

What is GREEN?

1. Research Institute for Geo-Resources and Environment (GREEN)

The GREEN is one of the principal divisions of the Geological Survey of Japan (GSJ) at the National Institute of Advanced Industrial Science and Technology (AIST). We carry out surveys, research, technological development, and the development of geoscientific intellectual infrastructure, to contribute to ensuring a stable supply of essential natural resources; enabling the sustainable and stable use of the subsurface for energy cycles; and conserving the subsurface environment to support safe and secure living conditions.

2. Mission of GREEN

To contribute to simultaneously achieving decarbonization, economic growth, and energy security, while promoting the transition of society toward GX, the GREEN advances comprehensive research, technology development, and knowledge infrastructure related to the geosphere.

Our activities are built on three pillars: **Geo-resources**, **Geo-environment**, and **Geo-exploration & analysis**. We pursue a wide range of research—from fundamental studies to applied research and social implementation—across diverse scientific fields, aiming to deliver internationally relevant outcomes that create value for the future.

3. Medium- and Long-term GREEN Initiatives (2025-2032)

(1) Ensuring stable supply and sustainable subsurface utilization

Advancing surveys, evaluations, and technology development for energy and mineral resources in terrestrial and marine areas, while promoting research in environmental conservation and remediation associated with resource development.

(2) Creating innovative technology seeds from geological insights

Leveraging advanced geological data to generate novel concepts and technologies for exploration, analysis, and modeling. These innovations aim to drive next-generation solutions for resource development, subsurface utilization, and environmental sustainability.

(3) Publishing geological thematic maps

As part of the GSJ, our aim is to continue to organize and enhance geological information, including geoscience maps for groundwater, surface soils, and mineral resources, while promoting dissemination and utilization across society.

4. Actions of GREEN under the AIST Management Policy (2025-2032)

[AIST mission] Continuously create innovations that contribute to solving social problems and strengthening Japan's industrial competitiveness. The GREEN focuses on two primary areas: "Energy, environment and resource limitations" and "Realizing a resilient society".

Actions of GREEN

- Collaborating with newly established Integrated Research Centers, particularly in nature positive technologies, CCUS, and resilient infrastructure.
- Maintaining strong partnerships with the Renewable Energy Advanced Research Center (Geothermal Energy / Shallow Geothermal and Hydrogeology Research Team).
- Advancing fundamental and interdisciplinary research based on geology and related fields to generate technology seeds that lead to practical solutions.
- Promoting collaboration with industry to translate research into societal impact. For risky social challenges beyond private-sector capacity, leveraging public funding and joint projects to develop technologies that enable commercialization and foster new industries.

Geomechanics Research Group

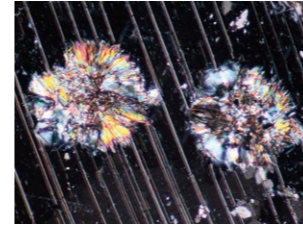
We are focused on optimizing subsurface technologies for geothermal energy, CO₂ storage, and well drilling with an emphasis on safety. Our research combines rock mechanics experiments and property evaluation with simulations of coupled hydro-mechanical-chemical processes, contributing to sustainable resource use and a resilient society.



Laboratory experiment.

Geo-Resources Chemistry Research Group

We focus on resources such as non-metallic minerals, non-metallic elements, and geosphere fluids. Our research combines geochemical and material science approaches to evaluate resource potential and develop technologies for recovery and utilization.



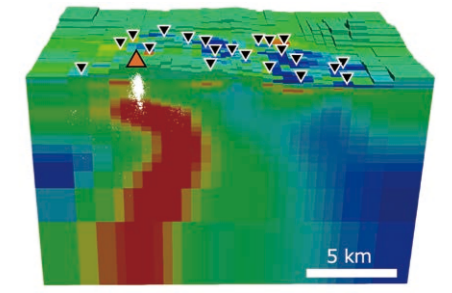
Polarized light microscope image of sericite.



Nakayama clay Mine (closed) in Toki City, Gifu Prefecture.

Exploration Geophysics Research Group

We focus on advancing geophysical methods to support resource exploration and resilient infrastructure. Our research spans survey design, data acquisition and interpretation, and rock property characterization—benefiting energy development, mineral prospecting, and infrastructure monitoring.



Three-dimensional electrical resistivity model.

Groundwater Research Group

We currently focus on sustainable groundwater use through regional surveys and development of a hydrogeological "Water Environmental Map". Our research explores deep coastal groundwater in the context of high-level radioactive waste disposal, biodiversity-water interactions, and geothermal applications, in collaboration with partner organizations.



Water sampling.



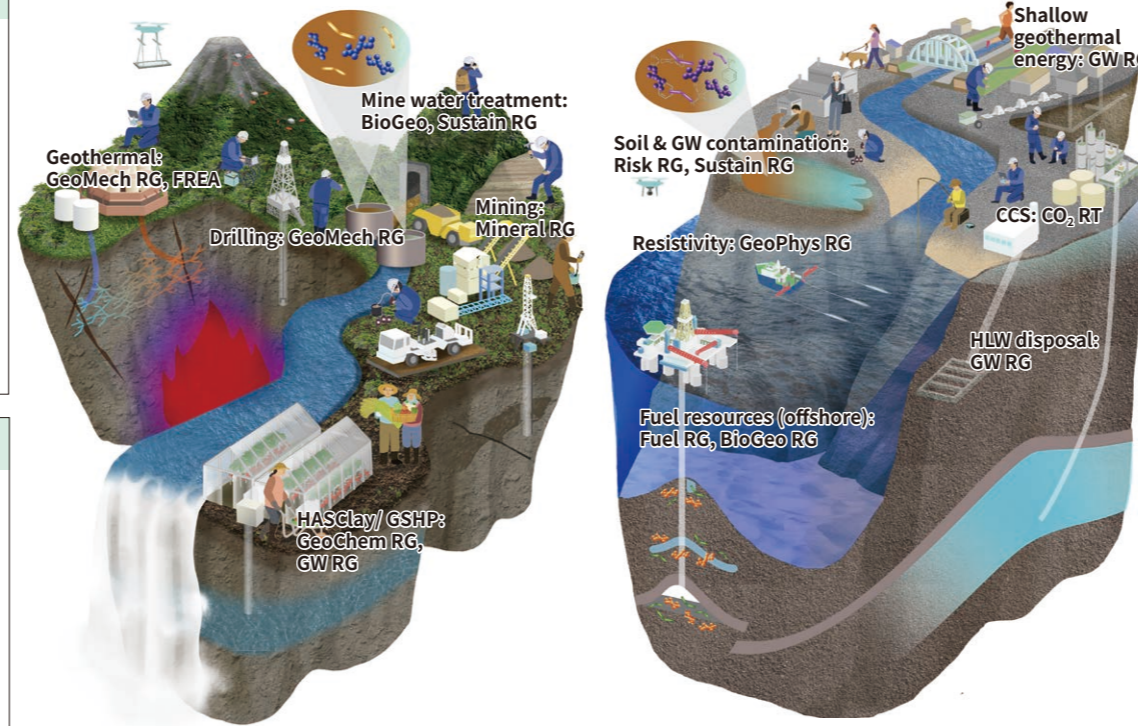
Chemical laboratory.

Geo-Environmental Risk Research Group

We are dedicated to solving soil and groundwater contamination and waste management issues for a sustainable society. Our activities include pollutant remediation, risk assessment, and development of software for quantitative exposure evaluation.



Soil investigation / Microbial test at VOC-contaminated site.



Fuel Resource Geology Research Group

We focus on methane hydrate and conventional energy resources such as oil, gas, and coal. Research develops advanced exploration techniques and evaluates resource potential through collaborations with industry and national projects.



Shallow methane hydrate beneath the sea floor.



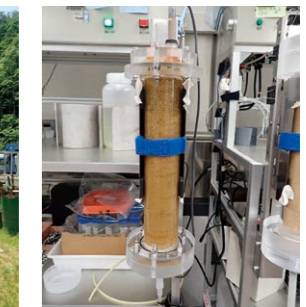
Survey in the Kushiro sedimentary Basin.

Geo-Sustainability Evaluation Research Group

Our group focuses on the sustainability assessment of geosphere-related issues such as geothermal use, old and abandoned mines, nuclear disasters, soil contamination and waste.

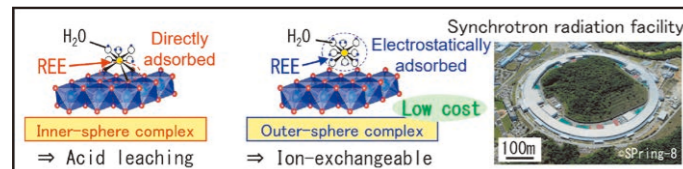


Drilling for a survey at a mine (left) and a column leaching test (right).



Mineral Resources Research Group

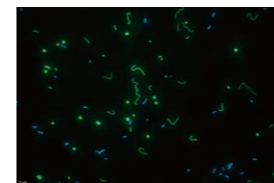
We are dedicated to assessing the development potential of metallic and non-metallic resources, including rare metals, through domestic and international projects. Our research spans ore genesis, grade improvement, mine waste reuse, and advanced technologies for analysis, exploration, and beneficiation.



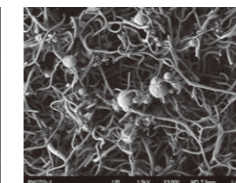
Optimal recovery of REEs in ion-adsorption deposits. Insights from synchrotron XAFS analysis.

Biogeoscience Research Group

We integrate microbiology and geochemistry to elucidate biogeochemical cycles in the deep subsurface and their impacts on resources and the environment. Our work addresses scientifically and societally important challenges, including uncovering microbial activities, understanding natural gas formation, and developing technologies for environmental remediation and monitoring.



Fluorescence micrograph of the phylum bacterium, strain IA91, and a methanogen.



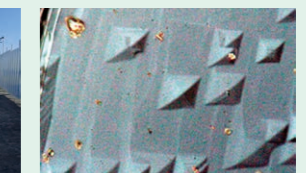
Electron micrograph of the new phylum bacterium, strain IA91.

CO₂ Geological Storage Research Team (Integrated Research Center for CCUS Implementation)

The CO₂ geological storage research team is conducting research to elucidate fluid behavior from hydraulic, mechanical, and chemical perspectives, and developing monitoring technologies, with a focus on the underground storage and mineralization of CO₂. Additional activities include research to utilize these technologies for geo-environmental conservation and resource development.



Gravity measurement at the Tomakomai site.



Growth hillocks on the surface of carbonate crystals.

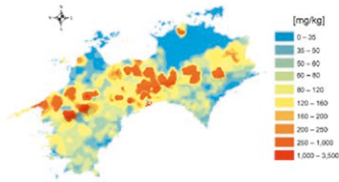
Concurrent Posts

- Integrated Research Center for CCUS Implementation, CO₂ Geological Storage Research Team
- Integrated Research Center for Resilient Infrastructure, Smart Monitoring and Inspection Research Team

- Integrated Research Center for Nature Positive Technology, Natural Capital Database Construction and Value Analysis Research Team; Ecological Impact and Countermeasure Technology Evaluation Research Team
- Renewable Energy Advanced Research Center, Geothermal Energy Research Team; Shallow Geothermal and Hydrogeology Research Team

Development of Geological Thematic Maps

Environmental conservation and resource management require scientific data organized and presented as maps. The GREEN publishes two key products: the *Geochemical and Risk Assessment Map of Subsurface Soils*, which evaluates heavy metal concentrations in surface soil and associated health risks, and the *Water Environmental Map*, which visualizes groundwater flow, temperature, and quality in plains and basins.



Chromium concentration in soil in Shikoku Region.

URL : https://d36bt12l9lx9np.cloudfront.net/Map/EN/soils_assessment.html



URL : <https://d36bt12l9lx9np.cloudfront.net/Map/EN/environment.html>



Strategic National Research Project



Investigating the subsurface through deep drilling and offshore surveys.

Coastal regions are considered potential sites for the geological disposal of high-level radioactive waste. To characterize the properties and flow dynamics of fluids from freshwater to saline groundwater zones in deep coastal formations, we are conducting collaborative investigations with multiple research institutions. These efforts include deep borehole drilling, geophysical exploration and offshore surveys for submarine groundwater discharge.

URL : https://unit.aist.go.jp/georesenv/gwrg/NEW_hlw.html



Recent Key Research Achievements

Development of drill bit for geothermal well drilling



Large-scale drill bit performance test in laboratory.

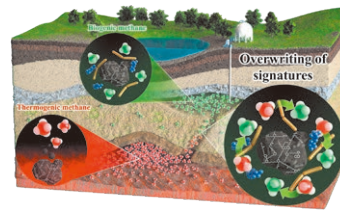
It is commonly recognized that rock excavation costs are high in subsurface development projects. To reduce the drilling costs of geothermal wells, we are working on the development of high-performance drill bits. Through collaboration with private companies, the newly developed bits have been successfully commercialized and are now available on the market.

URL : <https://unit.aist.go.jp/georesenv/about/geomec/>



Discovery: Methanogens overwrite the isotope signatures of natural gas

We discovered that subsurface methanogens can overwrite the isotopic "fingerprints" of thermogenic natural gas, making them appear biogenic. This finding suggests that



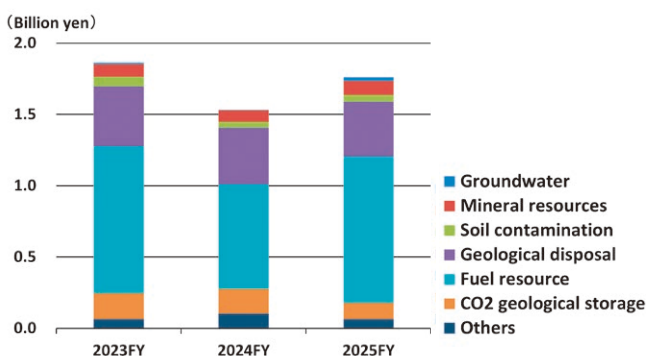
long-standing assumptions about the origins and volumes of natural gas resources need to be reconsidered, leading to the discovery of overlooked gas deposits.

Origins of natural gas and their overwriting by methanogens.

URL : https://www.aist.go.jp/aist_e/list/latest_research/2024/20241227/en20241227-1.html



External Public Research Fund (FY2023 to FY2025)



Employees as of August, 2025

Researchers	47(+Concurrent Post 38)		
Contract/Temporal employees	67	Visiting researchers	53

Management Staff

Director	Nobukazu SOMA	
Deputy Director	Masaya SUZUKI	Yasuhide SAKAMOTO
Principal Researcher	Masao SORAI	
Principal Research Manager	Youhei UCHIDA	Isao MACHIDA
Research Manager	Tatsuo MAEKAWA	

Group Leader

Fuel Resource Geology	Hideyoshi YOSHIOKA	Mineral Resources	Mihoko HOSHINO	Geo-Resources Chemistry	Kazuya MORIMOTO
Groundwater	Mayumi YOSHIOKA	Geo-Environmental Risk	Junko HARA	Geo-Sustainability Evaluation	Tetsuo YASUTAKA
Biogeoscience	Daisuke MAYUMI	Exploration Geophysics	Motoharu JINGUUJI	Geomechanics	Yasuhide SAKAMOTO

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