

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

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Dr. Byung-Gon Chae  
Policy & Planning Division, KIGAM



# **History & Achievements**



01

# Centennial Anniversary in 2018

KIGAM



**1918-1948**

**Office of  
Geological Survey**



**1948-1976**

**National Institute  
under Government**



**1976-Present**

**Government funded  
Research Institute**

1948-1961 : Central Geological &  
Mineralogical Research Inst.

1961-1973 : Geological Survey of Korea

1973-1976 : Geological & Mineral Inst.  
of Korea

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

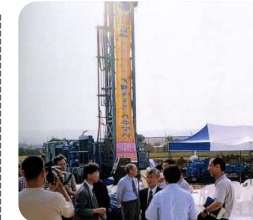
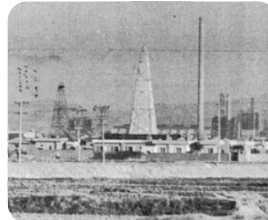
1941~1961

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



## 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

**C**reation &  
Culture

**O**pen

**R**esponsibility

**E**volution

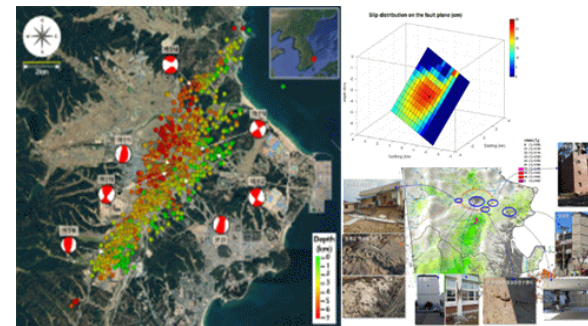


# 04 KIGAM Task #1

## 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**

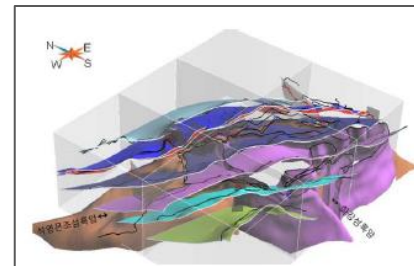
- Strong ground motion simulation based on dynamic rupture modeling
- Earthquake Early Warning (EEW) system development in the southeast Korea

# 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

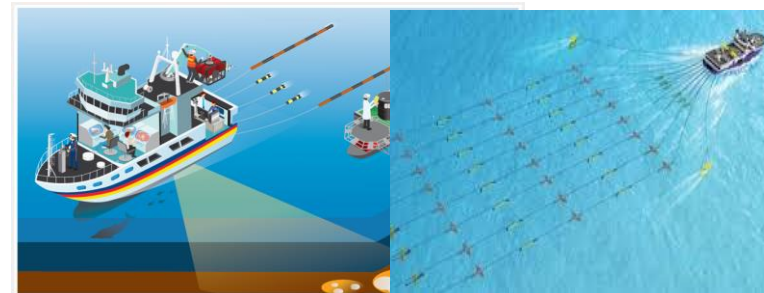
# 08 KIGAM Task #3



## 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<sup>+</sup> 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<sup>+</sup> original technology for matured shale gas reservoirs using CO<sub>2</sub> 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

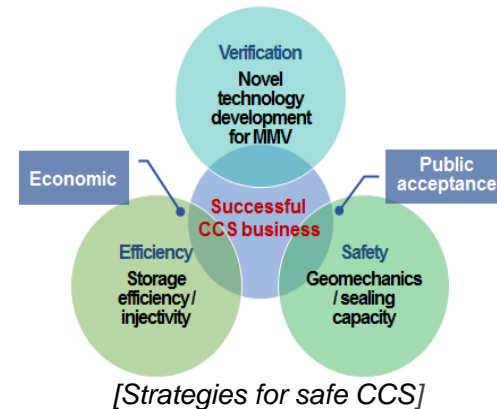


# 10 KIGAM Task #4

## 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 CO<sub>2</sub> 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 CO<sub>2</sub> Geological Storage**

- Evaluation and enhancement of CO<sub>2</sub> storage efficiency
- Safety assessment of CO<sub>2</sub> 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](mailto:jwlee@kigam.re.kr))  
Dr. Byung-Gon Chae ([bgchae@kigam.re.kr](mailto:bgchae@kigam.re.kr))
- ▶ Submission of proposal through the office of AKCSE
- ▶ Proposal Deadline : July 31<sup>st</sup>, 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:  
4<sup>th</sup> Industrial Revolution

\* DOF, Smart Mining





# 감사합니다

## | Centennial KIGAM |