusions show homogenization temperatures of 185-360°C with salinities ranging 1-7wt%. Base metal concentrations are higher than those of W, Sn and Bi.

(4) Cu-Pb-Zn-As deposits are of sulfide (Cu-Fe-As-Zn-S) -chlorite-quartz veins in the ignimbrites. Fluid inclusions show homogenization temperatures of 150-360°C with salinities ranging 1-6wt%. Almost all the metal concentrations, especially Cu, Pb, Zn, Fe, W and Mo, of fluid inclusions in (4) are 2-3 times higher than those of the other deposits.

Although the above physicochemical characteristics of the ore forming fluids have been clarified in the present study, much detailed examinations are required to investigate the entire process of ore formations and geneses and evolutions of the fluids.

キーワード: LA-ICP-MS, 流体包有物, 苗木花崗岩, レアメタル, ベースメタル, 熱水性鉱床

Keywords: LA-ICP-MS, fluid inclusion, Naegi Granite, rare metal, base metal, hydrothermal ore deposit

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浅海熱水湧出に関連したアンチモンに富み金を含む沈殿物の形成条件 Precipitation condition of antimony-rich and gold bearing hydrothermal minerals associated with shallow-water hydrotherm

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鹿児島湾北部、始良カルデラ内の水深 200m に位置する若尊火口においてチムニーを伴う活発な熱水活動が確認されており、これまでの研究で熱水端成分組成や熱水性石油を含む堆積物の存在が報告されている。本研究では、熱水性沈殿物を構成している主要鉱物の中に含まれる希土類元素 (REE) 等の微量成分を測定し、本熱水系における熱水性沈殿物の形成条件を検討することを目的とした。

本研究に用いた試料は、JAMSTEC 所有の無人潜水艇「ハイパードルフィン」およびその支援母船「なつしま」により、若尊火口北西部に位置する White cone と呼ばれるチムニー様の熱水性沈殿物とその沈殿物の下のマウンド様地形をなす部分から採取した。チムニーは熱水流路側と外縁部に区別し、マウンドをなす熱水性沈殿物の stibnite からなる硫化物塊 (直径数 10cm の礫状) とともに分析試料とした。それぞれの試料は塩抜き後に常温で乾燥させ、分析に供した。

顕微鏡観察と EPMA 分析によりチムニー外縁部と硫化物塊から少量の barite を、全ての試料から stibnite と多量の talc を確認し、これらの鉱物に含まれる Ag、Au、REE の濃度を測定した。

硫化物塊の barite から、コンドライトで規格化した REE パターンが得られた。軽い REE に富み正の Eu 異常を示すそのパターンは、多くの海底熱水系に共通する熱水の REE パターンと同じであり、これは barite の REE が熱水に由来すること、そして試料 C が海水の少ない還元的環境で生成したことを表す。また、barite と talc に含まれる REE の総量は他試料より硫化物塊で多い。鉱物の生成速度が速ければ含まれる REE が少なくなると考えられているため、海底での海水との激しい混合で沈殿したチムニーとは異なり、硫化物塊は海底下での穏やかな混合でゆっくり沈殿したと考えられる。

鉱物中の Ag、Au 濃度を測定した結果、barite と talc での濃集は見られなかったが、stibnite では最大で Ag を 260ppm、Au を 74ppm 検出した。試料毎に比較すると、チムニーの熱水流路側と硫化物塊で Ag と Au の濃度が高く、チムニー外縁部に比べ 10 倍以上の差を示した。talc の酸素同位体比を用いた地化学温度計より、熱水流路側で 195 °C、外縁部で 174 °C と、talc 生成温度に違いが認められたことから、硫化物塊の talc の酸素同位体比の分析は行っていないが、この硫化物塊の形成温度はチムニー流路側に近いものと考えられる。

以上のことから、マウンド地形をなす stibnite からなる硫化物塊は海底下で形成したものが時折起こる激しい火山活動の結果、海底面に噴出したものと期待される。もしそうなら、この硫化物塊は海底下に広く分布していることが期待でき、チムニーが崩壊して形成するマウンドに比べ、アンチモンと金の大きな埋蔵量が期待できるかも知れない。

キーワード: 浅海熱水, 熱水性沈殿物, アンチモン, 金, レアアース

Keywords: shallow-water hydrothermal activity, hydrothermal precipitation, Antimony, gold, REE

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Bazman epithermal gold-silver mineralization, Sistan and Baluchestan province, Iran Bazman epithermal gold-silver mineralization, Sistan and Baluchestan province, Iran

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The study area is located 160 km northwest of Iranshar in Sistan and Baluchestan province, southeast of Iran. The area is geologically located in the SE-trending part of the Central Iran magmatic arc zone known as Sahand-Bazman magmatic zone. This zone extends to Turkey to the northwest and to Pakistan to the southeast. The Arabian Plate was subducted and collided beneath Eurasian plate to form a few arc-trench systems in Turkey, Iran and west of Pakistan from Cretaceous to recent days. Among them is the active Makran subduction zone formed by the convergence of the Arabian plate and Lut block in Iran and Helmand block in Afghanistan. The Neogene volcanoes of Bazman, Taftan in Iran and Sultan in Pakistan have spatial link with this subduction zone. Epithermal mineralization occurs in Sahand-Bazman magmatic zone of Iran as a result of the Neogene volcanism and related processes. The study area is located in the northeastern slopes of Quaternary Mount Bazman. Geology of the mineralized area consists of andesite, andesitic basalt, basalt, olivine basalt, and pyroclastic rocks that had all been erupted from the Mount Bazman. Preliminary studies revealed considerable potential of gold and silver mineralization in the area. Mineralization occurs in a vast area and ore grade is high (up to 16 ppm Au and 120 ppm Ag). The mineralization mainly occurs in and around a few veins. The mineralized veins strike N 25 to 35 E and vary from 50 cm to 2 m in width and from 500 m to over 1000 m in strike length. The veins are generally crustiform banded to brecciated with colloform to cockade banding. Pure white and milky quartz and chalcedony occur in central part of the veins (along axial line of the veins). The volcanic rocks close to the milky pure quartz and chalcedony veins (seems as halo) are brecciated and strongly silicified and contains abundant pyrite. Phyllic, argillic and propylitic alteration occur peripheral to the veins. Mineralization is associated with the pyrite-rich brecciated parts around the axial line of the veins. Other sulfides are chalcopryrite, covellite, silver-rich covellite, galena, sphalerite, tetrahedrite and an unknown Ag-rich phase. Quartz is main gangue mineral and occurs as large euhedral to microcrystalline grains. Chalcedony occurs with quartz periodically in crustiform banded veins. Other gangue minerals are adularia, calcite and phyllosilicates. The brecciation is first stage followed by silica precipitates as cockade structure. Finally crustiform quartz and chalcedony were formed along central part of the veins. Pyrite is the most common sulfide. It occurs in every rock samples. Chalcopryrite and Ag-minerals occur as late veinlets. Gold (less than 1 micron up to 2-3 microns) occurs in the hydrothermal breccias of final phase. This paper will discuss many data that obtained by polarization microscope, XRD, XRF and EPMA. Keywords: Bazman deposit, epithermal gold-silver mineralization, Neogene volcanism, hydrothermal breccias, XRD, XRF and EPMA

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Hydrothermal alteration and mineralization in Abdar Caldera, Kerman province, Iran Hydrothermal alteration and mineralization in Abdar Caldera, Kerman province, Iran

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The Abdar Caldera is located in 35 km northeast of Shaher-e-Babak, southeast of Iran. This area is geologically a part of northwest of the Dehaj-Sardueih Belt (a part of Uromieh-Dokhtar magmatic arc) that consists of a thick sequence of Eocene volcanic, pyroclastic and volcanoclastic rocks and Oligo-Miocene intrusions. Post-collisional processes also produced adakitic and alkaline rocks in this zone during the Plio-Pleistocene and Plio-Quaternary. Local geology consists of Eocene fine-grained tuffs, andesitic tuff, andesite, andesitic basalt, trachyandesite and basalt, and Oligo-Miocene, diorite and granodiorite. The above rocks are mainly porphyry in texture and contain plagioclase, K-feldspar, quartz, biotite and hornblende and minor titanite, magnetite, apatite and zircon. The volcanic and pyroclastic rocks were cut by numerous quartz veins in the area. Every vein surrounded by an intense alteration halo. The quartz veins show banding and comb structures in their central part where contains large (up to 3 cm) pyramidal quartz. The quartz crystals decrease in size outward. Phyllic and propylitic alterations occur at the periphery of the veins. Although hydrothermal alterations occur around the veins in a vast area but the veins are weakly mineralized. Most of the assemblages and fluid inclusions can be assigned to epithermal alteration and mineralization. Mineralization occurs as sulfides and oxides. The sulfides are pyrite, galena, sphalerite, chalcopyrite, stibnite, tetrahedrite, tennantite, arsenopyrite and covellite. The oxides are hematite, magnetite, pyrolusite and iron hydroxides. The gangue minerals are mainly quartz, barite, calcite and phyllosilicates. In this paper we document and interpret petrography and geochemistry of volcanic rocks using microscopic and XRF data. Alteration mineralogy checked by XRD. Sulfide and oxide minerals were analyzed by EPMA and the mineral chemistry will be discussed in this paper.

Keywords: Abdar Caldera, Oligo-Miocene intrusions, porphyry copper, hydrothermal alteration, Iran

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拓洋第5海山に分布するマンガンクラストの地球化学的特徴およびレアメタル資源ポテンシャル評価

Major and trace elements geochemistry of Co-rich ferromanganese crust from the #5 Takuyo Seamount, northwestern Pacific

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Large amount of hydrogenetic cobalt-rich ferromanganese (Fe-Mn) crusts are known to occur on the surface of seamounts or ocean plateaus in the Pacific Ocean. The Fe-Mn crust is one of the most promising seafloor mineral resources enriched in not only Cu, Co, and Ni but also REE and PGE. Here we report the geochemical features of the Fe-Mn crusts collected from the #5 Takuyo Seamount, which is located 120 km west from the Minami-torishima Island, northwestern Pacific.

The amounts of trace elements in the crusts are controlled by the MnO₂(or Fe₂O₃) content: Those of Ni, and Cu are roughly proportional to the MnO₂ contents, while REE, especially HREE, show strong positive correlation with the Fe₂O₃ content. The Mn/Fe ratios decrease toward the surface of the crusts in all samples taken at various water depths between 965m and 2987m. The Fe/Mn ratios of crust samples from the surface part within 3 mm tend to be higher along with the increase of water depths, which is similar to the vertical profile of dissolved oxygen amount in the Pacific Ocean. The crusts are characterized by high total REE contents (La-Lu) varying from 1267 to 2168 ppm (average 1660 ppm). PAAS-normalized REE patterns show flat patterns with conspicuous positive Ce anomalies. We believe that the Fe-Mn crusts are promising alternative as the source of HREE because of the high REE contents and the large ore reserve.

キーワード: マンガンクラスト, 微量元素, 拓洋第5海山, レアメタル・レアアース, 資源ポテンシャル評価

Keywords: ferromanganese crust, minor elements, #5 Takuyo Seamount, REE, resource evaluation

SRD043-P02

会場:コンベンションホール

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宮城県宮崎鉱山の鉱化作用 特に梵天石膏鉱床について

Mineralization of Miyazaki Ore Deposits, Miyagi Prefecture, Japan -Especially about Bonten Gypsum Deposit-

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宮崎鉱山は宮城県北西部の宮崎町に位置し、いくつかの石膏鉱床とマンガン鉱床、鉛・亜鉛鉱床が存在する。このうち梵天石膏鉱床は初期中新世の流紋岩質凝灰岩中に胚胎している堆積鉱床であるとされる。付近の凝灰岩は7~10°南方に傾斜し、安山岩の円礫を含む凝灰岩が、鉱床の上位を占めている(安斎, 1957)。鉱床の中心は著しい粘土化変質を被っており、その中に15cmに及ぶ繊維石膏が産出する。本研究では初期中新世の梵天石膏鉱床、梵天マンガン鉱床、後期中新世の湯の倉鉱床を対象とした。

本研究では各鉱床および鉱床周辺の露頭よりサンプルを採取し、X線回折法(XRD)、流体包有物の加熱冷却実験、EPMAを用いた閃亜鉛鉱の定量分析を行い生成環境の解明を目的とした。

梵天石膏鉱床の粘土中には石英、黄鉄鉱、閃亜鉛鉱、粘土鉱物としてセリサイト、ハロイサイトが検出される。鉱床近傍の凝灰岩質母岩からは黄鉄鉱、アナルサイト、モルデナイト、スメクタイトが認められるが、鉱床から離れるにつれてあまり検出されなくなる。また、石膏中の流体包有物の加熱冷却実験より、均質化温度は50-60℃、塩濃度は4.9-3.2wt%という値を得た。周辺の地質状況から判断して圧力補正を加えてもおよそ70℃以下の温泉作用によって生じたものと考えられる。このことは硬石膏が全く産しないことと調和的である(例えば木下, 1924)。Caの起源については温泉作用によるスメクタイト化の過程で周囲の地層の岩石から溶出したと考えられ、Sについては本鉱床が海底堆積中の沈殿鉱床であれば海水に由来すると考えられ、堆積後の二次変質により生じたものであれば温泉熱水(下位層中の黄鉄鉱等の溶出など)に由来する可能性がある。

一方、梵天石膏鉱床のやや上位の魚取沼層には梵天マンガン鉱床が胚胎しこのマンガン鉱床からはパイロルーサイト、ヘマタイトといった酸化的環境で生成する鉱物が検出された。また、さらに上位の永志田層に胚胎する湯の倉鉱床は鉛・亜鉛鉱床で、方鉛鉱、閃亜鉛鉱、黄鉄鉱、黄銅鉱、重晶石が産する。湯の倉鉱床の石英、重晶石、閃亜鉛鉱の流体包有物についての均質化温度を求めたところ、120-200℃という温度が得られた。鉱床以外でも粘土化変質や岩石中に黄鉄鉱が含まれる露頭が数か所存在し、宮崎地域は広域的にまた、異なる性質の熱水(温泉)作用を幾度も被っていたことが示唆される。

SRD043-P03

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豊羽鉱床における脈石石英の酸素同位体比

Oxygen isotopic variation of vein quartz at the Toyoha deposit: a reconnaissance study

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The Toyoha deposit, an epithermal polymetallic vein-type deposit, was formed by two-stages mineralization. The veins in the northwestern part of the deposit were formed early mineralization (early-stage veins), while southeastern veins were formed by late mineralization (late-stage veins).

The oxygen isotope ratios of vein quartz were obtained for major veins. Delta ¹⁸O values of quartz from early-stage veins (Rebun, Rishiri, 3rd Chikugo, Bizen and Tajima veins) are +2.8 to +5.5 per mil, and those of late-stage veins (Izumo, Sorachi, Iwami, Shinano veins) are +3.3 to +8.8 per mil. The delta values of late-stage veins are higher than those of early-stage veins. Calculated delta ¹⁸O values of ore-forming fluid responsible for the veins are -9.3 to -4.2 per mil for early-stage veins, and -7.2 to +1.6 per mil for late-stage veins. These values are between local meteoric water (-11 per mil) and primary magmatic fluid (+5.5 to +9.5 per mil). The variation of delta values of ore-forming fluid can be explained by the difference of mixing ratio of meteoric water and magmatic fluid.

Previous mineralogical and geochemical studies have revealed that ore-forming conditions for early-stage and late-stage veins were distinctive. Early-stage veins were formed under relatively high oxygen fugacity, and ore-forming fluid was supplied by magnetite-series magma. Late-stage veins were formed under reduced condition, and have polymetallic nature. Difference of ore-forming conditions was explained by the model, where magnetite-series magma responsible for early-stage veins assimilated sedimentary rock then changed to reduced nature and supplied ore-forming fluid of late-stage veins (Ohta, 1995). If assimilation of sedimentary rock occurred, delta ¹⁸O values of bulk rock would shift to heavier. Then oxygen isotopic data of this study supports the model proposed by Ohta (1995).

キーワード: 酸素同位体, 豊羽鉱床, 鉱液, 石英

Keywords: oxygen isotope, Toyoha deposit, ore-forming fluid, quartz

SRD043-P04

会場:コンベンションホール

時間:5月22日 10:30-13:00

カムチャツカ弧, アバチャ火山産かんらん岩捕獲岩中の白金族元素に富むクレイ PGE-rich clays in a mantle peridotite xenolith from Avacha volcano, the southern Kam- chatka arc

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Platinum-group elements (PGE) have strongly refractory features within the mantle peridotite/melt system, and favor sulfides or metals (such as the earth's core). In addition, these PGE are not mobile during weathering and/or low temperature alteration processes. We found unusually high-Ni, Fe clays in a highly metasomatized mantle peridotite xenolith (sample #159) from Avacha volcano, the southern Kamchatka arc. The sample #159 contains Ni-rich spots, composed of mantle minerals with high-Ni contents: NiO contents of olivine, orthopyroxene, and chromian spinel is up to 5.3 wt%, 1.1 wt% and 1.1 wt%, respectively, there. The high-Ni, Fe clays are located at the center of the Ni-rich spot, and the Ni content of minerals decreases from the center outward. The high-Ni, Fe clays are brownish-yellowish in color under the microscope. Some of the clays are also quite rich in S (? 66,000 ppm). The Ni/(Fe+Ni) atomic ratio of the clay is highly changeable (0-0.7), and does not show any correlation with the S content. However some incompatible trace elements (Nb, Sr, Zr and Ti) are strongly depleted in the high-Fe, Ni clays, their rare earth element features are similar to those of Avacha silicic glasses and/or the host andesite. In addition, some clays show extremely PGE enriched features, and the concentrations of Os, Ir and Ru in the clays are 106 times higher than the chondrite values. Geochemical features of minerals around the high-Ni, Fe clay clearly indicate that the clays are an alteration product from the metasomatic agent that drastically enhanced the Ni content of surrounding minerals. Possible candidate of the metasomatic agent is sulfide, but we can deny the possibility because there is no Ni enrichment halo around intact sulfides in sample #159. We propose that the high-Ni, Fe clays were peculiar silicate melt or silicate-bearing aqueous fluid with high concentrations of Ni, Fe, S and PGE, and it possibly plays an important role in mobilization of transition elements and PGE within the mantle wedge.

キーワード: 白金族元素, 遷移元素, かんらん岩捕獲岩, マントルウェッジ

Keywords: platinum-group elements, transition elements, peridotite xenolith, mantle wedge

SRD043-P05

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Geochemical, Petrological and Environmental Tectonomagmatic dykes in north of Rabor (Southeast of Iran)

Geochemical, Petrological and Environmental Tectonomagmatic dykes in north of Rabor (Southeast of Iran)

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The study area is inclusive some dykes located in the Kerman province, 10 km north of Rabor. Geologically the area is in the Central Iranian, located volcano-plutonic zone of Urumieh- Dokhtar and southeastern Dehaj- sarduiyeh belt. These dykes have partly ordered array with process dominant north- south and are thickness intermediate 4 meters. These rocks are andesite and dacite in composition with porphyric texture at age Miocene- Pliocene that intruded in the Eocene pyroclastic rocks and Miocene sedimentary units. phenocryst minerals and basic constitutive this rocks are composed of plagioclase, amphibole, biotite and somewhat pyroxene. These minerals somewhen attendants with vitrophyr are in background these rocks. Phenocryst this rocks special plagioclase minerals show disequilibrium textures such as oscillatory zoning, soluble and sieve texture. Peer this disequilibrium structures more due pressure decrease and changing pressure water vapor is in the season those form. In microscopic section dominant texture porphyric this rocks, but in those may observe microlitic porphyric, hyaloporphyratic and microgranular textures. Based on geochemical studies, denote that inverse increase content silica oxide, alkali element oxides, contents Rb, Ba, Sr, Pb, elements increased and other oxides and V, Y, Co, Ni, elements decreased. Changing positive Ba, Rb, U, Th, Pb, Ce, Cs, La and Sr elements, negation V, Cr, Ni, Yb elements this rocks than chondritic normalization and primitive mantle normalization may due work fluid subduction zone and or differentiation minerals such as pyroxene and hornblende. Beside negation anomaly Nb and Ta elements this rocks probably product those contamination with crustal material. Changing increasing ratios Th/Zr, Ce/Y with stable ratio Zr/Nb in the rocks, probably due efficacy dehydration slab subduction is in the mantle wedge metasomatism. Geochemical instance various such as high LREE contents this rocks rather than HREE contents and high LILE/HFSE ratios show those probably formed in the seat continental margin correlate subduction and melting mantle wedge due dehydration slab subduction. Field survey, geochemical and structural this dykes show that probably fractions result activity Sarduiyeh and Dehshir- Baft fault adequate in those forming.

Keywords: Iran, Kerman, Rabor, Petrology, Geochemistry, Andesitic dykes

SRD043-P06

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時間:5月22日 10:30-13:00

Geology, mineralization and alteration in Nehbandan Mahor Mine, West Lut Block of Iran

Geology, mineralization and alteration in Nehbandan Mahor Mine, West Lut Block of Iran

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The study area is situated within the Lut Block 130 Km east of Nehbandan. The oldest exposed rocks are cretaceous limestone and conglomerate. Dacite-rhyodacite lava and pyroclastic rocks erupted over oldest rocks. Volcanic activities in Tertiary time consist of andesite, trachyandesite, basalt-andesite, dacitic tuff and rhyolite in composition. Plutonic rocks mainly consist of granite, diorite, granodiorite and monzonite. Volcanic rocks are K-rich calc-alkaline. The pattern of spider diagram in comparison with mantle, they are enriched in Cs, Ba, Rb, and Zr and depleted in Nb, K and Ti. In this area alteration zones are silicified, propylitic, sericitic and argillic. Mineralization associated with volcanic rocks show signs of Ag, Au, Zn, Pb and Cu geochemical exploration anomalies.

キーワード: Nehbandan, Geochemical exploration, Alteration, Mineralization, Mahor, Iran

Keywords: Nehbandan, Geochemical exploration, Alteration, Mineralization, Mahor, Iran