

KIGAM's R&R-based New Research Projects (2020-2024)

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History & Achievements

01

Centennial Anniversary in 2018




1918-1948

**Office of
Geological Survey**



1948-1976

**National Institute
under Government**

1948-1961 : Central Geological &
Mineralogical Research Inst.
1961-1973 : Geological Survey of Korea
1973-1976 : Geological & Mineral Inst.
of Korea



1976-Present

**Government funded
Research Institute**

1976-1981 : Korea Research Inst. of
Geoscience & Mineral Resources
1981-1991 : Korea Inst. of Energy & Resour.
1991-2000 : Korea Inst. of Geology, Mining
& Materials
2001-Present : KIGAM

02 R&D Achievements



~1940

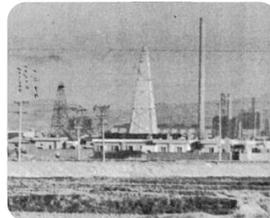
1941~1961

1961~1980

1981~2000

2000~2014

2015~



Basic Survey

- > Geological Survey,
- > Coal Testing

Introduction of Technology

- > Exploration & Drilling,
- > Aerial Exploration,
- > Geochemical exploration

Expansion of Research Areas

- > Mining & Oil Exploration
- > Geothermal Energy & Groundwater Exploration

Technology Independence

- > Discovery of Gas Bearing Strata
- > Discovery of Crude Oil in Vietnam
- > Registration as National Data Center

Pioneering New Research Areas

- > Gas Hydrate
- > Recovery of Lithium from Seawater
- > Deep Geothermal Energy
- > CAES

Technology Convergence

- > CCUS
- > Landslide & Earthquake Early Warning System
- > Medical clay
- > Unmanned exploration
- > Research on Moon and Planets



R&R-based Research Projects



Role & Responsibility

03 Role & Responsibility

Purpose of Establishment

To contribute to **sustainable development of Republic of Korea**
through dedicated research and service in geosciences

Main Function

- Geological science, geological resources data infrastructure, and underground utilization R&D
- Mineral resources exploration, development, utilization, and circulation R&D
- Underground energy resources securing R&D
- Earthquake, geological hazard, and climate change response R&D
- Groundwater exploration, development, and conservation R&D
- R&D Cooperation, technical service consignment, technology commercialization, professional personnel training, technology policy establishment, test examination, and certification

03 Role & Responsibility



VISION

Leading Innovative Geoscience and Technology Solutions to Create a Sustainable Earth

Four Major Tasks

Task #1

Geo-Information & Geo-Technology
for
public safety
& awareness

Task #2

**Mineral Resources
Securing &
Utilization Tech.**
for
mining industry

Task #3

**Petroleum & Gas
Resources Original
Technology**
for
securing future energy

Task #4

**New Geo-technology
on Global Climate
Change**
for
improving life quality

Managerial Objective

Creation &
Culture

Open

Responsibility

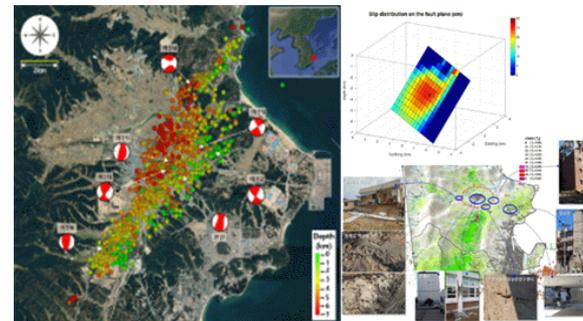
Evolution

04 KIGAM Task #1

Geo-information & Geo-technology for Public Safety & Awareness

Geo-information for Land Development & Geo-Hazards

- > Geological thematic map, seabed map, and fault map
- > Integrated ICT-based geological information system



[Geo-data earthquake complex analysis]

Earthquake Hazards Mitigation

- > Earthquake observation system & Disaster assessment and response system for EQ
- > Custom hybrid earthquake early warning technology



[Earthquake early warning program]

05 R&D Projects of Task #1 ('20-'24)



Geological Survey of the National Territory and Publication of Geological & Geological Thematic Maps

- Production & publication of domestic geological thematic maps with up-to-date geological information
- Establishment of the stratigraphy and interpretation of the tectonic environment of the coastal area of central-western Korean Peninsula

Research on the Rock Characteristics in Deep Geological Environment for the HLW Geological Disposal

- Identification of evaluation parameters for each rock type & Establishment of standard procedures for investigation and analysis
- Development of evaluation parameters DB, distribution, and range for each tectonic province and rock type

National Geoscience Data Center (NGDC) Construction through the Research Data Repository and Geodata Platform Development

- Establishment of integrated data management system for geoscience research data repository (GDR)
- Development of open geo-data platform for sharing, utilizing and servicing geo-data

Development of a Platform to Utilize GeoBigData and GeoAI

- Development of goal/demand-oriented GeoBigData collection technology and establishment of GBD sets
- Development of GeoAI utilization technology for GeoBigData-based analysis and prediction
- Establishment of a platform for integrated management/utilization of GeoBigData-GeoAI

05 R&D Projects of Task #1 ('20-'24)



Study on Active Intraplate Tectonics and Development of Fault Segmentation Model

- Evaluation of crustal deformation activity based on advanced data
- Development of intraplate fault segmentation model

Development of Integrated Geophysical Monitoring System at Depth for Assessing Earthquake and Fault Activities at South-eastern Korea

- Construction of 1 km-depth integrated geophysical monitoring system
- Monitoring system operation and development of data analysis technology

Development of Strong Ground Motion Prediction and Earthquake Early Warning System Specialized in Southeast Korea

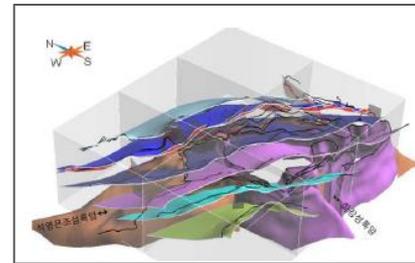
- Strong ground motion simulation based on dynamic rupture modeling
- Earthquake Early Warning (EEW) system development in the southeast Korea

06 KIGAM Task #2

Mineral Resources Securing & Utilization Technology for Mining Industry

Strategic Mineral Resources for the 4th Industrial Revolution Demand

- > New mineral resources with IoT-related 3D geological modeling platform
- > Intelligent utilization of industry raw materials (lithium, rare earth, vanadium, etc.) & Commercialization of recycling technology



[3D geological modeling]



[BGMP medical mineral]

Strategic R&D for the future Unified ONE Korea

- > South-North Korea's joint research & Strategic mineral resources exploration
- > Inter-Korean projects on 'Unification Science & Technology Research Council' for Government-supported organizations



[South-North Korea's Joint Research]

07 R&D Projects of Task #2 ('20-'24)



Precise Exploration Technology Development and Resources Prediction for Energy Storage Minerals (V, Li)

- Development of 3-D precision exploration and resources evaluation techniques for energy storage minerals
- Exploration of potential mineralized belt and resources prediction for domestic energy storage minerals

Development of mineral processing, metallurgical, and applied technologies for utilizing domestic vanadium mineral resources

- Low-cost, environment-friendly mineral processing technology of low grade vanadium ores
- Customized metallurgical technology for production of high purity vanadium
- Production of ESS materials from vanadium concentrate and high-purity vanadium

Discovery of Bio-mineral Material and its Commercialization for Regional Innovation

- Discovery of new bio-mineral material (Value creation of minerals unspecified by the law)
- Development of alternative materials to microplastics using domestic clay
- Development of bio-mineral complex for high-tech industries

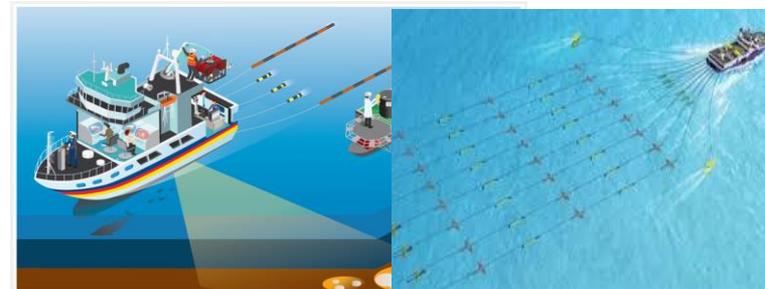
08 KIGAM Task #3



Petroleum & Gas Resources Original Technology for Future Energy

Original Technology for Petroleum & Gas Resources for the Future

- Intelligent gas field evaluation (shale and natural gas reserve)
- Petroleum exploration technology (Precise 3D exploration & Data analysis on geophysical explorations)



[3D exploration & Data analysis]

Advanced Infrastructure for Marine Exploration

- Constructing 5,000-ton high-performance 3D/4D Geophysical Research Vessel
- Operating high performance facility for geophysics big data analysis



[TAMHAE III]

09 R&D Projects of Task #3 ('20-'24)



Petroleum System Evaluation in Korean Shelf Area and Development of Shale EGR⁺ Methods

- Construction of exploration data integrated 3D basin-scale geology and precise petroleum generation model for estimation of petroleum system
- Obtainments of lab-scaled EGR/EOR⁺ original technology for matured shale gas reservoirs using CO₂ injection technique

Development of the Integrated Geophysical Survey and Data Processing Technologies for 3D High-resolution Imaging of the Marine Subsurface

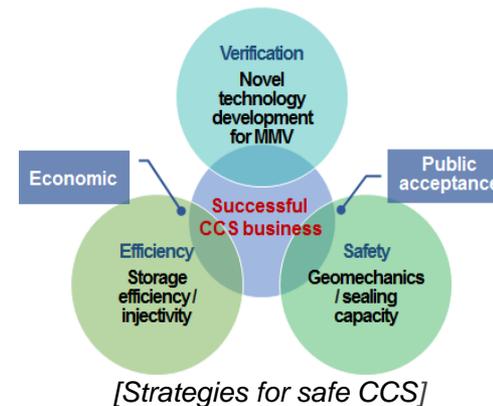
- Development of high resolution 3D acoustic/elastic integrated geophysical survey technologies
- Development of 3D elastic data imaging technologies
- 3D velocity/property distribution mapping and integrated analysis technologies based on the drilling core data

10 KIGAM Task #4

New Geo-technology on Global Climate Change for Improving Life Quality

New Geo-technology on Global Climate Change

- > Development of deep subsurface characterization methods for safe underground storage / disposal
- > Carbon mineralization & Monitoring large-scale CO₂ storage



Utilization of Groundwater & Geo-Hazards

- > Securing "Good water" in Korea
- > Landslide early warning system & geo-hazards risk control technology



[Securing good water resources]

Development of Deep Subsurface Characterization Technologies for Safe Underground Storage/Disposal

- Development of deep subsurface characterization technologies (maximum depth of 5 km)
- Development of THM coupled numerical analysis platform for discontinuous rock mass

Development of Capacity Enhancement and Safety Evaluation Technologies for CO₂ Geological Storage

- Evaluation and enhancement of CO₂ storage efficiency
- Safety assessment of CO₂ geological storage

Development of Technology for Exploitation and Optimal Utilization of Massive Groundwater Resources according to Climate Change

- Securing large-capacity groundwater resources and sustainable groundwater utilization
- Assessment of groundwater-dependent systems by climate change

Development of the Geo-environmental Hazards Monitoring, Risk Mitigation and Management Technologies

- Landslide early warning system based on weather forecasting in urban area and its application
- Nationwide G-PHEs mapping and monitoring of G-PHEs high risk area

KIGAM opens new R&D projects for research teams in the world

Objectives

- ▶ Development of world-class research outputs and outcomes under the collaboration between KIGAM and AKCSE
- ▶ Strengthening research foundation and technologies for Korea and Canada

Call for research proposal

- ▶ Inviting various research topics to join 2020-2024 R&D projects of KIGAM
- ▶ Discussion on the proposed topics between the researchers of KIGAM and AKCSE

Conducting R&D projects

- ▶ Joint research / Commissioned research starting from 2020
- ▶ Research periods and budget will be decided by the mutual agreements and contracts

Submission information

- ▶ Contact Points :
Dr. Jae Wook Lee (jwlee@kigam.re.kr)
Dr. Byung-Gon Chae (bgchae@kigam.re.kr)
- ▶ Submission of proposal through the office of AKCSE
- ▶ Proposal Deadline : July 31st, 2019



Future

“KIGAM provides solutions for societal demands”

Safe, Sustainable & Smart Earth for People

Geo-Platform



Geoscience Big Data for
Systemizing Geo-Platform

* National Data Center

Geo-Hazards



KIGAM's Signature
Geo-technology for Safe Korea

* Earthquakes, Landslide

Geo-Environment



Sustainable Geo-Actions
for Earth Environment &
Human Life

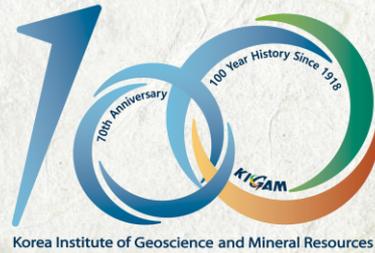
* Water, CCUS, Climate Change

Natural Resources



Smart Energy & Mineral
Development:
4th Industrial Revolution

* DOF, Smart Mining



감사합니다

| Centennial KIGAM |

