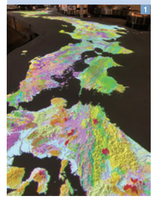
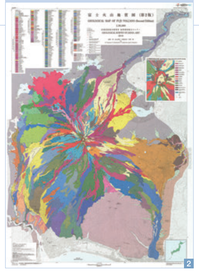
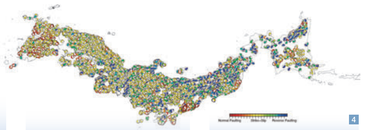
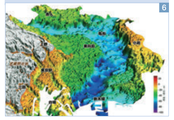
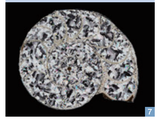
GSJ's Outcomes

1. Projection Mapping of the Seamless Geological Map at the Geological Museum
2. Geological Map of Fuji Volcano
3. Projection Mapping of the Active Fault Map at the Geological Museum
4. Stress Map of Japan
5. Active Fault Database of Japan
6. 3D Geological Map of central Tokyo
7. Thin section of an ammonite fossil



Research Laboratory on Environmentally-conscious Developments and Technologies [E-code]

In developing natural resources and energy and promoting land-use, seeking harmony with the environment has become ever more important for sustainable development of human society. The Geological Survey of Japan takes a lead role of the newly established Research Laboratory on Environmentally-conscious Developments and Technologies (E-code) consisting of six research departments in AIST, and promotes comprehensive study merging several areas of research: the development of basic environmental information such as database and maps of geosphere, coastal areas, and ocean; the development of techniques to measure and assess the environmental impact of various development and utilization, and to restore damaged environment; and the studies on risk assessment toward social implementation and on socioeconomic impact analysis, etc. The Laboratory aims to contribute to the achievement of seven SDGs (6, 11, 12, 14, 14, 15, and 17) by 2030 through its research activity.


Coral reefs off the coast of Okinawa Island

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E-mail: frea-info-ml@aist.go.jp

GSJ Website

https://www.gsj.jp/en/

The website is the one-stop portal of the GSJ research outcome.

■**GeomapNavi (https://gbank.gsj.jp/geonavi/)**
The portal "GeomapNavi" facilitates easy selections, overlaying, zooming of all available digital maps.

■**Databases (https://www.gsj.jp/en/database/)**
More than twenty series of the GSJ database collection are available through directory search at the website.

■**Web Map Services (https://gbank.gsj.jp/owscontents/index_en.html)**
A line of online contents is available in OGC (Open Geospatial Consortium) WMS (Web Map Service) or WMTS (Web Map Tile Services) for nationwide domestic and East and Southeast Asian geological maps, with viewer software downloadable.

Access

Visit our website for more information.
https://www.aist.go.jp/aist_e/guidemap/tsukuba/tsukuba_map.html

GSJ, AIST [Apr. 2022]

Cover: 3D Geological Map of Japan
Compiled based on the Geological Map of Japan (1:1,000,000), the 3rd edition and JTOPO30 (developed by the Marine Information Research Center, Japan) is used as DEM.

AIST NATIONAL INSTITUTE OF ADVANCED INDUSTRIAL SCIENCE AND TECHNOLOGY (AIST)

Geological Survey of Japan

Understanding and living with the Earth

https://www.gsj.jp/en/

Geological Survey of Japan

Established in 1882, the Geological Survey of Japan (GSJ) has been a national research center responsible for geoscientific survey and research. GSJ has been engaged in developing and improving the national geoinformation, which is essential for safe and sound daily life, under the national project on developing the intellectual infrastructure. Utilizing the data and know-how it has accumulated, GSJ conducts research activity to accomplish its mission: geological evaluation to make our land resilient; technology development to secure underground natural resources and to utilize and protect underground environment; and geoinformation management and dissemination of the outcomes.

Recently, Japan is challenged to tackle serious problems such as energy and environmental problems, strengthening of our national land, and disaster prevention so as to achieve a sustainable society. GSJ keeps producing outcomes including the ones from the research to solve these social challenges, collaborating with other institutes in AIST, domestic and overseas ones, to say nothing of our own units.


SDGs items promoted by GSJ

Our Mission
—Toward a safe, secure and sustainable society—

What the society expects to a geological survey has changed with times: in early days, its mission was resource exploration such as metallic and non-metallic minerals, coal, oil and natural gas; after the oil crisis in the 1970th, exploration for geothermal energy was accelerated; then the mission has shifted to volcanic and seismic disaster mitigation, securing of safe water resource, survey and assessment for soil contamination, carbon dioxide capture and storage (CCS) as a counter measure against global warming.

We humans have benefited from the Earth by developing and utilizing natural resources, land, and ocean, which have placed a heavy burden on its environment. Now we face a big challenge of how to live symbiotically with the Earth and how to develop our society in a sustainable manner, within its tolerance.

Seventeen goals of Sustainable Development Goals (SDGs) were set by UN to be achieved by 2030 for the establishment of a sustainable world. Japan set a challenging goal to realize a decarbonized society by 2050. Issues of natural resources, energy, and environment have become an urgent priority. On the other hand, the UN's Sendai Framework for Disaster Risk Reduction 2015-2030, which provides the international guidelines for disaster mitigation, lays out the priorities for action regarding the mitigation of natural and other disasters, and seven global targets to be achieved by 2030.

Keeping our motto "Understanding and living with the Earth" in mind, GSJ develops and improves geological information, and promotes publication and outreach activities of our research outcomes so as to have them widely used in society. It goes without saying that GSJ scientifically explores geological phenomena and develops the technologies for geological survey, analysis, and assessment. GSJ has the mission to contribute to the achievement of the goals stated above, collaborating with national and local government, universities and research institutes and private companies in the stable securement of natural resources in the geosphere, utilization and conservation of the geoenvironment, and mitigation of geohazards.

Research Institute of Geology and Geoinfomation

https://unit.aist.go.jp/igg/cie/


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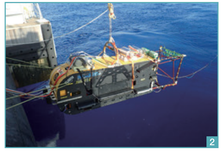
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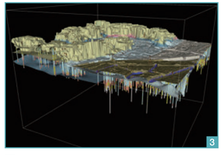
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1 Geological field survey : Geologists measure the strike, dip and thickness of the strata, identify the rock, and collect samples for chemical analysis and fossil studies.

2 IGG developed the Advanced Integrated Sensors Towing system for High-resolution Geo-survey (AISTs) that enabled exploration near sea floor.

3 3D geological map of the Tokyo metropolitan area.

The Research Institute of Geology and Geoinformation (IGG) conducts geological research of land and sea in Japan and surrounding area, and provides geological maps and information of Japan as part of intellectual foundation. IGG also performs integration of the geological maps and information and provides interoperable and user-friendly geological information. In addition, IGG creates geological information contributing to geological disaster mitigation and preservation of environment in urban and coastal areas. It also conducts advanced integration of geological information and satellite images. Cutting-edge applications of the integrated geological information for the society are also IGG's targets.

Geological survey and geological maps of Japan

IGG provides the following geological maps and information as a base registry for the society: geological maps (1:50,000 and 1:200,000 quadrangle maps) on land, seamless geological map of Japan, marine geological maps, marine geological databases, basic geological information on marine resources and environment, geophysical maps, and geochemical maps. These maps and information are created by the latest advanced geological, geophysical and geochemical research results.

Urban and coastal area

IGG provides seamless geological maps and information in urban and coastal areas where socio-economic activities are active. These maps and information contribute to geological disaster mitigation, geological risk assessment for industrial plants, and environmental protection. IGG also creates 3D urban geological map, which is expected to contribute to the risk assessment and efficient development in metropolises which is the center of socio-economic activities.

Satellite remote sensing

IGG distributes quality-controlled satellite images and integrates them with corresponding geoinformation to promote their utilization in resource exploration, disaster monitoring and environmental monitoring.

Research Institute of Earthquake and Volcano Geology

https://unit.aist.go.jp/ievg/en/


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3

1 Emergency survey of the Kumamoto earthquakes in 2016.

2 Survey after the eruption of the Kuchino-erabu island.

3 Sampling of water and gas at a hot spring in Akita prefecture.

To mitigate serious damage from geohazards, the Research Institute of Earthquake and Volcano Geology (IEVG) provides geological information and develops technologies to forecast earthquake occurrences, volcanic eruptions, and long-term geological phenomena up to 1 million years, based on geological surveys and geophysical and geochemical observations. IEVG also contributes to national research projects of earthquakes and volcanic eruptions and of safety management of nuclear energy facilities.

Earthquake

IEVG conducts field surveys of inland active faults and provides the active fault database of Japan. IEVG develops new evaluation methods of active faults with low activity and of a consecutive rupture possibility of neighboring active faults. IEVG also develops technologies to predict strong motions and surface deformations of active fault earthquakes. As for subduction zone earthquakes and tsunamis, IEVG updates the past tsunami inundation data and investigates large tsunamis in the past. IEVG carries out studies of midium- or short-term forecast of the Nankai Trough giant earthquakes based on the monitoring of deep slow slip in the Nankai Trough area.

Volcano

IEVG develops methods for evaluation and forecast of volcanic activity based on researches of eruption history and mechanisms. History of volcanic activities is studied based on geological survey to reveal evolution processes of volcanoes and temporal variation of eruption frequency and intensity. IEVG is also improving methods for precise age determination. IEVG is developing models of eruption processes and evolution processes of hydrothermal systems based on geochemical and petrological studies of eruption products, volcanic gas measurements, electromagnetic measurements and ground deformation measurements. Results of these surveys and observations are published on geological maps, database, scientific papers and reports.

Geological dynamics

IEVG systematically develops geological information to evaluate long-term geological phenomena such as surface erosion, crustal deformation, fault and igneous activities, underground water systems, and isolation capability of the bedrock barrier of the geological repository to radioactive materials.

Research Institute for Geo-Resources and Environment

https://unit.aist.go.jp/georesenv/index_en.html

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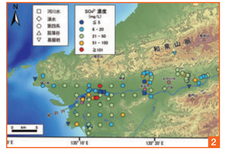
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Research Institute for Geo-Resources and Environment (GREEN) carries out researches below:
- Securement of natural resources such as fuels, minerals, and groundwater for industrial and public use,
- Effective utilization of geo-environment for sustainable and stable energy cycle,
- Preservation of geo-environment for safe and secure society.
GREEN compiles the data and information obtained from their research activities as intellectual infrastructure and disseminate them to the world.

Investigation and Research on Georesources

Surveys and researches to know the origin and genesis of mineral deposits of minor metals such as rare earth elements are given higher priority. Development and effective utilization of fuel resources such as methane hydrate and natural gases, as well as technical development for effective utilization and management of groundwater, is another major research subject.

Investigation and Research on Geo-environment

Development of a new safety evaluation method for CO_2 geological storage is conducted to advance carbon dioxide capture and storage (CCS). Research and technical improvement on wide-area and long-term groundwater flow investigation is aimed at technical upgrade for safety evaluation of a geological disposal of radioactive waste. Development of better evaluation technique and database of soil and groundwater contamination is also being performed.

Databases on geo-resources and geo-environment

The results of the studies on geo-resources and geo-environment are compiled in databases and maps, and standardization of the related techniques is also promoted. GREEN wants to contribute to improving the quality of national intellectual infrastructure, the fundamental information of the land, through its research activities.

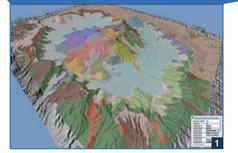
1 Development of a state-of-the-art particle analysis with imaging technique.

2 Water Environment Map "Kinokawa Plain". (https://www.gsj.jp/Map/EN/environment.html)

3 New method to directly assess the corrosion risk of water pipes.

Geoinformation Service Center

https://www.gsj.jp/en/geoinfo-center/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1 3D geological map of Aso volcano superimposed on topography data.

2 Collection of geological maps are available for research and public use in the Geological Map Library.

3 Special exhibition in the entrance hall of the Geological Museum.

The Geoinformation Service Center (GSC) provides reliable and unbiased information in collaboration with other research units of GSJ and serves as a linkage between the society and GSJ' s research activities. GSC works to improve the quality and usability of geological information as public property to be used for natural disaster mitigation planning, resource exploration, and environmental conservation. The followings are major missions of GSC:

Open Data distribution

GSJ publications have recently been distributed in Open Data formats through the GSJ website. Most of the geological maps are also distributed in print, CD/DVD-ROMs, and electronic forms. Vast amounts of domestic map series are being retroactively digitized in raster and vector formats and are to be also eventually downloadable. Those kinds of geoinformation are provided under the Creative Commons License (CC BY 4.0 compatible or CC BY-ND) for user derivative works.

Publication

GSJ is one of the national institutes providing its deliverables in planimetric map forms. High quality printed maps are published every year, covering Japan and its surrounding seas. GSJ journals and reports are available online, and also provided in exchange to hundreds of domestic and foreign institutes.

Archive of the literature, specimen and research data

Geological maps and literatures are collected and available in the GSJ Library and the Geological Map Library. Collection can be searched by GEOLIS (Geological Literature Search System) on the website. A large number of geological specimens such as rocks are ready to reuse for new research or outreach activities. The primary research data have also been archived to ensure the quality and reliability of the GSJ research publications.

Dissemination and research support

GSC manages the Geological Museum, which disseminates research results of GSJ through various exhibitions and educational events, and supports the research units of GSJ by managing and preparing geological specimens.

Renewable Energy Research Center

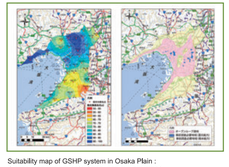
(Geothermal Energy Team, and Shallow Geothermal and Hydrogeology Team)

http://www.aist.go.jp/fukushima/en/

The Renewable Energy Research Center (RENRC) of Fukushima Renewable Energy Institute, AIST (FREA) conducts research and technical development to promote effective and sustainable use of renewable energy. Two teams of RENRC focus their research for extensive use of geothermal energy and ground-source heat pump (GSHP) based on geoscientific study, collaborating with two other research institutes of GSJ: GREEN and IGG.

Geothermal Energy Team

The team develops advanced techniques to evaluate the amount and location of geothermal resources and conducts scientific research on simulation and monitoring of the subsurface geothermal systems to be used to effective development and sustainable management of geothermal reservoirs. The team is leading the fundamental studies on "supercritical geothermal energy" , which will be able to dramatically increase geothermal power generation in the future.



Suitability map of GSHP system in Osaka Plain : Closed-loop system (left) Open-loop system (right)

Shallow Geothermal and Hydrogeology Team

The team investigates regional groundwater flow for many plains and basins to develop a sustainability map of GSHP systems by numerical simulation of subsurface heat and mass transfer, because, in Japan, the heat exchange rate of GSHP systems largely depends on the local hydro-geological settings. The efficiencies of different heat exchange systems in different groundwater and geological settings are also evaluated to obtain the optimal system design for each region.

Geological Museum

https://www.gsj.jp/Muse/en/

[Opening hours] 9:30 -16:30, from Tuesday to Sunday
Closed on Monday except for National Holidays (closed on the next weekday instead), and from December 28 to January 4.
[Admission] Free
TEL: +81-29-861-3750 / FAX: +81-29-861-3746 / E-mail: hyohon-kan-ml@aist.go.jp

The Geological Museum provides opportunities for people to learn about the geology of Japan, natural resources, volcanoes, earthquakes and active faults, and so on with plain explanation and exhibitions of appropriate geological specimens. Special exhibitions, lectures and other events are held on a variety of geoscientific topics including recent geological hazards.

Special guided tours are available for groups of 15 or more. Please contact us in advance. There is a shop visitors can purchase GSJ's publications and museum souvenirs.

Research Planning Office

Serving as the headquarter for GSJ, the office considers the research strategy, coordinates with relevant ministries and agencies, prepares a press release, and develops human resources. Once a large-scale geological disaster such as an earthquake or a volcanic eruption occurs, it gathers and delivers the information for the emergency response team.

Collaboration Promotion Office

The office promotes the collaboration in research, technical training, and publicity and outreach initiatives under close cooperation of the Innovation Coordinators, the Social Coordination Group, and the International Coordination Group so as to contribute to the creation of innovative industry using the intellectual foundation.

The Research Planning Office and the Collaboration Promotion Office support GSJ in achieving its mission, creating high-quality research outcomes, and expanding its domestic and international presence.

Social Coordination Group

The group conducts various outreach activities such as exhibitions outside GSJ, special exhibitions at the Geological Museum, GSJ symposia to deliver our research outcomes to the public. The group also provides consultations on geology for government and industry utilizing the knowledge and technology accumulated in GSJ.

One of the exhibitions outside of GSJ: the geological map on the floor and the rock specimens exhibited help visitors understand the local geology, learn the location of active faults, and many more.

International Coordination Group

The group supports researchers to improve their quality by promoting collaborative research under a MOU with relevant research organizations abroad, enhance personnel exchange, and so on. It also contributes to the improvement of the geological information of the world and to the global human resource development, closely cooperating with international organizations such as CCOP.

Trainees experiencing zircon U-Pb dating : The training course is held for young researchers of geological organizations in the CCOP Member Countries and includes practical guidance on geological mapping technique and lectures on geology and application areas.