

Sustainable Global Environmental Studies Program

We conduct education and research on the past, present, and future history and changes of the atmosphere, hydrosphere, geosphere, and biosphere that make up the Earth's environment, as well as their interactions, from the earth's interior to outer space, to develop human resources with interdisciplinary knowledge and thinking ability. Specifically, education and research are conducted on the structure, behavior, evolution, and diversity of organisms in the Earth's environment, and the mechanisms of transmission, expression, and regulation of genetic information. Based on the knowledge obtained from these studies, we conduct education and research on (1) genetic engineering for the industrial production of useful materials, (2) analysis of the relationship between biological functions and the internal and external environment, (3) conservation and restoration of the environment using chemical and biological methods, (4) changes in the crustal structure, (5) prediction of natural disasters, and (6) disaster prevention technology. Furthermore, we also work on issues aimed at the formation of a sustainable society.

Educational field	Education and Research	Supervisors	Related lectures
Geological Science	<p>We conduct education and research for unveiling the origins of underground resources and changes in the global environment during 4.6 billion years of the Earth history. The primary targets of our study are solid substances that record the Earth history such as minerals, rocks, and sedimentary strata. From the targets, we explore the material cycle, chemical reaction, heat history, and environmental changes of the Earth from its birth to the present on the basis of accurate age dating.</p>	<p>Prof. Yasuo Ishizaki ishizaki@sus.u-toyama.ac.jp</p> <p>Prof. Shin-ichi Sano ssano@sus.u-toyama.ac.jp</p> <p>Associate Prof. Ken-ichi Yasue yasueken@sus.u-toyama.ac.jp</p> <p>Assistant Prof. Hikaru Sawada hsawada@sus.u-toyama.ac.jp</p>	<p>Advanced volcanology</p> <p>Earth and life history</p> <p>Advanced neotectonics</p> <p>Advanced earth material science</p>
Geophysics of Atmosphere, Ocean, and Cryosphere	<p>As global warming progresses, extreme weather events are becoming more severe and frequent. The Hokuriku region is also affected by these significant climate changes, facing increased risks of various local disasters such as heavy snowfall, thunderstorms, heatwaves, and storm surges. To protect safe urban functions and rich social life from these risks, we aim to study the mechanisms behind climate system changes from a global perspective and develop highly capable individuals who can apply this knowledge to solve local problems.</p>	<p>Prof. Kazuaki Yasunaga yasunaga@sus.u-toyama.ac.jp</p> <p>Prof. Kazuma Aoki kazuma@sci.u-toyama.ac.jp</p> <p>Prof. Konosuke Sugiura sugiura@sus.u-toyama.ac.jp</p> <p>Prof. Bunmei Taguchi taguchi@sus.u-toyama.ac.jp</p> <p>Prof. Masahiro Hori mhoris@sus.u-toyama.ac.jp</p> <p>Associate Prof. Wataru Shimada shimada@sci.u-toyama.ac.jp</p> <p>Associate Prof. Atsushi Hamada hamada@sus.u-toyama.ac.jp</p>	<p>Advanced dynamic meteorology</p> <p>Advanced atmospheric radiation</p> <p>Advanced geoglaciology</p> <p>Advanced ocean and climate dynamics</p> <p>Advanced remote sensing</p> <p>Advanced snow and ice science</p> <p>Advanced atmospheric physics</p>

Solid Earth Geophysics	Our education and research are aiming to advance our understanding of the structure of the solid Earth and its dynamics, especially around the Central Japan. We are investigating the crustal structure, seismic and volcanic activities, and environmental changes in this area through geophysical observations, field surveys, and laboratory experiments. Students are trained to contribute to the prediction, prevention and mitigation of natural disasters..	<p>Prof. Tohru Watanabe twatanabe@sus.u-toyama.ac.jp</p> <p>Prof. Naoto Ishikawa ishikawa@sus.u-toyama.ac.jp</p> <p>Associate Prof. Kazuo Kawasaki kawasaki@sus.u-toyama.ac.jp</p> <p>Assistant Prof. Kohei Hotta hotta@sus.u-toyama.ac.jp</p>	<p>Advanced physics of the Earth's interior</p> <p>Advanced paleomagnetism and rock magnetism</p> <p>Advanced resource and environmental geophysics</p> <p>Advanced geodesy</p>
Regulatory biology	Education and research are conducted on adaptive significance of biological rhythms and sleep system, endocrine system, and behavioral system of an individual organism or population in changing external environments.	<p>Prof. Kouhei Matsuda kmatsuda@sci.u-toyama.ac.jp</p> <p>Associate Prof. Tomoko Yoshikawa tomokoyn@ctg.u-toyama.ac.jp</p> <p>Lecturer Norifumi Konno nkonno@sci.u-toyama.ac.jp</p> <p>Lecturer Tomoya Nakamachi nakamachi@sci.u-toyama.ac.jp</p> <p>Lecturer Eri Morioka emorioka@sci.u-toyama.ac.jp</p>	<p>Advanced Biochemistry for Organic Molecules</p> <p>Advanced biological clocks</p> <p>Advanced endocrinology</p> <p>Advanced behavioral physiology</p> <p>Advanced invertebrate neuroethology</p>
Life information science	We conduct education and research on molecular mechanisms of cell differentiation and organ development in higher plants, structure, and expression of plant genome. The perception and transduction of environmental signals such as light and hormones are also studied.	<p>Prof. Ichirou Karahara karahara@sci.u-toyama.ac.jp</p> <p>Lecturer Masayuki Yamamoto mpyama@sci.u-toyama.ac.jp</p> <p>Lecturer Daisuke Tamaoki tamaoki@sci.u-toyama.ac.jp</p>	<p>Advanced plant morphology</p> <p>Advanced plant molecular genetics</p> <p>Advanced plant cell biology</p>
Living structure science	We analyze various processes in the biological developments, morphogenesis, structural features, phylogenetic relationships, diversity, behavioral ecology and evolution through comparative study in living structures. Thus, we conduct education and research to understand the fundamental principles and rules.	<p>Associate Prof. Yuji Yamazaki yatsume@sci.u-toyama.ac.jp</p> <p>Associate Prof. Kiyoto Maekawa kmaekawa@sci.u-toyama.ac.jp</p> <p>Associate Prof. Tsutomu Tsuchida tsuchida@sci.u-toyama.ac.jp</p> <p>Assistant Prof. Kyouko Sato taraxaca@sci.u-toyama.ac.jp</p>	<p>Living structure science</p> <p>Advanced evolutionary developmental biology</p> <p>Advanced biology of symbiosis</p> <p>Advanced plant cytotaxonomy</p>

<p>Environmental and analytical chemistry</p>	<p>Our group focuses on exploring techniques from chemical approaches in solving and clarifying environmental problems. For example, we are developing simple and rapid analytical methods to measure harmful components related to environmental pollution. The dynamics of these components are then studied, and based on these findings, we perform basic research to remove the pollutants from waste water. Furthermore, our research also includes geochemical monitoring of CO₂ which consists of water rock interaction in geothermal fields. We also clarify and evaluate material cycling systems and mechanisms and changes in oceanic and terrestrial water systems, using major ions, trace elements, and stable isotopes.</p>	<p>Prof. Jing Zhang jzhang@sci.u-toyama.ac.jp</p> <p>Prof. Hideki Kuramitsu kuramitz@sci.u-toyama.ac.jp</p> <p>Prof. Keiji Horikawa horikawa@sci.u-toyama.ac.jp</p> <p>Lecturer Kazuto Sazawa sazawa@sci.u-toyama.ac.jp</p> <p>Project Assistant Prof. Hidetaka Kobayashi hidekoba@sci.u-toyama.ac.jp</p> <p>Project Assistant Prof. Takanori Kagoshima kagos@sci.u-toyama.ac.jp</p>	<p>Advanced marine geochemistry</p> <p>Advanced water analysis</p> <p>Isotope studies in environmental science</p> <p>Advanced environmental water quality</p> <p>Advanced Ocean Dynamics</p> <p>Advanced Solid Earth Geochemistry</p>
<p>Environmental Biology</p>	<p>We conduct research on the functions of organisms, which are important components of the biosphere, from the molecular to ecosystem level. In particular, education and research will be conducted on the effects of environmental factors such as light, water, metal ions, and chemical substances on the physiological functions of organisms, the effects of global environmental change, and interactions between individual organisms and between species.</p>	<p>Prof. Daisuke Tanaka tanakada@sci.u-toyama.ac.jp</p> <p>Prof. Hiroshi Ishii hishii@sci.u-toyama.ac.jp</p> <p>Associate Prof. Hiroyuki Kamachi kamachi@sci.u-toyama.ac.jp</p> <p>Associate Prof. Kenji Kashiwagi kashiwagi@sci.u-toyama.ac.jp</p> <p>Lecturer Akihiro Sakatoku sakatoku@sci.u-toyama.ac.jp</p> <p>Lecturer Tamihisa Oota tamihisa@sci.u-toyama.ac.jp</p>	<p>Advanced microbiology</p> <p>Advanced plant ecology</p> <p>Advanced plant physiology</p> <p>Advanced stratigraphy</p> <p>Advanced environmental molecular biology</p> <p>Advanced isotope ecology</p>
<p>Environmental Sustainability Science</p>	<p>From the perspective of the use and conservation of natural ecosystems, agricultural lands, plantations, and other green spaces, we will guide environmental sustainability research for Ph.D students.</p>	<p>Prof. Naoya Wada wada@sci.u-toyama.ac.jp</p>	<p>Advanced Conservation Ecology</p>