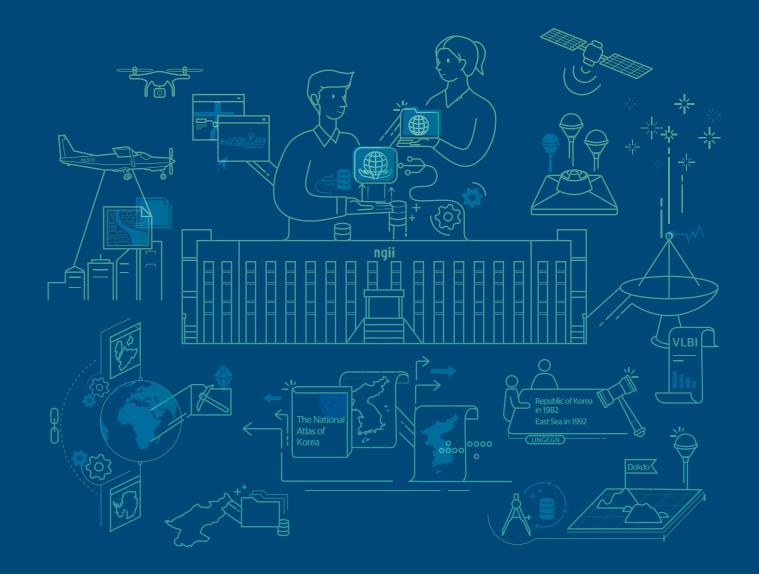
National Geographic Information Institute

Achievement Report

A Tale of Rising Up to the Challenge



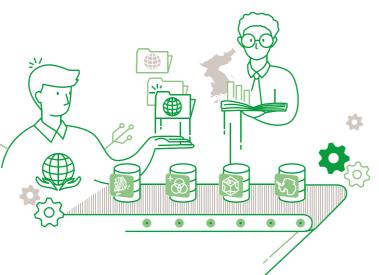


A Tale of Rising Up to the Challenge

National Geographic Information Institute

Achievement Report





National Geographic Information Institute



66

Braille letters protruded on white paper may not seem like much, but they serve as the eyes for the visually impaired. Tactile maps help visually handicapped see the world, and achieve their dreams.

- Hyesuk Park, Officer at Geographic Information Department

HD road maps are important as geospatial information plays an increasingly important role in an era where technology and data are brought together in numerous ways. As someone who works on HD road maps, I am dedicated to contributing to economic development and improved convenience in daily life.

- Seokwon Chang, Officer at Geographic Information Department

It was the NGII that made the profile of Dokdo, including its coordinates, height and circumference well known to the international community. I feel proud that I was part of the efforts in reconfirming our national sovereignty over our territory.

- Taegyeong Lee, Officer at Geographic Information Department

I will do my best so that the national control points can be more conveniently used by all those who work in fields associated with measurement.

- Jihoon Lee, Officer at Geodesy Department

I am happy that we were able to compile information that had been scattered throughout multiple divisions into one so that it is easier for people to use.

- Seungryeol Hong, Officer at National Geographic Data Monitoring Department

GNSS services are readily available for you to use.

- Hyeonho Kim, Officer at Geodesy Department

We made sure that the National Atlas of Korea that show the evolution of our maps from the Great Daedong Map to the 21st century maps, are easily understandable by teenagers.

- Seonyoung Park, Officer at National Geographic Data Monitoring Department

Our best effort to establish an accurate geoid model will be made in order to realize GPS Leveling.

- Woojin Sung, Officer at Geodesy Department

Geospatial information is now being offered free of charge. This will help consumers save costs while increasing their profit, making work more convenient and easier to expand into other business areas.

- Jeonghyeon Ku, Officer at National Geographic Data Monitoring Department

03

CONTENTS

World Geodetic System	E
CORS	8
Unified Control Points	10
Geodetic VLBI	12
Geoid Model Establishment	14
Aerial Photogrammetry Taken Every Two Years	16
Aerial Photo Web Service	18
National Orthophoto Manufacturing	20
Geospatial Information on North Korea	22
Establishment of Geospatial Information on Polar Regions	24

Shortened Cycle for Revisions to the National Base Map	26
HD Road Map Production	28
National Internet Map	30
Establishing Tactile Maps for the Visually Impaired	32
Dokdo Surveying and Mapping	34
Expansion of Open Geospatial Information Available to the Public Free of Charge	36
Establishment of the National Information Platform	38
International Activities on Geographical Names	40
Publications of the National Atlas of Korea	42
Establishment of the African Geoscience Geospatial Information	44

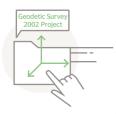
04

World Geodetic System

BACKGROUND · Moving Away from the System of the Last Century and Introducing International Standards

- The need to eliminate the world geodetic system considered the remnants of the Japanese colonial rule from the past century and to adopt international standards
- World geodetic system based on GPS can respond effectively to international trends, which makes it a requisite for geospatial data in the 21st century

PROCESS · Evolution into Becoming a Leader of Geospatial Data in the 21th Century through an World Geodetic System



Apr. 2000

- Implement a geodetic survey 2002 project with a ministerial policy
- Establish a Long term and short term plan for introducing and fulfilling World Geodetic System



2002

Studies on the guidelines on utilization of and revisions to the World Geodetic System (Korea survey association, Prof. Young Jin Lee et al.)



Dec. 2002

- Notification of country coordinate conversion coefficient figures through measurement of outcomes using the Tokyo Geodetic System and the World Geodetic System
- 7 variables in accordance with the Bursa-Wolf model



Jan. 2003

Started to use the old and new geodetic reference systems in parallel due to the revision of Act on Survey



2006

- Study on adjusting the national control points system preparing for conversion into world geodetic system in 2007
- 1975 ~ 2005 Performance evaluation regarding GPS, EDM, level data(Korea survey association, Prof. Youngjin Lee et al.)



Dec, 2006

Revision of the overall execution Act on Survey including the planned application of the World Geodetic System in 2010



2007

Performance evaluation of island areas in 2006 and border areas in 2007(Korea survey association, Prof. Youngjin Lee et al.)

The World Geodetic System was fully



Oct. 2007

Establishment of the International geodetic survey team in the National Geographic Information Institute



Dec. 2007

In order to measure border areas and EDM regions in 2007, it was decided to conduct complementary measurements on EDM areas in 2007 and 2008, after which publication would be made

Love for the nation's land in our hearts; Spatial information that makes our lives more



2008

Conducted a project to announce the comprehensive results of the study on the existing network adjustment and measurements in 2008 (Prof. Youngjin Lee of Gyungil University)



Dec. 31, 2008

- Incorporation of the results of Korea's national control points system into the World Geodetic System
- Notification of 14,946 points on the World Geodetic System



Jun. 2009

World Geodetic System applied to limited areas based on 「Act on the Establishment, Management, ETC of Spatial Data」 to be applied in 2021



Dec. 2009

Completed geodetic conversion for GIS and measurements held by national and local governments and public organizations



Overall implementation of the World Geodetic System

Jan. 1, 2010

 Existing national control pointsbased performance is made only available for viewing

ACHIEVEMENT · Contribution to Economic Growth by Establishing a Geolocation-based Industrial Forming a Land Based Industry Based on Position

Introduction of a Sucessful World Geodetic System

 Progress over 4 years for introduction of policy and research projects to establish a scientific World Geodetic System that takes into account globalization



National Economic Development by Introducing World Geodetic System







CORS

BACKGROUND · Ushering in a World of Location-based Services with CORS

- CORS was launched to apply GNSS satellites to survey technology and operate a permanent GNSS-based CORS(Continuously Operating Reference Station)
- · Post-processing of the reference points using the satellite measurement technique made it possible to provide post-processing data(RINEX) on the reference point survey

PROCESS · CORS was Applied for Greater Accuracy

Established in Jeiu

1995 ~ 2011 · Period of Rapid Progress Measurements made easy contributed to progress in an information society

Continuous **Establishment** of CORS



1995 Establishment of the first CORS(Continuously Operating Reference Station) in Korea at the National Geographic

Station) in Jeonju, Gwangju, Daegu, and Gangneung

Registered Suwon CORS(Continuously Operating Refer-

1997 Established CORS(Continuously Operating Reference

2000 Established in Taebek, Sangju, Cheongju

· · · · · · · · · 14 locations nationwide

2008 Transfer of 30 permanent GPS-based CORS, overhaul of Government Administration and

Ministry Home Affairs 44 locations nationwide

2009 Transfer to 2 CORS of KCCP 46 locations nationwide 2011 Established in Gunsan, Jindo, Geoje, Yeongdeok

- 51 locations nationwide

Research

2003 Study on introduction of virtual control point(Korea survey conference)

ence Station) as IGS reference station 5 locations nationwide

2007 Study on Korean Peninsula's crustal movements

2009 Study on GNSS Network policy of application study Research service for reestablishment of vertical standard by GNSS

2010 CORS with expansion of utilization and study on crustal movements

2011 Study on plan for enhanced national satellite network Study on analytic technique for Crustal movement observation based on the Great Earthquake in East Japan





(within the National Geographic Information Institute)

Services

2001 Announcement of performance of 14 CORS(ITRF97,epoch2001.0)

2002 Announcement of changes to the performance of 14 CORS (ITRF2000,epoch2002.0)

2006 Implemented post-process dataweb services

2007 Introduce GPSNet S/W and operate Network RTK Service

2008 Included 30 Ministry of Government Administration and Home Affairs Observatory and notice of performance for 44 places

2009 Included 24 sites of National Maritime Intelligence Service observation station and announced performance for 68 sites

Love for the nation's land in our hearts; Spatial information that makes our lives more

2010 Announced performance of 72 sites including Korea Intellectual Property Office in Changwon and Anseong, National Oceanographic Research Institute in Anhung and Chuncheon

Transferred Jeju CORS to improve communication facilities (from Seongpanak Rest Area to Seongsan Gymnasium)

2012 ~ 2016 · Innovation Period Continuous service innovation to provide accurate and stable services

2	2012	Established in Gwanghwa and Yongin	•••••	53 locations nationwic
2	2013	Established in Donghae and Bonghwa		55 locations nationwic
2	2014	Established in Dangjin, Gosung, Chulwon	and Hwacheon	59 locations nationwic
2	015	Establishment of a CORS installation at S	aemangelim	60 locations nationwice

- 2012 Taebek CORS was transferred to Taebek City Hall from Gangwon University of tourism Studies with establishment of a new building
- 2013 Base study for expanding FKP-GPS Service utilization Research project on GNSS survey 1st year
- 2014 Base study for monitoring of special structures based on GNSS / Pilot project for GNSS height survey / Study on installation plan for Baekdoo mountain GNSS reference points / Establishment of a comprehensive data system on CORS 1st year / Project and study on upgrading GNSS measurement services 2nd year Establishment of a strategy to build a national GNSS open platform
- 2015 Established a data integrated system of CORS 2nd year GNSS INFRA diagnostic research to refelct global environment change

2012 Launched Operate network RTK services(FKP) with the introduction of GNSmart S/W

- 2013 Revision of network RTK services(VRS) operation program(from GPSNet to PIVOTK)
- 2014 Announced performance of 7 new observatories and 79 CORS -
- 2015 Announced performance of 85 CORS (28 height altitude value announcements)

2016 Announcement of the performance of 86 CORS including construction of a new building(to the Military Academy at Seoul University of Science and Technology)

→ Announcement of changes to the performance of reference points due to the Great Earthquake in East Japan

(72 points, including the transfer of Jeju and Taebaek)

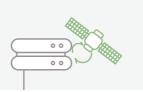
one new observation center / Transfer of the Seoul CORS due to

ACHIEVEMENT · All GNSS Observational Data in the Country are Covered by the GNSS Data Integration Center

Network RTK service

- Since 2014, the average annual number of users has increased to 132%
- 540,000 in 2014, 740,000 in 2015, 940,000 in 2016





GNSS Data Integration Services

- Launched GNSS data integration center in December 2016
- December 2016 ~ May 2017 More than 2,000 post-processing data
 - More than 750,000 real-time station data



Unified Control Points

BACKGROUND · Launch of a Measurement Reference Point Network Deployed on Flat Ground

- Establishment of a base point network of flat land rather than mountain top installation of survey reference points that requires a network, thanks to the increased penetration of GPS surveying technology
- Reduction of social costs by incorporating functions of national control points distributed by Triangulation Point, Benchmark, and Gravity Point

PROCESS · Unified Control Points - A More Accurate Measurement Criterion



Oct. 2007

■ 「Basic Study for Establishment of Unified Electronic Control Points」(basic research), pilot installation of 3 points and survey of elevation, gravity and geomagnetic forces



Feb. 2008

■ Establishment of a unified electronic control point that can be identified by satellite or aerial images and that can be used for measurement of the surface, height or gravity(1.5m × 1.5m) ○



Reference standar for enterrment o



Aug. 2008

Drawing on the result of base research, unified control point applied to 10km X 10km intervals



Prepared a plan for measurement of unified control points based on preliminary studies and due diligence



Apr. 2009

Change of unified control point survey and announcement of the format for marking comprehensive reference points

- Reflected opinions from external experts and the internal assessment committee to adjust the labor input into the enterment process
- Saved the amount of stone materials used by revising the layout of materials consisting the reference point markers



2010

Completed installation of 1,193 unified control points



2011

Launched maintainance mangement project for unified control points



Feb. 2012

- Installed additional unified control points for basic measurement and geological resource surveys
- Established a plan to install 7,000 points in densely-spaced 3 to 5km intervals across the country



May 2012

Announced miniaturized unified control point system •



Reference standar for enterrment of a unified control point, Type "B"



Dec. 2015

- By establishing a new national positioning system in 2020, the goal to install 7000 points was actively pursued
- Installed 3,800 points nationwide 54%
- Established a detailed plan for 「Establishment of Surveying Control Points Based on CORS and Unified Control Point」



2016

Height measurement of unified control points without height performance



2017

4,700 points installed nationwide



ACHIEVEMENT · Completion of Framework for the National Control Points Network in Korea

What Completion of the Unified Control Points Network Means

The completion of the unified control point network provides the basic framework of the national control points network in Korea, together with the CORS



Efficient Budget Execution with Unified Control Points

 Prevent waste of national budget by removing duplication of control points through a detailed survey based on unified control points



The Effect Resulting from the Completion of the Unified Control Point



Installation of a flat la reference point



Supply of comprehensive information on the correlation between flat land, water levels and gravity surveying results





10

Geodetic VLBI

BACKGROUND · Determine National Position Standard by Space Geodetic Technology

- National Geographic Information Institute is responsible for determining national position standards and improving surveying accuracy by applying global measurements through the introduction of geodetic technology(VLBI)
- Precision(mm) position survey technology is applied to study the precision crustal fluctuation between continents and geophysical and space sciences

PROCESS · Sejong Universe Geodetic Observation Center

MOCL33				
Jul. 2001	Established VLBI observation plan(Ministerial policy)		Jan. 2015	A study on the establishment of Geodetic VLBI Network on the Korean Peninsula 1st year
Apr. 2006	Established basic plan for VLBI construction(Director General's policy)		May	Attended VLBI manager technology work shop(MIT Haystack Observatory)
May	Implemented VLBI establishment implementation design service		Dec.	Study on establishment of Geodetic VLBI Network on the Korean Peninsula 2nd year
Jun. 2008	·			Joint observation of international VLBI in 2015(a total of 50 times)
0.4	the Land Corporation for the construction of the VLBI observatory		Jan. 2016	Base study on the application of VLBI results to national control points 1st year
Oct,	Signed contract for the manfucaturing equipment and installation of VLBI observation		Mar.	Attended the 9th International VLBI(IVS) General Meeting and
Dec. 2011	Completed building construction of Space Geodetic Observation Center			announced VLBI operation status(South Africa)
Feb. 2012	Successful initial test observation through Korea - VLBI test observation(fringe detection)		Dec.	Study on the establishment of Geodetic VLBI Network on the Korean Peninsula (3rd year)
Apr.	Joined the International VLBI(IVS) 'Network Station'(the 16th country to become a member)	100 Pm		Joint observation of international VLBI in 2015(a total of 51 times)
Jun.	Completed building dedication ceremony Space Geodetic Observation Center	SERVICE SCHOOL SERVICE	Jan. 2017	Base study on applying VLBI result to national control points 2nd year
Nov.	Opening public center for Space Geodetic Observation Center	The second secon	Mar.	VLBI Short-term training for securing VLBI analysis technology(NASA)
Dec.	Combined surveying for VLBI and GNSS connection	E 1000 E	Apr.	Study on the establishment of a plan for the application of the national
May 2013	Attended the 7th IVS Operator Technical Education Workshop(MIT Haystack Observatory)	No. of Contract of		geodetic reference system(ITRF)
Oct.	Memorandum of understanding signed between NGII and KASI for common utilization of VLBI	Approval form for IVS membership		Study on the selection of Radio Wave source for geodetic observation of high frequency band
Jan. 2014	Research on establishing medium and long-term development strategy		May	Observation of participation in international joint research
	for Space Geodetic Observation Center			(verification of relativity theory)
Mar.	Attended the 8th International VLBI(IVS) General Meeting and announced the operation status of VLBI(China)	7	Sep.	Analyzed VLBI precise positioning results using independent technique
Sep.	Participation in international VLBI(IVS) observation (first observation date : Sep. 29)			~
Nov.	Press reports(first successful intercontinental surveying through the successful introduction of space geodetic technology)	ent and Observation Center		
Dec.		iong Base		

$\textbf{ACHIEVEMENT} \cdot \textbf{Better Understanding of the Universe, Establishment of More Precise Geodetic Positions by Applying Advanced Technology}$

Joint Observation with the International VLBI Agency Observation Network

• International VLBI Organization Observation Network, with over 50 observations per year with 17 countries around the world, including the US, Germany, and Japan

Love for the nation's land in our hearts; Spatial information that makes our lives more

→ Contribution to the establishment of global positioning system and improvement of performance



Mastery of Space Geo-measurement(VLBI) Technology

 Completed internalization of space geo-measurement(VLBI) technology by obtaining observation data, maintaining observation stability, implementing data processing process, and achieving precise position and calculation



Geoid Model Establishment

BACKGROUND · Accuracy of GPS Leveling Improved by Establishing a Deliberate Geoid Model throughout the Country

- Establishment of precision geoid model for the whole country to improve leveling accuracy using GPS as a generalization of GPS surveying technology
- * In order to convert the ellipsoidal height calculated by GPS survey to the height system in Korea, it is necessary to calculate the geoid height which is the height between the ellipsoid and the geoid face

PROCESS · A Korean Approach to Research and Development for Geoid Models



Jun. 2006

Geiod model system development

 Development of a precise geoid model calculation module and establishment of a web-based geoid data service system



2008

Conducted gravity survey for a national control points system

 Acquired base data for the establishment of a geoid model and gravity network and the determination of water levels •



Sep. 2009

Establishment of a geoid model for the land area of Korea (GMK09) Development / (Precision) Average of 8cm



Sep. 2011

Conducted research on measures to establish an integrated geoid model of land and marine fields



2012

Launched research for the development of a national geoid model(3rd year) (Precision) Average ±4cm

- Announcement of a geoid model KNGeoid13(Dec. 11, 2013)
- Announcement of a synthetic geoid model KNGeoid(Dec. 25, 2014)

Established a basic plan for national integrated geoid model

 Establishment of a geoid model in order to ensure the accuracy of korean vertical datum and practical use of leveling using GPS(2012 ~ 2014)



2015

Conducted additional gravity surveying the national control points(2,120points)

 The surveying was conducted to improve accuracy of the geoid model in mountain camps area with relatively low accuracy, and conduct additional gravity performance(Unified control point and triangulation point)

(In 2015) Gwangwon-do (In 2016) Gyeongsang-do (In 2017) Gyeonggi-do areas



Dec. 2017

Established a geoid model and linked model for vertical datum of land and marine fields

 The existing national geoid model (KNGeoid 14) was improved by incorporating the data from the latest global satellite gravity field model(GOCE) and gravity performance data in mountain areas from 2015 ~ 2017



No. of National Control Points

Duration
No. of Survey Points



Unified Control Point

2008 ~ 2010 1,196 points



Benchmark 2009 ~ 2012, 2014

6,496 points

Triangulation Point

2011 ~ 2014 2,007 points



CORS2014

43 points

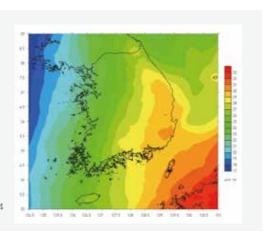
ACHIEVEMENT · Geoid Model Establishment for the Entire Country

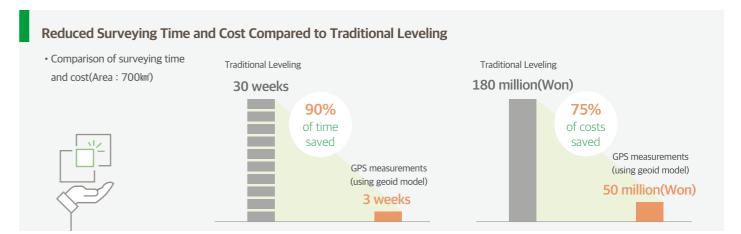
Improved GPS Leveling Accuracy with Geoid Model

• The homogeneous geoid model throughout the country provides average accuracy of about 4cm



Gravity geoid model for Korea, KN Geoid14





Love for the nation's land in our hearts: Spatial information that makes our lives more convenient

Aerial Photogrammetry Taken Every Two Years

BACKGROUND · Aerial Photogrammetry to Record Developments over Time

- The entire country was divided into two regions for aerial photogrammetry to be taken every year, followed by national base map production and revision in the subsequent year
- The cycle at which aerial photogrammetry is taken needed to be reduced to meet various industrial and everyday needs

PROCESS · Once Supported by the Netherlands, Now Providing Aerial Photogrammetry for the Entire Country Every Two Years



1966

Concluded an agreement on cooperation for aerial photogrammetry(between Korea and the Netherlands)



Launched analog aerial photogrammetry of 0.7m and 0.4m level; Completed map for the entire region of South Korea at 1:25,000

2002

Established a 5-year cycle for national map revisions

A 5-year cycle for revision to



country

Established a 4-year cycle of analog photogrammetry of 0.4m for the entire



Digital aerial photogrammetry project following the introduction of a 4-year revision cycle(2010 ~). map production

Metropolitan areas are photographed every 2 years, and other areas are photographed every



Study on the commercialization of digital cameras for large-scale

- Case study on the introduction and practical use of digital cameras, verification of digital camera performance
- Revision to rules on aerial photogrammetry, plan submitted for standard aerial photogrammetry



2010

update(2011 ~)

2009

Launched pilot project for digital aerial photogrammetry

- Completion of aerial photogrammetry for the establishment standards (addition of pre-processing data)



Digital aerial camera - DMC(Z/I image)





2011

Digital aerial photogram-Launched digital photometry nationwide shooting grammetry and renewal of 0.25m digital aerial phoand national 2 year map togrammetry nationwide every 2 years





Digital aerial photogrammetry

ACHIEVEMENT · Past, Present and Future Economic Growth

Aerial Photogrammetry which Contributes to Domestic Economic Growth



the country







Our Country



Establishing Spatial Information Infrastructure

• Established a basic infrastructure for spatial information, including a topographical map, digital map and video map



Topographical Map



Digital Map

Video Map

Aerial Photo Web Service

BACKGROUND · An Aerial Photography Album Viewable by the Public

- Aerial photographs are a valuable records used in map production and GIS-based materials
- · Aerial imagery can be permanently preserved and converted into digital format to be made readily available for use anytime, anywhere
- No need to visit in person to receive aerial photos

PROCESS · Conversion of Analog Films to a Digital Album





2005

Launched the conversion of analogue aerial photographs into digital format(scanning) and established a DB

)

Launched internet and intranet service of national spatial image information(aerial photograph) services online; Developed image compression format(NIX) only for NGII image



MK-4 Close attachment device



Aerial film automatic developer



Image maximizer(Dust CLS1840)

Improved service features with better web access and security



2009

- Improved services by improving web accessibility and security through integrated development of aerial photographs and satellite image management system
- Introduction of server integration, interface improvements and aerial photograph, satellite image system integration and image engine, vector engine, 80TB storage, operating software, web services server, integration management
- System server location search function through search API, aerial photograph comparison function, topographical superposition function, map, coordinate, administration space function and spatial information search function is added

Launched to provide new spatial information such as orthophoto, DEM



2015

Spatial information integration service of national geographic information institute through National Geographic Platform

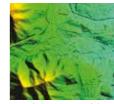




Aerial images : 181,716 sheets



Satellite images 89,769 sheets



Digital elevation model : 21,632 sheets



Static images 5,147 sheets

ACHIEVEMENT · Digital Aerial Photography is Made Available to Anyone Anywhere

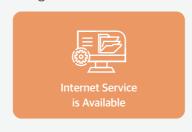




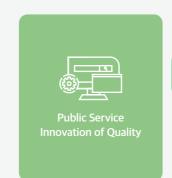








Aerial Photography More Easily Available in National Platform





essibility online



The Nation's Leading Institution for Spatial Data Production NGII



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Multi-faceted search function provided to review the past, present and evolution of the nation's land



A Basis for Increased Use of Aerial Photographs in the Public and Private Sectors

National Orthophoto Manufacturing

BACKGROUND · Foundation for the Nationwide Spatial Image Services

- Establishment of three-dimensional spatial information, Internet map services, monitoring of environmental changes in the country to meet increased needs for orthophoto-based data
- Support needed for the usage of orthophotography for civil and military purposes through the creation, processing and editing of nationwide spatial images and/or the addition of security features to the images

PROCESS · Digitalized Orthophoto Technology



2000

Study on the establishment of a DEM suitable for Korean terrain by presenting the use of digital elevation model orthophoto image production



2001

- Establishment of a basic plan for image map production, establishment of orthophoto quality control and legal system(work regulation), implementation of pilot project(Daejeon areas)
- An analysis of orthophoto use cases in USA, Canada, Australia, Japan, India and Malaysia for the basic plan of image map



2002

- Establishment of working regulations on image map production
 - Launched to produce digital orthophoto(~ 2005), orthophoto map production(~ 2010)

Established and launched a national



2006

- **Establishment of DEM data and** orthophoto map, establishment of multi-dimensional spatial information
- 1:5,000 digital elevation model using digital topographic map and image matching



2007

Expansion of multi-dimensional spatial information establishment area (Gwangju, Gunsan, Busan), numerical elevation data and orthographic image map expansion area(Incheon, Suwon, Cheongju, Daegu, Osan)



2008

- Establishment of DEM data and orthophoto map
- Guri, Euijeongbu, Changwon, Masan, Guhje, Gwangju, Gongju, Gwangyang, Gwangmyeong, Anyang, Gunpo, Gwacheon, Hanam, Bucheon, Shiheung, Ansan



2009

Establishment of DEM and the Orthophoto Map(Hwaseong, Pyeongtaek, Anseong, Icheon, Goyang, Namyangju, Yongin, Yeoju, Jecheon)



2010

Launched a national program for continuous management of orthophoto; Launched pilot production



2011

Established a national orthophoto production plan



Produced a nationwide digital orthophoto by utilizing aerial photography achievements made in 2010



2012

2-year cycle of production and revision for orthophoto



2014

Establishment of an orthophoto production plan and production of a nationwide orthophoto DB

ACHIEVEMENT · Achievements in National Orthophoto Production

National Digital Elevation Model and Orthophoto Production

Year of Production	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Size of the Product(km²)	540	4,650	3,235	3,281	11,243	4,868	90,191	13,500	54,930	40,100	54,930	40,100
Budget(million Won)	650	3,280	3,313	5,441	16,073	1,504	7,427	2,216	8,725	8,278	10,613	7,400
Digital Elevation Model Grid Spacing(m)	1	1	1	1	1	5	5	5	5	5, 10, 30, 90	-	-
Orthographic Resolution(cm)	40	40	40	40	12	25	25	25	25	25	25	25



Geospatial Information on North Korea

BACKGROUND · Foundation for Comprehensive Land Management on the Korean Peninsula

- The need to compile data on the North Korean region for policies regarding foreign affairs, national security and the economy as the geopolitical situation
- The need to update outdated data on the North Korean region has led to the initiative aimed at resolving the issue of lack of accurate data as the peninsula prepares for an eventual reunification

PROCESS · Updates to Spatial Information and Data regarding North Korea



2006

Launched a pilot map project for inaccessible areas



ACHIEVEMENT · Establishment of Spatial Information Data on North Korea

Established a 5-year plan for building basic geographic information on North



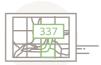
1:25,000 digital map production on North Korea

- 1/25,000 Digital topographic map, orthophoto(2.5m), DEM(10m) production(334 sheets), improved accuracy of geographical information establishment in inaccessible areas



2008

1:25,000 digital topographic map, orthographic image(2.5m), DEM(10m) production(317 sheets)



2009

1:25,000 digital topographic map, orthophoto(2.5m), digital elevation model(10m) production(337 sheets)



Digital map of North Korea on a scale of 1:25,000 revised

- Revised the 1:25,000 digital topographic position, localized production of maps by theme production (4 sheets) on inaccessible areas, integration of existing spatial information research through ISP



2012

1:25,000 basic spatial information revised and updated(10 sheets), continued production of digital maps (988 sheets), 1:5,000 map newly produced for Najin area(4 sheets) numerical topographic map in North Korea(988 sheets made public)



Published a map book on North Korea



2014

A regional map for North Korea, a satellite map, and general map for North Korea were made public



2015

Established a mid-term plan to build spatial information for North Korea

- High-precision spatial information(digital topographic map) on North Korea numerical topographic map and orthophoto images presented in a pilot project(185 sheets)



2016

I High precision spatial information produced on North Korea











Year of Production	2006	2007	2008	2009	2011	2012	2013	2014	2015	2016
Size(km²)	-	51,436	43,199	48,750	35,574	50,000	- ,/	143,385	980	39,000
Budget(million Won)	495	6,000	5,300	4,860	400	900	No budget	1,700	2,000	1,847
Other	Pilot project	Hwanghae-do and	Pyeongan-do and	Hamgyeong-do and	Hwanghaenam-do and	Hwanghae-do	Publication of man book	North Korea	8 cities including Sinuiju	7 cities including Hwanghae-do



Establishment of Geospatial Information on Polar Regions

BACKGROUND · Building a Foundation of Geospatial Information in Polar Regions for Future Resource Power

- Precise geodetic surveying and mapping are needed for national interests such as exploration, development and environment studies in polar regions
- Since 1950, it has been necessary to respond to the rising need for exploration in polar regions and map production to promote national interests, Such moves have been noticeable of the world powers such as the United States, Japan, and China

PROCESS · The Antarctic and the Arctic Regions that are Precisely Studied by Our Technique

Construction of Spatial Information in Antarctic

Jun. 2009

^rBasic Plan for Antarctic Suverying and Mapping(1st) Minister's policy decisions

Aug. 2009

MOU signed with KOPRI for polar regions surveying and mapping

Conducted FAntarctic Surveying and Mapping Project ~ 2012

Jun. 2009

Established a unified control point(1 location) to serve as a CORS station(1 point) near Sejong Station; Mapping of 1:1000, 1:5000 1:25000

Jul. 2010

⁷2010 Antarctic Surveying and Mapping Project

- Precise geodetic surveys around Seiong Station(GPS surveying. gravity observation), mapping around JangBogo Station(1:5.000. 1:25,000 digital maps); DEM, Antarctic portal systems, and registration of Antarctic place names



Jul. 2011

⁷2011 Antarctic Surveying and Mapping Project

- Research on geodetic surveying suitable for the Antarctic environment, manufacture of thematic map using mobile maps and SAR satellite installation and maintenance of control point

^r2012 Antarctic Surveying and Mapping Project

- Geodetic survey around Jang-bogo Station[Satellite control point(1 point), unified control point(3 points)], production of coastline and glacier change map around Sejong and Jangbogo Station, production of bettle map and fan-shaped map etc. around Sejong and Jangbogo Station



Jan. 2013

^rBasic Plan for Polar Regions Surveying and Mapping Project(2nd)_J Vice Minister's policy decisions

Apr. 2013

MOU signed with KOPRI for Antarctic **Geodetic Observation Center**

Jun. 2013

^rAntarctic Surveying and Mapping Project_ completed and reported(to Ministser)

Completed installation of a Geodetic Observation Center at Sejong Station ~ May 2015



Three dimensional map of Antarctica

2009

Construction of Spatial Information in **Arctic**





2010

2011

2012

Three dimensional map of the North Pole

2013

Research project for FBasic Plan of Building Arctic Geospatial Information

Apr. 2013

Mar. 2013

Conference on establishment for Korea and Denmark-Greenland Arctic geospatial inforatmion

Nov. 2013

Arctic spatial data compilation in cooperation between Korea and Greenland and held cooperation seminar

Dec. 2013

Arctic policy basic plan announced (7 departments under the Ministry of Maritime Affairs)

Feb. 2014

2014

^rArctic Geospatial Information Building Plan(2014 ~ 2018)_J Minister's policy decisions

Mar. 2014

⁷2014 Arctic Surveying and Mapping Project_J launched under the ^rBasic Plan for Building Arctic Geospatial Information_J

- Arctic image map(1:5,000, 1:25,000, 1:100,000), digital map(1:5,000, 1:25,000), digital elevation model, shoreline and glacier change map (Ny-Alesund areas)

2015

Aug. 2015 ⁷2015 Arctic Surveying and Mapping

- Arctic(Svalbard) image map(1:5.000. 1:25,000), digital map(1:5,000, 1:25,000), digital elevation model, enhancement polar spatial information portal(integration with Antarctic



Digital map of Svalbard Islands 1:25,000

2016

Aug. 2016 「2016 Arctic Surveying and Mapping Project i

- Three-dimensional map around Svalbard, image map(1:5000, 1:25000), digital map(1:5000, 1:25000), digital elevation model, compilation of 3D spatial data on areas near Dasan Base, enhancement polar spatial information portal

ACHIEVEMENT · Future Land Exploration Facilitated with Geological Data

To Establish the Official Basis for Recognition of Relevant International Organizations for Territorial **Sovereignty in Future**

Arctic Geospatial Information

- Map Production Digital map(1:5,000, 1:25,000), image map(1:5,000, 1:25,000), Arctic map, coastline and glacier change map
- Web Services Enhancement polar spatial information portal include Arctic road-view and displaying thematic map

Antarctic Area Geospatial Information

- Map Production Digital map(1:1,000, 1:5,000, 1:25,000), Antarctic map, 3D map
- Installation of Geodetic Observation System and Tide Observation System Establishment of geodetic observation center(about 76.32m) in Sejong Station, installation of tide observation system
- Installation and Measurement of Reference Points Installation of CORS stations(2 points), unified control point(1 point), GNSS surveying(6 points) and gravity surveying(50 points)
- International Geographical Names Registration Succeeded in registering 27 place names in Korean including "Baekdubong" in the Antarctic Science Station area

Love for the nation's land in our hearts; Spatial information that makes our lives more

Shortened Cycle for Revisions to the National Base Map

BACKGROUND · Increased Application of Spatial Information

- Increased need to maintain state-of-the-art national maps that are accurate and up to date as requested by consumers
- Increased need for state-of-the-art basic maps essential to navigation

PROCESS · Maps Made Readily Available in Daily Life



Nov. 2002

Plan unveiled to renew the national base maps every 5 years by dividing the country into five regions



Feb. 2007

Plan unveiled to renew the national base map in 4-year cycles by dividing the whole country into four regions. Established a revision plan and complete the construction work



2008

Established guidelines for the construction of National Base Map(regulations on scale and



Nov. 2009

Established a variable data collection system by designation of about 250 persons from 230 local governments and 5 governm-ent departments in Korea



Jun, 2010

Renewal cycle of National Base Map notification shortened from on an annual basis to a quarterly



Acquisition and sharing of geo-

graphical feature and material

change data(by type, region,

year) through homepage

Dec. 2010

Established a plan to renew the National Base Map by 2-year period, dividing the whole country into 2 regions



2011

■ Established a 「Geographical and **Land Variation Management** System_J for National Base Map renewal system



Jan, 2011

Renewal cycle of National Base Map notification shortened from on a quarterly basis to a monthly basis



tional base map took effect in earn

Dec, 2012

Establishment and implementation of the national base map advancement plan and expanding the linkage between the subject of modification and the system at any time

- Reduction of map revision cycles, improvement of mapping system based on continuous digital map



Jan. 2014

Renewal cycle of National Base Map notification shortened from on a monthly basis to a weekly basis



Dec. 2014

Automatic collection of data from relevant organizations on changes to the topography and landmarks, as part of a project to improve the ^rChange Management System for Topography and Landmarks



Jan, 2016

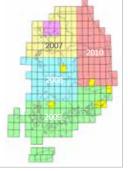
Designation of a 2-week cycle for the periodical renew of the National Base Map and the simultaneous revision to the National Internet Map and OnMap

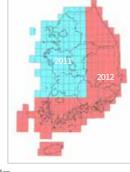


Sep. 2017

Configured a real-time synchronization system and implemented closer cooperation with related organizations to reflect revisions to the address system due to the expansion of the ^rNational Geographical and **Land Variation Management** System」









ACHIEVEMENT · Up-to-date Spatial Information Made Available to the Public and **Private Sectors Every 2 Weeks**

Newest Form

· Significantly shortening the revision cycle of the National Base Map compared to 10 years ago



Renewed every 4 years



Changes to the revision cycle for the National Base Map

HD Road Map Production

BACKGROUND · An Increased Need for Accurate Maps in an Era of Autonomous Vehicles

- An urgent need for HD road maps on roads and nearby facilities to stay in step with the progress in the core technology for autonomous driving vehicles, as technology moves away from a 'sensor-based' system to a 'sensor + map-based' system
- It is increasingly necessary to secure position accuracy by collecting and displaying property information such as roads, surrounding facilities, and cover information beyond the limits of aerial photogrammetry map
- Establishment of an integrated management base of vehicle-road facility-traffic information is needed for realizing C-ITS and LDM system in the era of commercialization of autonomous driving

PROCESS · Guaranteed Map Stability and Up-to-date Data with Precision

May 2015 In 2015, the third regulations ministerial meeting was held to jointly ministers of related departments to promote

the commercialization of autonomous vehicles

- Designated the role of national geographic information source according to joint report of MOLIT, MSIT, MOTIE(HD road map production)

Establishment of pilot map and establishment of pilot map for precision support for autonomous Sep.

- One expressway(42km), three national highways(186km), the car safety research center(13km)

Feb. 2016 Providing vector data performance based on completion of pilot project

HD road map industry-related meetings(with private companies, associations, public organizations etc.)

Provided HD road map data for demonstration of autonomous vehicles of Seoul National University

Sep. Industry, academy, and government meeting to increase the utilization of autonomous vehicles ~ Jan. 2017

- Two national roads(99km), Daegu Regulation Freezone(74km), Yeoido area(21km)

Holding industry, academy, and government meeting to increase

the utilization of autonomous vehicles

HD road map point cloud(LAS) data disclosure and providing vector data online

Holding a seminar to improve HD road map utilization

Aug.

Feb. 2017

Dec.

Apr.

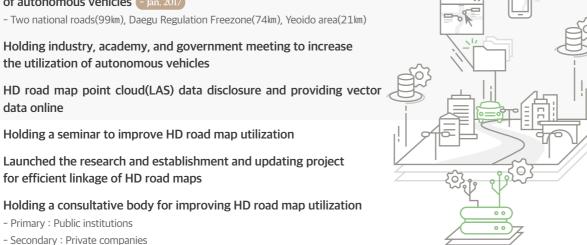
Jun.

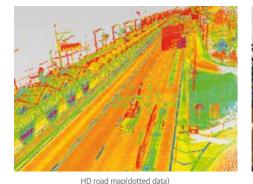
Launched the research and establishment and updating project for efficient linkage of HD road maps

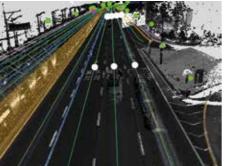
Sep.

- Primary : Public institutions

- Secondary : Private companies

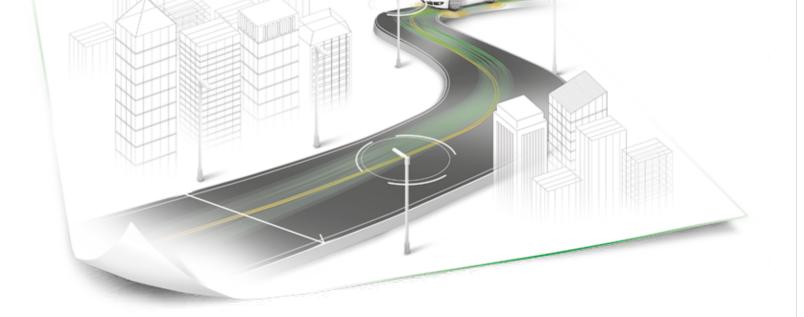






Love for the nation's land in our hearts; Spatial information that makes our lives more of

10	Shape +	FIMERIO	FROMRODE	TOMODE	LEWGTH	BOX
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. 1	Polyline ZM	2990/1968201	2990061900	2900010404	2330,127	1.
- 2	Polytoe 2M	2900064222702	2990072401	299001 T900	194,374	1
- 3	Polyline ZM	29909586ZZ00	29900001902	2900012400	2309,975	9.
	Polytine ZM	293000502208	2930012401	293001 T301	2340,099	1.
5	Polytine ZM	290002532900	2990012405	2990010406	101,301	1
. 6	Polyline ZN	290007212200	2930000000	2900000000	119,404	1.
7	Polytoe ZM	29/3014/352/208	2930065500	290000114000	437,724	1
	Polytine ZM	290002538201	2900012400	290001 T300	2342,752	1
9	Polytine ZM	29/3000/5/32/2/00	2900012402	2900017002	2342,672	1.
.10	Polytine 2M	290098622204	2900014101	2990014100	184,907	1.
11	Polytice 2M	2930ne822203	2990014101	29000011400	609,413	1.
12	Polytice ZM	299094292209	29/9009 7300	2900014102	571,085	1
13	Polytine 2M	290000427700	29/3009 7400	290000 T300	190,571	t
14	Polytine ZM	29/30/17/12/22/03	2980014102	2990000000	634281	1
15	Polytra 2M	29901701R206	2900014102	2990066600	139,765	+
16	Polytine ZM	299017132203	58300000000	2900014101	426,666	1.
17	Polytine ZM	293017142233	29/30000601	2900014001	319.46	1
.10	Polytoe ZM	2010117142201	2930066600	2900000000	147,297	1
-19	Polyline ZM	299002522P06	298009 4001	2999014000	901,116	1
- 00	Polytne ZM	290002552200	29/30012408	\$400000000	254,757	1.
21	Polytine ZM	29/9002532.203	29000012405	2930012406	176,437	1
44	Polytoe ZM	2930025822103	2900052408	2900012405	160,36A	1
29	Polytine ZM	299002501,230	29/3009 4000	2900012406	163,588	8



ACHIEVEMENT · Contribution of Geographical Information Services to a Wider Range of Future Projects

Free Performance Data Provided to Approximately 200 Public and Private Organizations

Category	Field	Requirements	Application
SNU	Autonomous car	Establishment source data(point cloud)/whole area of Yeouido	Provided(Oct. 2016 ~) / Completion(about 21km)
Hyundai MN	HD map	Coordination of road change information/Cooperation with HD road map establishment	Ongoing in 2017
Thinkware	HD navigation	Establish a basic plan for publishing plans such as HD road map establishment	Promotion(Sep. 2017)
Ministry of Land	C-ITS	HD road map including road information + surrounding facilities + cover information	Applied(using C-ITS basic map)
NAACC	MAC	Establishment of HD road map within happy city	Ongoing promotion 2017
Daegu City	Regulation-free zone	Regulation-free zone establishment	Completed(about 74km)
KARI	HD GNSS	Gyeongbu Highway(Shingal - Anseong)	2017 Ongoing construction
LX Corporation	Road ledger	Coordination of advanced road management	Ongoing Promotion
Other	Offer	Online supply of HD road map(including point cloud data)	Online distribution(Dec. 2016~)

Establishment Area from 2015 ~ 2016

	Categor	у	Duration	Extension		
		Highway	Gyeongbu Line(Seoul TG - Shingal JC) - Youngdong Line(Shingal JC - JC)	41km		
	Autonomous	Route 1	Route 42 - Route 39 - Route 77 - Route 38(Suwon, Hwaseong)	61km		
2015	Car Trial Section	Route 2	Route 42 - Route 45(Giheung, Yongin)	40km		
		Route 4	Route Route 37 - Route 1 - Route 39 - Route 77(Paju, Ilsan)	85km		
	Automobile Safety Institute		Advanced driving test	50km		
	Total					

	Yongin 3 sections		Duration	Extension	
			Line 42 - Line 17 - Line38(Yongin, Anseong)	65.3km	
	Seongnam	5 sections	Line 3 - Line 45(Gwangju, Yongin, Seongnam)	33.5km	
			Daegu National Industrial Park	2.2km	
		Achievement 2nd Industrial Park	13.6km		
2016	Daegu Regulation-Free Zone		Daegu Driving Experiment Center	5km	
			Daegu Technopolis	32km	
			Technopolis Road	13km	
			Science South and North Road	8.4km	
	Yeo	ouido	Yeouido	21km	
	Total				

2017 HD Road Map Project

· 2017 HD road map linkage efficiency research, establishment, updated business promotion

Target Section	Establishment Extension
Gyeongbu Expressway	about 404km
Youngdong Expressway	about 202km
Donghae Expressway(some parts)	about 2.5km
Gwangju - Wonju Expressway	about 56km
Chubu Expressway(some parts)	about 22km
Second Central Highway(some parts)	about 13km
Seoul Expressway	about 128km
Connecting Section	about 12km
PyeongChang Olympic Support National Highway	about 1.5km
Happiness City	about 33km
Pangyo Zero City	about 6km
Total Routes	about 880km



National Internet Map

BACKGROUND · The Beginning Point for Producing a Leading National Map of Korea Online

- The need to establish an online map of the country to promote map services in the private sector to be applied to the internet, smartphones or navigation systems
- The need to increase satisfaction regarding the National Base Map on a weekly renewal and to provide multi-language maps for international visitors

PROCESS · Growth of a User-friendly National Internet Map



Dec. 2012

Preparation of a basis for Internet map services and improved satisfaction of users under the [Implementation Plan for Upgrading the National Map_



Mar. 2014

Establishment of a **National Internet Map** and implementation plan for associated services



May. 2014 ~ Jan. 2015

Establishment of maps for the visually impaired or color blind, and maps in Korean and English through the project on establishing a basis for internet maps and national interest point data

- Establishment of work rules for national internet maps and data base on national interest areas



Mar. 2015

National Internet Map and Country Interest Point Information made available free of charge



National Internet Map online service



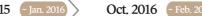
May 2015

National Internet Map and expanding information on National Interest Points promotion of establishment project

- More National Internet Maps(in Chinese and Japanese), expansion of the data base for maps on North Korea and border areas

- Establishment of national interst area data in multiple languages(in Chinese and Japanese) to provide tourist information





Implementation of National Internet Map and National Interest area data renewal project

> - The National Internet Map and data on national POI(Points of Interest) were updated based on the latest peformance on the National Base Map



Jan. 2017

Cooperation with related private companies(Kakao. etc.) on information on national POI



Feb. 2017

Synchronization of **National Geography** Institute's POI information with that of the National Disaster Research Institute to promote everyday safety against disasters



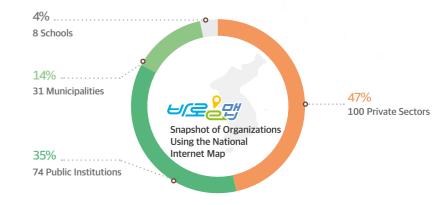
Sep. 2017

Establishment of national geospatial data and National Interest Point information



Oct. 2017

Launched project to study automation measures for map production and development of derivative systems(including internet maps)



ACHIEVEMENT · Increased Utilization of Spatial Information through Online Maps







(Public disaster research institutes, etc.) and private institutions(Kakao maps, etc.)



National Online Maps and Compilation of Data on Areas of National Interests and National Interest Branch **Information Establishment Achievement**

National Internet Map

	·		
Category	Size(GB)	Category	Size(GB)
National Map	158	Colored Map	152
HD National Map	267	Low-sighted	158
English Map	160	Educational Outline Map	81
Chinese Map	157	Outline Map	96
Japanese Map	158	-	-

· Points of National Interest

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Category	Size(GB)	Category	Size(GB)
Korean Search	4.38	Korean Print	0.21
English Search	1.27	English Print	0.28
Chinese Search	0.07	Chinese Print	0.05
Chinese Search	0.10	Japanese Print	0.10

Establishing Tactile Maps for the Visually impaired

BACKGROUND · Removing Blind Spots on Spatial Information

- The need to improve welfare services for the visually impaired that are lacking in comparison to leading countries
- The need for tactile maps and maps tailored to the color blind to be developed for the 250,000 visually impaired citizens and over 2 million color-blind citizens to provide spatial information to all citizens

PROCESS · Bringing the Tactile Maps in Korea Up to Par with the Needs of Our Times



May 2014

- Ist year Through a survey on domestic and overseas cases and collection of opinions, standards to configure a signage system tailored to the needs of the socially vulnerable were established and map production was launched
- Consulting body was formed with the Association of the Visually Impaired, School for the Blind and Barille Library



Dec. 2015

Tactile maps on Seoul, Korea and the world distributed to 16 braille schools nationwide



Jun. 2014

May 2016

- Composition of customizable schematic symbols tailored to the socially
- Practice Competition

 Tactile maps were distributed to 13 schools for the blind and 44 braille

libraries nationwide

■ Selected as best case by 「Ministry of

Land, Transport and Maritime Best

Dec. 2014



compiled book of tactile maps of

Jul. 2016

- Survey conducted on 14 schools for the blind for tactile map development apps for the visually impaired
 - A combined method with braille was added to the preliminary rules of NGII on its rule no. 2016-100, Production of Tactile Maps to ensure the map can be used for both the visually impaired and the blind



Mar. 2015

- For production of a standardized Tactile map, rule by the National Geographic Information Office no. 2015-84 was established
- 2nd year Pilot production and establishement of mid to long term action plans for a map of Seoul for the visually impaired



May 2015

Distributed the world's first ever map guide at the 2015 Seoul Competition for the Visually Impaired(with 6,000 attendees from 80 countries)



Jul. 2015

Four institutions including Seoul School for The Blind conducted a usability evaluation on blind people



May 2017

- 6 major metropolitan cities nationwide and Jeju produced a tactile map
- 14 maps were distributed to schools for the blind nationwide and 160 maps to special education support centers



Jun. 2017

4th year Project for tactile maps launched



Jul. 2017

Tactile maps distributed to the visually impaired students attending 26 general schools



ACHIEVEMENT · Establishment of Domestic Tactile Map Framework and Establishing World-Wide Status

Establishment of Domestic Tactile Map

- Conducted a survey of domestic and overseas cases for advanced tactile maps and color map, and collected opinions of the visually impaired
- · Production of the Tactile Map for the Education The national Atlas of Korea for visually impaired, the World Tactile Map

Love for the nation's land in our hearts; Spatial information that makes our lives more

• Production of the Tactile Map for Living Seoul, 6 major metropolitan city, Jeju



Reaffirms the International Status of Domestic Tactile Maps

- Promoting international visions for braille instruction through tactile guidance map for 2015 Seoul World Blind Tournament, 2018 Winter Olympic Winter Games, Paralympic Stadium Braille guide guidance
- Introduction of domestic tactile map production method and development direction at the international map conference of 2015/2017



Dokdo Surveying and Mapping

BACKGROUND · Our Land Dokdo Begins with Accurate Information

- Japan's claim to the territorial claim of Dokdo(Natural Monument No. 336) has led to diplomatic disputes
- We need to clarify the coordinates, height, and circumference of the island, to provide more accurate information on national territory, highlight its value and raise awareness in the global community of the status as Dokdo as part of Korea

PROCESS · The Value of Dokdo Has been Promoted for More Than Half a Century



Dec. 1961

Conducted Dokdo astronomical survey and produced a 1:3.000 topographic map(using flat surface measurements)



May 1980

Produced 1:5,000 aerial photogrammetry(produced maps of 1:1,000 and 1:5,000 scale), conducted astronomical survey



May 1996

First production of a map of Northeast Asia on a 1:3 million scale(Korean and English versions)

Produced the first map of 1:3 million



May 1998

Measurement of national reference points based on GPS (11 triangulation points on Dokdo)



Aug. 2000

Produced 1: 5000 aerial photogrammetry(1:1.000 scale digital map production



Jul. 2004

Held meeting with related government departments, hosted by the Office of State Coordination for announcement on the official status of Dokdo

- Related departments of government: Ministry of Construction and Transportation, Ministry of Maritime Affairs(general oversight), Ministry of Foreign Affairs, Ministry of the Interior and Safety



Produced a 1:3 million map of Northeast Asia(Korean/English version) and distribution of a revised map



Dec. 2004

Conducted a national control points survey based on GPS of Ulleungdo and Dokdo



Apr. 2005

Produced a 3D map of Dokdo



eneral information and status on Dokd

as compiled and made public by NGII

Jun. 2005

National Geographic Information Institute announced a government standard on the general status of Dokdo

- Coordinates, height and circumference of Dokdo's eastern and western islands



Oct. 2005

Revised the digital map for Ulleungdo and Dokdo



Dec. 2005

Published a book on Korean geography(including Yeongnam and Dokdo)



Jan. 2006

Officially legislated the geographical name of smaller islands near Dokdo (22 islands)



Apr. 2006

First production of world map(Korean/English version)

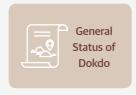


Dec. 2006

Establishment of a GPSbased CORS on Dokdo

ACHIEVEMENT · Accuracy Acquired on the Current Status of Dokdo and Securization of Korea's Sovereign Rights to Dokdo

Acquisition and Publication of Information on the General Status of Dokdo



Distance Area

Coordinates

Ulleungdo: 87.4km, Oki Island: 157.5km

Love for the nation's land in our hearts; Spatial information that makes our lives more

Area of the eastern island: 73,297m², Height 98.6m, Circumference 2.8km Area of the western island: 88,740m², Height 168.5m, Circumference 2.6km Other affiliated small islands(89 pieces): 25,517m²









The Benefit that Can be Obtained at Home and Abroad with the Notification and Publication of the Status of Dokdo

Expansion of Open Geospatial Information Available to the Public Free of Charge

BACKGROUND · Welfare Services to be Provided to All Citizens of Korea

- The use of spatial information has been rapidly emerging as a driving force for the creation of high added value such as autonomous vehicles and Internet of objects
- In the era of the 4th industrial revolution, to eliminate barriers to entry of SMEs and individual entrepreneurs into the spatial information industry, 1:5,000

PROCESS · Spatial Information has Helped Promote Industrial Growth



Aug. 1998

First sales of digital maps to citizens with the digital conversion of maps

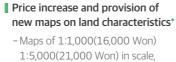
- 8 types of digital maps including those of 1:5,000(14,000 Won), 1:25,000(18,000 Won) and 1:250,000(16,000 Won) in scale were sold to the public
- However, the 1:1,000 map was supplied only to government organizations



Jan. 2000

Free supply to national and local governments

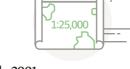
- Strict rules were applied to determine recipients as information on underground facilities, when exposed, can undermine national



Nov. 2000

land characteristics map in 1:1,000 (14,000 Won) and 1:5,000(16,000 *Maps produced based on digital

topography and land price data



Feb. 2001

Supply of a new map on the current usage of land

- Basic compilation of data on land use was completed with the establishment of a plan on land usage. The new map on current usage of land was sold to the public(25,000 Won)



B+

Sep. 2002

Conversion of the map distribution from free-of-charge to a paid model

-Conversion was made to resolve issues of supply disruption due to reckless distribution



Mar./Dec. 2004

Price increase for digital maps

- Prices were increased in accordance with inflation
- 1:1,000(18,000 Won),
- 1:5,000(23,000 Won),
- 1:25,000(27,000 Won),
- 1:250,000(24,000 Won)



New supply of digital maps

- Version 2 of digital maps and basic geographic information map were distributed
- ver2.0 1:1,000(20,500 Won) and 1: 5.000(26.000 Won). basic geographic information 1:5,000 (3 Won/KBvte)

atial data of NGII began to be

red free of charge



Apr. 2010

New supply of orthoimages and digital elevation models

- -Static images and digital models were provided free of charge to public organizations only for security reasons. Private organizations were charged a fee
- New pricing policy : 0.02 Won/Kb for static images 0.15 Won/Kb for digital models



Re-supply to government bodies free of charge and a drastic price cut

- To prevent overlapping investment, maps were provided for free to government bodies. Price was drastically cut to promote business in the private sector and job creation
- 1:1,000(18,000 Won → 12,000 Won, approximately 33%) 1:5,000(23,000 Won → 15,000 Won, approximately 35%)



Jul. 2012

New supply of the nationwide seamless digital maps and basic map for coastal areas

- The scale of 1:2,500 digital maps for cities and countries and seamless digital map with layer options, as well as 1:25,000 basic maps of coastal areas were distributed
- 1:5,000 continuous digital map(6 Won/Kb) 1:2,500 digital map(17,000 Won) Basic map of coastal areas(17,500 Won)



Feb. 2014

New supply of English digital map(1:25,000)

- English version of the digital map was newly distributed to promote geographical names such as Dokdo and East Sea and to respond to requests by foreign corporations on release of a Korean map overseas



Opening spatial information to the public free of charge

- Pricing policy was converted from a paid model to a free model, Sptial information including 1:5,000 digital map and orthoimages was provided to the public for free(excluding 1:1,000)
- -1:5.000 digital map: 15.000 Won → 0 Won (nationwide : 2.7 million Won → 0 Won)



Jul. 2016

1:1,000 digital map was also made free for the public

- In consultation with local governments and organizations related to spatial information, pre-estabilished 1:1,000 digital map became available free of charge to the public by the matching fund of local governments



Mar. 2017

Spatial information of NGII was converted entirely to a free

- Revision to related law and an overhaul of the sytem allowed aerial photogrammetry and older maps to be open to the public
- Fees for using aerial photos was cut(20,000 Won → 0 Won) and time for issuance was shortened (2 ~ 3 days → 5 minutes)

ACHIEVEMENT · Increased Utilization of Spatial Information and Revitalization of Industries

Provide a Foundation for Full Utilization of Spatial Information

Information Usage





d 378 thousand sheets → 2017 Free 2,422 thousand sheets 6.4 fold

Love for the nation's land in our hearts; Spatial information that makes our lives more convenier





Activation of Industry by Opening Free of Charge

 Activation of related industries such as improvement of service quality, improvement of company competitiveness, development of new technology, etc.



Establishment of the National Information Platform

BACKGROUND · A New Platform is Needed in the Era where Spatial Information Enables Multi-disciplinary Approaches

- Provision of an analysis system for establishing national policy that can support decision-making by integrating administrative and statistical information of external agencies into spatial information provided by the Geographical Information Service
- Reinforcement of services that makes it easier for users to search, view, and download information provided by the Geographical Information Service





Feb. 2014

- Established infrastructure for land survey development plan and platform
- Establishment of a matrix for a national statistics map and web-based public services



Mar. 2015

- A DB based on matrix-based national statistics, online synchronization of the DB and related services offered to the public
- Data base that forms the foundation: population, address, building, land. DEM





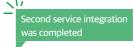
Jun. 2015

- Establishment of an integrated services system that provides land information through a platform
- Integration of 7 services including aerial photos, digital topographic maps, and control points



Mar. 2016

- Launched platform services with the introduction of free spatial information services
- Service channel is compiled into one to make it convenient for users anytime, anywhere





Aug. 2016

- Upgraded the national information platform
- 6 additional systems are incorporated, including the national online map and evaluation of measurement tool performance
- Improved services for aerial photogrammetry and wholesale services for old version maps (Offline → online)



Apr. 2017

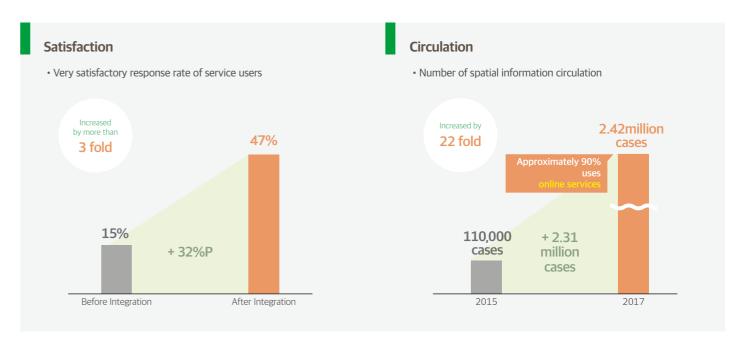
- Opening of the services to the public for free, including aerial photogrammetry services
- One-stop services including services for aerial photogrammetry, digital topographic maps and paper maps converted into online format
- Offline for 2~3 days → 5 minutes online



Aug. 2017

- Improved quality for the national land information platform
- Improved accuracy, convenience and advanced management of the geographical system based on the matrix information from 2014

ACHIEVEMENT · Spatial Information Services and Land Information Platform that Benefits Citizens



International Activities on Geographical Names

BACKGROUND · Raising Awareness in the International Community of Correct Geographical Names

- Participation in International Geographical Name Conference* to encourage the correct use of place names to minimize disputes and confusion over names
- * The standardization meeting (UNCSGN, 1967) is held every 5 years by the representatives of the governments of each country, and a special meeting of experts(UNGEGN, 1975) is held every two years to provide technical support to the General Assembly

PROCESS · Promoting Beautiful Korean Names in the World





■ Joined United Nations Group of Experts on Geographical Names(UNGEGN)

Feb. 1979



Joined United Nations Conference on the Standardization of **Geographical Names** (UNCSGN)



Study and analysis of the United Nations Resolutions resulting from the Conference on Standard Geographical Names



2009 ~ 2010

Analysis of geographical names system and study of an improvement plan (establishment of a resolution DB and related services)



2011 ~ 2012

Publication of a guideline on how to use correct Korean geographical names, to be submitted to the UN(production of guidelines)



Republic of Korea in 1982

East sea in 1992

2012 ~ 2013

Survey on geographical names of international interest and study on measures to address global issues related to geographical names (analysis and evaluation of the paper from the 10th General Conference)



Study on preparation of measures to respond to moves taken by the UN Conference on **Geographical Names** (e.g. Organization of domestic academic conferences)



2015

Publication of Correct **Geographical Names** and Understanding of Korean Geographical Names(2nd edition of International Guidelines on Geographical Names)



Strategic studies on reinforcing activities related to international activities related to geographical names (publication and distribution of book on Korean geographical names)



2017

Study on measures to respond to the decisions made by **UN General Assembly** (translation of 207 **UNCSGN** resolutions)



Toponymic guidelines for international use version 2(brochure distributred at the 29th General Conference)



tred at the 29th General Conference



(Korea served as speaker for the Agenda Item 7 discussion

ACHIEVEMENT · Beautiful Geographical Names in the Map Draw in Interest and Attention from the World

Love for the nation's land in our hearts; Spatial information that makes our lives more convenient

Working Paper

Standardization of Geographic Names

Geographical Names



Role for national geographical information



Cooperation with local governments

A total of 82 cases were submitted



geographical names(11th UN Conference on

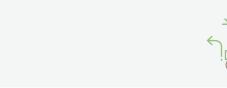
Resolution

· As for the resolution passed when the UN Conference was held, the database was established in 2009



PR Activities

• Promote the standardization activities of geographical names through the promotion of international guidelines on geographical names, band names, and tactile maps published as recommended by the UN General Assembly



Publication of the National Atlas of Korea

BACKGROUND · A Powerful Way to Tell the Exact Status of Our Country

- With the official marking of the "East Sea" in the World Atlas in 2002, correct geographic names, including the correct usage of the name "Dokdo" became both a domestic and international issue of importance
- The need to publish national maps with the latest information and data on land, accurate markings of borders and geographical names was raised. The National Atlas Commission of the International Geographical Union thus recommended that each country produce a national atlas
- The National Atlas of Korea was published, compiling economic, social, cultural and demographic statistics related to the territory of the country and its people in both chart and map formats

PROCESS · The National Atlas of Korea that Can Offer Useful Data to Those of All Ages and Nationalities

he National Atlas of Korea was



Apr. 2005

Regarding East Sea and Dokdo, the National Assembly published a list of questions to be posed to the government, urging the government to produce a map book

Established a plan to publish the National Atlas of Korea(under guidelines of the

Minister)



2006 ~ 2007

The National Atlas of Korea was published and distributed(1,500 copies each)





2008 ~ 2009

English-language version of the National Atlas of Korea was published and distributed (20,000 copies)



Conducted an outsourced base study to publish a renewed version of the National Atlas of Korea



Dec. 2013

Established mid-long term plan to publish the National Atlas of Korea(under the head of NGII's guidelines)



2014

Published and distributed a volume on territory and history (1 volume) of the National Atlas of Korea (500 copies in Korean and 1,000 copies in English)



2015

Online services were launched for the National Atlas of Korea (http://nationalatlas. ngii.go.kr)



2015 ~ 2016

Published and distributed two volumes on nature and three volumes on humanities and civilization for the National Atlas of Korea (500 copies in Korean, 1,000 copies in English)



Dec. 2017

Published and distributed versions of the National Atlas of Korea for elementary and middle schools (Korean/English version)

Book of National Atlas of Korea provided online

ACHIEVEMENT · Capturing the Eyes of the World at World Map Conferences 2017





that use intuitive and easy-to-understand techniques and statistics

Demand of the World

Love for the nation's land in our hearts; Spatial information that makes our lives more

Benefits of Publication in English



and Usage in Educationa

Establishment of the African Mineral Geoscience Initiative (AMGI)

BACKGROUND · Let's Prevail the Advantage of Resource Competition with Domestic Spatial Information Technology

- An urgent need to expand the market size for spatial information by going overseas and developing new business model arised, since creation of new domestic market reached the breaking point
- Participation in the AMGI pilot project to promote the excellence of Korean spatial information technology and to gain foothold in the market for eventual expansion into the larger African market
- * African Mineral Geoscience Initiative: Adding mineral seoscience resource information to digital topographic maps as a resource utilization plan for Africa, building spatial information that can be used for national development and resource exploration

PROCESS · Spatial Information Korean Wave Begins in Africa



Jul. 2014

World Bank's Africa resource spatial information project



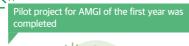
Dec. 2016

- MOU on cooperation on Korea-Zambia geoscience spatial information and promotion of the 4th Korea-Africa forum linkage
- Attend the first technological workshop for the establishment of AMGI



Jan, 2015

- Request to participate National
 Geographic Information Institute from UN
- Introduction of the African project through the UN ambassador associated with the Ministry of Foreign Affairs





Feb. 2017

1st year Establishment of AMGI pilot project



Mar. 2015

UN-World Bank visit and meeting with experts



May 2017

 Establishment of a long-term plan for AMGI(guidelines issued by the Vice Minister of Land, Transport and Maritime Affairs)



Apr. 2015

Request to participate National Geographic Information Institute from African Union



Jul. 2017

2nd year Launched the AMGI pilot project



Oct, 2015

Ministry of Land, Infrastructure and Transport's new project for 2016 ODA is confirmed



May 2016

1st AMGI project in Zambia launched



Aug. 2017

Participation in the 2nd technological workshop and consultation with Tanzania in target area in 2018



Sep. 2017

Attendance of the first Korea-AU
Policy Council in accordance with the
results from the Korea-Africa forum

ACHIEVEMENT · Launching a Trust Roadmap in Africa ODA Competition

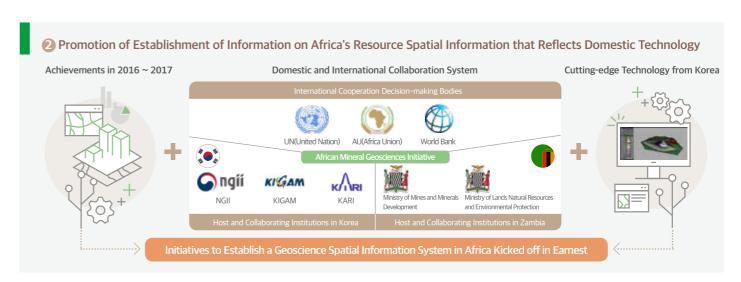
NGII has been continuously implementing MOLIT's ODA Projects(2016 ~ 2020)

- Ministry of Foreign Affairs and Ministry of Strategy and Finance recognized the feasibility and effectiveness of the establishment of spatial information on African geoscience
- Establishment of a Plan to Build AMGI through Pilot Project









National Geographic Information Institute Achievement Report

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