Organization and Activities of the Doctoral Program in Earth Evolution Sciences (Geological Sciences) for the Academic Year 2019

Organization

During the year from April, 2019 to March, 2020, several promotions and appointments were made in the Doctoral Program in Earth Evolution Sciences (Geological Sciences) so that our research and teaching activities were enforced.

Professor:
Arakawa, Yoji, D. Sc., petrology, geochemistry and geochronology
Hisada, Ken-ichiro, D. Sc., stratigraphy, sedimentology
Sugihara, Kaoru, Ph.D. (Sc.), carbonate sedimentology, paleontology
Tsunogae, Toshiaki, Ph.D. (Sc.), metamorphic petrology and crustal evolution
Yagi, Yuji, Ph.D. (Sc.), seismology, structural geology

Associate Professor:
Agematsu, Sachiko, Ph.D. (Sc.), paleontology
Fujino, Shigehiro, Ph.D. (Sc.), sedimentology, stratigraphy, paleoseismology
Kamata, Yoshihito, Ph. D. (Sc.), stratigraphy, tectonics
Kurosawa, Masanori, Ph.D. (Sc.), mineralogy and geochemistry
Kyono, Atushi, Ph.D. (Sc.), structural physics of minerals
Maruoka, Teruyuki, Ph.D. (Sc.), geochemistry
Ujiie, Kohtaro, Ph.D. (Sc.), structural geology

Assistant Professor:
Ikehata, Kei, Ph.D. (Sc.), petrology, resource geology
Komuro, Kosei, D. Sc., ore geology and geochemistry
Mukai, Hiroki, Ph.D. (Sc.), mineralogy, resource geology and environmental science
Okuwaki, Ryo, Ph.D. (Sc.), seismology, structural geology
Tanaka, Kohei, Ph.D., vertebrate paleontology

Professor (National Museum of Nature and Science):
Kohno, Naoki, D. Sc., mammalian paleontology
Shigeta, Yasunari, D. Sc., ammonite paleontology

Associate professor (National Museum of Nature and Science):
Tsutsumi, Yukiyasu, Ph.D. (Sc.), absolute dating

Research and Teaching Assistants:
Otani, Satoshi, B.A.
Ozaki, Shiro
Shimizu, Masahiro

Administrative Staff:
Kuwahara, Mutsuko
Yasuda, Yoko

Doctor and Mater's Theses

The following doctor and master's theses were completed during the academic year 2019 under the supervision of the members of the Doctoral Program in Earth Evolution Sciences.

Doctor of Philosophy (Science or Geosciences):
Tominaga, Kohei (2020) Paleogeography of the Northwestern Panthalassa Ocean restored in the Chichibu–Mikabu Accretionary Complex, the Kanto Mountains, Central Japan
Takagi, Sota (2020) Phase transition dynamics of zirconia under shock compression using synchrotron-based time-resolved X-ray diffraction method
Takamura, Yusuke (2020) Petrology, Zircon U-Pb Geochronology, and REE Geochemistry of Granulites from the Northeastern Lützow-Holm Complex, East Antarctica: Implications for the *P-T-t* Evolution of Gondwana Collisional Orogens
Tamura, Tomoya (2020) Effect of atranorin on silicate mineral dissolution: Experimental study on lichen-induced rock weathering in volcanic area
Oyunjargal, Luvsannyam (2020) Application of Oxygen Isotope to the Studies of Hydrothermal Mineral Deposits

Master of Science or Geoscience:
Hirayama, Eri (2020) Petrology and Geochronology of Partially-Melted Pelitic Gneisses from the Wanni Complex, Sri Lanka
Ikeda, Ryotaro (2020) Temperature dependence of orientationally disordered SO4 tetrahedra in mirabi-

lite ($Na_2SO_4 \cdot 10H_2O$)

Ishii, Syogo (2020) Development of Geostories in Geopark ~as an Example of Setting of Trekking Route in Mt. Tsukuba Area Geopark~

Kadowaki, Hikaru (2020) Petrogenesis of Incipient/Bleached Charnockite - Khondalite Association from the Trivandrum Block, Southern India

Kikuchi, Eisuke (2020) Geology and Paleoenvironment of the Cretaceous Tetori Group in the Hida-Furukawa Area, Gifu Prefecture

Maehata, Kento (2020) Complex Rupture Source Process of the 2016 Kaikoura, New Zealand Earthquake

Masuyama, Haruna (2020) Change in Temperature and Deformation Mechanism During Subduction: Insights from Raman Geothermometer and Microstructures of Pelitic Schist in Subduction Mélanges

Matsukawa, Takuya (2020) Mineralogical and Geochemical Characteristics of Ag-Zn-Pb Ores from the Cerro Los Gatos Vein-Type Deposit, Mexico

Mizukoshi, Yurina (2020) Reconstruction of the Masticatory System of *Desmostylus* based on Biomechanics

Nagate, Ayaka (2020) Frictional Melting and Thermal Fracturing Recorded in the Pseudotachylyte Derived from Pelagic Sedimentary Rocks

Noro, Kazuya (2020) Metasomatic Reactions and Localization of Ductile Shear Observed in Subduction Mélanges Exhumed from Source Depths of Deep Slow Earthquakes

Ohishi, Takuma (2020) Characterization of melt veins for petrologic type 4-6 ordinary chondrites

Okamoto, Naomi (2020) A New Record of the Extinct Tusked Walrus (Carnivora: Odobenidae) from the Lower Pliocene of Japan Reveals their Unknown Paleoecology

Ozawa, Chizuru (2020) Geochemical Evidence for Source Materials of Frictional Melt: an Example from the Pseudotachylyte in the Jurassic Accretionary Complex, Central Japan

Sano, Yoshinari (2020) Structure change process of iron sulfide nanoparticle under hydrothermal conditions

Sasanuma, Shiori (2020) Petrology and fluid inclusions of ultrahigh-temperature granulites from Skallevikshalsen in the Lützow-Holm Complex, East Antarctica

Shimada, Yumi (2020): A 3,000-year record of event deposits from the coastal lake sediments in Minami-ise Town, facing the Nankai Trough, western Japan

Shimizu, Kousuke (2020) Proving Fault Geometry with Finite-Fault Inversion of Teleseismic Data

Sudo, Masayoshi (2020) Paleoclimate Analysis of the Late Miocene Katabira Flora from Koriyama City, Fukushima Prefecture

Tsuzuku, Nahoko (2020) The Diversification of Pleistocene Sea Lions (Carnivora: Otariidae) based on Morphometric Analyses of Mandibular Fossils

Yu, Junyu (2020) Earthquake Detection Based on Deep Learning

Master of Arts in Education:

Honma, Ryunosuke (2020) Simulation of River Embankment Collapse in a Simple Model

Kawabata, Kei (2020) Weathered Granite and its Geological Features of Mt. Kaba in Mt. Tsukuba Massif

Narai, Shun (2020) A Study on the Handling of Tuff Utilizing the Rock Cycle in Junior High School Science

Uemura, Motohiro (2020) A Study on the Usefulness of Siliceous Shale from the Tohoku Region as a Stone Tool Material

Research Activities

Each researcher had the following research activities during the academic year 2019.

Research projects

Agematsu, S. (2014~): Reconstruction of the Triassic conodont apparatuses.

Agematsu, S. (2015~): Lower and Middle Paleozoic microfossils and paleoenvironments in Thailand and Malaysia (IGCP 668; Equatorial Gondwanan History and Early Paleozoic Evolutionary Dynamics).

Arakawa, Y. and Shinmura, T. (2017~): Geological and petrological study of Aso volcano, Kyushu, Japan.

Arakawa, Y., Matsui, T., and Ikehata, K (2018~): Mineralogical and petrological studies of anorthite megacrysts in arc volcanic rocks.

Arakawa, Y. and Ikehata, K. (2014~): Petrological and geochemical investigations of volcanic rocks in Izu-volcanic arc, Japan.

Fujino, S. (2007~): Stratigraphic records of past earthquakes and tsunamis along the Nankai Trough

Fujino, S. (2014~): Potential risk of tsunamis generated at submarine active faults in western Japan

Ikehata, K. (2005~): Petrological and petrochemical studies of volcanic products from active volcano.

Ikehata, K. (2006~): Development of analytical methods for non-traditional (e.g., Cu, Fe, Zn) stable isotope ratios of materials and its applications to geochemical samples.

Kamata, Y. (2015~): Stratigraphy and tectonics of the Paleo-Tethys in Thailand and Lao.

Kamata, Y. (2015~): Stratigraphy and tectonics of Jurassic accretionary complex in Japan.

Kurosawa, M. (2015~) Single fluid-inclusion analysis using particle-induced X-ray emission (PIXE) to elucidate chemical compositions and behaviors of hydrothermal fluids from granites.

Kurosawa, M. (2018~) Mineralogical studies on archeological artifacts from ancient West Asia.

Kyono, A. (2015~): Studies on a phase transition mechanism from ferrihydrite to hematite with compression, the effect of water on crystal structure and phase variation of the magnesium carbonate hydrate mineral, the carbon solubility into silica minerals under high-temperature, shock-induced phase transition of iron and aluminum metals, symmetry changes of analcime by formation conditions, and TEM investigation of the interaction between bacteria and mineral surfaces.

Maruoka, T. (2009-2019) Geochemical study for understanding the environmental perturbations at the mass-extinction events.

Mukai, H. (2018~): Microscopic study of weathered granite soil in ion adsorption rare earth deposit.

Tanaka, K. (2019~): Excavation of fossil eggs and eggshells in Tamba, Hyogo, Japan.

Tsunogae, T. and Santosh, M. (2016~): Crustal evolution of the Gondwana suture zones in India and Sri Lanka.

Tsunogae, T., Dunkley, D.J., and Miyamoto, T. (2014~): Pressure-temperature-time evolution of granulites in East Antarctica.

Tsunogae, T. (2018~): Crustal evolution of the basement rocks in southern Africa.

Ujiie, K. (2007~): Field and microstructural studies of accretionary complexes and fault rocks

Ujiie, K. (2007~): Fault zone drilling in the Nankai and Japan Trench subduction zones

Ujiie, K. (2016~): Structural and rheological studies of metamorphic rocks

Yagi, Y. (2012~): Seismic source process of large and great earthquakes derived from a hybrid back-projection and a waveform inversion.

Research grants

Agematsu, S. (2017~2020): Lower and Middle Paleozoic microfossils and paleoenvironments in Thailand and Malaysia. Grant-in-Aid for Scientific Research (B), JPY 7,800,000.

Ikehata, K. (2019-2022): Study on formation mechanism of seafloor hydrothermal deposits based on copper isotopic measurement. Grant-In-Aid for Scientific Research (C).

Ikehata, K. (2017-2019): Elucidation of a formation mechanism for hydrothermal native copper. The Japan Mining Promotive Foundation research grant.

Kurosawa, M. (2018~2022) An interdisciplinary study of the origin and transformation of ancient west Asian cities. Grant-in-Aid for Scientific Research on Innovative Areas.

Mukai, H. (2018~2020): A study of minerals adsorbing rare earth elements in ion adsorption type ore. Grant-in-Aid for Early-Career Scientists, JPY 4,160,000.

Tanaka, K. (2019~2021): Reconstruction of Mesozoic bird reproduction. Grant-in-Aid for Research Activity Start-up, JPY 2,860,000.

Tsunogae, T. (2018~2021): Petrology and geochronology of the Neoproterozoic Kuunga orogen and its implications for the evolution of Gondwana Supercontinent. Japan Society for the Promotion of Science, Grant-in-Aid for Scientific Research (B), JPY 15,990,000

Tsunogae, T. (2019~2020): Petrology and tectonics of the Central Asian Orogenic Belt. Japan Society for the Promotion of Science, Grant-in-Aid for Foreign Post-Doc, JPY 2,300,000

Ujiie, K. (2016~2020): Science of slow earthquakes. Grant-in-Aid for Scientific Research on Innovative Area (Research in a proposed research area).

Yagi, Y. (2016~): Development of new hybrid back-projection to understand the generation of high frequency waveform in great earthquakes. Japan Society Promotion of Science: Basic Research (C), JPY 4.680,000.

Activity Reports for Academic Exchange and Cooperation

Chulalongkorn University, the Kingdom of Thailand

(1) Exchange of Researchers: N/A

(2) Exchange of Graduate Students: N/A

(3) Collaboration Research and/or Class: International Geological Filed Excursion B in Thailand (Approximately 20 Japanese students were planning to partic-

ipate, but cancelled due to COVID-19)

China University of Geosciences (Beijing), P. R. China

(1) Exchange of Researchers: N/A

(2) Exchange of Graduate Students: Masanori Ozeki, Xue Fei, Hu Xinkai, Chao Weiwei (under the double-degree program between Tsukuba and CUGB)

(3) Collaboration Research and/or Class: Special Filed Excursion on Earth Evolution Sciences in China (6 students and one professor participated)