Fri. Sep 13, 2024

Oral presentation | T1: Comprehensive understanding of the crustal evolution and resource exploration in Asia (Symposium)

9:00 AM - 12:00 PM JST | 12:00 AM - 3:00 AM UTC | ES Hall Higashiyama Campus

T1: Comprehensive understanding of the crustal evolution and resource exploration in Asia (Symposium)

Chairperson:Yasuhito Osanai, Masaaki Owada

9:00 AM - 9:25 AM JST | 12:00 AM - 12:25 AM UTC

[T1-01] Decarbonized Society and Essential Metal Resources

「招待講演」

*YOSHITAKA HOSOI[1] (1. JICA)

9:25 AM - 9:50 AM JST | 12:25 AM - 12:50 AM UTC

[T1-02] Japan's current approach to securing mineral resources

「招待講演」

*Kazuhiro YONEMURA[1] (1. JOGMEC)

9:50 AM - 10:15 AM JST | 12:50 AM - 1:15 AM UTC

[T1-03] Critical metal potentiality of Mongolia

「招待講演」

*Sereenen Jargalan[1], M. Arvinzun[2] (1. Mongolian University of Science and Technology, 2. Mongolian Society of Economic Geologists)

10:15 AM - 10:30 AM JST | 1:15 AM - 1:30 AM UTC

[2Lecture-101-06-4add] 休憩

10:30 AM - 10:55 AM JST | 1:30 AM - 1:55 AM UTC

[T1-04] Geology, sedimentation environment of the
Ovoot khural coal bearing depression, in South Mongolia

「招待講演」

*Magsarjav Ochirbat[2], Sereenen Jargalan[1] (1. Mongolian University of Science and Technology, 2. Mongolian Society of Economic Geologists)

10:55 AM - 11:20 AM JST | 1:55 AM - 2:20 AM UTC

[T1-05] Insights into the mineralogical characteristics of Li-enriched metasomatic albitite from the Iwagi islet, SW Japan

「招待講演」

*Mariko NAGASHIMA[1], Teruyoshi IMAOKA[1] (1. Yamaguchi Univ. Sci.)

11:20 AM - 11:45 AM JST | 2:20 AM - 2:45 AM UTC

[T1-06] Ion adsorption-type REE deposits: the source of HREE

「招待講演」

*Yasushi Watanabe[1] (1. Akita Univ. Int. Res. Sci.)

11:45 AM - 12:00 PM JST | 2:45 AM - 3:00 AM UTC

[2Lecture-101-06-8add] 休憩

Oral presentation | S2: Water Rock Interaction (Special Session)

9:00 AM - 12:00 PM JST | 12:00 AM - 3:00 AM UTC | ES024 Higashiyama Campus

S2: Water Rock Interaction (Special Session)

Chairperson:Noriyoshi Tsuchiya

9:00 AM - 9:05 AM JST | 12:00 AM - 12:05 AM UTC

[2Lecture-201-10-1add] コンビーナ挨拶

9:05 AM - 9:35 AM JST | 12:05 AM - 12:35 AM UTC

[S2-01] Slab-derived fluid infiltrating back-arc mantle

「招待講演」

*Junji YAMAMOTO[1] (1. Kyushu University)

9:35 AM - 9:50 AM JST | 12:35 AM - 12:50 AM UTC

[S2-02] Geochemical diversity and significance of orthopyroxene pseudomorphs in ultramafic rocks derived from mantle wedges

「発表賞エントリー」

*Takumi Wani[1], Yuji Ichiyama[1], Akihiro Tamura[2], Tomoaki Morishita[2] (1. Chiba University, 2. Kanazawa University)

9:50 AM - 10:05 AM JST | 12:50 AM - 1:05 AM UTC

[S2-03] Petrogenesis and significance of ophicarbonate in the Kanasaki serpentinite body (Kanto Mountains, Central Japan)

*Ryosuke OYANAGI[1,2], Hikaru Sawada[3,2], Qing Chang[2], Madhusoodhan Satish-Kumar[4] (1. Kokushikan Univ., 2. JAMSTEC, 3. Toyama Univ., 4. Niigata Univ.)

10:05 AM - 10:20 AM JST | 1:05 AM - 1:20 AM UTC

[S2-04] CO_2 mineralization in andesitic rocks revealed by hydrothermal experiments and thermal analyses

*Otgonbayar DANDAR[1], Atsushi Okamoto [1], Masaoki Uno[1], Miku Takeya[2] (1. Tohoku University, 2. INPEX)

10:20 AM - 10:30 AM JST | 1:20 AM - 1:30 AM UTC

[2Lecture-201-10-6add] 休憩

10:30 AM - 10:45 AM JST | 1:30 AM - 1:45 AM UTC

[S2-05] Massive and foliated serpentinites from the Udonohana ultramafic body, Western Ehime Prefecture, Japan.

「発表賞エントリー」

*Yui Joguchi[1], Satomi Enju[1] (1. Ehime Univ. Sci. &Egn.)

10:45 AM - 11:00 AM JST | 1:45 AM - 2:00 AM UTC

[S2-06] "Element transport and magnetite decomposition during alteration of the gabbroic vein in serpentinite body from the Bayankhongor ophiolite, Mongolia"

「発表賞エントリー」

*Nomin Tumurkhuu[1], Otgonbayar Dandar[1], Masaoki Uno[1], Manzshir Bayarbold[1], Atsushi Okamoto[1] (1. Tohoku University)

11:00 AM - 11:15 AM JST | 2:00 AM - 2:15 AM UTC

[S2-07] Dissolution reprecipitation - re-equilibration process of feldspar in heat source granite and supercritical geothermal reservoir using borehole samples from Kakkonda granite

「発表賞エントリー」

*Masayoshi Hoshida[1], Masaoki Uno[1], Satoshi Matsuno[1], Astin Nurdiana[1], Noriyoshi Tsuchiya[2,1] (1. Tohoku University, 2. National Institute of Technology, Hachinohe College)

11:15 AM - 11:30 AM JST | 2:15 AM - 2:30 AM UTC

[S2-08] Formation mechanism of "cleavable olivine"

*Jun-ichi ANDO[1,2], Naotaka Tomioka[3,2], Hirokazu Maekawa[4] (1. Hiroshima Univ., 2. Hiroshima Univ., HiPeR, 3. JAMSTEC, 4. Osaka Metropolitan Univ.)

11:30 AM - 11:45 AM JST | 2:30 AM - 2:45 AM UTC

[S2-09] Experimental study to elucidate sulfide chimney development process and power generation characteristics in submarine hydrothermal systems

「発表賞エントリー」

*Kentaro Toda[1], Atsushi Okamoto[1], Dandar Otgonbayar[1], Misaki Takahashi[1], Yoshinori Sato[1] (1. Tohoku Univ. Environmental Sci)

11:45 AM - 12:00 PM JST | 2:45 AM - 3:00 AM UTC

[S2-10] Carbonation of Mantle Peridotite: An Approach From Fluid Inclusion Analysis and Hydrothermal Experiments

*Tatsuhiko KAWAMOTO[1] (1. Shizuoka University)

Oral presentation | S3: Rheology and Material Transfer in Mantle and Crust (Special Session)

9:00 AM - 10:00 AM JST | 12:00 AM - 1:00 AM UTC | ES025 Higashiyama Campus

S3: Rheology and Material Transfer in Mantle and Crust (Special Session)

Chairperson:Miki Tasaka(Shizuoka University)

9:00 AM - 9:15 AM JST | 12:00 AM - 12:15 AM UTC

[S3-10] Rheological evolution of olivine during formation of the mantle lithosphere

*Katsuyoshi MICHIBAYASHI[1,2], Takeo Okuwaki[1], Itsuki Natsume[3] (1. Nagoya University, 2. JAMSTEC, 3. Kanagawa Prefectural Museum of Natural History)

9:15 AM - 9:30 AM JST | 12:15 AM - 12:30 AM UTC

[S3-11] Three-dimensional location analysis on acoustic emissions and faults in olivine under pressure-temperature conditions of subducting slabs

*Tomohiro OHUCHI[1], Masato Hoshino[2], Kentaro Uesugi[2], Satoshi Okumura[3], Yuji Higo[2], Noriyoshi Tsujino[2], Sho Kakizawa[2] (1. GRC, Ehime Univ., 2. JASRI, 3. Tohoku Univ Sci.)

9:30 AM - 9:45 AM JST | 12:30 AM - 12:45 AM UTC

[S3-12] In-situ observation of grain growth and fluid movement using camphor as a rock analogue

*Junichi Fukuda[1] (1. Dept. Geos. Osaka Metrop. Univ.)

9:45 AM - 10:00 AM JST | 12:45 AM - 1:00 AM UTC

[S3-13] Mantle carbonation through seawater penetration along the outer-rise faults

*Ikuo KATAYAMA[1], Keishi Okazaki[1], Atsushi Okamoto[2] (1. Hiroshima University, 2. Tohoku University)

Oral presentation | R4: Mineral sciences of the Earth surface

10:15 AM - 12:00 PM JST | 1:15 AM - 3:00 AM UTC | ES025 Higashiyama Campus

R4: Mineral sciences of the Earth surface

Chairperson:Hiroshi Sakuma(NIMS), Satoko Motai(Yamagata Univ.), Jun Kawano(Hokkaido University)

10:15 AM - 10:35 AM JST | 1:15 AM - 1:35 AM UTC

[R4-01] Understanding and application of spherical concretions: A new durable sealing material learnt from nature

「招待講演」

*Hidekazu Yoshida[1] (1. Nagoya University)

10:35 AM - 10:50 AM JST | 1:35 AM - 1:50 AM UTC

[R4-02] Color change process of Hiroshima granite due to weathering

*Tadashi YOKOYAMA[1], Yuka Inkyo, Masahiro Kaibori[1] (1. Hiroshima University)

10:50 AM - 11:05 AM JST | 1:50 AM - 2:05 AM UTC

[R4-03] Crystallographic preferred orientation and grain size of apatite in terrestrial mammalian bones

*Kyoko N. MATSUKAGE[1], Momoka Ide[2], Masaya Kurata[2], Yu Nishihara[3] (1. Teikyo Univ. of Sci. Natural and Environmental Sci., 2. Teikyo Univ. of Sci. Aminal Sci., 3. Ehime Univ.)

11:05 AM - 11:20 AM JST | 2:05 AM - 2:20 AM UTC

[R4-04] Microscopic distribution of sodium in biogenic aragonite

*Taiga Okumura[1], Michio Suzuki[2], Alberto Perez-Huerta[3], Eshita Samajpati[3], Toshihiro Kogure[1] (1. UTokyo Sci., 2. UTokyo Agri. Life Sci., 3. Univ. Alabama Geol. Sci.)

11:20 AM - 11:40 AM JST | 2:20 AM - 2:40 AM UTC

[R4-05] Structural and functional analyses of organic matrices regulating the formation of minerals in biomineralization.

「招待講演」

*Michio Suzuki[1] (1. UTokyo)

11:40 AM - 11:55 AM JST | 2:40 AM - 2:55 AM UTC

[R4-06] Aragonite formation from amorphous calcium carbonate (ACC) with addition of *n*-butylamine

*Hiroyuki KAGI[1], Kensuke Muraoka[1] (1. The University of Tokyo)

Oral presentation | T1: Comprehensive understanding of the crustal evolution and resource exploration in Asia (Symposium)

Fri. Sep 13, 2024 9:00 AM - 12:00 PM JST | Fri. Sep 13, 2024 12:00 AM - 3:00 AM UTC | ES Hall Higashiyama Campus

T1: Comprehensive understanding of the crustal evolution and resource exploration in Asia (Symposium)

Chairperson:Yasuhito Osanai, Masaaki Owada

9:00 AM - 9:25 AM JST | 12:00 AM - 12:25 AM UTC

[T1-01] Decarbonized Society and Essential Metal Resources

「招待講演」

*YOSHITAKA HOSOI[1] (1. JICA)

9:25 AM - 9:50 AM JST | 12:25 AM - 12:50 AM UTC

[T1-02] Japan's current approach to securing mineral resources

「招待講演」

*Kazuhiro YONEMURA[1] (1. JOGMEC)

9:50 AM - 10:15 AM JST | 12:50 AM - 1:15 AM UTC

[T1-03] Critical metal potentiality of Mongolia

「招待講演」

*Sereenen Jargalan[1], M. Arvinzun[2] (1. Mongolian University of Science and Technology, 2. Mongolian Society of Economic Geologists)

10:15 AM - 10:30 AM JST | 1:15 AM - 1:30 AM UTC

[2Lecture-101-06-4add] 休憩

10:30 AM - 10:55 AM JST | 1:30 AM - 1:55 AM UTC

[T1-04] Geology, sedimentation environment of the
Ovoot khural coal bearing depression, in South Mongolia

「招待講演」

*Magsarjav Ochirbat[2], Sereenen Jargalan[1] (1. Mongolian University of Science and Technology, 2. Mongolian Society of Economic Geologists)

10:55 AM - 11:20 AM JST | 1:55 AM - 2:20 AM UTC

[T1-05] Insights into the mineralogical characteristics of Li-enriched metasomatic albitite from the Iwagi islet, SW Japan

「招待講演」

*Mariko NAGASHIMA[1], Teruyoshi IMAOKA[1] (1. Yamaguchi Univ. Sci.)

11:20 AM - 11:45 AM JST | 2:20 AM - 2:45 AM UTC

[T1-06] Ion adsorption-type REE deposits: the source of HREE

「招待講演」

*Yasushi Watanabe[1] (1. Akita Univ. Int. Res. Sci.)

11:45 AM - 12:00 PM JST | 2:45 AM - 3:00 AM UTC

[2Lecture-101-06-8add] 休憩

Decarbonized Society and Essential Metal Resources

*YOSHITAKA HOSOI[1]

1. JICA

Measures to curb the rise in global temperature include energy conservation, low-carbon energy (promotion of the use of wind power, solar power generation, geothermal power generation, etc.), and conversion of energy use (electrification, use of hydrogen, etc.).Here, when trying to reduce the carbon value of energy, it became clear that special metals were needed in unusually large quantities. For example, solar power generation requires gallium and cadmium as solar cells, in addition to copper and aluminum. Wind turbines use generators that use permanent magnets composed of rare earth minerals such as neodymium and dysprosium. Geothermal power generation requires titanium for heat-resistant wells, and chromium is also needed for other technologies. Storage batteries are also needed for electric vehicles and wind power generation, but they also require lithium and vanadium. The demand for electric vehicles is expanding rapidly in various countries, and the demand for storage batteries will expand proportionally.According to the World Bank's 2020 report, if we forecast the amount of production required for 2050 compared to the production volume in FY2018, the amount of graphite 494%, lithium 488%, cobalt 460%, indium 231%, vanadium 189%, etc. It has become necessary. This is not the only metal needed. The World Bank lists 17 mineral types. As for the reserves, production, and consumption of these metals, the author considered the priority countries. Many of these resources are found in developing countries.Here, we consider the challenges of securing critical mineral resources.In addition, there are concerns that many of these limited producer countries are politically unstable, environmental pollution associated with mine development is a problem, and social turmoil occurs frequently.JICA is committed to solving the problems of resource-rich developing countries.

Keywords: Decarbonization, Essential metals, Mining challenges

Japan's current approach to securing mineral resources

*Kazuhiro YONEMURA[1]

1. JOGMEC

The global green transformation (GX) is intensifying competition to secure Critical Minerals for batteries, semiconductors, and other applications. In particular, not only existing resource companies but also automakers and battery manufacturers around the world are accelerating their efforts to secure those material source to lithium, nickel, and graphite, which are used in electric vehicles. In some cases, there are concerns about economic security risks due to the ubiquity of supply source and midstream processes for these mineral resources.

Under these circumstances, efforts to diversify supply sources and midstream processes are being promoted worldwide, including financial support from governments and institutional design. There is also a growing movement to promote sustainable resource development by high level ESG standards.

In Japan, based on the "Storage Battery Industrial Strategy" and the "Policy for Initiatives to Ensure Stable Supplies of Critical Minerals" based on the Economic Security Promotion Act, Japanese government supports Japanese companies investment for mine development, technology development and smelting-processing, specifically, increasing the ratio of financial support and providing subsidies for development and other activities through JOGMEC. In addition to these measurement, it is also actively conducting resource diplomacy with resource-rich countries and responding to multiple-frameworks.

As for diversification of supply sources, while existing resources are being depleted, investment is concentrated on promising projects. As one solution, JOGEMC is focusing on ore minerals that have not been considered as resources (e.g., Awaruite) and areas where exploration has not progressed. Asia, which contains complex tectonics settings and remains un-exploration areas, has great potential of critical minerals.

Keywords: Critical Minerals, Securing Mineral Resources

Critical metal potentiality of Mongolia

*Sereenen Jargalan[1], M. Arvinzun[2]

1. Mongolian University of Science and Technology, 2. Mongolian Society of Economic Geologists

Critical metals such as copper, lithium, nickel, cobalt and rare earth elements are essential components in many of today’ s rapidly growing clean energy technologies –from wind turbines and electricity networks to electric vehicles. Lithium, nickel, cobalt, manganese and graphite are crucial to battery performance. rare earth elements are essential for permanent magnets used in wind turbines and EV motors.
Mongolia has wide potential on mineral resources in variety of types.
Regarding to critical metal tendency, there is no clear classification in Mongolia, partly identify as high technology minerals and some government official documents use as important minerals. Even though some small projects are carried out to identify how potential is critical metals including REE, Li, Ni, Co as well as graphite in recent years.
Therefore, we carried out geological reconnaissance study to make clear genetic type, regional distribution characteristics and ore mineral identification. As result we have quite good potentiality on REE mineralization, including carbonatite and alkaline metasomatite types. Lithium is not so studied in Mongolia, but recently, we have several discoveries of Li bearing pegmatites in the central-eastern part. Nickel and cobalt are almost not studied instead of small occurrences found during geological mapping at scale 1:200000 and 1:50000, so no clear potentiality is recognized. There are several deposits and occurrence in Mongolia which are closely relate with marbles metamorphic rocks and has possible potentiality. Copper is the most potential resource making in all, almost 1 billion tons of reserves and resources. Annual production is expected to more than double from 300,000 tons of copper concentrate per year to over 600,000 tons per year from 2028 to 2036 once the Oyu Tolgoi mine is fully operational in 2023.
This time we would like to make general introduction of how potential is in critical metal tendency in Mongolia.

Keywords: Metal potentiality, Mongolia

Oral presentation

T1: Comprehensive understanding of the crustal evolution and resource exploration in Asia (Symposium)

Chairperson:Yasuhito Osanai, Masaaki Owada

Fri. Sep 13, 2024 9:00 AM - 12:00 PM ES Hall (Higashiyama Campus)

10:15 AM - 10:30 AM

[2Lecture-101-06-4add]休憩

Geology, sedimentation environment of the Ovoot khural coal bearing depression, in South Mongolia

*Magsarjav Ochirbat[2], Sereenen Jargalan[1]

1. Mongolian University of Science and Technology, 2. Mongolian Society of Economic Geologists

Mongolia has abundant resources of coal, which are distributed mainly in the south and southeastern part, including some deposits in the north and west part of the country. In recent years, the exploration of coal deposits has been intensively carried out, but not much effort has been made to determine the origin, regional regularity of coal distribution as well as relationship between geological condition and coal quality.
The purpose of this study is to clarify geology and sedimentation environment of the Ovoot khural coal bearing depression in order to contribute to the reconstruction of the Mesozoic geologic and geodynamic setting of the Mongolia.
The study area is located at the 1000 km southwest of Ulaanbaatar and 50 km north of the Mongolia-China border, forming latitudinal trending depression which is 40 to 60 km in width and continues more than 200 km. There are five independent coal bearing parts with 16 coal deposits, which are: Bayantes part, contains Elstei, Khurshuut, Khuvd, Gashuu Tolgoi and Khuren tasv deposits; Ovoot Tolgoi part, contains Sunset and Sunrise deposits; Nariin sukhait part contains West Nariin sukhait, Central Nariin sukhait, East Nariin sukhait and Khuren shand deposits; Sumber part contains Central Sumber, Sumber and Biluut deposits and Jargalant part contains Jargalant and South Biluut deposits.
Result of geochemical study indicates that sediments deposited in the Ovoot khural depression is sourced by the weathering and transporting of intermediate and felsic composition magmatic rocks, mainly from dacite, andesite including minor amount of metamorphic, sedimentary and intrusive rocks.
Spider diagrams of trace element composition of sedimentary rocks of the Orgilokhbulag formation, show Nb-depletion and Pb, Mo enrichment, indicating possible origin of magmatic rocks formed under subduction environment and they are intermediate to felsic in composition. The major trace and rare earth element composition of the Orgilokh bulag formation sedimentary rocks, indicate that the source rocks of sediments might have been formed in the active continental margin tectonic setting.
According to provenance model, coal deposition is undertaking with good tissue preservation, in an alternating environment of oxygenic and deoxygenated swamps.
Based on the metamorphic degree, the temperature of peat compression, the amount of volatile, and the depth gradient of temperature, peat was buried and deposited at a depth of 3500-7000 meters. Low sulfur content, low ash content and low volatile content of coal at the various parts of the depression indicates thet the peat deposition is occurred under two stages.

Keywords: Ovoot khural coal, Mongolia

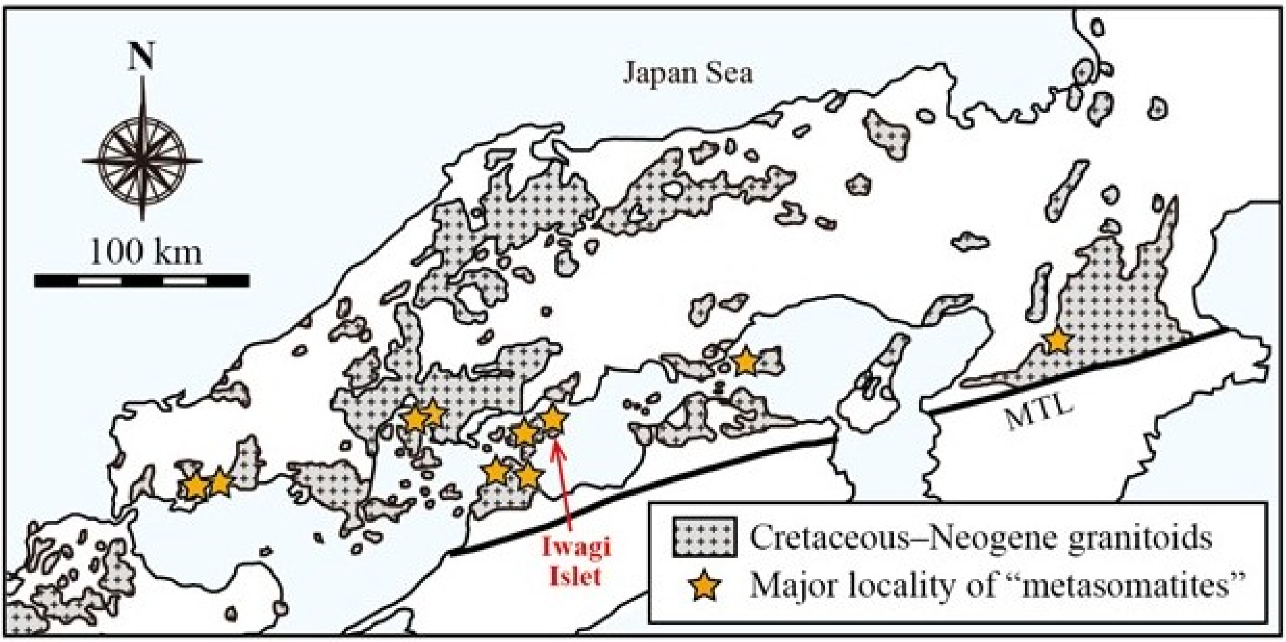
Insights into the mineralogical characteristics of Li-enriched metasomatic albitite from the Iwagi islet, SW Japan

*Mariko NAGASHIMA[1], Teruyoshi IMAOKA[1]

1. Yamaguchi Univ. Sci.

The study of metasomatic rocks is essential for comprehending the nature and origin of metasomatic agents. It might provide a clue for fluid circulation within the crust. In the Setouchi Province, metasomatic rocks are distributed along an approximately E–W trend, and these rocks are associated with Late Cretaceous granites. The Iwagi albitite is one such metasomatic rock. However, unlike other metasomatites in the area, its high lithium content (500 ppm) is unique. Detailed investigations of the mineralogical characteristics of Li-minerals have been conducted to better understand the formation and evolution of Iwagi albitites. The albitites exist as small masses, and the textures of the weakly metasomatized ones resemble those of the host adjacent granite. The transition from granite to albitite occurs gradually and can be understood through the mineral assemblages. The Iwagi albitite is known as the type locality of four Li-analog minerals: sugilite $KNa_2(Fe^{3+}, Mn^{3+}, Al)_2Li_3Si_{12}O_{30}$, katayamalite $KLi_3Ca_7Ti_2(SiO_3)_{12}(OH)_2$, murakamiite $LiCa_2Si_3O_8(OH)$, and ferro-ferri-holmquistite $Li_2(Fe^{2+}{}_3Fe^{3+}{}_2)Si_8O_{22}(OH)_2$. The former three minerals were found in the fully albitized rock, while the latter was found in the weakly albitized granite. The albitites display a variety of replacement textures due to Na–Li metasomatism, and they also exhibit noticeable strain-induced textures.
The δ^7Li values of murakamiite and Li-rich pectolite show a wide range from -9.1 to +0.4‰ (ave. -2.9‰) and should have resulted from hydrothermal fluid-rock interactions at 300–600 °C. The very low δ7Li values may have originated from intra-crystalline Li isotope diffusion or involvement of deep-seated, Li–Na-enriched subduction-zone fluids with low δ7Li values. This finding highlights the significance of fluid-rock interactions in the formation of metasomatic rocks. Deformation-induced fracturing of the rock may have enhanced fluid circulation, leading to the formation of the metasomatic rocks along the E–W trending lineament.

Keywords: Lithium, albitite, metasomatism



Distribution of metasomatites in Setouchi Province, SW Japan.
(after Murakami 1976)

Ion adsorption-type REE deposits: the source of HREE

*Yasushi Watanabe[1]

1. Akita Univ. Int. Res. Sci.

Ion adsorption rare earth deposits were confirmed in southern China including Jiangxi province in late 1970's. This unique deposit type forms by adsorption of rare earth ions on clay minerals represented by kaolinite and halloysite due to weathering of granitic rocks. Although the ore grades of this deposit type is extremely lower (<0.2 wt%) than the other rare earth deposits such as carbonatite, extraction of rare earths from the clay ores is easy and inexpensive. The development of this deposit type has been accelerating since 2000 as the source of heavy rare earths. This is due to the invention of neodymium magnet in 1983, followed by commercialization in 1985, and production of hybrid vehicle (Prius) in 1997. Because major rare earth deposits such as carbonatite and placer deposits are enriched in LREE but poor in HREE, the ion adsorption type deposits became the important HREE supply source. Although exploration of HREE prospects has been conducted worldwide and a few HREE enriched alkaline-rock related deposits were discovered, no deposit is better than the ion adsorption deposits in terms of production cost and easiness in processing. The ion adsorption type deposits are distributed not only in southern China but also in southeast Asia. This type of deposits also present in suthern Africa including Malawi and Madagascar and South America such as Brazil and Chile. Presently Myanmar has become the major country that produces ionic ores. For the formation of ion adsorption HREE deposits needs the following three conditions; 1) presence of HREE enriched host rocks, 2) formation of thick (>10 m) weathering crust, and 3) presence of REE minerals in the host rocks that easily dissolve during weathering.

Keywords: ion adsorption-type deposit, heavy rare earth elements, weathering, magnet

Oral presentation

T1: Comprehensive understanding of the crustal evolution and resource exploration in Asia (Symposium)

Chairperson:Yasuhito Osanai, Masaaki Owada

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11:45 AM - 12:00 PM

[2Lecture-101-06-8add]休憩

Oral presentation | S2: Water Rock Interaction (Special Session)

Fri. Sep 13, 2024 9:00 AM - 12:00 PM JST | Fri. Sep 13, 2024 12:00 AM - 3:00 AM UTC | ES024 Higashiyama Campus

S2: Water Rock Interaction (Special Session)

Chairperson:Noriyoshi Tsuchiya

9:00 AM - 9:05 AM JST | 12:00 AM - 12:05 AM UTC

[2Lecture-201-10-1add] コンビーナ挨拶

9:05 AM - 9:35 AM JST | 12:05 AM - 12:35 AM UTC

[S2-01] Slab-derived fluid infiltrating back-arc mantle

「招待講演」

*Junji YAMAMOTO[1] (1. Kyushu University)

9:35 AM - 9:50 AM JST | 12:35 AM - 12:50 AM UTC

[S2-02] Geochemical diversity and significance of orthopyroxene pseudomorphs in ultramafic rocks derived from mantle wedges

「発表賞エントリー」

*Takumi Wani[1], Yuji Ichiyama[1], Akihiro Tamura[2], Tomoaki Morishita[2] (1. Chiba University, 2. Kanazawa University)

9:50 AM - 10:05 AM JST | 12:50 AM - 1:05 AM UTC

[S2-03] Petrogenesis and significance of ophicarbonate in the Kanasaki serpentinite body (Kanto Mountains, Central Japan)

*Ryosuke OYANAGI[1,2], Hikaru Sawada[3,2], Qing Chang[2], Madhusoodhan Satish-Kumar[4] (1. Kokushikan Univ., 2. JAMSTEC, 3. Toyama Univ., 4. Niigata Univ.)

10:05 AM - 10:20 AM JST | 1:05 AM - 1:20 AM UTC

[S2-04] CO_2 mineralization in andesitic rocks revealed by hydrothermal experiments and thermal analyses

*Otgonbayar DANDAR[1], Atsushi Okamoto [1], Masaoki Uno[1], Miku Takeya[2] (1. Tohoku University, 2. INPEX)

10:20 AM - 10:30 AM JST | 1:20 AM - 1:30 AM UTC

[2Lecture-201-10-6add] 休憩

10:30 AM - 10:45 AM JST | 1:30 AM - 1:45 AM UTC

[S2-05] Massive and foliated serpentinites from the Udonohana ultramafic body, Western Ehime Prefecture, Japan.

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11:00 AM - 11:15 AM JST | 2:00 AM - 2:15 AM UTC

[S2-07] Dissolution reprecipitation - re-equilibration process of feldspar in heat source granite and supercritical geothermal reservoir using borehole samples from Kakkonda granite

「発表賞エントリー」

*Masayoshi Hoshida[1], Masaoki Uno[1], Satoshi Matsuno[1], Astin Nurdiana[1], Noriyoshi Tsuchiya[2,1] (1. Tohoku University, 2. National Institute of Technology, Hachinohe College)

11:15 AM - 11:30 AM JST | 2:15 AM - 2:30 AM UTC

[S2-08] Formation mechanism of "cleavable olivine"

*Jun-ichi ANDO[1,2], Naotaka Tomioka[3,2], Hirokazu Maekawa[4] (1. Hiroshima Univ., 2. Hiroshima Univ., HiPeR, 3. JAMSTEC, 4. Osaka Metropolitan Univ.)

11:30 AM - 11:45 AM JST | 2:30 AM - 2:45 AM UTC

[S2-09] Experimental study to elucidate sulfide chimney development process and power generation characteristics in submarine hydrothermal systems

「発表賞エントリー」

*Kentaro Toda[1], Atsushi Okamoto[1], Dandar Otgonbayar[1], Misaki Takahashi[1], Yoshinori Sato[1] (1. Tohoku Univ. Environmental Sci)

11:45 AM - 12:00 PM JST | 2:45 AM - 3:00 AM UTC

[S2-10] Carbonation of Mantle Peridotite: An Approach From Fluid Inclusion Analysis and Hydrothermal Experiments

*Tatsuhiko KAWAMOTO[1] (1. Shizuoka University)

Oral presentation

S2: Water Rock Interaction (Special Session)

Chairperson:Noriyoshi Tsuchiya

Fri. Sep 13, 2024 9:00 AM - 12:00 PM ES024 (Higashiyama Campus)

9:00 AM - 9:05 AM

[2Lecture-201-10-1add]コンビーナ挨拶

Slab-derived fluid infiltrating back-arc mantle

*Junji YAMAMOTO[1]

1. Kyushu University

Keywords: slab, mantle transition zone, nitrogen isotope ratio, xenolith, fluid inclusion

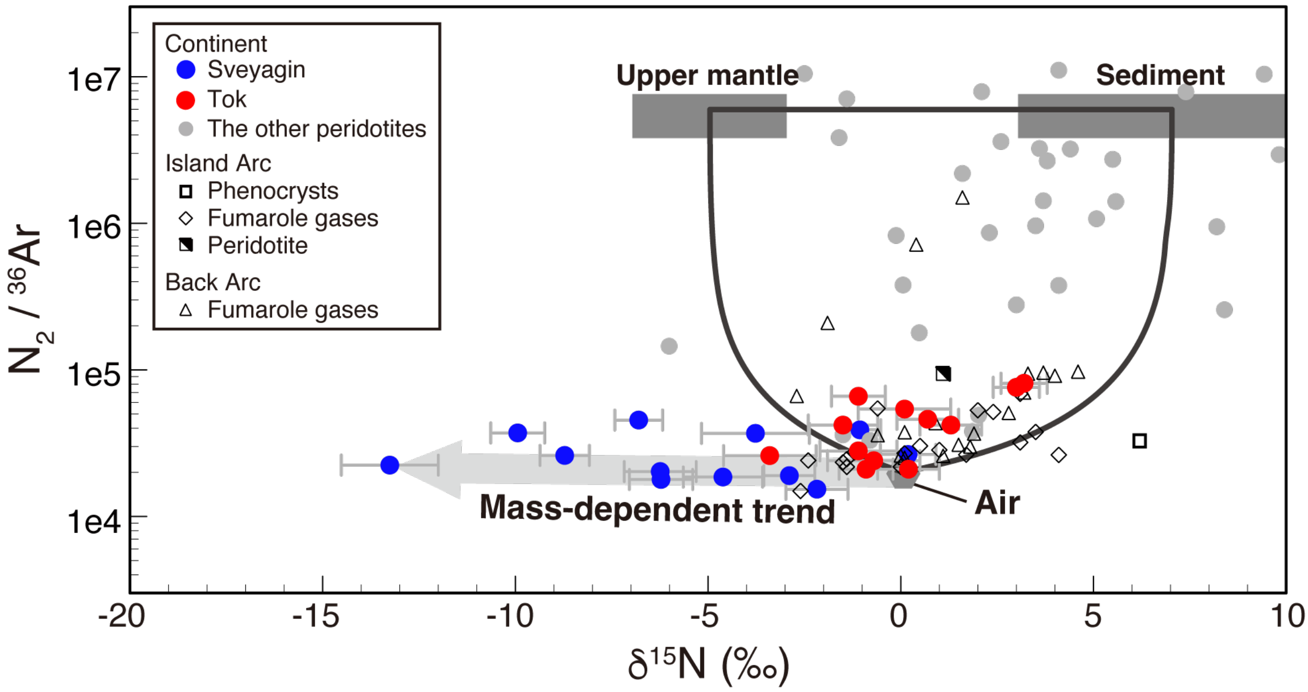

図１． $N_2/^{36}Ar$ vs. $\delta^{15}N$ of Far Eastern Russian xenoliths with data referred from earlier studies (see Yamamoto et al. (2020) EPSL).

Geochemical diversity and significance of orthopyroxene pseudomorphs in ultramafic rocks derived from mantle wedges

*Takumi Wani[1], Yuji Ichiyama[1], Akihiro Tamura[2], Tomoaki Morishita[2]

1. Chiba University, 2. Kanazawa University

Keywords: mantle wedge, mantle metasomatism, slab fluid, orthopyroxene pseudomorph

Petrogenesis and significance of ophicarbonate in the Kanasaki serpentinite body (Kanto Mountains, Central Japan)

*Ryosuke OYANAGI[1,2], Hikaru Sawada[3,2], Qing Chang[2], Madhusoodhan Satish-Kumar[4]

1. Kokushikan Univ., 2. JAMSTEC, 3. Toyama Univ., 4. Niigata Univ.

Keywords: Serpentine, Ophicarbonate, Carbon cycle

CO_2 mineralization in andesitic rocks revealed by hydrothermal experiments and thermal analyses

*Otgonbayar DANDAR[1], Atsushi Okamoto [1], Masaoki Uno[1], Miku Takeya[2]

1. Tohoku University, 2. INPEX

Mineral carbonation enables long-term stable CO_2 storage. Among rocks, basalts and ultramafic rocks (high Mg and Ca contents) are known to have high potential to store CO_2. Although, andesitic rocks (composition is wide; microstructures are diverse) are widely distributed in Japan (in a subduction zone), their suitability for mineral carbonation and CO_2 storage is not well understood. In this study, we report preliminary results of hydrothermal reaction experiments (exps) using andesitic agglomerate rocks from the Nagaoka area, Niigata Prefecture and thermal analyses of the products.The andesite agglomerate consists mainly of volcanic glass, plagioclase, clinopyroxene, with small amounts of orthopyroxene, hornblende, and iron oxides. Two types (a batch-type vessel and a stirred apparatus) of exps have been conducted with the powder samples (150-250 μm). In the batch exp (filling ratio = 43% and remained space is CO_2 gas), powder sample is placed at two locations: the top (supercritical CO_2 saturated in water) and bottom (reacted with a CO_2 dissolved solution) of the reaction vessel. The batch exps were conducted at 75 ℃, 18 MPa (80 days), 150 ℃, 20 MPa (20 days), and 200 ℃, 25 MPa (20, 40, and 60 days). The solid phase after exp is observed by EPMA, TG, and TPD-MS, and the solutions are analyzed for element contents by ICP-OES. To accelerate the reaction, a stirred reaction apparatus was used for the exp at 200 ℃, 20MPa, and 10 days.In the batch exps at 75 ℃ and 150 ℃ (Ca and Mg+Fe contents = 10-80 mg/kgH_2O), dissolution of volcanic glass is observed only with small dissolution of plagioclase and other minerals. Significant carbonate precipitation was observed in a 60-day batch exp at 200 ℃ (Fe- and Ca-rich magnesite) and a 10-day stirred exp (calcite and dolomite). The precipitation proceeded not only at the bottom (CO_2 dissolved solution), but also at the top (supercritical CO_2), suggesting the reaction accelerated by water vapor. The experimental solution (carbonate precipitated, the pH increased to >7 and the concentrations of Mg and Ca <20 mg/kH_2O), suggests the pH in the reaction vessel increased and reached to condition of carbonate precipitation.Based on the above exps, the andesitic rocks in the Nagaoka area are considered to have sufficient potential for mineral carbonation and CO_2 storage.

Keywords: Mineral carbonation , CO2 storage, Andesite, Hydrothermal reaction experiment, the Nagaoka area, Niigata Prefecture

Oral presentation

S2: Water Rock Interaction (Special Session)

Chairperson:Noriyoshi Tsuchiya

Fri. Sep 13, 2024 9:00 AM - 12:00 PM ES024 (Higashiyama Campus)

10:20 AM - 10:30 AM

[2Lecture-201-10-6add]休憩

Massive and foliated serpentinites from the Udonohana ultramafic body, Western Ehime Prefecture, Japan.

*Yui Joguchi[1], Satomi Enju[1]

1. Ehime Univ. Sci. &Egn.

Keywords: serpentinite, ultramafic rocks, cumulate, Mikame ultramafic body

"Element transport and magnetite decomposition during alteration of the gabbroic vein in serpentinite body from the Bayankhongor ophiolite, Mongolia"

*Nomin Tumurkhuu[1], Otgonbayar Dandar[1], Masaoki Uno[1], Manzshir Bayarbold[1], Atsushi Okamoto[1]

1. Tohoku University

Hydration of mantle rocks is important for elucidating the dynamics of global water circulation, elemental transport, and geological processes. The crust-mantle interface constitutes a significant geological boundary where element transport occurs. However, research on the multi-stage hydration of mantle rocks within this zone, particularly in the oceanic lithosphere (mid-ocean ridge), is still lacking. Therefore, to understand element transport during the hydration of the crustal vein in the mantle at the crust-mantle transition zone, we investigate the mantle-crust section preserved in the Bayankhongor ophiolite (BO; mid-ocean ridge origin) Mongolia.The outcrop of the crust-mantle section (~30 m in diameter) in the BO is characterized by a brownish gabbroic body with a massive and sheared mantle body fully serpentinized. Mantle rock samples mainly consist of lizardite in two forms: mesh core (Mg# = 0.95-0.98) with fine magnetite (Mgt) and vein (Mg# = 0.94-0.98) with vein Mgt (<30 μm width), along with spinel (Mg# = 0.42-0.52 & Cr# = 0.46-0.48), and chlorite (Chl; Mg# = 0.87-0.96). The absence of brucite in the serpentinites suggests infiltration of Si-rich fluids. Green veins (80-95 cm in width; it mainly consists of clinopyroxene (Cpx; Mg# = 0.92) replaced by a mixture of Chl-serpentine (Srp) and cut by serpentine and epidote (Ep) veins), along with white veins (~15 cm in width; ~40 cm long; it is mostly consisted of Ep and Cpx with a minor amount of Chl) cut through the mantle rocks. Additionally, black veins (~2 cm in width; it is composed of Chl patches (Mg# = 0.83-0.93) and Chl-Srp patches with clear cleavages and fine Ti-rich minerals) intersect the serpentinite. The reaction zone (~3 mm) between host serpentinite and black vein shows that Mgt disappeared and Mgt is replaced by Al-rich (1.1-6.9 wt%) Srp. Mass balance on black vein (assuming protoliths: Cpx for Chl-Srp and plagioclase for Chl patch shows gain of Fe and Mg, and loss of Si, Al, and Ca whereas that on the reaction zone shows loss of Fe and gain of Si, and Al. This implies that Mg-rich fluid and chl formation cause Mgt disappearance and mobility of Fe, Si, and Al. Reaction zone and mass balance result imply that local mobility of Si, Al, Fe, Mg, and Ca could occur at the crust-mantle section in the oceanic lithosphere during multi-stage hydration.

Keywords: Element transport, Serpentine, Gabbroic vein

Element transport and magnetite decomposition during alteration of gabbroic vein in serpentinite body from the Bayankhongor ophiolite, Mongolia.

Nomin TUMURKHUU, Otgonbayar DANDAR, Masaoki UNO, Manzshir BAYARBOLD, Atsushi OKAMOTO

Graduate School of Environmental Studies, Tohoku University

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The outcrop of the crust-mantle section (~30 m in diameter) in the BO is characterized by a brownish gabbroic body with a massive and sheared mantle body fully serpentinized. Mantle rock samples mainly consist of lizardite in two forms: mesh core (Mg# = 0.95-0.98) with fine magnetite (Mgt) and vein (Mg# = 0.94-0.98) with vein Mgt (<30 μm width), along with spinel (Mg# = 0.42-0.52 & Cr# = 0.46-0.48), and chlorite (Chl; Mg# = 0.87-0.96). The absence of brucite in the serpentinites suggests infiltration of Si-rich fluids. Green veins (80-95 cm in width; it mainly consists of clinopyroxene (Cpx; Mg# = 0.92) replaced by a mixture of Chl-serpentine (Srp) and cut by serpentine and epidote (Ep) veins), along with white veins (~15 cm in width; ~40 cm long; it is mostly consisted of Ep and Cpx with a minor amount of Chl) cut through the mantle rocks. Additionally, black veins (~2 cm in width; it is composed of Chl patches (Mg# = 0.83-0.93) and Chl-Srp patches with clear cleavages and fine Ti-rich minerals) intersect the serpentinite.

The reaction zone (~3 mm) between host serpentinite and black vein shows that Mgt disappeared and Mgt is replaced by Al-rich (1.1-6.9 wt%) Srp. Mass balance on black vein (assuming protoliths: Cpx for Chl-Srp and plagioclase for Chl patch shows gain of Fe and Mg, and loss of Si, Al, and Ca whereas that on the reaction zone shows loss of Fe and gain of Si, and Al. This implies that Mg-rich fluid and chl formation cause Mgt disappearance and mobility of Fe, Si, and Al. Reaction zone and mass balance result imply that local mobility of Si, Al, Fe, Mg, and Ca could occur at the crust-mantle section in the oceanic lithosphere during multi-stage hydration.

Dissolution reprecipitation - re-equilibration process of feldspar in heat source granite and supercritical geothermal reservoir using borehole samples from Kakkonda granite

*Masayoshi Hoshida[1], Masaoki Uno[1], Satoshi Matsuno[1], Astin Nurdiana[1], Noriyoshi Tsuchiya[2,1]

1. Tohoku University, 2. National Institute of Technology, Hachinohe College

Keywords: Feldspar, Feldspar thermometer, Supercritical geothermal reservoir, Dissolution reprecipitation, Re-equilibration

Formation mechanism of "cleavable olivine"

*Jun-ichi ANDO[1,2], Naotaka Tomioka[3,2], Hirokazu Maekawa[4]

1. Hiroshima Univ., 2. Hiroshima Univ., HiPeR, 3. JAMSTEC, 4. Osaka Metropolitan Univ.

Keywords: cleavable olivine, Subgrain boundary, Pipe diffusion

Experimental study to elucidate sulfide chimney development process and power generation characteristics in submarine hydrothermal systems

*Kentaro Toda[1], Atsushi Okamoto[1], Dandar Otgonbayar[1], Misaki Takahashi[1], Yoshinori Sato[1]

1. Tohoku Univ. Environmental Sci

Keywords: Hydrothermal Chimney

Carbonation of Mantle Peridotite: An Approach From Fluid Inclusion Analysis and Hydrothermal Experiments

*Tatsuhiko KAWAMOTO[1]

1. Shizuoka University

Carbonate rocks in serpentinites are called ophicarbonate. Two types of ophicarbonate are observed as carbonate veins in serpentinite and serpentinite breccias surrounded by carbonate matrix. At Shizuoka University, Japan, we have described and reported saline fluid inclusions in carbonate minerals in ophicarbonate at the localities as follows: (1) carbonate veins in serpentinites of the Oman ophiolite, formed at a fast spreading ridge; (2) carbonate veins and carbonate matrix in serpentinites in the Western Alps ophiolite, formed at a slow spreading ridge; (3) calcite in serpentinite mud volcanoes in the Izu Mariana Trench; and (4) carbonate veins in mantle-wedge serpentinite in the Sambagawa Belt, Chichibu, Japan. The results show that the studied fluid inclusions have salinity similar to that of seawater or slightly higher than seawater, except for the fresh water fluid inclusions found in the later veins of the Oman ophiolite serpentinite in (1), where fluid inclusions with salinity similar to seawater are present in veins formed below the seafloor before. This means that ophicarbonates formed by metamorphism beneath the seafloor seen in (1) and (2) involve saline fluids similar to seawater, and such saline fluids are also brought into the mantle wedge, where lithospheres sink seen in (3) and (4).

Hydrothermal experiments are also conducted to provide constraints on the carbonization of the Earth’s mantle. In addition to the hydrothermal experiments, we calculate phase diagrams by use of thermodynamic calculation such as Perple_X. If we will experimentally determine the equilibrium mineral assemblage in iron-bearing system, we can understand the effect of iron on the temperature and pressure conditions by comparing the calculated phase equilibrium in the CaO-MgO-SiO_2-H_2O-CO_2 system. The comparison between natural ophicarbonate and the calculated phase diagram also enables us to know the CO_2 /(H_2O+CO_2) molar ratio of the fluids in the carbonation. It will be also possible to constraint on the temperature and pressure conditions from the isochore of fluid inclusions. Combination of natural observation, experiments and calculation allows us to understand the conditions of mantle carbonation more precisely.

Keywords: fluid inclusions, serpentinite, seawater, carbon dioxide, mantle

Oral presentation | S3: Rheology and Material Transfer in Mantle and Crust (Special Session)

Fri. Sep 13, 2024 9:00 AM - 10:00 AM JST | Fri. Sep 13, 2024 12:00 AM - 1:00 AM UTC | ES025 Higashiyama Campus

S3: Rheology and Material Transfer in Mantle and Crust (Special Session)

Chairperson:Miki Tasaka(Shizuoka University)

9:00 AM - 9:15 AM JST | 12:00 AM - 12:15 AM UTC

[S3-10] Rheological evolution of olivine during formation of the mantle lithosphere

*Katsuyoshi MICHIBAYASHI[1,2], Takeo Okuwaki[1], Itsuki Natsume[3] (1. Nagoya University, 2. JAMSTEC, 3. Kanagawa Prefectural Museum of Natural History)

9:15 AM - 9:30 AM JST | 12:15 AM - 12:30 AM UTC

[S3-11] Three-dimensional location analysis on acoustic emissions and faults in olivine under pressure-temperature conditions of subducting slabs

*Tomohiro OHUCHI[1], Masato Hoshino[2], Kentaro Uesugi[2], Satoshi Okumura[3], Yuji Higo[2], Noriyoshi Tsujino[2], Sho Kakizawa[2] (1. GRC, Ehime Univ., 2. JASRI, 3. Tohoku Univ Sci.)

9:30 AM - 9:45 AM JST | 12:30 AM - 12:45 AM UTC

[S3-12] In-situ observation of grain growth and fluid movement using camphor as a rock analogue

*Junichi Fukuda[1] (1. Dept. Geos. Osaka Metrop. Univ.)

9:45 AM - 10:00 AM JST | 12:45 AM - 1:00 AM UTC

[S3-13] Mantle carbonation through seawater penetration along the outer-rise faults

*Ikuo KATAYAMA[1], Keishi Okazaki[1], Atsushi Okamoto[2] (1. Hiroshima University, 2. Tohoku University)

Rheological evolution of olivine during formation of the mantle lithosphere

*Katsuyoshi MICHIBAYASHI[1,2], Takeo Okuwaki[1], Itsuki Natsume[3]

1. Nagoya University, 2. JAMSTEC, 3. Kanagawa Prefectural Museum of Natural History

Keywords: Olivine, Mantle

Three-dimensional location analysis on acoustic emissions and faults in olivine under pressure-temperature conditions of subducting slabs

*Tomohiro OHUCHI[1], Masato Hoshino[2], Kentaro Uesugi[2], Satoshi Okumura[3], Yuji Higo[2], Noriyoshi Tsujino[2], Sho Kakizawa[2]

1. GRC, Ehime Univ., 2. JASRI, 3. Tohoku Univ Sci.

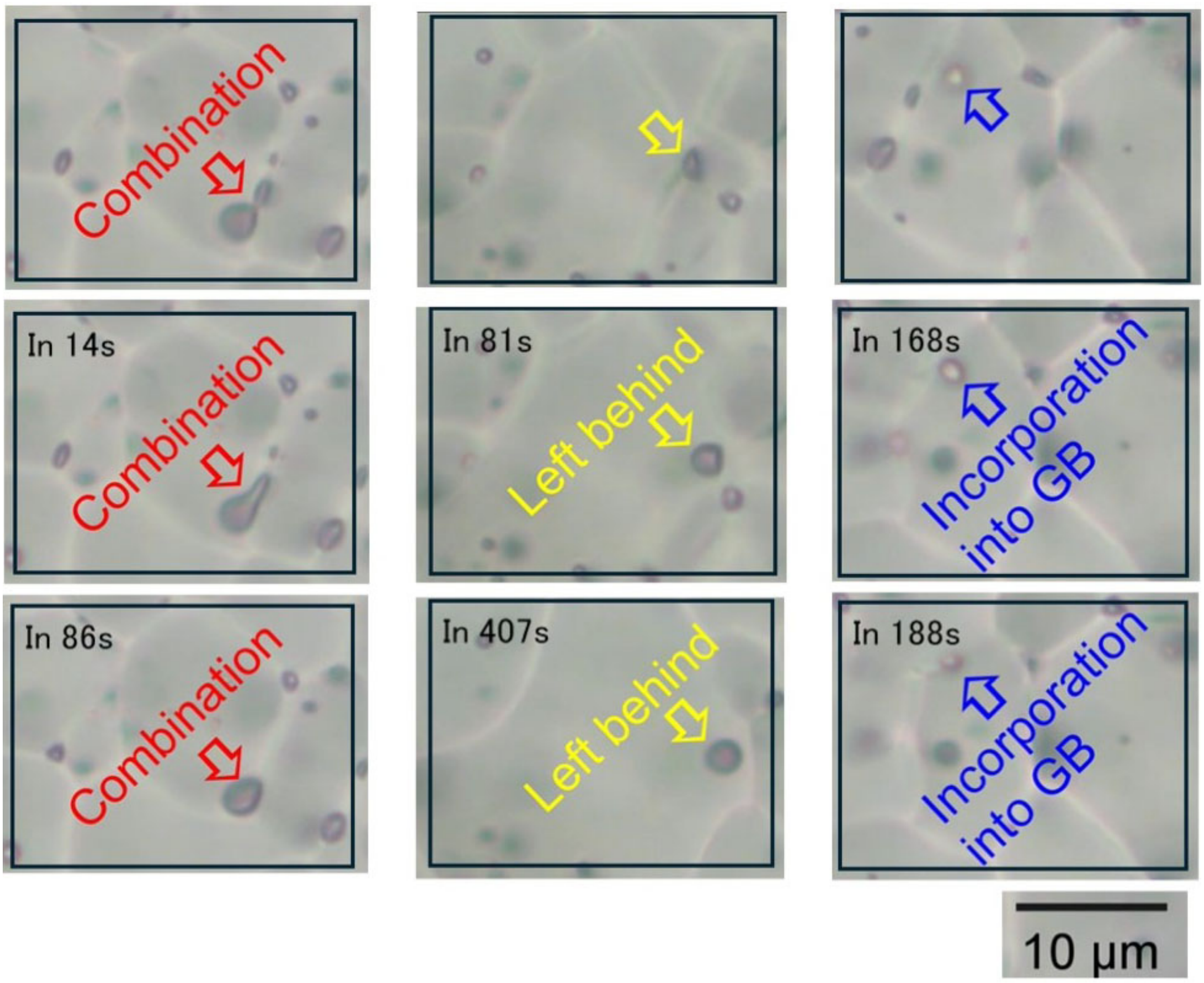
Keywords: Olivine, Acoustic emission, Fault, Intermediate earthquake

In-situ observation of grain growth and fluid movement using camphor as a rock analogue

*Junichi Fukuda[1]

1. Dept. Geos. Osaka Metrop. Univ.

Keywords: Rock analogue, Camphor, Grain growth, Fluid



Mantle carbonation through seawater penetration along the outer-rise faults

*Ikuo KATAYAMA[1], Keishi Okazaki[1], Atsushi Okamoto[2]

1. Hiroshima University, 2. Tohoku University

Keywords: Carbon cycle, Carbonation, Mantle

Oral presentation | R4: Mineral sciences of the Earth surface

Fri. Sep 13, 2024 10:15 AM - 12:00 PM JST | Fri. Sep 13, 2024 1:15 AM - 3:00 AM UTC | ES025 Higashiyama Campus

R4: Mineral sciences of the Earth surface

Chairperson:Hiroshi Sakuma(NIMS), Satoko Motai(Yamagata Univ.), Jun Kawano(Hokkaido University)

10:15 AM - 10:35 AM JST | 1:15 AM - 1:35 AM UTC

[R4-01] Understanding and application of spherical concretions: A new durable sealing material learnt from nature

「招待講演」

*Hidekazu Yoshida[1] (1. Nagoya University)

10:35 AM - 10:50 AM JST | 1:35 AM - 1:50 AM UTC

[R4-02] Color change process of Hiroshima granite due to weathering

*Tadashi YOKOYAMA[1], Yuka Inkyo, Masahiro Kaibori[1] (1. Hiroshima University)

10:50 AM - 11:05 AM JST | 1:50 AM - 2:05 AM UTC

[R4-03] Crystallographic preferred orientation and grain size of apatite in terrestrial mammalian bones

*Kyoko N. MATSUKAGE[1], Momoka Ide[2], Masaya Kurata[2], Yu Nishihara[3] (1. Teikyo Univ. of Sci. Natural and Environmental Sci., 2. Teikyo Univ. of Sci. Aminal Sci., 3. Ehime Univ.)

11:05 AM - 11:20 AM JST | 2:05 AM - 2:20 AM UTC

[R4-04] Microscopic distribution of sodium in biogenic aragonite

*Taiga Okumura[1], Michio Suzuki[2], Alberto Perez-Huerta[3], Eshita Samajpati[3], Toshihiro Kogure[1] (1. UTokyo Sci., 2. UTokyo Agri. Life Sci., 3. Univ. Alabama Geol. Sci.)

11:20 AM - 11:40 AM JST | 2:20 AM - 2:40 AM UTC

[R4-05] Structural and functional analyses of organic matrices regulating the formation of minerals in biomineralization.

「招待講演」

*Michio Suzuki[1] (1. UTokyo)

11:40 AM - 11:55 AM JST | 2:40 AM - 2:55 AM UTC

[R4-06] Aragonite formation from amorphous calcium carbonate (ACC) with addition of *n*-butylamine

*Hiroyuki KAGI[1], Kensuke Muraoka[1] (1. The University of Tokyo)

11:55 AM - 12:00 PM JST | 2:55 AM - 3:00 AM UTC

調整

Understanding and application of spherical concretions: A new durable sealing material learnt from nature

*Hidekazu Yoshida[1]

1. Nagoya University

Here, we introduce a more durable sealing method for concretion-forming resin developed by learning from natural calcite, CaCO3 spherical concretion formation. The method was tested by sealing flow paths next to a tunnel in an underground research laboratory at 350 m depth, in Hokkaido, Japan. The flow paths were initially sealed rapidly, then resealed after disturbance by repeated earthquakes just below the underground research laboratory at depths of 2–7 km and maximum magnitude Mw 5.4. The treated rock mass rapidly recovered its very low natural permeability, demonstrating robust self-sealing and healing.

Keywords: Spherical concretion, Calciumu carbonate, Durable sealing material

Color change process of Hiroshima granite due to weathering

*Tadashi YOKOYAMA[1], Yuka Inkyo, Masahiro Kaibori[1]

1. Hiroshima University

The characteristics and mechanisms of color change associated with weathering of Hiroshima granite were investigated, using a core drilled to a depth of 20 m. Color (L* a* b* values) were measured at approximately every 2-10 cm at each depth using a spectrophotometer. The color is: brighter for larger L* values, more reddish for larger a* values (for a* > 0), and more yellowish for larger b* values (for b* > 0). For core color, whitish unweathered areas at depths greater than 12 m have smaller a* and b* values and larger L* values. From about 12 m to 4 m depth, both a* and b* values increase and L* values decrease closer to the surface, although there is some variation depending on the location. The color at each depth was compared with that of a reference material made from four typical iron-bearing secondary minerals (goethite (yellow), ferrihydrite (dark brown), lepidocrocite (light brown), and hematite (dark red)), where each mineral mixed with SiO2 powder in various proportions from 0-100%. In the early stage of weathering, a dark brown band close to the color of ferrihydrite is often seen around the fractures. For more weathered areas, the entire rock matrix is often yellowish, the color close to that of goethite. In general, ferrihydrite is known to transform to more stable goethite and hematite with time. From the color measurement results of the drilled cores, it is inferred that ferrihydrite was first formed in the early stage of weathering, and then changed from ferrihydrite to goethite with the progress of weathering. Secondary iron minerals were dissolved and quantified by the selective iron dissolution method at several locations with different degrees of weathering. The amount of secondary iron minerals (all assumed to be goethite) at each location was estimated by comparing the color of the core with that of the reference material and plotted against the values obtained by the selective iron dissolution method, showing a generally proportional relationship. Although the results may change after correction for the effect of ferrihydrite, the results indicate that it may be possible to roughly estimate the amount of secondary iron minerals from a quick and easy core color measurement alone.

Keywords: Granite, Weathering, Color

Crystallographic preferred orientation and grain size of apatite in terrestrial mammalian bones

*Kyoko N. MATSUKAGE[1], Momoka Ide[2], Masaya Kurata[2], Yu Nishihara[3]

1. Teikyo Univ. of Sci. Natural and Environmental Sci., 2. Teikyo Univ. of Sci. Aminal Sci., 3. Ehime Univ.

Keywords: Apatite, terrestrial mammal, Bone, Pregerred orientation, Grain size

Microscopic distribution of sodium in biogenic aragonite

*Taiga Okumura[1], Michio Suzuki[2], Alberto Perez-Huerta[3], Eshita Samajpati[3], Toshihiro Kogure[1]

1. UTokyo Sci., 2. UTokyo Agri. Life Sci., 3. Univ. Alabama Geol. Sci.

Keywords: Aragonite, Sodium, Biomineralization, STEM-EDS, Atom probe tomography

Structural and functional analyses of organic matrices regulating the formation of minerals in biomineralization.

*Michio Suzuki[1]

1. UTokyo

Keywords: biomineralization, organic matrices, calcium carbonate, Pinctada fucata

Aragonite formation from amorphous calcium carbonate (ACC) with addition of *n*-butylamine

*Hiroyuki KAGI[1], Kensuke Muraoka[1]

1. The University of Tokyo

Direct conversion from amorphous calcium carbonate (ACC) to aragonite has been extremely difficult compared to the other two polymorphs, calcite and vaterite. In the present study, aragonite formation with a high polymorph fraction (>97%) was obtained from ACC immersed in n-butylamine under 90% RH (relative humidity) at 30˚C for two hours. It is noteworthy that the aragonite with high purity was obtained without the addition of Mg^{2+} ion, which is well known to promote aragonite formation.To understand the effects of hydrophobic and basic properties of n-butylamine, hexane, NH_3 aq., and hexane + NH_3aq. were mixed with ACC and left for two weeks. Aragonite was formed only from the mixture of hexane and NH_3 aq. This result indicates that both hydrophobic and basic properties are required for crystallization from ACC into aragonite.

Keywords: amorphous calcium carbonate, aragonite, polymorph control