Annual Report 2018

Geography

Department of Geography
Graduate School and Faculty of Urban Environmental Sciences
Tokyo Metropolitan University
Contents

1. Laboratory of Quaternary Geology and Geomorphology 1
   1) Staff
   2) Overview of Research Activities
   3) List of Research Activities in FY2018

2. Laboratory of Climatology 13
   1) Staff
   2) Overview of Research Activities
   3) List of Research Activities in FY2018

3. Laboratory of Environmental Geography 30
   1) Staff
   2) Overview of Research Activities
   3) List of Research Activities in FY2018

4. Laboratory of Geographical Information Sciences 36
   1) Staff
   2) Overview of Research Activities
   3) List of Research Activities in FY2018

5. Laboratory of Urban and Human Geography 44
   1) Staff
   2) Overview of Research Activities
   3) List of Research Activities in FY2018
1. Laboratory of Quaternary Geology and Geomorphology

1) Staff
Takehiko SUZUKI  Professor / D.Sc.
Geomorphology, Quaternary Science, Volcanology

Masaaki SHIRAI  Associate Professor / D.Sc.
Sedimentology, Quaternary Geology, Marine Geology

Daisuke ISHIMURA  Assistant Professor / D.Sc.
Tectonic Geomorphology, Quaternary Geology

Makoto KOBAYASHI  Project Associate Professor / D.Sc.
Volcanology, Volcanic Geology, Quaternary Geology

Masanori MURATA  Project Assistant Professor / D.Sc. (from May, 2018)
Tephrochronology, Volcanic Geology

Kaori AOKI  Project Researcher / D.Sc.
Quaternary, Marine Tephrochronology, Chronology

2) Overview of Research Activities
To prospect the futuristic view of environmental changes, our laboratory investigates the history
and process of surface landform/geological development during the Quaternary period. The
followings are some topics of our studies.

1. Reconstruction of geomorphological/geological phenomena during the Quaternary (the last 2–3
   million years) with accuracies of $10^5$–$10^1$ years
2. Study on volcanic products (tephra) and explosive eruption history in and around the Japanese
   Islands
3. Investigation on production–transport–depositional processes of sedimentary particles
4. Study on coastal–deep marine sediment for reconstruction of natural hazard history and influence of human activity to natural environment
5. Reconstruction of earthquake recurrence interval and fault activity from earthquake/fault induced landform and sediment
6. Investigation on marine/fluvial terraces for reconstruction of landform development and crustal movement during the last $10^5$ years

3) List of Research Activities in FY2018

**Peer-reviewed Articles**


Miyazaki, M. and Ishimura, D. 2018. Re-examination of the ages of the last interglacial marine terraces and crustal movements since the last interglacial period along the Northern Sanriku Coast based on tephrochronology. *Journal of Geography (Chigaku Zasshi)* **127**: 735-757. (in Japanese with English abstract)


Tsutsumi, H., Toda, S., Goto, H., Kumahara, Y., Ishimura, D., Takahashi, N., Taniguchi, K., Omata,


**Other Articles**


Books

None

Reports


Book Reviews


Miscellaneous Reports


**Presentations**

Suzuki, T 2018. Volcanoes and eruptions in the Japanese Islands. Open University, Tokyo Metropolitan University, April, Chiyoda-ku. (in Japanese)


Chigira, M., Tajika, J., Ishimaru, S., and Suzuki, T. 2019. The reasons why so many landslides were induced by the 2018 Eastern Iburi Earthquake: distribution of pyroclastic fall deposits, their weathering, and slope undercut. Disaster Prevention Research Institute, Kyoto University Annual Meeting 2018, February, Uji. (in Japanese)


Shirai, M., and Utsugawa, T. 2018. Forming process of a waterfall accompanying with slope failure
caused by 18th century earthquake, central Japan. *Abstracts of 20th International Sedimentological Congress*: ThFr-4.8-D182-P, August, Quebec, Canada.


Kobayashi, M. 2018. Volcanic hazards prediction of the eruption of Fuji, Hakone and Izu-Islands volcanoes, and theirs management, Open University, Tokyo Metropolitan University, Volcanoes in Japan, April, Chiyoda-ku. (in Japanese)


Kobayashi, M., Nishizawa, F., Aoki, K. and Suzuki, T. 2018, Tephrostratigraphy in central and


Aoki, K., 2018. The examination for the Middle-late Pleistocene cryptotephrostratigraphy of the sediment core MD01-2421 collected off the Kashima coast, Japan by recycling the residue of the sample for foraminiferal research. *Japan Association for Quaternary Research, Program and Abstracts 48*: 23, August, Hachioji. (in Japanese)


11


Utsugawa, T. and Shirai, M. 2018. Effects of rock type and grain size on changes in roundness of gravel and sand grains during fluvial transport process. *Abstracts of 20th International Sedimentological Congress*: MoTu-5.4-D236-P, August, Quebec, Canada.


2. Laboratory of Climatology

1) Staff

Jun MATSUMOTO   Professor / D.Sc
Monsoon Climatology, Environmental Climatology

Hideo TAKAHASHI   Professor / D.Sc.
Urban Climatology, Climatic Change, Rainfall Climatology

Hiroshi TAKAHASHI   Assistant Professor / PhD (D.Sc.)
Climate System Study, Cloud-Precipitation Climatology, Regional Climate Modeling

Fumiaki FUJIBE   Project Professor / D.Sc.
Urban Climatology, Environmental Climatology

Jun-Ichi HAMADA   Project Associate Professor / PhD (D.Sc.)
Tropical Climatology, Meteorological Observation

Tomoshige INOUE   Project Assistant Professor / PhD (D.Sc.)
Monsoon Climatology, Climate Change, Global Warming

Masato NODZU   Project Researcher / PhD (D.Sc.)
Tropical climatology, Satellite Meteorology

Yoshihito SETO   Project Researcher / PhD (D.Sc.)
Urban Climatology, Local Climatology, Statistical Analysis

Takanori WATANABE   Project Researcher / PhD (D.Sc.) (from June, 2018)
Urban climatology, Atmospheric chemistry, Meteorological model

Ko NAKAJIMA   Project Researcher / PhD (D.Sc.) (from October, 2018)
2) Overview of Research Activities

Our laboratory investigates climate system on the earth in various temporal-spatial scales. In particular, we focus on climate changes due both to natural and anthropogenic causes, for example, processes of heat island and heavy rainfall events over and around urban regions, and influences of land-use changes and deforestation on regional climates. We also investigate diurnal, intra-seasonal, and inter-annual variabilities and long-term changes of climate, in particular, rainfall activities in the Asian monsoon region, and influences of global warming on regional climates (future projection).

We apply three major methods, observation (monitoring), data-analysis of various global and regional datasets, and numerical modeling for investigating above-mentioned topics.

1) Climate changes and climate variability over Japan and around the world
2) Variability and seasonal changes of regional climate over Asian monsoon region
3) Observational study on formation processes of urban heat island, detailed structure of urban boundary layer, and elucidation of urban effects on short duration intense rainfall
4) Impacts of land-surface conditions and changes on cloud and precipitation activities, in particular, in the tropics
5) Reconstruction of past climate during the historical period in Japan and in East Asia

3) List of Research Activities in FY2018

Peer-reviewed Articles


Takahashi, H.G. and Polcher, J. 2019: Weakening of rainfall intensity on wet soils over the wet Asian


Kamizawa, N. and Takahashi H.G. 2018. Projected trends in interannual variation in summer
seasonal precipitation and its extremes over the tropical Asian monsoon regions in CMIP5. *Journal of Climate* **31**: 8421-8439. doi.org/10.1175/JCLI-D-17-0685.1


**Other Articles**


Books
None

Reports

Book Reviews

Miscellaneous Reports


Takahashi, H. 2018. Urban climate phenomenon of Tokyo observed by using high density


**Presentations**


Matsumoto, J. and Asada, H. 2018. Extreme rainfall, severe floods and their impact on rice production in Bangladesh. Regional Conference of IGU 2018, August, Quebec, Canada.


Matsumoto, J., Terao, T. and Kanae, S. 2018. Post MAHASRI and AMY-II. Ad-hoc Workshop on Aerosol-Monsoon Interactions: Disentangling the Influences of Dynamics and Physics on Variability and Change of Precipitation over East Asia, December, Maryland, USA.


Takahashi, H. 2019. Two kinds of climatic changes which we are facing: Global warming and urban heat island. Lecture in the energy conservation month, Nerima Ward regional council on global warming countermeasures, February, Nerima-ku. (in Japanese)


Fujibe, F. 2019. Recent features of extreme weather events in relation to climate change. The 23rd Earthquake Technology Expo., February, Yokohama. (invited)


Abstract for the EGU General Assembly 2018, 20, EGU2018-16395, April, Vienna, Austria.


between reproducibility of GSMaP and rain top height in TRMM2A25 over Northern Vietnam. Precipitation Measurement Missions (PMM) 2nd domestic science meeting, September, Chuo-ku. (in Japanese)


Konduru, R.T. and Takahashi, H.G. 2018. Realistic simulation of Indian summer monsoon rainfall in


Hoshi, R. and Takahashi, H.G. 2018. A long-term change of lag-relationship between the Arctic


3. Laboratory of Environmental Geography

1) Staff
Makiko WATANABE  Professor / PhD
Soil Geography, Environmental Dynamic Analysis, Geoarcheology

Masayuki KAWAHIGASHI  Associate Professor / D. Agr.
Soil Ecology, Environmental Chemistry, Material Dynamics in Ecosystems

Kimihiro KIDA  Project Researcher / PhD. (D.Sc.) (until October, 2018)
Urban Soil study, Soil Classification

2) Overview of Research Activities
This research unit focuses on the relations between human and natural environment. For understanding processes enacted upon environment in local and regional scales, we try to integrate subdivisions of both physical and human geography together with interdisciplinary aspects of environmental sciences, such as botanical science, forest ecology, zoology, soil science, landscape design, political ecology, folklore, anthropology and so on. Research methods are in primary based on fieldworks, including weather observation, land survey, soil and vegetation surveys, and interview survey and in participative on laboratory analyses on soil-water analyses and interpretations of aerial photo and satellite imagery as well.

1. Development of survey methods for evaluation of soils in urban area
2. Characterization of sclerotium grains and their function in forest soil ecosystem
3. Geoarcheological study of ancient water environment in Kharga, Western Desert, Egypt
4. Environmental risk evaluation of the soils surrounding the mining area in Erdenet, Mongolia
5. Environmental dynamics study of watershed area of Small Water Impounding Project dam in central Luzon, Philippines
6. Influence of anthropic pressure in a river basin on downstream water environment
7. Evaluation of forest fire impact on soil, vegetation and landform in terrestrial ecosystems
8. Study for elemental dynamics in urban ecosystems
9. Soil carbon sequestration from the point of view of soil parent materials

3) List of Research Activities in FY2018

_Peer-reviewed Articles_


_Other Articles_


Books

Reports
None

Book Reviews
None

Miscellaneous Reports
Presentations


Watanabe, M., Kelly, C.L. and Hardenbicker, U.M. 2018. Interpretation of Beaver Index as a wet-dry proxy during the Holocene applied for the alluvial fan deposits in the Qu’Appelle Valley, Saskatchewan. *Japan Association for Quaternary Research, Programme and Abstracts* 48: 50, August, Hachioji.


Kawahigashi, M. 2018. Introduction of Tokyo Metropolitan University (TMU). Aktru Summer School, July, Tomsk, Russia. (invited)

Kawahigashi M. 2018. Functions of dissolved organic matter in boreal forest ecosystems. Aktru Summer School, July, Altay-Aktru, Russia. (invited)

Kawahigashi M. 2018. Soils beneath gray and green infrastructure in Japan. Regional meeting of Polish Soil Science Society, April, Torun, Poland. (invited)


4. Laboratory of Geographical Information Sciences

1) Staff

Hiroshi MATSUYAMA  Professor / PhD (D.Sc.)
Hydrometeorology, Geographical Information Sciences

Takeki IZUMI   Assistant Professor / PhD (D.Eng.)
Urban Climatology, Geographical Information Sciences, Numerical Meteorological Modelling

Daichi NAKAYAMA  Assistant Professor / PhD (D.Sc.)
Geographical Information Sciences, Remote Sensing, Computational Geomorphology

2) Overview of Research Activities

This laboratory is mainly going to study the natural environment as a whole which is composed of geomorphology, climate, hydrology, vegetation, and so on. Concretely, deductive approach and inductive approach are combined for conducting studies. The former approach is going to explain results from causes by physical lows such as mass balance, energy balance, equation of motion, and so on. The latter approach is going to explain facts demonstratively based on field surveys and in situ observations. Therefore, collection of quantitative data, digital mapping, statistical analyses, numerical modeling, and GIS (Geographical Information Systems) are main methods used in this laboratory.

The main study themes in this laboratory are listed as follows.

1. Energy and water cycle in the atmosphere and hydrosphere
2. Capturing snow distribution and snow water resources, along with snowmelt-runoff based on remote sensing techniques and field surveys
3. Quantitative evaluation of spectral reflectance characteristics of coniferous forests and their leaf area indices
4. Water environment around Mt. Aso and Tokyo metropolis
5. Numerical simulation of urban climate and local wind
6. Capturing surface conditions of cities using GIS
7. Monitoring and modeling natural environment and natural hazards
8. Quantitative evaluation of geographical phenomena in Tokyo in the modern era

3) List of Research Activities in FY2018

Peer-reviewed Articles


Matsuyama, H. 2018. Severe drought after an absence of 37 years illustrated by photographs and figures: Comparison of less precipitation at Chichi-jima and Haha-jima in the Ogasawara (Bonin) Islands from 2016 to 2017 and normal precipitation in 2018. *Journal of Geography (Chigaku Zasshi)* **127**: 823-833. (in Japanese with English abstract)


Other Articles

Aoyama, M. 2019. Relationship between liquefied sites and artificial landform changes in the Kinu and Kokai river basin, caused by the 2011 off the Pacific coast of Tohoku Earthquake. *Annual Reports of the Faculty of Education, Gunma University, Cultural Science Series* **68**: 69-78. (in

**Books**
None

**Reports**

**Book Reviews**
Miscellaneous Reports


Hasegawa, K. 2018. Proposal to learn geography in high school—Education of relationship between resources and industry—. *Chiri* 64(2): 116-121. (in Japanese)


Presentations

Matsuyama, H. 2018. Severe drought after an absence of 37 years—Less precipitation at Chichi-jima in the Ogasawara (Bonin) Islands from 2016 to 2017. Exhibition of Gallery at Tokyo Metropolitan
Matsuyama, H. 2018. Interannual variability of rainfall in Ogasawara—Comparison between Chichi-jima and Haha-jima—. *Lecture at Ogasawara Environmental Planning Institute*, August, Haha-jima. (in Japanese)


Matsuyama, H. 2018. Characteristics of springwaters at Kurokawa Seiryu Koen—Comparison between other springs at Hino city and those at Tokyo Metropolis—. September, Hino. (in Japanese)

Matsuyama, H. 2018. Figure of the Earth as seen from the hydrological cycle. *Yume-Nabi Live*, October, Fukuoka. (in Japanese)

Matsuyama, H. 2018. Hydroclimatology at Ogasawara—Comparison between Chichi-jima and Haha-jima—. Lecture at Open University “Study for 50 years by Tokyo Metropolitan University on World Natural Heritage Ogasawara”, October, Chiyoda-ku. (in Japanese)


Matsuyama, H. 2019. Hydroclimatological study of Ogasawara and its feedback to the community. Ogasawara Mini-Symposium, Japan Society of Island Studies/Ogasawara Research Committee, Tokyo Metropolitan University, March, Chichi-jima. (in Japanese)


Aoyama, M. 2018. Land condition of the liquefied area in the Nakagawa and Kujigawa basin caused by the 2011 off the Pacific coast of Tohoku Earthquake. *Proceedings of the General Meeting of*

Hasegawa, K. 2018. Reports of active learning in Geoparks and areas familiar to students—Two presentations from an introduction to physical geography—. Abstracts of Japan Geoscience Union Meeting 2018: G05-P05, May, Chiba. (in Japanese with English abstract)


Nemoto, Y. 2018. Interpret local lore based on natural science: Significance of interpreting Shingen-Tsutsumi and Artificial Flooding Tactics at Bicchutakamatsu Castle by Hideyoshi. 3rd Meeting for the Study of Historical Big Dat, August, Chiyoda-ku. (in Japanese)


5. Laboratory of Urban and Human Geography

1) Staff

Yoshiki WAKABAYASHI   Professor / PhD (D.Sc.)
Urban Geography, Behavioral Geography, Geographical Information Sciences

Akihiro TAKINAMI   Associate Professor / PhD (D.Lit.)
Regional Studies, Representation Studies

Naoto YABE    Associate Professor / PhD (D.Sc.)
Quantitative Geography, Urban Geography

Hiroyuki TSUBOMOTO   Assistant Professor / PhD (D.Sc.)
Urban Geography, Office Study

Yoshio SUGIURA   Senior Leading Professor / PhD (D. Sc.)
Human Geography

2) Overview of Research Activities

This research unit specializes in human geography, with special emphasis on the city and its environs. Our research interests center on the structural explanation of the relationship between human activities and geographic environment by employing approaches of social sciences and humanities. Methodologically, the emphasis lies largely on positivistic (viz., quantitative or mathematical); fieldwork is also encouraged. The research interests cover quantitative, socioeconomic, urban and behavioral geography. The main themes of our current research are as follows:

1. Mathematical modeling of human geographic phenomena
2. Regional analysis of human geographic phenomena
   1) Relationship between human activities and geographic environment
   2) Land use change in the city and its suburbs
3) Spatial organization of the society
4) Transformation of human activities brought about by environmental change

3. Geographical studies of urban systems
   1) Spatial structures of intra-urban system
   2) System of cities

4. Geographical thought
   1) History of modern geography
   2) Bibliometric research of geographical studies

3) List of Research Activities in FY2018

Peer-reviewed Articles


Other Articles


**Books**

None

**Reports**


**Book Reviews**

Miscellaneous Reports

Presentations
Wakabayashi, Y. 2018. Variation in the use of geospatial information on the web: mainly focused on the current conditions and intergenerational differences of map use. Regional Conference of IGU 2018, August, Quebec, Canada.
Wakabayashi, Y. 2018. Inter-generational comparison of contemporary map use based on an online survey. Papers and Proceedings of the Annual Conference of the Japan Cartographers Association, 4-5, August, Toyama. (in Japanese)


