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ANNUAL REPORT 2013

KOREA METEOROLOGICAL ADMINISTRATION

KMA

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03 ACTIVITIES

MESSAGE FROM ADMINISTRATOR

It is my great pleasure and honor to present to you the 2013 Annual Report of the Korea Meteorological Administration (KMA) which highlights a variety of major events, activities, projects conducted in 2013. Looking back, the year of 2013 left me a memory of unprecedentedly long period of Jangma (Korean monsoon) which lasted from June to August. This long Jangma was also called as 'reverse Jangma', because it began from middle part of the nation, whereas it normally starts from Jeju Island.

The extreme weather events and its large-scale impacts caused by climate change become a new risky factor when it comes to national security and competitiveness. In this respect, the KMA extended the duration of its medium-range forecast from 7 days to 10 days and specified the interval for precipitation forecast by every 6 hour with aims to reduce weather-related damage as well as to increase the convenience for the public, while supporting the decision-making process for many sectors, including energy and agriculture. The Administration has also exerted its efforts to enhance the service delivery by providing text messages of health and weather information for the vulnerable as well as automatic alarms of weather warnings and app services for earthquakes and marine weather through smart phones.

Furthermore, the climate change monitoring system was established nationwide ranging from Anmyeon-do and Jeju-do to Ulleung-do and Dok-do to reinforce the capability to deal with and to adapt to climate change, while expanding its applied information service based on the national standard climate change scenarios.

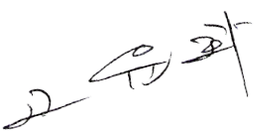
The meteorological technology such as numerical prediction and remote-sensing has been steadily developed thanks to the interests and supports from the public. The development of source technology for Korea's own numerical forecast model is planned to be completed by 2016. The so-called Smart Forecasting System that integrates the overall process of forecast production will continue to advance. Based on this technological capacity, the KMA plans to transfer its meteorological technology to developing nations, including Vietnam, Mongolia, and Africa though dispatching meteorological advisors.
In January, 2013 Dr. Park, Chung-Kyu, a former

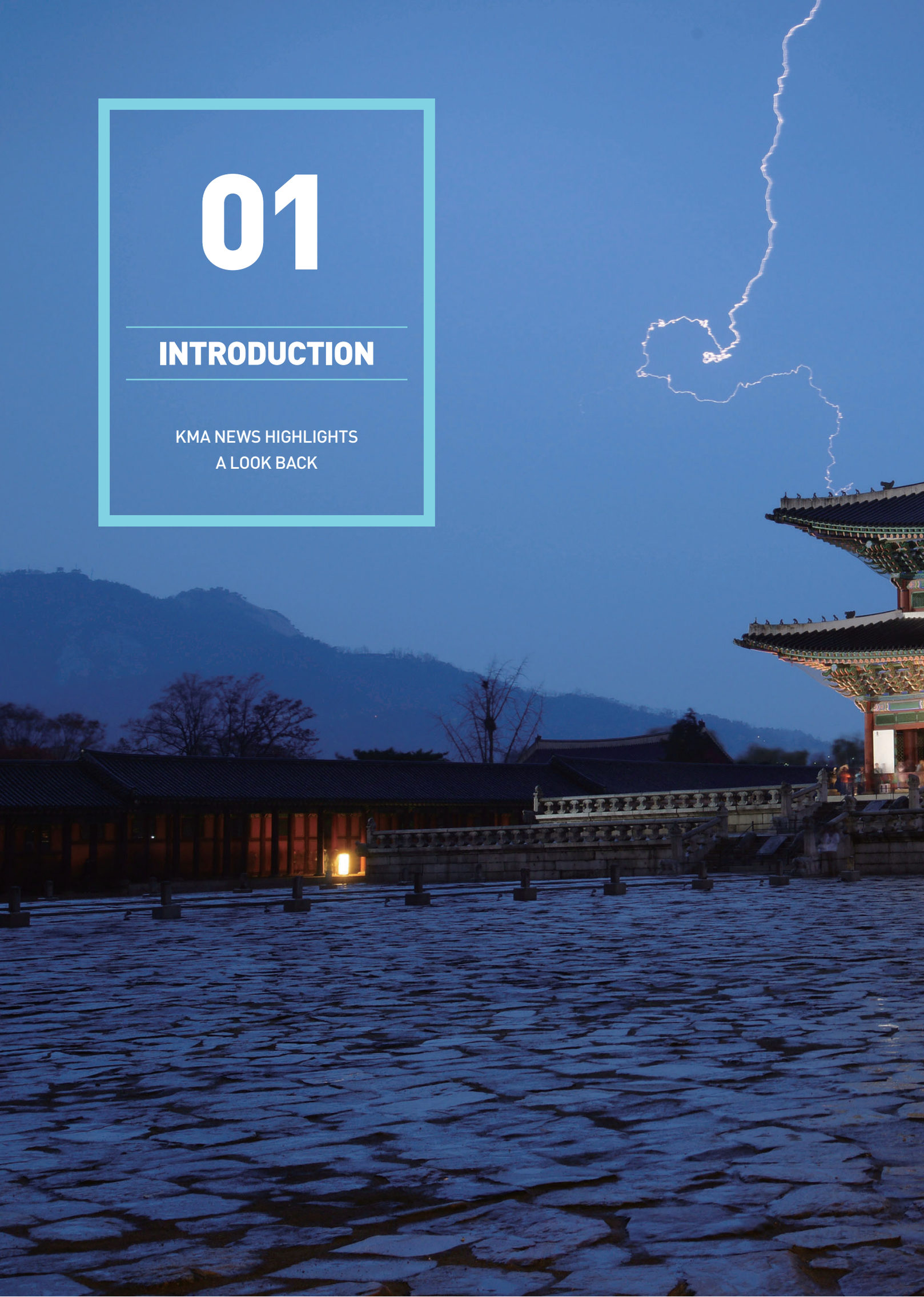
Director-General of Planning and Coordination Bureau of the KMA was appointed as a Director of the Regional Office for Asia and the South-West Pacific of the World Meteorological Organization of the United Nations. This marks the first-ever event in which the KMA personnel entered into an international organization as a high-ranking officer in the history of the Administration since its establishment in 1948. In addition, the WMO designated KMA as Global Information System Centre Seoul. With the function of GISC, the KMA now can play a role as a hub of global weather and climate data, which I believe it enables it to contribute to the prevention of disasters.

As Big Data, weather data now serves as critical information in decision-making not only for weather forecasts but also for a variety of governmental policies such as water and energy management. The value of weather data glows in almost all disciplines, ranging from disaster prevention, crop and animal husbandry, tourism, transport, environment, national defense, health, to many more industries, influencing individuals, enterprises, and countries. This is why the KMA does not spare any efforts in providing the weather and climate services that can satisfy the public, while protecting and ensuring the safety and happiness of our people.

I hope that this annual report will serve as a useful reference not only for the governmental agencies across the globe but also for those who want to know more about and offer advice to the KMA. Thank you.

KO YUNHWA
Administrator
Korea Meteorological Administration





01

INTRODUCTION

KMA NEWS HIGHLIGHTS
A LOOK BACK

KMA NEWS HIGHLIGHTS

Public service of 10-day forecast (trial)

The KMA reorganized its forecasting services to better and promptly respond to HIWs and to improve convenience for the public by extending its existing 7-day (weekly) forecast to 10-day (medium-range). The duration of KMA's medium-range forecast has been consistently extended from 5 days to 7 and to current 10 days, while specifying the forecasting districts as well as adding more elements such as precipitation, sky condition, temperature, etc. Due to the growing public demand on detailed weather information caused by improved quality of life as well as leisure activities, it is expected that the use of 10-day forecast will be of a great help for many people in Korea.

Launch of 10-day forecast

National Institute of Meteorological Research moved its office to Jeju with International Coordination Office

The National Institute of Meteorological Research built its new office building in Jeju island and had its opening ceremony in March. In addition to this new launch, the International Coordination Office that aims to coordinate Subseasonal to Seasonal Prediction (S2S) began its work in the new NIMR office building. It will not only support and coordinate international joint research activities related to 2-month long-range prediction but also assist a variety of cooperation with other international programmes.

L New office building of NIMR
R Launch of ICO

A series of earthquakes in West Sea

It is fair to say that the year of 2013 showed the most exceptional cases in the history of earthquake activities in Korea. Total 29 earthquakes were detected, which brought up huge public interests. In this regard, the KMA began a research work titled with 「Investigation on the characteristics of seismotectonic structure and fault activities in West Sea」. This research result will serve as a very critical material to see dynamic relationships between the earthquakes occurred in West Sea as well as to estimate the potential maximum scale of earthquakes.

First-ever WMO high-ranking officer

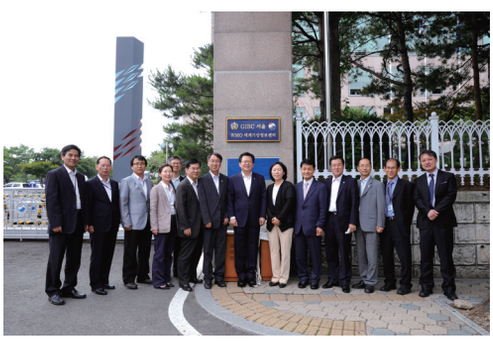
In January, former Director-General of Planning and Coordination Bureau of the KMA, Dr. Chung Kyu PARK was selected as a Director of the Regional Office for Asia and the South-West Pacific (RAP) of the World Meteorological Organization (WMO) of the United Nations. He lodged the application in March 2012 for this position and was finally chosen in December among about 80 applicants. This marks the first-ever event in which the KMA personnel entered into an international organization as a high-ranking officer in the history of the KMA since its establishment in 1948. Dr. Park supervises the coordination, execution, and implementation of a variety of cooperation projects in the field of weather and climate in Asia and South-West Pacific Region to which 58 Member States (30%) belong among total 191 WMO Members.

Former and Current Directors of RAP (Right: Dr. Park)

KMA NEWS HIGHLIGHTS

Launch of Global Information System Centre Seoul

The Global Information System Centre Seoul (GISC Seoul) that distributes and manages the global weather data opened in the KMA on June 13. GISC Seoul, launched as the 6th Global Information System Centre approved by the WMO, is the top entity of the world weather telecommunication network. With launch of this, the KMA is now able to directly distribute the global weather information which used to be provided via Japan and China. Through the web portal of GISC Seoul (http://gisc.kma.go.kr), all dispersed data will be integrated and shared, with a help-desk in full operation to assist various users in applying weather data.



LR Launch of GISC Seoul

LR Website of GISC Seoul

Longest Jangma (Korean Monsoon) recorded

In 2013 Jangma began from the middle part of South Korea on June 17 and ended on August 4 (southern part: 6/18~8/2, Jeju: 6/18~7/26). This period of Jangma was longer than the average (32 days) by 17 days in the middle part and by 14 days in southern part. In case of Jeju, the duration was 7 days longer than the average.

	2013			Average years		
	Bejin	End	Duration	Begin	Begin	Duration
Middle	6.17	8.4	49(days)	6.24~25	7.24~25	32
Southern	6.18	8.4	49(days)	6.23	7.23~24	32
Jeju	6.18	7.26	39	6.19~20	7.20~21	32

Date when Jangma began and ended in 2013 and average years (1981~2010)

One more exceptional phenomena was that Jangma began from the middle part of the country, whereas it used to start from Jeju, thus this time it was called 'reverse Jangma'. This was because the Jangma front was activated in Bohai Bay and moved southward due to the upper trough approaching from northwest, which made Jangma begin from the middle part of the nation. The last time this was observed was 32 years ago in 1981. During the Jangma period, the average precipitation amount in the middle part was 526.4㎜ (average: 366.4㎜), while southern part and jeju showed 318.9㎜ and 115.3㎜, respectively (average: 348.6㎜and 398.6㎜).

***Entire country: Average of 47 sites (19 from middle, 26 from south, and 2 from Jeju)**

	2013		Average years	
	Duration	Average prep.(㎜)	Duration	Average prep.(㎜)
Middle	30.2(days)	526.4	17.2	366.4
Southern	19.9	318.9	17.1	348.6
Jeju	14	115.3	18.3	398.6
Entire	23.8	394.1	17.2	357.9

Duration of Jangma and average precipitation in 2013 and average years (1981~2010)

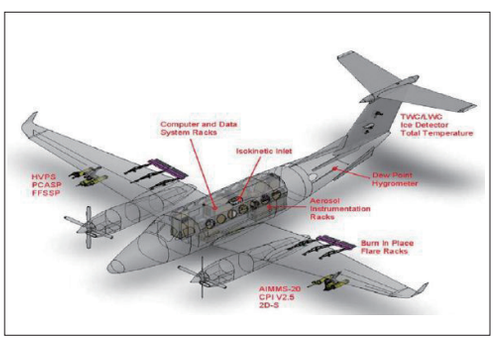
Weather support for Pyeongchang Special Winter Olympic Games

The KMA organized a task-force team in 2011 to prepare for the successful 2013 Pyeongchang Special Winter Olympic Games, while signing on the MoU with the Organizing Committee in June 2012. During the Olympic Games ('13.1.26~2.6), the KMA dispatched 4 senior forecasters to provide specific weather information for the venues and nearby areas, and installed 66 observing equipments with two weather observing vehicles. It also developed a high-resolution numerical prediction model for detailed forecasts for major venues (e.g., alpine ski), while providing specific weather services through specialized web-site, DID (Digital Information Display) touch screen, sign board, SMS, and mobile web for operators, athletes, coaches, and visitors.

KMA NEWS HIGHLIGHTS

L On-site support
R Website to provide special information

In addition, the KMA concluded a contract to purchase a multi-purpose weather air craft (King Air 350HW) by 2015. It will be in operation for early detection of HIW, air-quality measurement, weather modification, and weather support for 2018 Pyeongchang Winter Olympic Games from 2016.



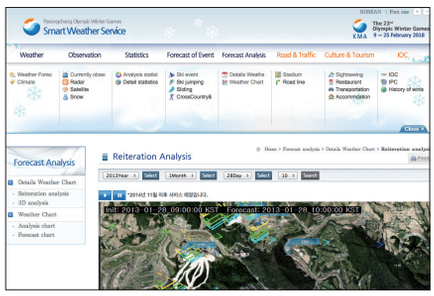
L Air craft
R Height: 4.37m, Length: 14.22m, Width: 17.65m

A LOOK BACK

New member of JSC for WCRP Elected (1 January)

WMO Secretariat elected Prof. In-sik Kang of Seoul National University as a new member of Joint Science Committee (JSC) for World Climate Research Programme (WCRP). A committee member of JSC has to be nominated by three organizations (ICSU, IOC of UNESCO, WMO) as well as renowned scholars in climate-related areas such as atmospheric, oceanographic, hydrological and polar science studies. Prof. Kang began his role as a committee member on 1 Jan. 2013 which will last for four years until Dec. 2016.

Weather Services for the Special Olympics World Winter Games Pyeong Chang 2013 (29 January - 5 February, Pyeong Chang, Korea)

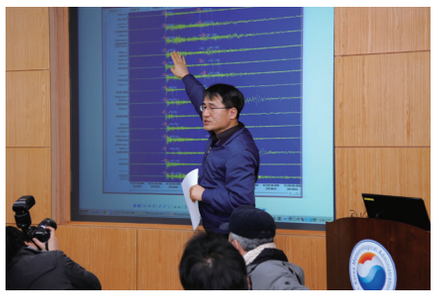


The Special Olympic Games, a world sport event for athletes with intellectual disabilities was held in PyeongChang, Korea on 29 January-5 February. KMA promoted safety and convenience for athletes, organizers and spectators by providing weather forecasts and detailed weather information including visibility, wind direction, wind speed and temperature in and around sports venues during the Games. Based on this service for the Special Olympics, KMA will extend its full support to weather service for the PyeongChang 2018 Olympic Winter Games.

Launch of Weavigation Service (1 February, Seoul, Korea)

Weavigation Service led by KMA started on 1 Feb. with joint participation of KBS (Korea Broadcasting System) and HYUNDAI MnSOFT. Weavigation Service is KMA's major future-oriented weather service combining weather and navigation. It provides drivers with information on weather conditions and changes of drivers' current location, driving paths and areas to arrive in 1-2 hours in real time. The service aims to ensure safety and convenience of drivers from severe weather events such as torrential rains, heavy snows and fogs.

Artificial Earthquake Detected in Hamkyeongbuk-do, North Korea (12 February, Seoul, Korea)



On 12 Feb 2013, 11:57, a 4.9 magnitude artificial earthquake was detected in Hamkyeongbuk-do (41.28°N, 129.06°E), a northeastern province of North Korea by a nearby observatory. After analyzing the seismic event to decide whether it was artificial or natural, KMA confirmed that it was artificial one caused by a large-scale explosion. According to the Comprehensive Nuclear-Test Ban Treaty Organization (CTBTO), 96 observatories under International Monitoring System (IMS) around the world picked up the artificial seismic indication resulted from the 3rd nuclear test in North Korea.

A LOOK BACK

Dr. Kenneth Crawford, Farewell to KMA after Successful Tenure (28 February, Seoul, Korea)

KMA held a leave ceremony for Dr. Kenneth Crawford, Vice-Administrator and Chief of the Meteorological Advancement Office on 28 Feb. to celebrate his contribution to KMA during 3 years and 8 months of his tenure. KMA appointed Prof. Kenneth Crawford of Oklahoma University, a U.S. meteorological authority, to head the advancement of Korea's meteorological affairs in August 2009. Dr. Crawford has suggested advanced paradigm for KMA based on precise understanding of KMA's present forecasting capability, observation techniques and weather services. He has made great contribution to Korea's meteorological advancement by providing and executing a roadmap for (Top 12 issues facing the KMA) which includes cross-ministerial and integrated radar operations; advancement of weather forecasting system; high-quality integrated observation network; and service system for national climate data center.

DMH Myanma Delegation's Visit to KMA (31 January, Seoul, Korea)

Delegation from the Department of Meteorology and Hydrology of Myanmar visited KMA to observe advanced meteorological technology in observation/communication/forecasting and to discuss ways to enhance cooperation. KMA currently offers consulting service for modernization of meteorological service in Myanmar and has made a great progress.

Dr. Chung-kyu Park, Appointed a New RAP Director of WMO (1 March)

Dr. Chung-kyu Park, former director-general of KMA started his mission as director of RAP (Regional Office for Asia and the South-West Pacific) at the World Meteorological Organization as of 1 March 2013. Dr. Park will be responsible for a wide range of weather/climate cooperative projects in Asia and the South-West Pacific regions with 58 WMO members. He is expected to contribute to strengthening capacity in dealing with climate change of developing countries.

Capacity Building on Radar Operations and Data Applications (4-15 March, Seoul, Korea)

The KMA invited 19 experts from NMHSs of Asian and African developing countries to Training Course on Radar Operations and Data Applications for two weeks from 4 to 15 March. The program of the course was composed of four sessions: weather radar observation and operation techniques; purchase and installation of weather radar instruments; data generation and analysis session; and data application and development technology. The training course aimed at building capacity for radar operation and early response against severe weather conditions.

Inauguration of New KMA Administrator (18 March, Seoul, Korea)

On 18 March, Mr. LEE Ilsoo, former Vice Administrator of the KMA took office as the 10th head of the KMA. In his inauguration speech, he stressed, "Protecting life and property of the public is the primary mission of the KMA, and the KMA should serve as a foundation to promote a creative economy and the happiness of the public." He also mentioned the importance of co-prosperity through effective communication and cooperation within the Administration and with partner organizations home and abroad. Administrator LEE had been committed to a variety of international activities in bilateral and multilateral cooperation throughout his career. He is expected to carry on his legacy as administrator based on his flexible thinking and competent leadership.

World Meteorological Day Commemorated in Seoul (21 March, Seoul, Korea)

The KMA held a number of commemorating events for the World Meteorological Day on 21 March, such as international cooperation forum, weather and climate photo exhibition, weather equipment display, cultural events and the KMA headquarters tour etc. The commemorating ceremony took place in the KMA headquarters with about 350 guests, including Minister of the Environment, legislators, dignitaries, retirees, partner agencies' representatives, etc.

A LOOK BACK

The 4th Bilateral Meeting between Korea and the Philippines (27 March, Seoul, Korea)

The KMA welcomed four delegates from the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) for the 4th bilateral meeting on meteorological cooperation held on 27 March. Delegates from both administrations dealt with agenda for collaboration, and signed and exchanged the agreed minute. The two administrations reached an consensus on cooperation and support for a range of projects including on COMS data receiving and analysis system, capacity building, radar operations and applications, and consultation on modernization of meteorological services.

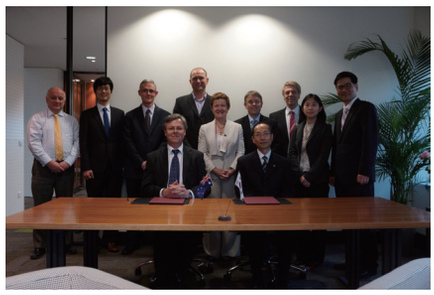
New Service to Support Global Aviation Meteorology (1 April, Incheon, Korea)

The Korea Aviation Meteorological Agency (KAMA) launched the 'Global Aviation Meteorological Service (global.kama.go.kr or flight.kama.go.kr)' on 1 April to support the operations of Korean and foreign airliners operating in Korea.
The service provides member companies with a wide range of real-time information such as area forecasts, weather for flight, airport weather and High Impact Weather (HIW). Seven Korean airliners including Korean Air and Asiana Airlines are the first beneficiaries of the service and the membership will be gradually expanded to foreign airlines flying to Korea.

Appointment of New Vice Administrator (12 April, Seoul, Korea)

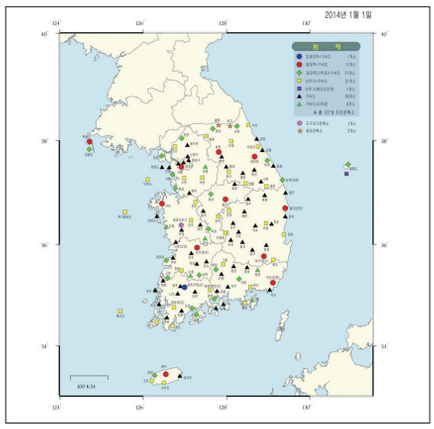
Ms. CHO Jooyoung, Director General of Planning and Coordination Bureau was newly appointed as Vice Administrator of the KMA as of 12 April. Ms. CHO served as the first-ever female forecaster and Director General, and now became the Vice Administrator. She has successfully completed KMA's major projects such as enhancement of NWP system and introduction of digital forecasts and the 3rd supercomputer. It is expected that her rich experience in meteorology will contribute to enhancing work efficiency as well as communication and cooperation inside and outside the Administration.

The 7th Bilateral Meeting between Korea and Australia (23 April, Seoul, Korea)



Korea and Australia have held a regular bilateral meeting for meteorological cooperation every two years since 1996 when both signed an MoU. The KMA delegation visited Bureau of Meteorology (BoM) to attend the 7th bilateral meeting from 21 to 25 April. The two meteorological bodies discussed and reached a consensus on collaboration in NWP data application, climate prediction, WMO Information System, and technology exchange for marine weather and aviation weather service. It is expected that various cooperative activities including joint research will be carried out to implement agenda discussed during the meeting.

Web Service for Comprehensive National Earthquake Information (1 May, Seoul, Korea)



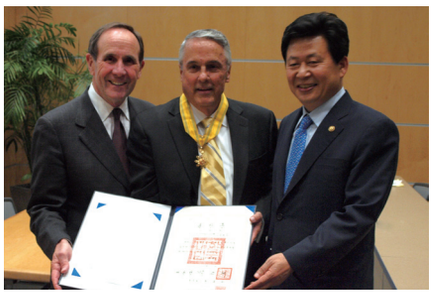
The KMA launched the Web Service for Comprehensive National Earthquake Information on 1 May. The service provides government, academia, research institutes and private earthquake experts with a range of earthquake information including real-time earthquake waves, historical data, past analogue and digital observation data, and environment data of earthquake observatory. The administration will extend the scope of the service in quantity and quality from earthquake data to geophysical information so that such data will be used for various areas such as national security, disaster safety and creative economy. The KMA also has a plan to lay the foundation to support 10 ASEAN countries as well as other developing countries by expanding this service in the future.

TEMM Environment Award (6 May, Kitakyushu, Japan)

The TEMM Environment Awards were conferred on 6 May at the annual 15th Tripartite Environment Ministers Meeting (TEMM) among Korea, China and Japan held in Kitakyushu, Japan. The TEMM Environment Awards are presented to those who made outstanding contributions to Korea-China-Japan environmental cooperation. This years honor went to Dr. CHUN Youngsin of the National Institute of Meteorological Research who has been devoted to addressing the dust and sandstorm issue. As this issue like other environmental issues requires close cooperation across the borders, receiving TEMM Environment award is viewed to carry grave meaning.

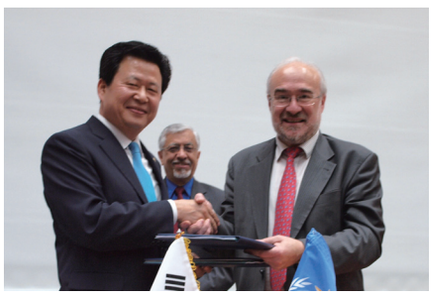
A LOOK BACK

Dongbaek Medal Award Ceremony for Dr. Ken Crawford (13 May, Oklahoma, USA)



Lee Ilsoo, administrator of the KMA paid a visit to the University of Oklahoma on 13 May to present the Dongbaek Medal Award to Dr. Ken Crawford, former vice administrator of the KMA who made great contribution to the advancement of weather service in Korea. Dr. Crawford served for about 42 months as the first foreign public official in Korea. During his service, he set up strategies to advance the capability of the KMA and was committed to establishing a cross-governmental, integrated radar network. To honor such contribution, the administrator of the KMA awarded the Dongbaek Medal to Dr. Crawford on behalf of the President of Republic of Korea.

MoU on the Establishment of ICO for S2S (16 May, Geneva, Switzerland)



The KMA and WMO signed an MoU on the establishment of the Sub-seasonal to Seasonal Prediction Project (S2S) International Coordination Office (ICO). ICO will be based at the National Institute of Meteorological Research which will move this year to Seogwipo, Jeju. ICO will coordinate the planning and implementing of international joint research to enhance capacity for S2S providing scientific, technical, administrative support and assisting cooperation with other international programs. It is expected that the KMA will play a significant role as a lead research center in the long-term predication area by hosting S2S ICO.

Weather Meets Fashion (31 May, Seoul, Korea)

The KMA held a cultural event of weather fashion show under the theme of "Weather, Blossoming into the Flower of Fashion." The fashion show was well-received as it showed off apparels with a variety of colors and materials which symbolized Korean climate with four distinct seasons. The administration is planning to develop and spread weather-related cultural contents in convergence with other areas.

Just Call Weatherman (31 May, Seoul, Korea)

The KMA produced a music video 'Weatherman', a parody of 'Gentleman' by PSY, a Korean singer, internationally known for his hit single 'Gangnam Style'. The music video reflects the wish of the KMA to let the public know the importance of meteorological information and enjoy safe and healthy summer by making full use of various meteorological information. If you want to check it out, visit

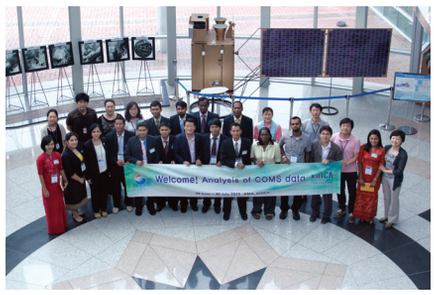
* http://www.youtube.com/watch?v=4wPlqe1Sa_0

Signing board Ceremony for GISC Seoul (13 June, Seoul, Korea)

GISC Seoul, the 6th hub of global meteorological information was endorsed at the 64th WMO Executive Council (in June 2012) and the KMA held the signing board ceremony at the headquarters on 13 June. GISC Seoul will be an opportunity for the KMA to contribute to international community as a hub of collecting and disseminating global weather/climate information.

Training on Analysis of COMS data (30 June~30 July, Jincheon, Korea)

From June 30 to July 30 (31 days), the KMA ran a training course, titled 「Training on Analysis of COMS data」 at the National Meteorological Satellite Center (NMSC) in Jincheon, Chungcheongbuk-do, targeting 15 staff members from NHMSs in Asia and Pacific. The course aimed at minimizing damages from natural disasters in the region by sharing application method, including the information on the current status of COMS operations and distribution policy of observation data. The KMA's commitment to the international community will continue by providing consistent and effective meteorological technology to developing countries.



The 4th KMA-EUMETSAT Bilateral Meeting (15 July, Jincheon, Korea)

The KMA and EUMETSAT held the "4th KMA-EUMETSAT Bilateral Meeting" at the National Meteorological Satellite Center (NMSC) on 15 July (Monday) to exchange satellite information and strengthen cooperation between the two. During the meeting, the two sides discussed how to exchange information on the current status of satellite development programme and the plan, share satellite data possessed by the EUMETSAT, and develop satellite data utilization technology in very-short range forecasts. In addition, they agreed to conduct joint research in the field of a number of satellite technology. To follow up the agreement, both institutions are planning to consecutively proceed a number of issues, such as technology exchange among working-level staff members, a joint workshop for satellite data utilization in forecasts and a forum for verifying satellite products.

A LOOK BACK

MoU between KMA and QCAA (29 July, Doha, Qatar)

The KMA signed an MoU on meteorological cooperation with the QCAA (State of Qatar Civil Aviation Authority) in Doha, Qatar on July 29 (Monday), making an agreement on exchanges of human resources to transfer meteorological technology of both institutions. More active exchanges between Korea and Qatar are expected.

The 2nd GISC Seoul Workshop (12~13 September, Gapyeong, Korea)

The KMA hosted 「The 2nd GISC Seoul International Worksrop」 in Gapyeong from 12 to 13 September to share operation technology needed to interchange meteorological data worldwide. At this workshop, the participants discussed provision policy on international meteorological data, exchange of international meteorological and climate data, data management system and the current status of the service. The KMA was able to endorse GISC, a hub of meteorological data, in June 2012. Based on that, it has now been able to collect and distribute global meteorological data in real time, and will provide active support for developing technology and policies on international meteorological information and communication.

Inauguration of New KMA Administrator (26 September, Seoul, Korea)

Dr. Ko Yunhwa was sworn in as the 11th Administrator of the KMA on 26 September (Thursday). During his inaugural speech, Dr. Ko said, "For the sake of the Government 3.0, I will make the KMA open to the public so that every citizen can easily access to the meteorological information for their daily lives and businesses. By doing so, I will help protect lives and properties of the public while facilitating economic activities." He also emphasized the importance of developing integrated meteorological information in cooperation with other governmental agencies, local governments and private sectors. His flexible thoughts and cool-headed leadership will guide the advanced KMA.

2013 KMA-WMO Training Workshop (13~24 October, Busan, Korea)

The KMA ran the 「2013 KMA-WMO Training Workshop」 in Busan from 13 to 24 October (12 days), targeting 10 staff members and researchers from 10 member countries. The workshop consisted of programmes that can be practically utilized in connection with research and operation when the participants go back to their home countries. During the event, they received professional level of training, such as advanced climate prediction method and application of high-quality climate prediction information. The KMA will continue to provide its support with practical meteorological technology to member countries while contributing to the growth of international community in cooperation with developed nations.

The Pilot Service on Medium-Range Forecast (15 October, Seoul, Korea)

From 15 October (Tuesday), the KMA added three days to its existing "weekly forecast" (from 7 to 10 days) and renamed it to "medium-range forecast". It provides the service twice a day (6 a.m. and 6 p.m.) on a trial base from 15 October. The service is available via KMA's website, mobile web and weather app. The pilot service is expected to bring benefits to public life and allow to respond to hazardous weather events preemptively.

Asia-Pacific GAW Workshop on Greenhouse Gases (24~25 October, Jeju, Korea)

The KMA held 「The 5th Asia-Pacific GAW Workshop on Greenhouse Gases」 at Ramada hotel in Jeju from 24 to 25 October (2 days) with 63 greenhouse gas experts from the WMO and Asia-Pacific. At the workshop, the participants shared the current status and information on greenhouse gas observation in Asia and Pacific, and introduced the latest research trend to help understand carbon cycle. This event is expected to help increase the use of greenhouse gas information and serve as a foundation to play a leading role in greenhouse gas observation based on the improved operations of the World Calibration Center (WCC) for SF6.

A LOOK BACK

Opening Ceremony of S2S ICO (5 November, Jeju, Korea)

By inviting 78 relevant parties from the WMO and NOAA, the KMA officially launched the International Coordination Office (ICO), which coordinates the international joint research to improve forecast capacity, in Seogwipo, Jeju.
The ICO was established for two-month long-range forecast, which will fill the gap between the conventional short- and medium-range forecast (up to 10 days) and climate prediction (more than three months). The ICO is expected to jump up to be the leading research institution in the world in long-range prediction with NIMR (National Institute of Meteorological Research), which will be relocated to Seogwipo, Jeju.

International Radar Workshop (5~7 November, Jeju, Korea)

The KMA held "the International Radar Workshop" in Jeju Special Self-Governing Province from 5 to 7 November (2 days), inviting 126 radar experts from home and abroad. The workshop was designed to share technology and raise awareness on the use of "Meteorological Radars" that play a big role in forecast, warning, water resources management and aircraft operations. The KMA expects the workshop to serve as an opportunity where the participants from government, industry and academia consider measures on how to use radar products effectively as well as how to continue their cooperation and communication.

Dr. Jae-Cheol Nam was elected as Vice-President of WMO CAS (22 November, Antalya, Turkey)

Dr. Jae-Cheol Nam was elected as Vice-President of Commission for Atmospheric Sciences (CAS) of the World Meteorological Organization (WMO) at its Session held in Turkey November 2013. He will actively play a role as Vice-President of CAS during the given term of 4 years.

The 6th Meeting of Working Group(Ⅰ) for Joint Research on Dust and Sand Storms among Mongolia, China, Korea and Japan (28~29 November, Incheon, Korea)

The KMA hosted "The 6th Meeting of Working Group (I) for Joint Research on Dust and Sand Storms among Mongolia, China, Korea and Japan" in Incheon from 28 to 29 November, inviting 25 yellow dust experts from the nations. The purpose of the meeting was to provide momentum for international joint research, such as intensive analysis on DSS case to improve the monitoring and prediction capacity. Through this event, the KMA looks forward to building a foundation for the international joint research in monitoring yellow dust and improving the prediction capacity as well as for the comprehensive prevention system in Asia.

The 12th KMA-CMA Bilateral Meeting (3~7 December, Beijing, China)

Under the leadership of the KMA's Administrator, the KMA delegation visited China to attend "The 12th KMA-CMA Bilateral Meeting" held by the Chinese Meteorological Administration (CMA). Since the meteorological cooperation agreement between the two began in 1994, the bilateral conference made them achieve tangible results, such as establishing joint observation network for dust and sand storms and sharing radar data. At this conference, both parties discussed measures on how to strengthen the technology sharing between regional weather stations in China and Korea, which have been implemented since 1998. Meanwhile, the 13th Meeting will be held in Korea in two years.

The 6th Asia Meteorological Partnerships and Cooperation Enhancement Workshop (17~20 December, Busan, Korea)

The KMA held "The 6th Asia Meteorological Partnerships and Cooperation Enhancement Workshop" in Busan from 17 to 20 December (4 days), inviting 25 working-level staff members from 8 Asian countries and Korea. The event aims at sharing the international cooperation strategy and the action plan with the participants from major partner nations in RA II and with the KMA's experts on international cooperation. The KMA hopes that the event serves as a venue to help cooperate and communicate among nations in northeast Asia.

02

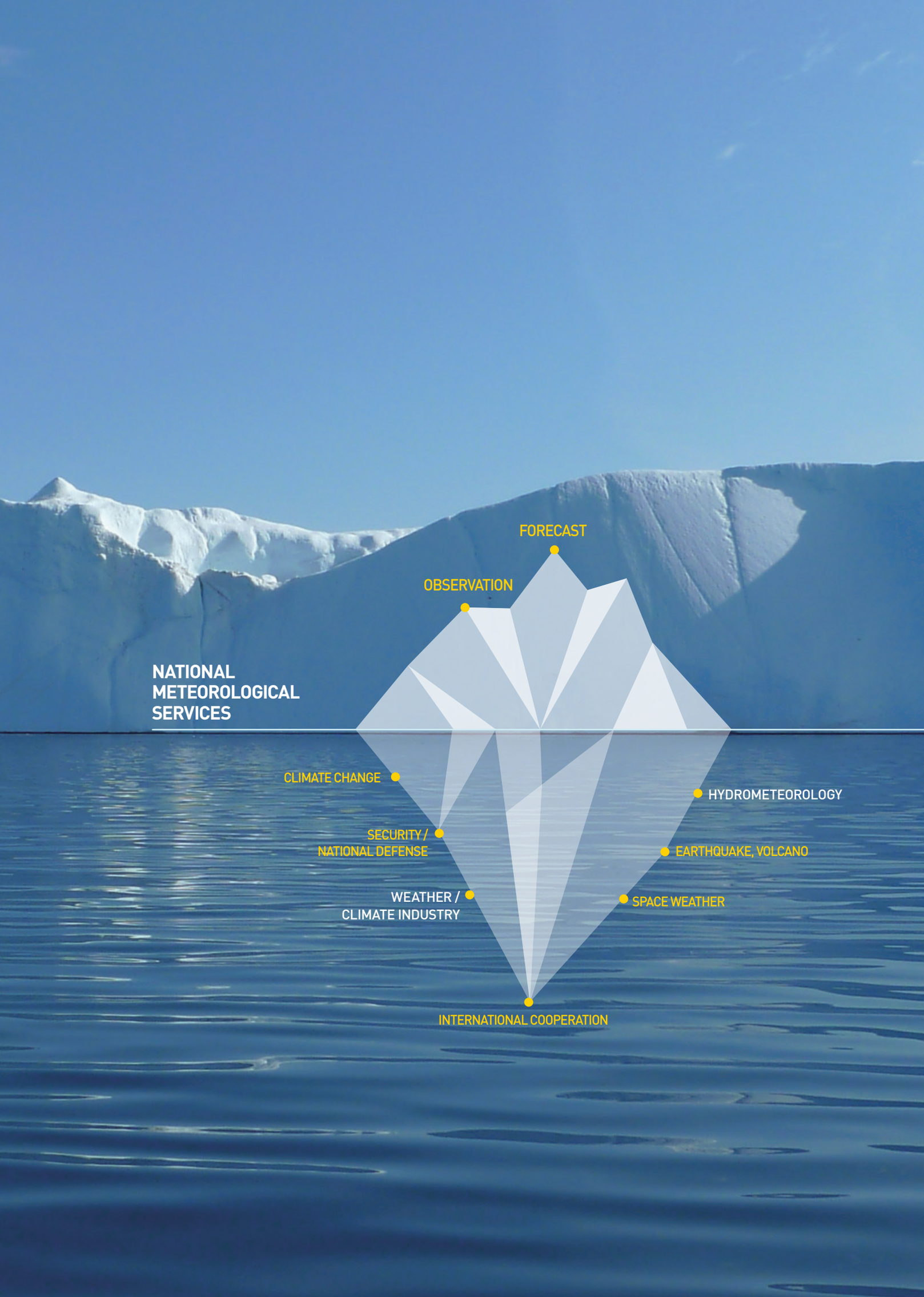
OVERVIEW

HISTORY

ORGANIZATION
- ORGANIZATIONAL STRUCTURE
- ROLES AND FUNCTIONS
- HUMAN RESOURCES
- BUDGET
- VISION & STRATEGY

WEATHER TREND IN 2013

THE PROCESS OF NATIONAL METEOROLOGICAL SERVICES


FORECAST
OBSERVATION
NATIONAL METEOROLOGICAL SERVICES
CLIMATE CHANGE
HYDROMETEOROLOGY
SECURITY / NATIONAL DEFENSE
EARTHQUAKE, VOLCANO
WEATHER / CLIMATE INDUSTRY
SPACE WEATHER
INTERNATIONAL COOPERATION

HISTORY

BC 35

THREE KINGDOMS PERIOD

BC 35
First records of weather patterns in 'Samguksagi' (Clouds, 3rd year of the King Dongmyeong of Goguryeo)

633
Installation of Cheomseongdae, the oldest astronomical observatory in the East (2nd year of Queen Seondoek of Silla)

기상	최초 기록
구름 (雲氣)	BC 35 고구려 동명성왕 3년
안개 (霧氣)	34 고구려 동명성왕 4년
천둥 (雷震)	16 백제 온조왕 3년
가뭄 (旱魃)	15 백제 온조왕 4년
눈 (大雪)	6 고구려 유리왕 14년
지진 (地震)	AD 2 고구려 유리왕 21년
서리 (霜氣)	10 백제 온조왕 28년
우박 (雹氣)	13 백제 온조왕 31년

1023

KORYO PERIOD

Early Koryo
Operation of Taebokgam and Taesaguk for acquisition

1023~1275
Taebokgam → Sacheondae → Sacheongam → Gwanhuseo → Sacheongam

1308
Sacheongam & Taesaguk → Merged as Seoungwan (34th year of King Chungnyul)

1441

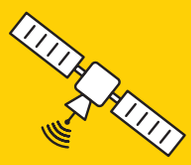
JOSEON PERIOD

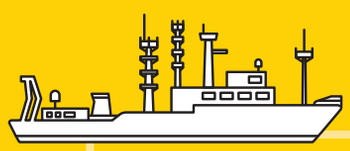
1441
Invention of the World's first rain gauge (23rd year of King Sejong)

1442
Establishment of a nationwide rainfall observation network (24th year of King Sejong)

1466
Name change from Seoungwan Gwansanggam (12th year of King Sejo)

1818
Publication of the meteorological and astronomical book 'Seoungwanji' (18th year of King Sunjo)





1949~

PRESENT

1949
Establishment of the Central Meteorological Office (CMO)
1956
Commencement of weather Observation by radar
1978
Establishment of the National Institute of Meteorological Research
1982
Name change to Central Weather Stations
1989
Commencement of weather observations at the South Pole Sejong Station
1990
Promotion to the Korea Meteorological Administration
2007
Entry into WMO Executive Council
2008
Establishment of the National Tyhoon Center, Commencement of Digital Weather Forecast Services
2009
Enactment of the Weather Industry Promotion Act, Establishment of the National Meteorological Satellite Center and the National Meteorological Super Computer Center
2010
Launch of Cheollian Satellite Establishment of the Meteorological Radar Center
2011
Service operation of Meteorological Observation Ship No.1
2012
Relocation of the office of Global Information System Center (GISC) to Seoul

1883

MODERN PERIOD

1883
Establishment of Joseon Maritime Customs (inch eon, Wonsan and Busan) The beginning of modern weather observation (20th year of King Gojong)

1894
Name changes from Gwansanggam → Gwansangguk (Meteorological observation Bureau)

1907
Residency-General Observatory (Incheon) and substations (Busan, Mokpo, Wonsan and Yongampo (Yongchen), Seongjin) Establishment of meteorological stations (Pyongyang, Daegu, Gyeongseong) by the Korean Empire Government

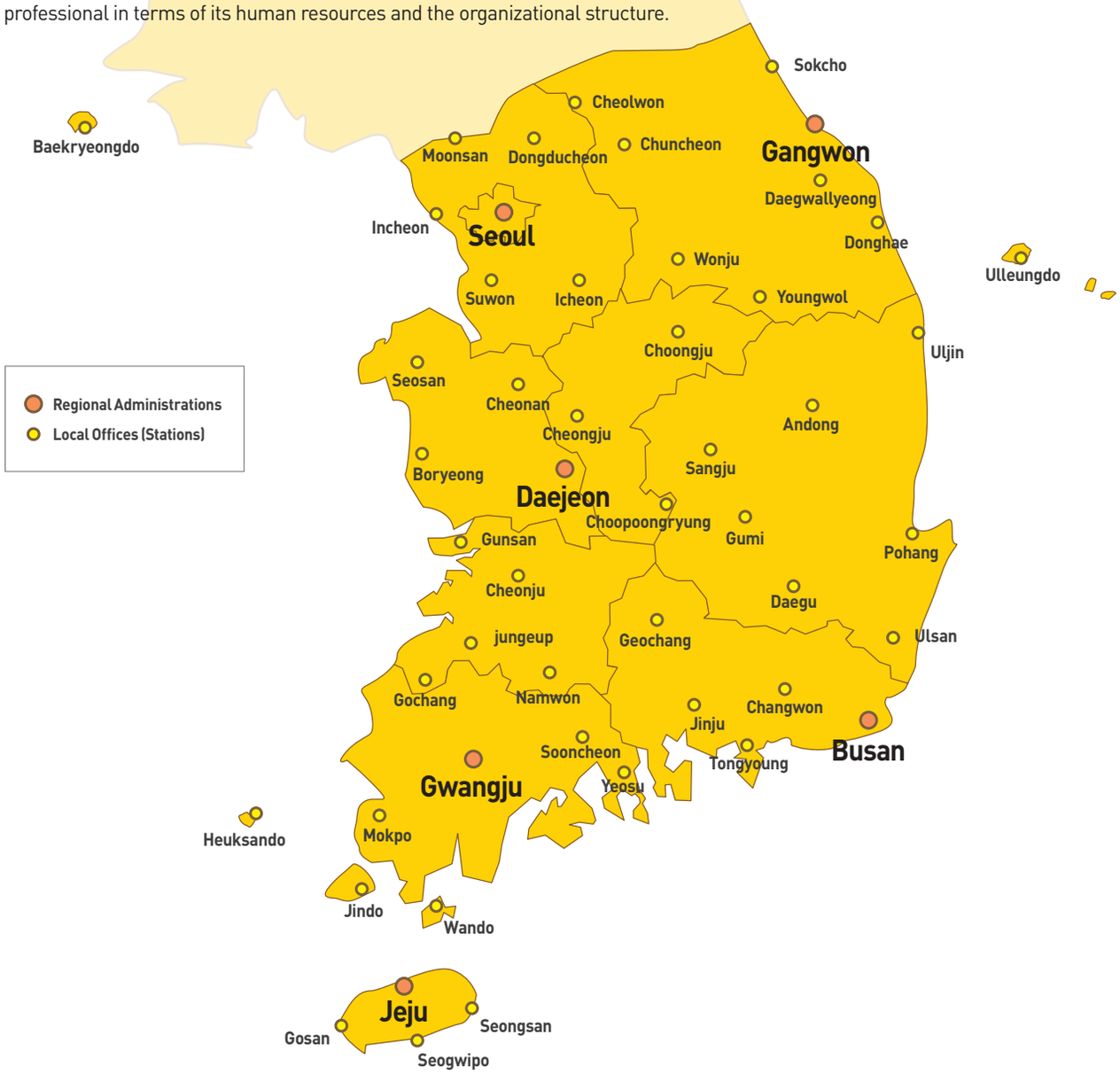
1910
Take-over of weather services of the Korean Empire Government by the meteorological observatories and stations of the Japanese Government-General of Korea

1945
Weather stations of the Japanese Government-General of Korea changed to Meteorological Observation Bureau (Ministry of Education) of the US army military government in Korea

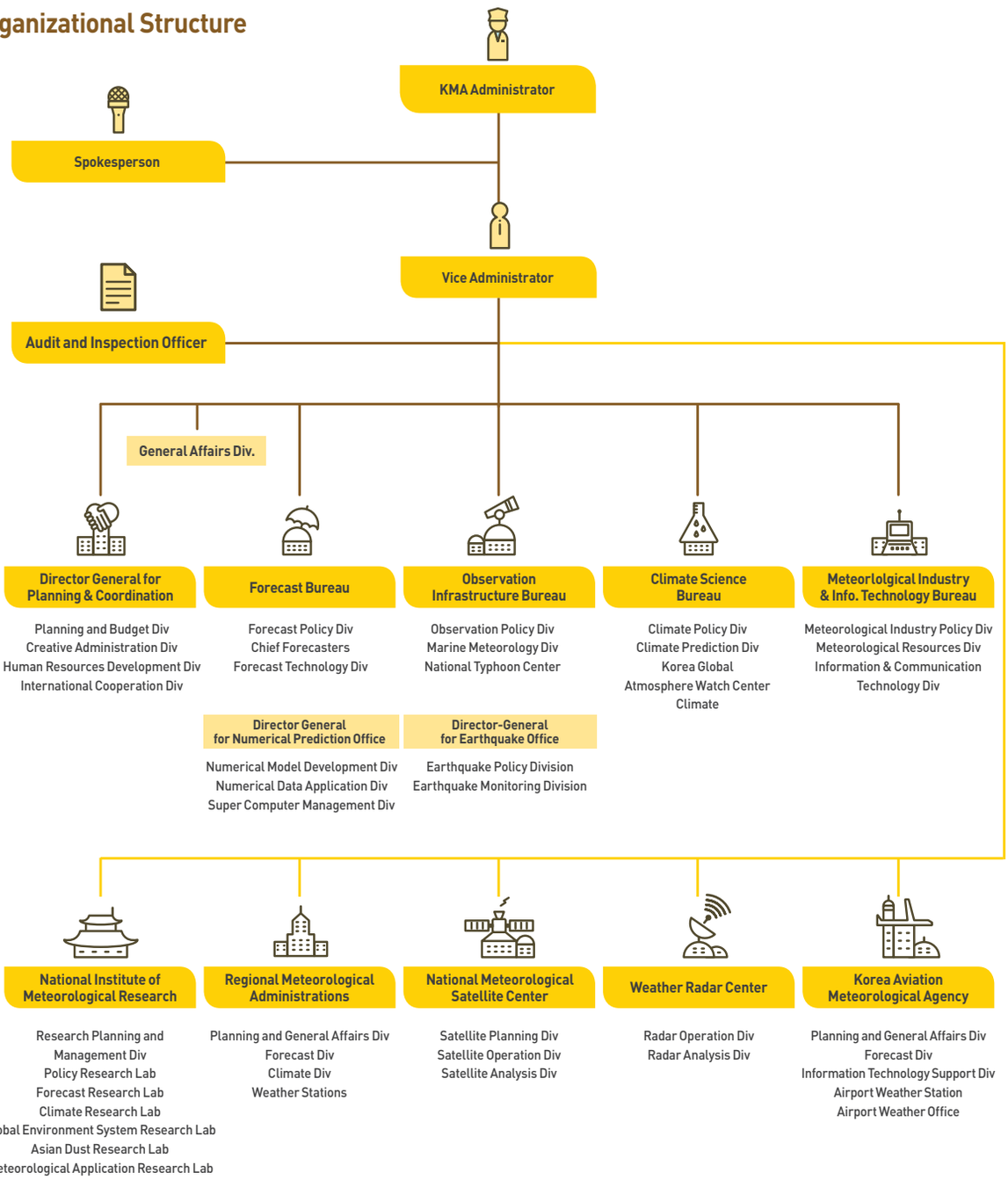
ORGANIZATION

Roles & Functions

The Korea Meteorological Administration (KMA) is a central governmental organization of the Republic of Korea under the Ministry of Environment (MOE). Its mission is to observe atmosphere, produce weather and climate information as well as forecasts, while conducting relevant research activities.
The KMA produces weather forecasts using a wide range of domestic observing data (surface, marine, satellite, radar, etc.) and those collected from countries around the world. With its principle mission of observation and forecast, the KMA is in charge of a variety of tasks, ranging from earthquake, volcanic eruption, climate change, meteorological and climate industry, hydrology to space weather.
In the era of climate change, the KMA is responsible for the national meteorological tasks to protect citizens' lives and properties, create future competitiveness and elevate the national standing in the global society.
The KMA consists of its headquarters in Seoul, five regional administrations in Busan, Gwangju, Gangwon, Daejeon and Jeju, 45 local offices, the National Institute of Meteorological Research (NIMR), the National Meteorological Satellite Center, the Weather Radar Center and the Korea Aviation Meteorological Agency. The KMA is striving for the highest standards to meet the growing demands for more complex and diversified meteorological tasks, while becoming more sophisticated and professional in terms of its human resources and the organizational structure.



Organizational Structure



Number of staff members

(As of 2013. 12. 31.)

Category	HQ	NIMR	Regional		NMSC	WRC	KAMA			Total
			Main(5)	Local(45)			Main	Station(4)	Office(8)	
Allowed	398	74	213	446	42	33	45	41	28	1,320
Current	393	73	214	432	43	34	45	42	26	1,302

ORGANIZATION

Human Resources

As the modern society has rapidly become more globalized as well as knowledge- and information-oriented, the demand for a variety of specialized meteorological services is increasingly on the rise. To sustain qualified workforce for highly advanced meteorological services, the KMA recruited those who have master's and Ph. D degree through a special employment, while hiring Grade 9 public officials in meteorological position to secure working-level workforce additionally. Breaking the newly employed into their tertiary educational background, four Doctors and six Masters were hired through a special employment, and 38 Grade 9 public officials were employed through the KMA's open recruitment. As of the end of 2013, there are 458 master's and doctor's degree holders (115 doctors and 343 masters), which accounts for 32.3% of the total number of staff members.

Number of qualified workforce (As of 2013.12.31)

Category	Degree	Year								
		Total	2013	2012	2011	2010	2009	2009	2007	2006
Special Recruitment	Ph. D	44	4	4	1	5	4	0	12	14
	Master	71	6	9	5	4	6	1	23	17
	Bachelor	17		4	2	2	0	1	2	6
	Total	132	10	17	8	11	10	2	37	37
Open Recruitment		300	38	46	39	30	2	45	58	42
Total		432	48	63	47	41	12	47	95	79

Number of qualified workforce in each grade

Grade	Year	Master	Bachelor	Diploma or lower	Total
High-ranking officers	10	8			18
Grade 3~4	26	33	9	8	76
Grade 5	55	71	68	36	230
Grade 6~9	24	228	598	136	986
Management and others		3	25	78	106
Total	115	343	700	258	1,416

Budget

Budget Overview

The KMA's budget in 2013 is divided into general accounts and special accounts for innovative city construction. The revenue is KRW 6,888 million, increased by KRW 4,769 million or 225% from that of 2012 (General: KRW 2,709 million, Special: KRW 4,179 million), while the expenditure is KRW 318,838 million, increased by KRW 9,599 million or 3.1%, compared to the previous year.
The expenditure in general accounts is classified into labor costs (KRW 74,732 million, increased by KRW 144 million or 0.2% YoY), basic expenditure (KRW 18,111 million, increased by KRW 1,083 million or 6.4% YoY) and major project costs (KRW 225,994 million, increased by KRW 24,059 million or 11.9% YoY). Those expenses account for 23.4%, 5.7% and 70.9%, respectively.
The major project expenses consist of general projects (KRW 81,542 million, 36.0%), R&D (KRW 89,413 million, 39.6%) and I&T (KRW 55,039 million, 24.4%). Meanwhile, the expenses to establish new office buildings were transferred from the general accounts to the National Property Management Fund under the Ministry of Strategy & Finance (MOSF) from 2012, arranging KRW 30,212 million for new office building and staff residence.

Detailed Revenue-Expenditure Budget

The revenue budget in general accounts in 2013 consists of asset income (KRW 36 million), current transfer (KRW 1,024 milllion), sales revenue of goods and services (KRW 1,612 million), government's property sales (KRW 37 million) and special accounts for innovative city construction (KRW 4,179 million). The entire expenditure budget of 2013 is from general accounts, consisting of several programs, including weather forecast (KRW 41,348 million), observation (KRW 48,322 million), climate change sciences (KRW 14,469 million), meteorological industry information (KRW 25,813 million), meteorological research (KRW 70,031 million), operations of performance-based agency (KRW 11,324 million), and support for administrative affairs (KRW 107,530 million).
Meanwhile, the National Property Management Fund of the MOSF earmarked KRW 23,451 million and KRW 5,471 million for building KMA's office facilities and official residences, respectively, while providing KRW 1,290 million for adding infrastructure for supercomputers. Major projects with increased budget among general projects include purchasing a multi-purpose aircraft (KRW 5,469 million, increased by KRW 4,293 million) and supporting to vitalize meteorological industry (KRW 2,483 million, increased by KRW 763 million). In addition, R&D projects contain the development of a follow-up geostationary meteorological satellite (KRW 10,000 million, increased by KRW 6,000 million) and of the next-generation urban- and agro-meteorological smart service (KRW 5,500 million, increased by KRW 2,500 million). For IT projects, KRW 18,127 million is allocated, risen by KRW 2,311 million compared to the previous year.
In case of 5 new projects (total KRW 2,679 million), KRW 1,000 million for pan-governmental development to use dual polarization radars, KRW 1,000 million for developing technologies to use and install sensors to high-altitude and long-endurance aircraft, KRW 200 million for establishing advanced aeronautical weather forecasting service system, KRW 240 million for supporting the movement of offices to the innovative city, and KRW 239 million for supporting the relocation of offices.

ORGANIZATION

2013 Expenditure Budget for each Program

(unit: KRW million)

Classification	2012 budget (A)	2013 budget (B)	up(△)down (B-A/A)	up(△)down (B-A/A)
Total	309,239	318,837	9,598	3.1%
General accounts	293,551	318,837	25,286	8.6%
1. Weather forecast	41,785	41,347	△437	△1.0%
2. Weather observation	44,919	48,321	3,402	7.6%
3. Climate change sciences	12,951	14,469	1,518	11.7%
4. Weather industry information	23,589	25,813	2,224	9.4%
5. Meteorological research	60,109	70,031	9,922	16.5%
6. Performance-based agency operation	11,241	11,324	83	0.7%
7. Administrative affairs	98,957	107,530	8,573	8.7%
Special accounts for innovative city construction	15,688	-	△15,688	pure decrease
1. Administrative affairs (Relocation of the Meteorological Radio Transmission Station and the National Institute of Meteorological Research)	15,688	-	△15,688	pure decrease

Vision & Strategy

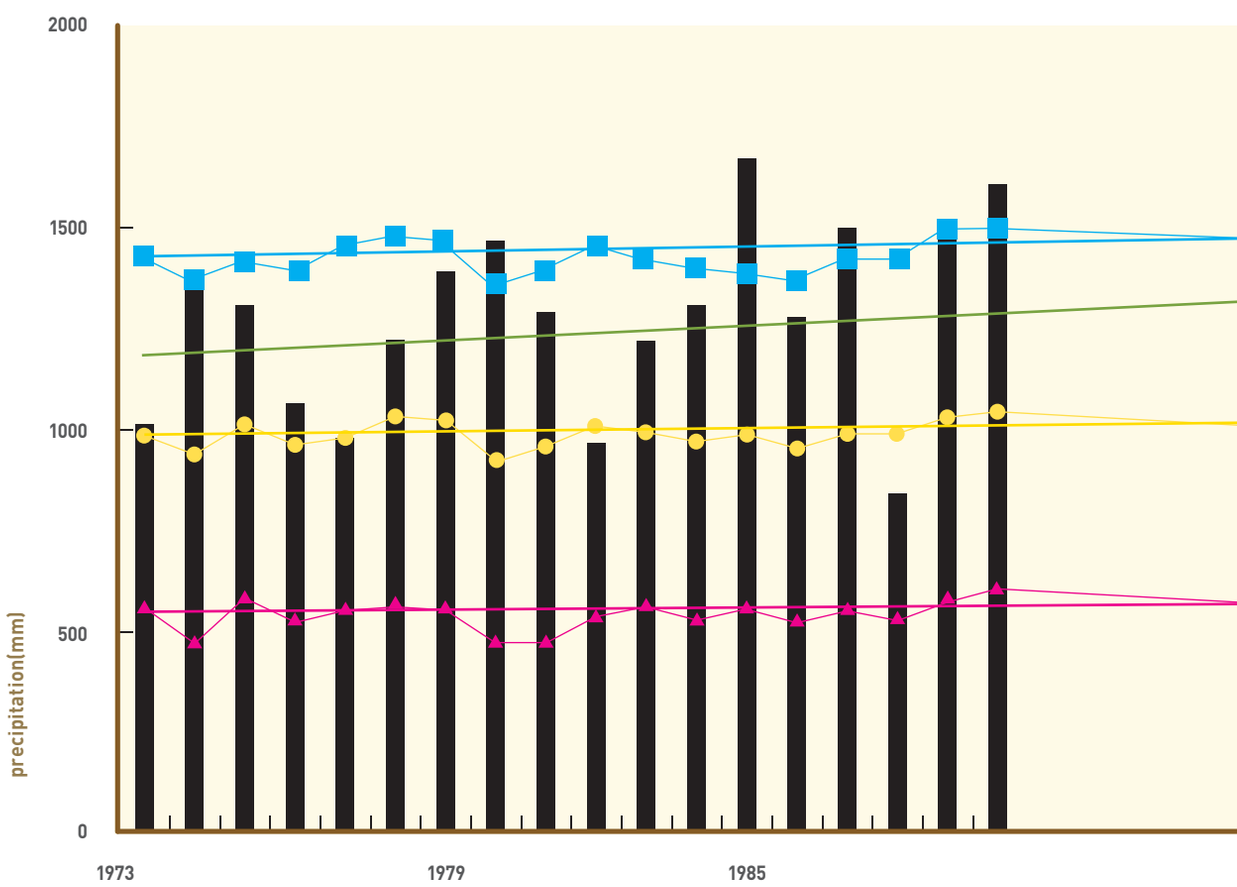
Lead the public safety and national economic growth,
while spreading the value of integrated weather and climate services

Strategies	Implementation plan	
Strategy 1	Upgrade weather services for the well-being of people/ to benefit people	– Build capacities against severe weather events, while improving NWP models and setting up advanced forecasting system – Provide local weather services to the public by advancing its delivery system
Strategy 2	Utilize climate and weather information to make the society more prosperous	– Support strategies to adapt and respond to climate change, while producing high-quality information on climate change science – Enhance availability of climate data with integrated management, while improving its service system – Develop strategic products for weather services, while implementing technology transfer & equipment localization
Strategy 3	Strengthen weather services for the decision-making process to make the country more resilient	– Establish an early warning system for earthquakes and a response system against volcanic eruption crisis – Extend forecasting period, while subdividing forecasting districts – Create social and economic benefits by integrating weather information with non-meteorological factors
Strategy 4	Promote global partnership for co-existence	– Promote differentiated weather cooperation between Seoul and Pyeongyang – Strengthen KMA's roles within international organizations, while supporting developing countries – Establish weather economic community among South Korea, China and Japan and global weather cooperation system
Strategy 5	Lay the foundation to carry out meteorological tasks for the future	– Develop Korea's own NWP models, while acquiring world-class NWP technology – Establish stereographic weather observation network based on sophisticated equipment – Facilitate R&D for enhancing meteorological technology – Expand the understanding and the base of meteorological science through distribution of meteorological culture

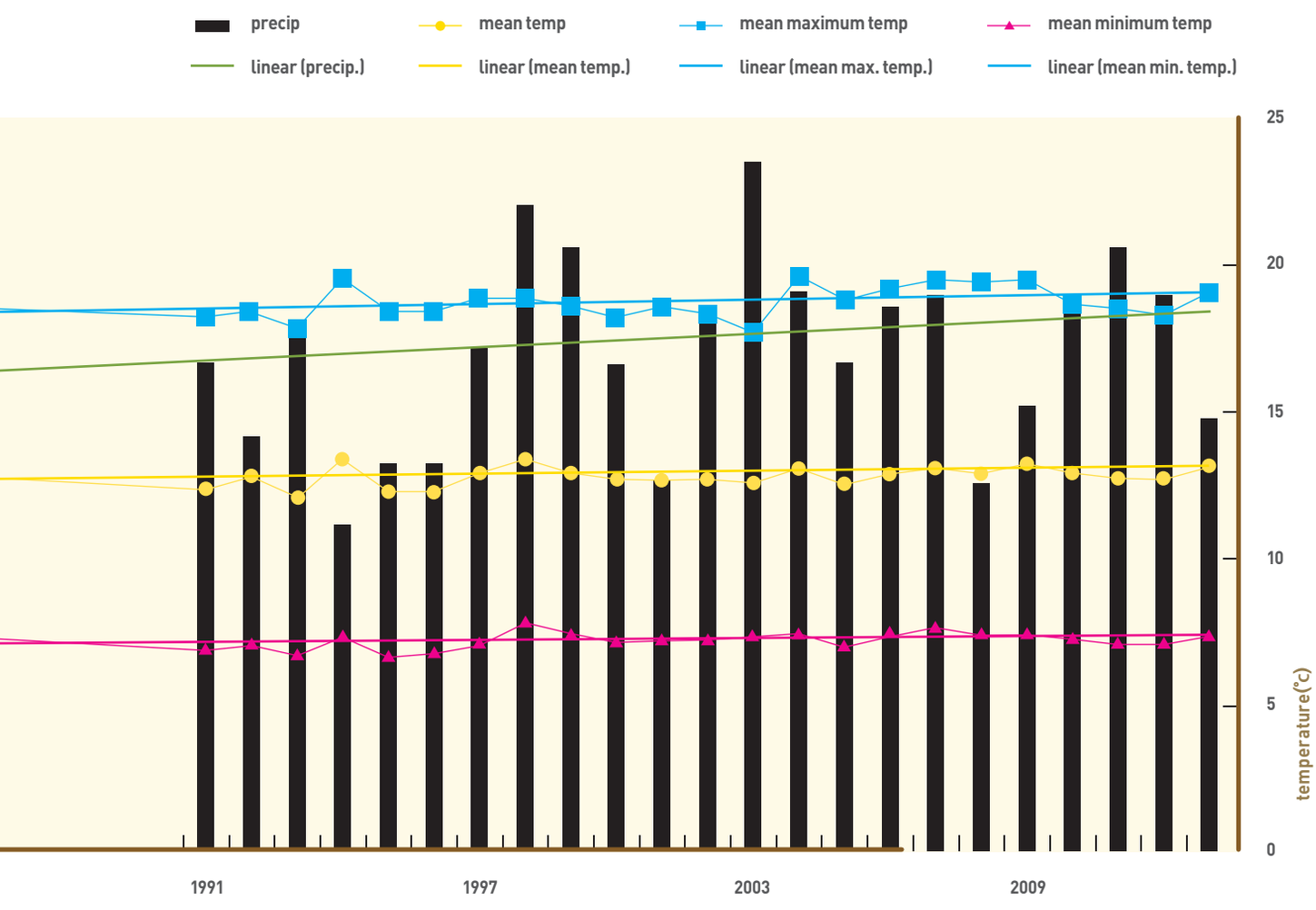
WEATHER TREND IN 2013

The annual mean temperature in 2013 was 12.9℃, while mean maximum and minimum temperatures showed 18.4℃ and 8.1℃, respectively. Those figures were higher by 0.4℃, 0.3℃, and 0.4℃ than those in the previous year. The number of days with tropical night and heat-wave were 15.8 and 18.5 days, showing the second-to-top record since 1973 (The longest duration of tropical night and heat-wave: 17.7 days and 31.1 days in 1994, respectively). The annual mean precipitation was 1162.8mm which accounted for 89% compared to the average, while the number of days with precipitation was 110.4 days, showing 6.9 days more than the average.
The annual mean, mean maximum, and mean minimum temperatures of Seoul City in 2013 were 12.5℃, 16.9℃, and 8.7℃, respectively, which showed similar figures to the average. The amount of annual precipitation was 1,403.7mm (97% of average), while the number of days with precipitation was 127 days, showing 18.1 days more than the average. The number of days with hourly precipitation higher than 30mm was 5 days (average: 3 days), whereas the number of days with daily precipitation higher than 150mm was 1 days (average: 0.6 day).

The Jangma period of 2013 lasted for 49 days in the middle part of the country (top record since 1973), 46 days in southern area (top record since 1973), and 39 days in Jeju (ninth-to-top record since 1973), while the number of days with precipitation across the nation was 24.4 days (third-to-top since 1973).



* Fig. Mean temperature, mean maximum temperature, mean minimum temperature, and mean precipitation (1973-2013)

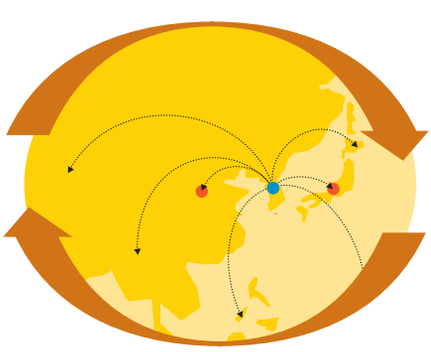

precip
mean temp
mean maximum temp
mean minimum temp
linear (precip.)
linear (mean temp.)
linear (mean max. temp.)
linear (mean min. temp.)
25
20
15
10
5
0
temperature(℃)
1991
1997
2003
2009

THE PROCESS OF NATIONAL METEOROLOGIC SERVICE

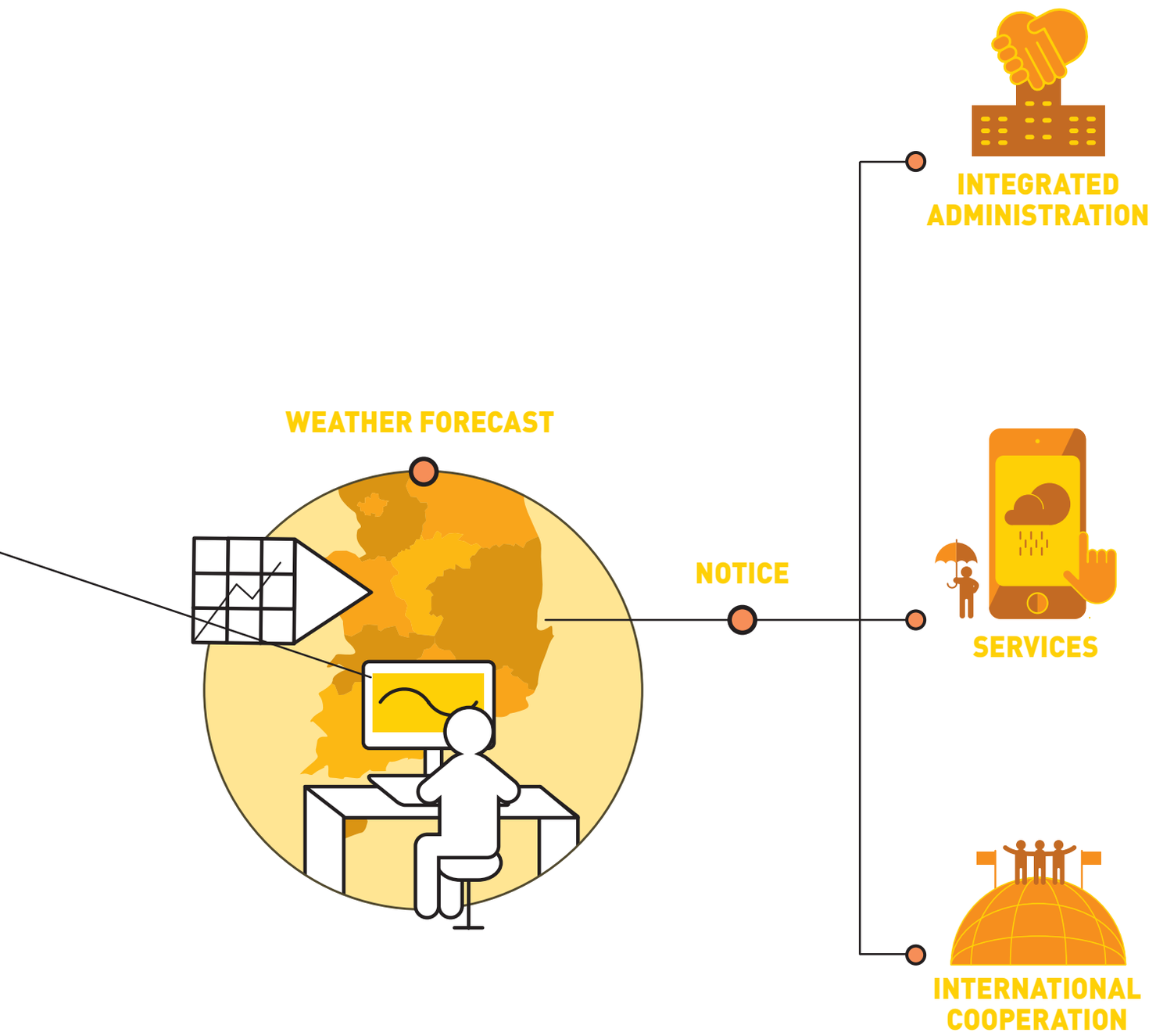
OBSERVATION

NWP INFORMATION USING SUPERCOMPUTER

METEOROLOGICAL TELECOMMUNICATION



REAL-TIME REGIONAL AND GLOBAL DATA COLLECTION·PROCESSING·DISTRIBUTION VIA GTS


INTEGRATED ADMINISTRATION
WEATHER FORECAST
NOTICE
SERVICES
INTERNATIONAL COOPERATION

03

ACTIVITIES

OBSERVATION

WEATHER FORECAST

CLIMATE CHANGE

METEOROLOGICAL RESEARCH

INTERNATIONAL COOPERATION

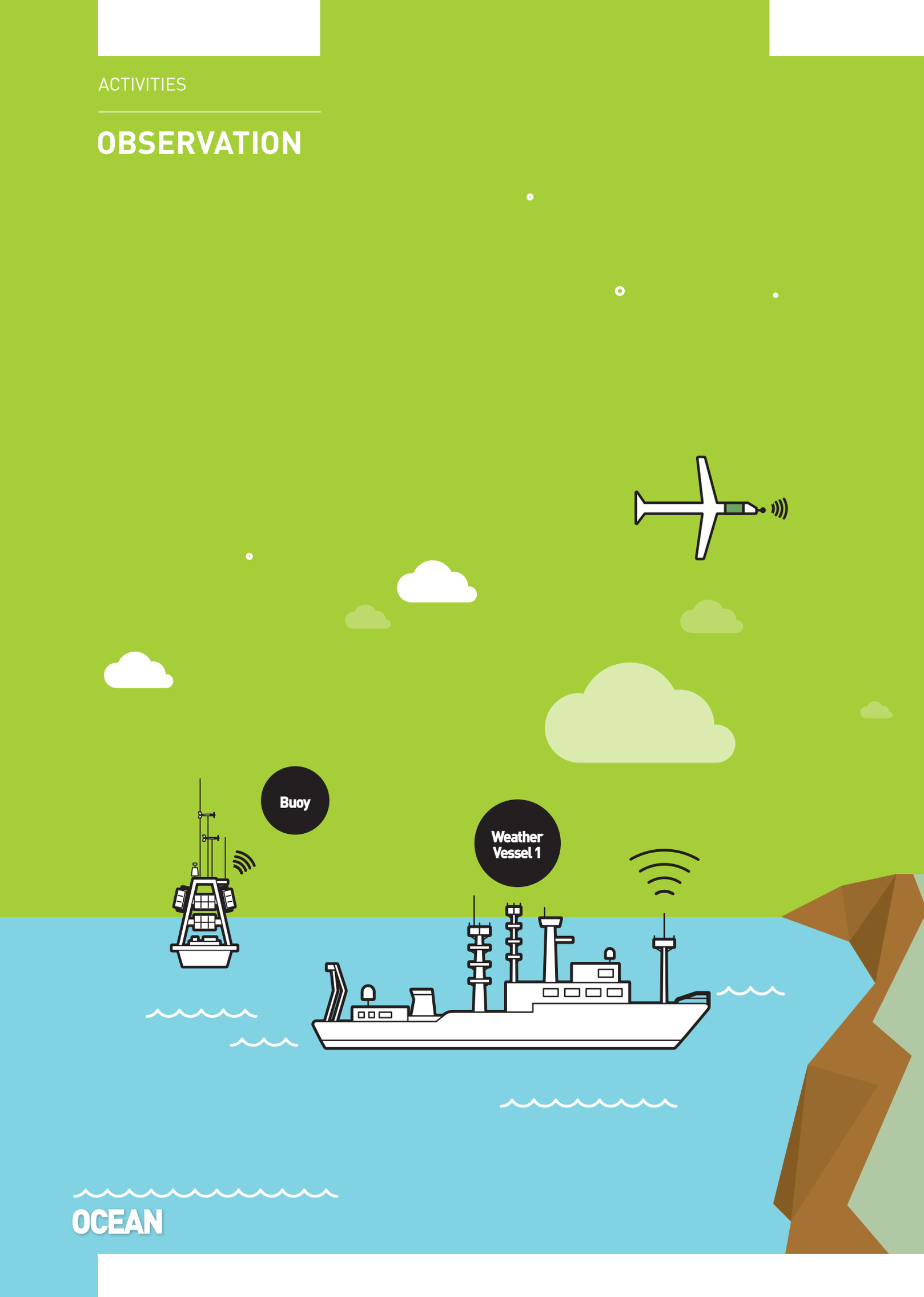
METEOROLOGICAL INDUSTRY

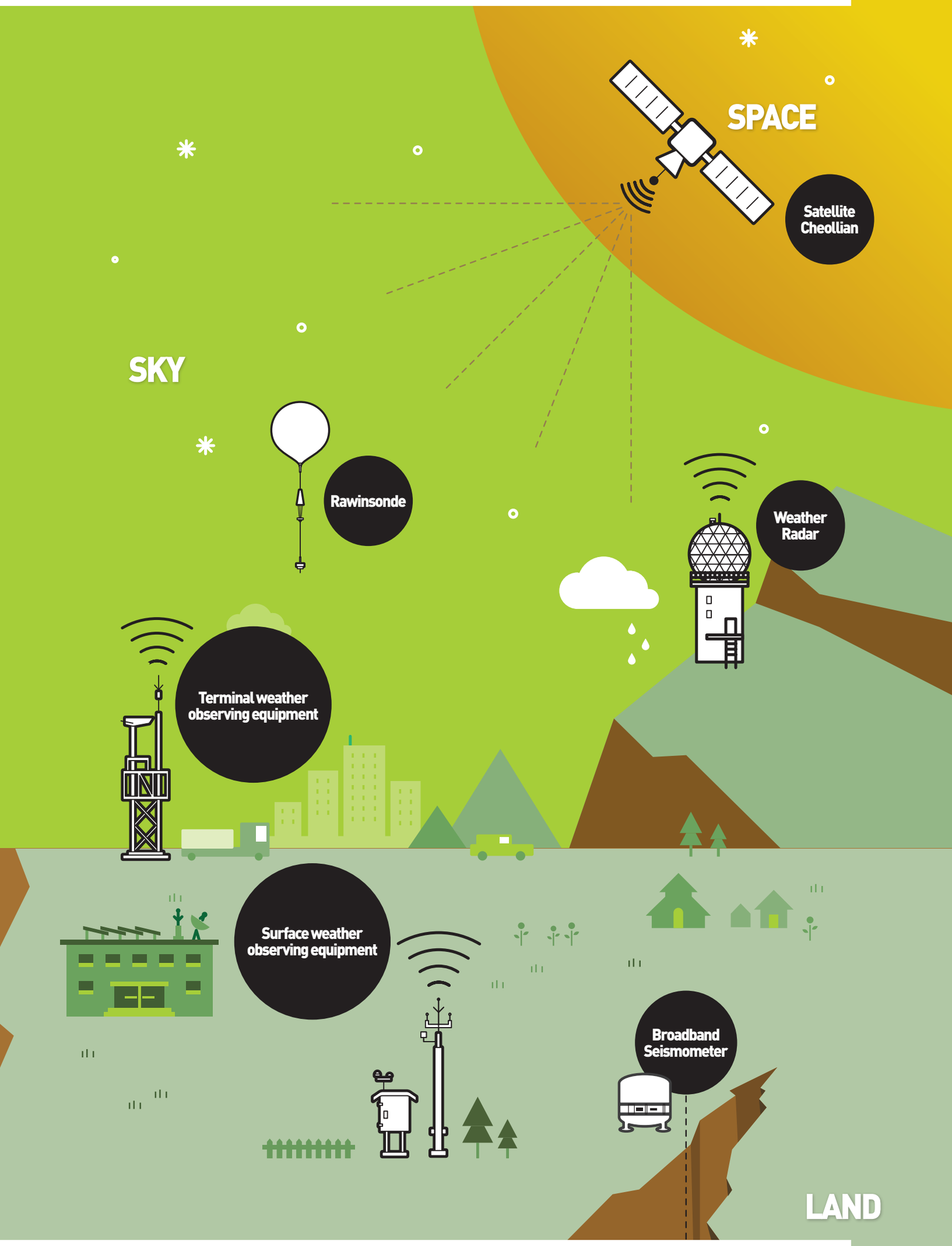
INTEGRATED ADMINISTRATION

CENTER

SERVICE

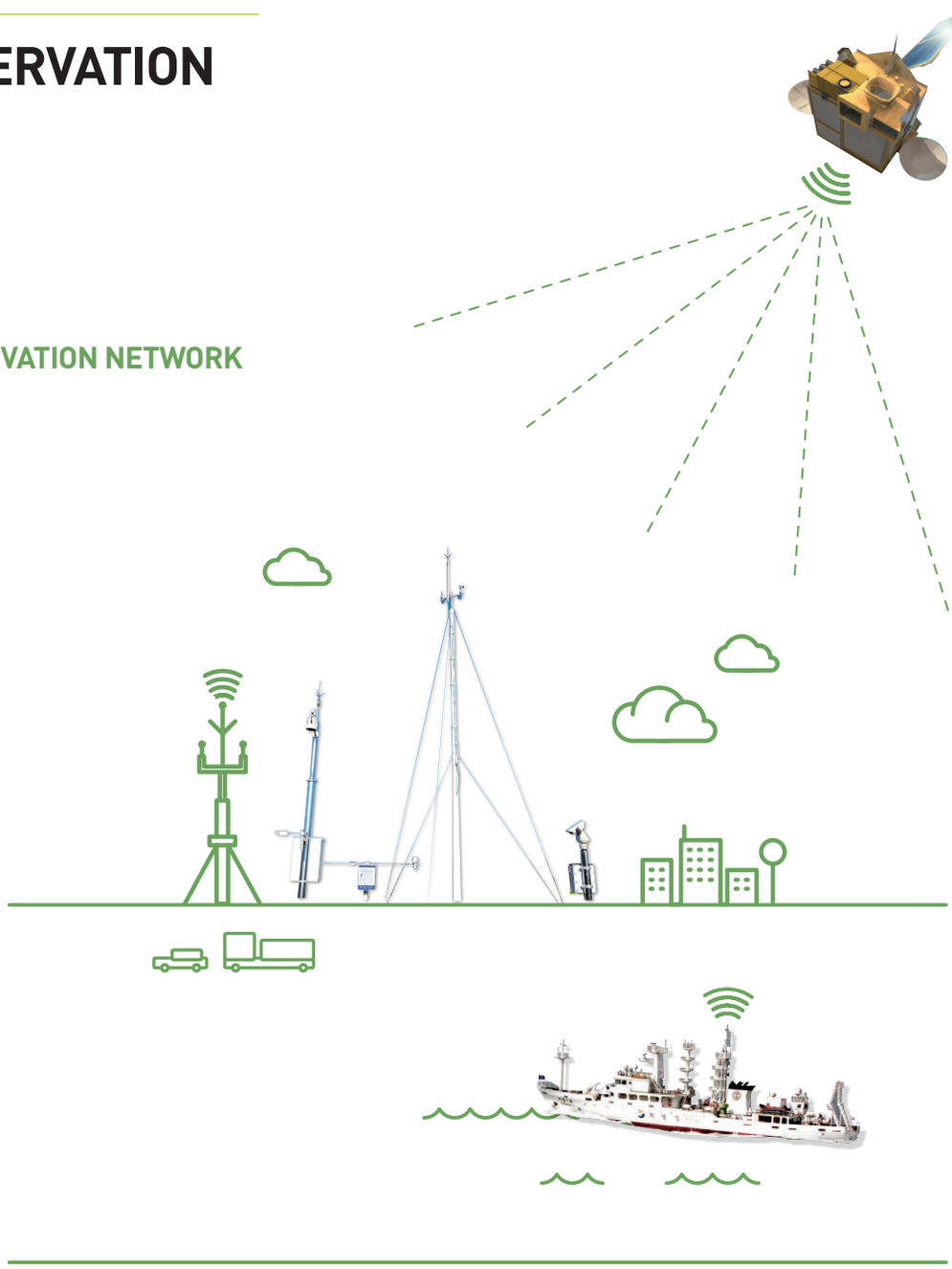
OBSERVATION




SPACE
Satellite
Cheollian
SKY
Rawinsonde
Weather
Radar
Terminal weather
observing equipment
Surface weather
observing equipment
Broadband
Seismometer
LAND

OBSERVATION

OBSERVATION NETWORK



Surface Observation

To find atmospheric conditions of a certain area, you need to know the pressure, temperature, humidity, wind direction, wind speed, and precipitation of the location that represents the area. The KMA has installed 550 surface weather observation instruments at every 13 km on average across the country to automatically measure atmospheric conditions per minute. On the other hand, Japan and the United States operate them at every 15 km and 20 km on average, respectively. Therefore, South Korea hashigher observation density compared to Japan and the United States.

Various meteorological elements are also directly and manually observed at meteorological offices. At each of the office, men manually measure sky conditions, visibility, and the current weather conditions every minute during the day and every 3 hours during the night. If it rains or snows or if the weather is not good, however, the observation will be made more often, for example, every 30 minutes to one hour.

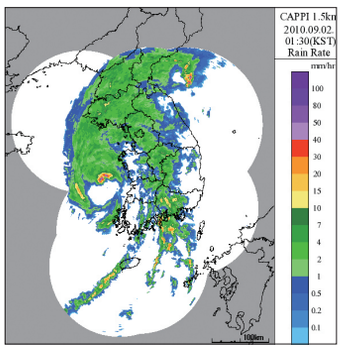
Marine Weather Observation

Characteristics of atmosphere change continuously while the air passes through the ocean. For South Korea, marine meteorological observation is especially essential to identify the conditions of atmosphere that comes up to the land, as the nation is surrounded on three sides by water. The observation is also important to produce meteorological information for different industries, such as fishing industry, passenger ship operation, and marine leisure activities. For the marine observation, ocean data buoys, costal wave buoys, water gauges, port weather observation systems, light house AWSs and wave radars are in operation. In May 2011, South Korea has launched the first weather research vessel ""Gisang 1."" This vessel measuresvarious marine meteorological elements, including wind direction, wind speed, wave height, and atmospheric pressure and temperature at 20 km above the ground, to monitor severe weather events such as heavy rain or typhoon. South Korea's first base station of oceanic-meteorological observation, located in the westernmost island,conducts wave observation, vertical wind observation and automatic weather observation to respond to torrential rain in the central region during the summer season, heavy snow in the west coast area during the winter, and sea fog in the Kyunggi bay. Moreover, for marine meteorological research, unmanned observation equipment has been installed in waters around the Korean peninsula and in the Pacific Ocean in order to measure salinity and water temperature.

OBSERVATION

Upper-Air Observation

Information about the vertical profile of the upper atmosphere is essential to analyze atmospheric conditions in all aspects. Rawinsondes are carried aloft by a wide weather balloon to an altitude of 35 km to measure profiles of temperature, pressure, humidity, wind direction, and wind speed and send back the information to the ground. Currently there are seven upper-air weather stations (five in Pohang, Jeju, Gosan, Baengnyeong-do, Sokcho and Heuksando, and two in Osan and Gwangju which are belonged to the Weather Group of the Republic of Korea Air Force). They are registered in the WMO (World Meteorological Organization) and conduct observations twice a day under regular weather conditions and four times a day under severe weather conditions. For more detailed observation, upper-air wind direction and speed up to 5km above the ground are measured by wind profilers, and temperature and humidity up to 10km above the ground are measured by radiometers at 10-minute intervals.



Weather Radar Observation

The weather radar is a remote sensing instrument which detects precipitation area and velocity by projecting electronic waves on water droplets of clouds and analyzing their reflected waves. Weather radars mainly contribute to monitoring and tracing typhoon and unexpected weather events, including heavy localized rain and hail. The first radar observation began with the installment of the first weather radar on Mt. Gwanak in 1969 so that it opened up South Korea's new era of remote sensing weather observation. Currently there are 12 weather radars, including laboratory radar, are in operation across the country. Images from those radars are composed at 10-minutes intervals and are used to identify precipitation conditions all over the country.

Meteorological Satellite Observation

The meteorological satellite is cutting-edge equipment, observing from a fast developing and small-scale to widespread global meteorological phenomena. Chollian (COMS), South Korea's first geostationary meteorological satellite, was launched in 2010. For the meteorological services, the full disk is observed every 3 hours East Asia region observation is done every 15 minutes and observation over the Korean peninsula is carried out every 8 minutes. Data from the COMS are critical to detect typhoon, fog, Asian dust, and forest fire. 16 meteorological products, including cloud information, precipitation intensity, and sea surface temperature, are utilized in different fields such as hydrologic management and environment as well as weather forecasting.

Aviation Weather Observation

Weather observation is essential toflight safety. The KMA operates automated Aerodrome Meteorological Observation System (AMOS) in all airports across the country to measure wind, the Runway Visual Range (RVR), temperature, pressure, and the amount of precipitation, which are necessary for landing and take-off of flights. LLWAS (Low Level Wind Shear Alert System), TDWR (Terminal Doppler Weather Radar) andwind profiler make routine observations every hour or every 30 minutes. However, special observations are frequently made if there are any meteorological changes influencing flight safety or requests from air transportation organizations and airport operating agencies. Then the observation data is distribute to aviation related administrations and civil aviations.

Asian Dust Observation

Recently Asian Dust blowing in from China's growing deserts affects the Korean peninsula more often and the concentration of the dust also gradually increases. Since fine particles can cause various health problems, such as respiratory diseases and eye diseases, Asian Dust observation is becoming more critical than ever. The KMA has operated BAMs (Beta Attenuation Monitors/PM10) designed to make a real time observation of fine particles afloat in the air with size less than 10 Đ and LIDAR (Light Detection and Ranging system)that uses a laser to measure vertical profile of Asian Dust concentration. In addition, the KMA is monitoring Asian Dust in the source regions through the 15 Korea-China Joint SDS (Sand and Dust Storm) Monitoring Network Stations.

Lightning Observation

Lightning is a meteorological phenomenon by which electricity accumulated in the cloud plunges into the ground. A recent growing in outdoor activities has led to an increase in loss of life and property. The KMA introduced and has operated LDAR (Lightening Detection and Ranging system) detecting lightning and cloud-to-cloud discharges across the country to observe and analyze them in real time. LDAR detects discharge signals generated by lightning and analyzes the time, location, and intensity of lightening. The analysis information is provided on the KMA website.

OBSERVATION

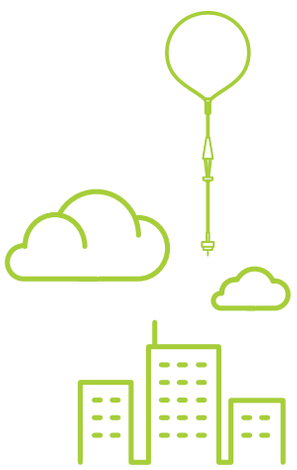
Global Atmosphere Watch

The KMA has operated KGAWC (Korea Global Atmosphere Watch Center) to identify atmospheric environment changes on the Korean Peninsula in an objective and scientific manner to respond to the future global environmental changes. Currently the Korea Global Atmosphere Watch Center, a regional GAWstation established in Anmyeondo in 1996, measures 37 different kinds of parameters of climate change such as aerosol, stratospheric ozone, UV, and atmospheric radiation. In 2008, Jeju Gosan Station (JGS) was founded in Jeju and the construction of Ulleungdo Dokdo Station (UDS) will be completed in 2013. This will lead to making an East-West-South triangular monitoring system on the Korean Peninsula.

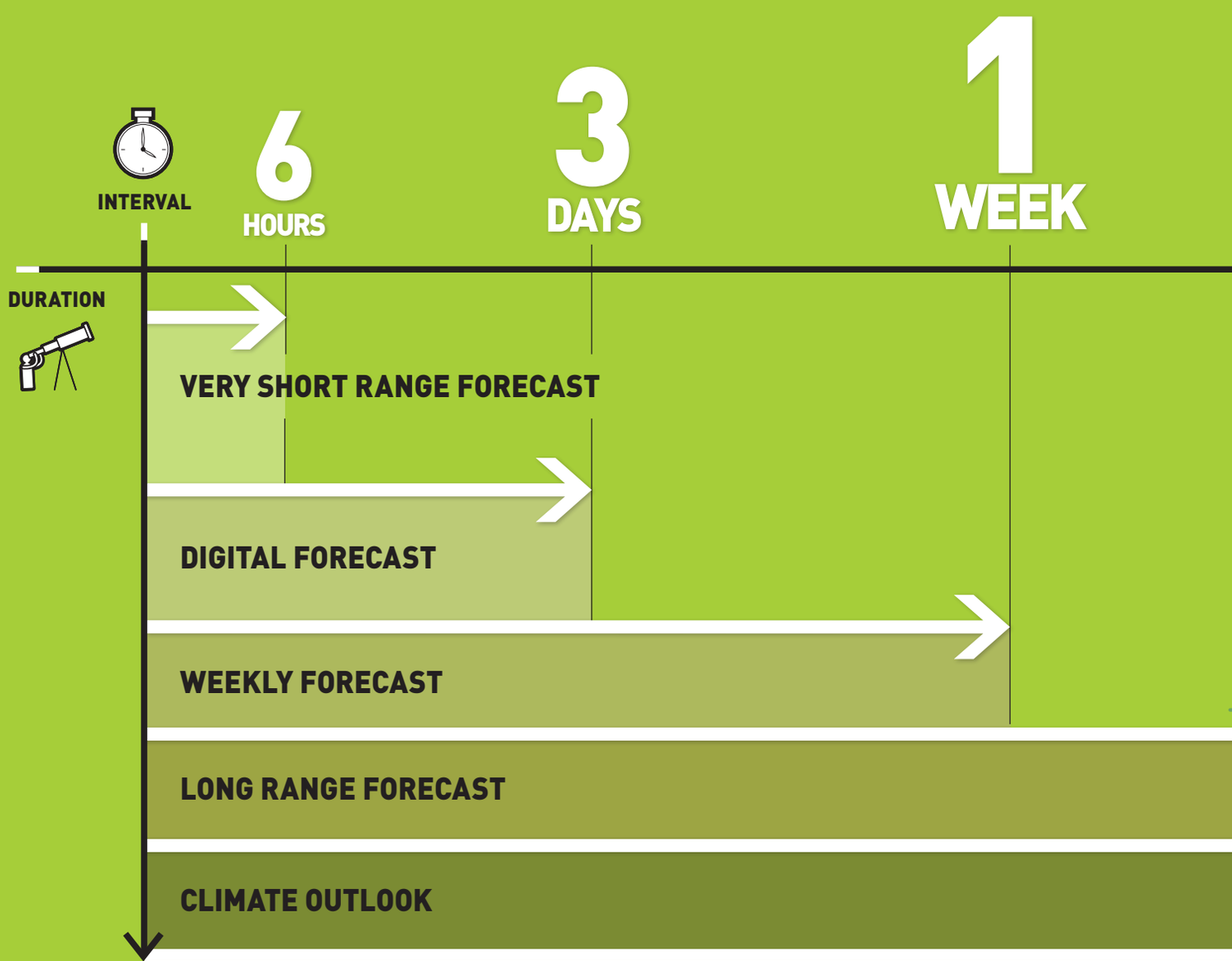
Several other weather stations also functionas secondary climate change monitoring agencies. Among them, Pohang weather station mainly observes stratospheric ozone and UV radiationand Uljin and Ullenungdo station focus on acid rain observation. Mokpo weather station and Kangwon Regional Meteorological Administration were added to supplementary observatories for UV radiation to monitor climate change.

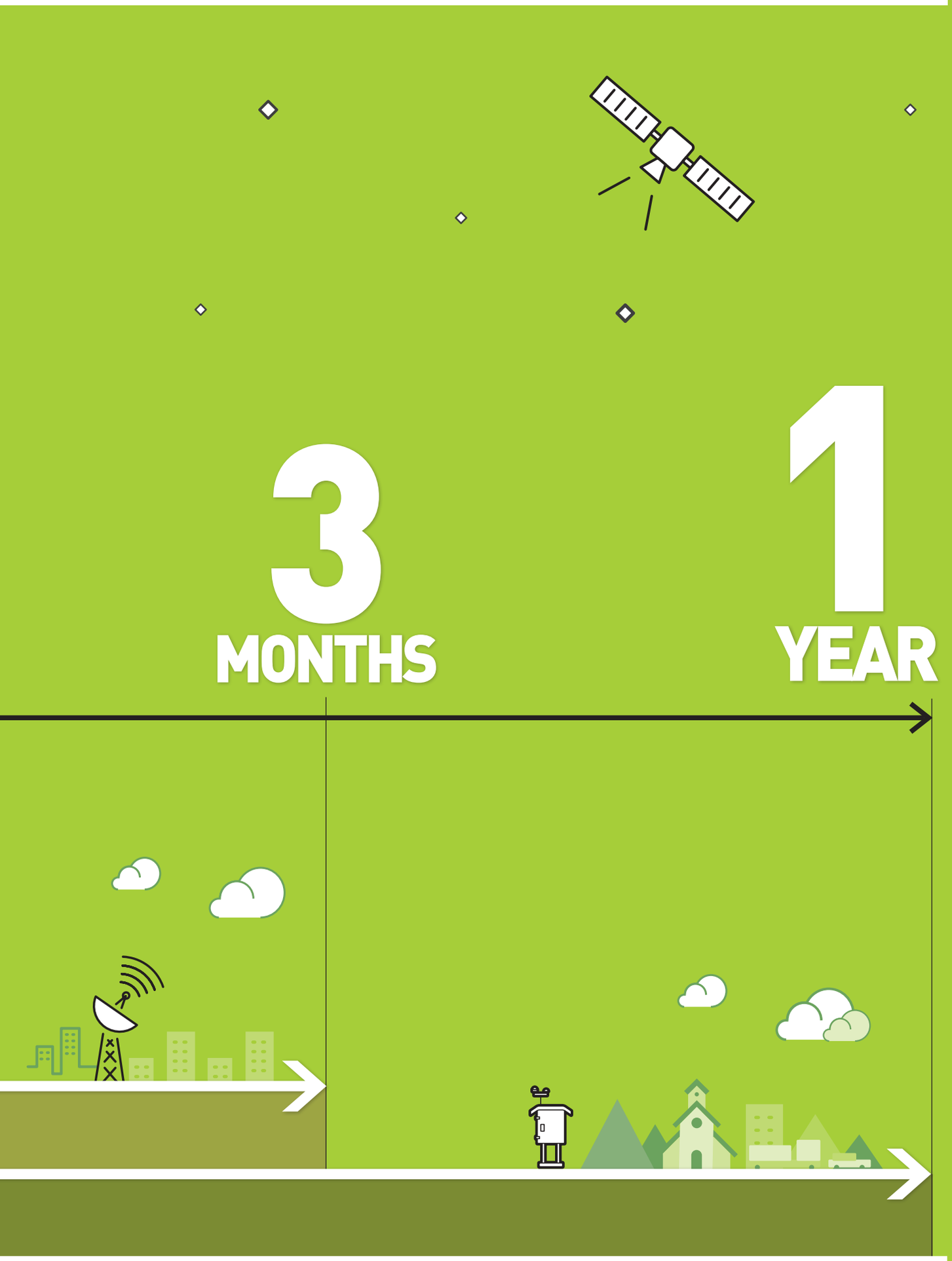
Earthquake·Tsunami and Volcano Observation

The KMA makes a close observation of earthquakes occurred in Korea as well as around the world and provides information to help people quickly evacuate. Earthquake Early Warning System (EEWS) is now under development to give earthquake information more quickly. If the system is completed by 2015, earthquake warnings, which are currently issued within two minutes, will be disseminated to the public within 50 seconds after the occurrence. Moreover, the KMA observes artificial vibration generated by nuclear test, blast,and massive explosion. Damages caused by tsunamis are also a concern for South Korea, as it is surrounded by water on three sides. In particular, the East Sea is more likely to see tsunamis since the tectonic plate generating huge earthquakes is located around Japan. To respond to tsunamis, the KMA has installed a wave gauge and ocean bottom seismometer and exchanges observation data and tsunami information with Japan. In addition, it makes effort to develop international cooperation with Southeast Asian countries including China and Japan for earthquake·tsunami monitoring. Moreover, the KMA has employed different types of observation instruments, such as satellite mounted a geophysical sensor observing volcanic activities and a sensor measuring sounds delivered through the atmosphere.



WEATHER FORECAST

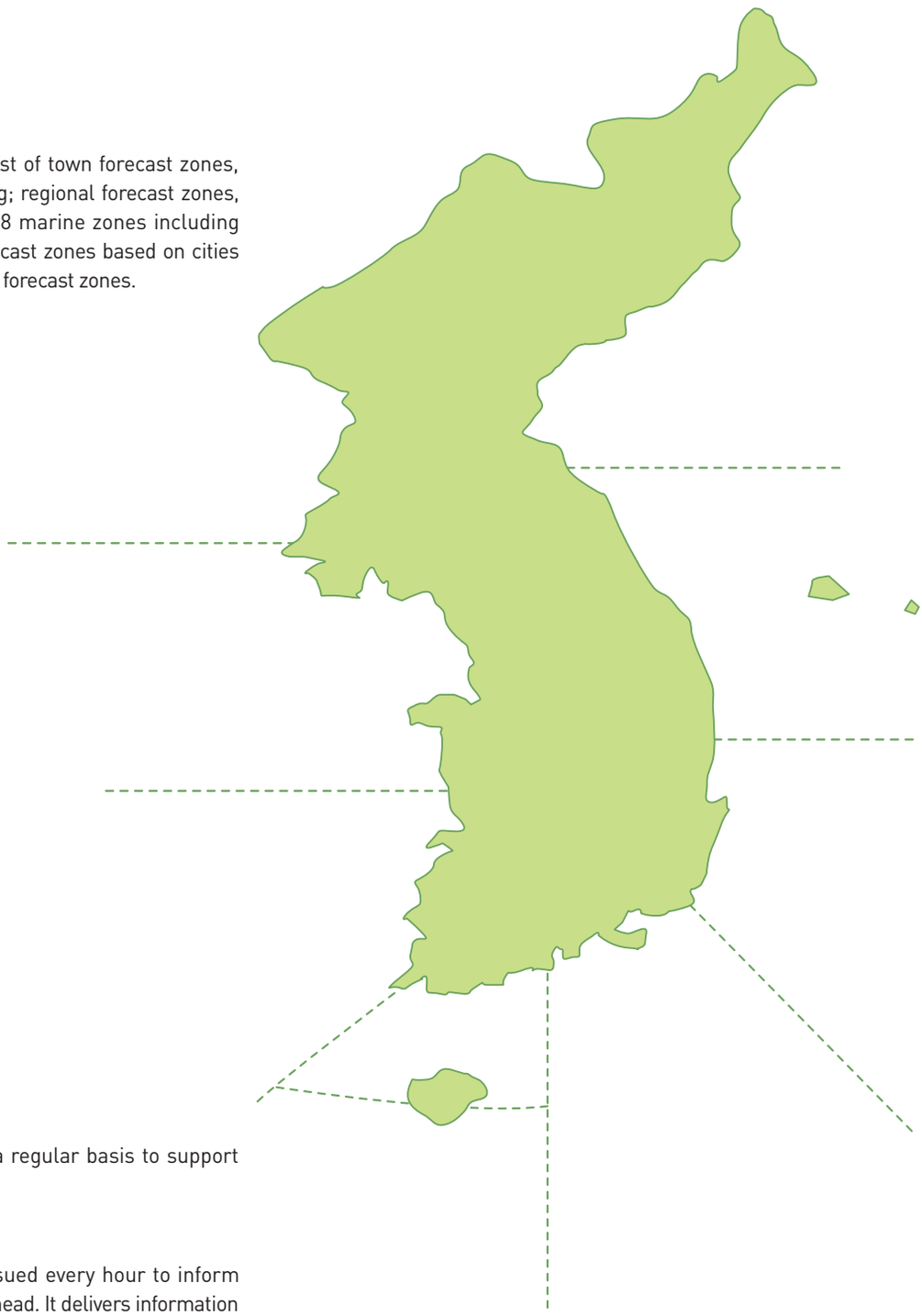



3
MONTHS
1
YEAR

WEATHER FORECAST

Forecast Zones

The KMA's forecast zones consist of town forecast zones, including 3,500 Eup/Myeon/Dong; regional forecast zones, containing 17 land zones and 18 marine zones including North Korea; 170 local land forecast zones based on cities and counties and 24 marine local forecast zones.



Weather Forecast

Weather forecast is issued on a regular basis to support people's safe and happy life.

Very Short-range Forecast

Very short-range forecast is issued every hour to inform weather conditions for 6 hours ahead. It delivers information on 8 weather conditions including temperature, rainfall, rainfall types, relative humidity, wind direction, wind speed, sky condition and lightning, and 4 weather forecast parameters including rainfall types, rainfall, sky condition and lightning.

Digital Forecast

Digital forecast divides the whole country into grids of 5km x 5km and provides weather forecasts to 3,500 Eup/Myeon/Dong. It shows 12 elements within 3 days at three-hour intervals, including temperature (per hour, maximum, and minimum), forms and probability of precipitation, precipitation, snow, sky conditions, wind direction, wind speed, humidity, and ocean wave height. The forecast is delivered in the form of text, chart, and graphics, for people to easily understand and provided through the KMA website (http://www.kma.go.kr) and 131 Weather Call Center.

Medium-Range Forecast

Medium-range forecast provides information, such as weather forecast, land and ocean conditions, maximum and minimum temperature, and ocean wave height, for the next 3 to 10 days and is issued on a 12 hour basis (morning/afternoon) twice a day (8 to 10 days of forecast is provided once a day). In addition, it gives forecast reliability with 3 levels (High/Average/Low), which indicates people's confidence in the forecast as a whole.

Monthly Forecast

Monthly forecast is announced three times (on every 3rd, 13th and 23rd day of the month) per month and includes trends of synoptic pattern, temperature and precipitation for the next one month.

Three-Month Forecast

Three-month forecast is issued once a month (on every 23rd day of the month) and includes trends of synoptic pattern, temperature and precipitation for the next 3 months.

Seasonal Climate Forecast

Seasonal climate forecast predicts the average temperature, precipitation and El Nino/La Nina of a season after the next season. It is issued on a 3-month basis in February, May, August and November.

Yearly Climate Outlook

Yearly climate outlook is issued on December 23rd and predicts average temperature, precipitation, and El Nino/Na Nina of the following year.

TIP | South Korea ranks 6th in NWP technology

Global numerical weather prediction (NWP) is carried out by only 13 countries in the world, including Korea. The KMA has used numerical weather prediction model data for weather prediction for more than two decades since 1991. Countries with NWP system exchange errors of NWP models on a monthly basis. South Korea ranks 6th in the world after ECMWF(European Centre for Medium-Range Weather Forecasts), Britain, Japan, U.S, and France, when it comes to NWP accuracy. In 2011, the KMA launched a project to develop Korea's own global NWP model. Its NWP technique will be improved by 2019 when the project is completed.

WEATHER FORECAST

Special Weather Report

Special weather report is issued to draw attention or give notice when serious weather hazards are anticipated. They include advisories and warnings for 11 types of weather conditions such as heavy rain, heavy snow, storm surge, typhoon, strong wind, wind waves, Asian Dust, dry weather, cold wave, and heat wave.

Strong Wind	Wind speed exceeding 14m/s or wind speed of moment exceeding 20m/s are expected on land. But wind speed exceeding 17m/s or wind speed of moment exceeding 25m/s are expected in mountain areas.
Wind Wave	Wind of 14m/s or more sustains for over 3 hours at sea or significant wave height is expected to be over 3m
Heavy Rain	The precipitation for 6 hours is expected to be more than 70mm or the precipitation for 12 hours to be over 110mm.
Heavy Snow	Snowfall is expected to be more than 5cm in 24 hours
Dry Air	Effective humidity of 35% or less is expected for at least 2 days
Storm Surge	Sea level is expected to rise locally due to complex factors, such as astronomical tides, typhoons, storms and low pressures, and to surpass the standard point to issue the advisory. Ref. the standard point is set by regions.
Tsunami	A submarine earthquake with the magnitude of over 7.0 is occurred in the waters around the Korean Peninsula (21N~45N, 110E~145E), and tsunami with wave height of less than 0.5 – 1.0m is expected around the coastline of South Korea.
Cold Wave	When any of the following is expected between October and April: ① Morning minimum temperature is predicted to drop by more than 10℃ than the previous day to below 3℃ and to lower by 3℃ compared to the climatological normal year; ② Morning minimum temperature of -12℃ or less is expected for more than 2 days; ③ Serious damage is expected due to rapid temperature drop.
Typhoon	Strong wind, wind wave, heavy rain and storm surge are expected to reach advisory levels due to typhoon.
Asian Dust	Hourly average dust (PM 10) concentration is expected to exceed 400μμg/m3 for over 2 hours due to Asian dust.
Heat Wave	Between June and September, the daily maximum temperature of more than 33℃ is expected for over 2 days.

Weather Information

In addition to weather forecast and special report, weather conditions and warning status are frequently provided when sudden changes in weather are expected or weather changes need to be informed in more detail.

Typhoon Information

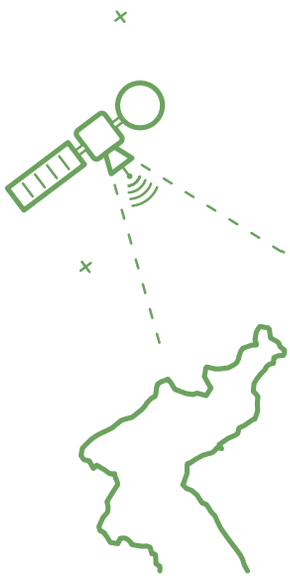
Typhoon information delivers the location of typhoon center, path and intensity of typhoon, and strong wind radius, fromwhen the typhoon is created until it is dissipated.

5-Day Typhoon Forecast

A 3-day forecast for typhoon has changed to a 5-day forecast to help people quickly respond to the typhoon.

North Korea Forecast

The KMA has produced and issued short-range forecasts and weekly forecasts of North Korea since 1979. Then since 2009 the KMA has established a system, providing regular and detailed weather forecasts of North Korea to manage the North's comprehensive weather information for the nation's security and risk management. It produces a 48-hour detailed forecast of seven sites in North Korea at 3-hour intervals a weekly forecast for five provinces and major citiesand a month/three month forecast at five provincial level. Moreover, the KMA produces and distributes North Korea's weather analysis data on a monthly basis and provides relevant agencies and the press with analysis data on severe weather conditions including heavy rain in summer, the number of tropical nights and Asian Dust. Such weather analysis and forecast data are also provided when urgent events occur, such as high flood risks in the Imjin River, and server weather hazards are anticipated

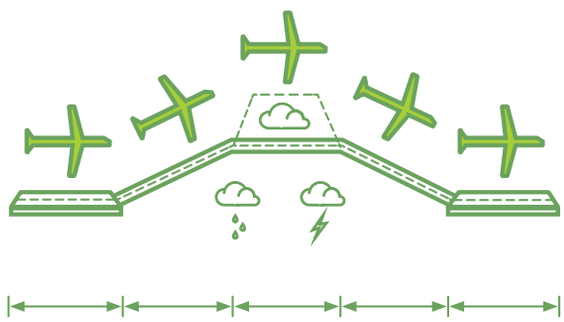


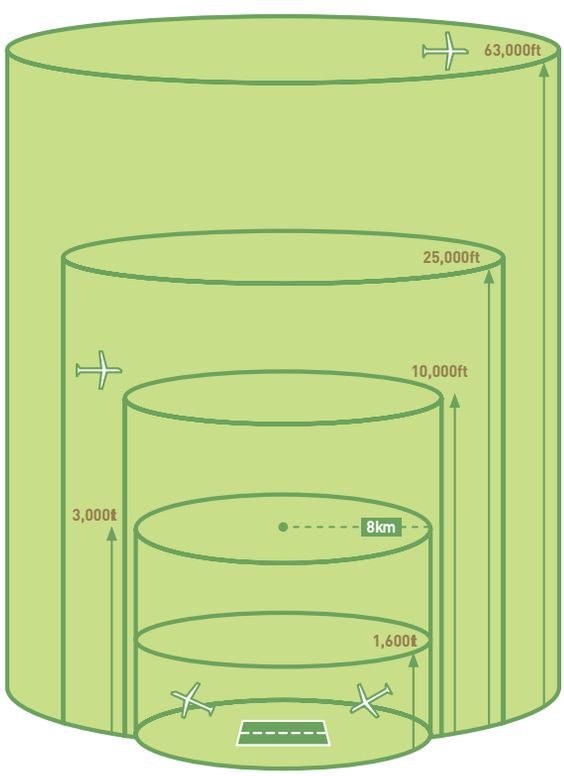
North Korea Forecast for Media

North Korea weather forecasts are provided to different media, such as online unification broadcasting (http://unitv.unikorea.go.kr) run by the Ministry of Unification, KBS ""Hanminjok broadcasting"", YTN Weather Channel and VOA (Voice of America)

WEATHER FORECAST

Aviation Meteorological Services





Aeronautical Meteorological Forecast

The KAMA (Korea Aviation Meteorological Agency) issues airport weather forecast and takeoff · landing forecast for flight plans and take-off/landing aircrafts. For aircrafts in flight, it also provides area forecasts for low-level flights and medium-level significant weather forecasts in the form of a weather map based on South Korea's FIR (Flight Information Region)

Terminal Aerodrome Forecast (TAF)

Terminal Aerodrome Forecast is issued four times a day and provides information on predicted changes in weather elements at the airports during a certain period, such as wind, visibility, weather phenomenon and cloud.

Landing Forecast

Landing forecast providesinformation on important changes in weather conditions including wind, visibility, and weather phenomenon and cloud, which are anticipated within the next 2 hours at the airport. This forecast is mainly used for aircraft operation which is within one hour of landing at the airport.

Take-off Forecast

Take-off forecast is to ensure safe take-off and landing of aircraft based on maximum loaded weight. It provides information on anticipated wind, temperature and pressure on the runway and is issued every hour.

Area Forecast for Low-level Flights

This forecast is issued four times a day, providing information on surface wind, visibility, turbulence, icing, and mountain blockage, for operating aircraft within South Korea's FIR (Flight Information Region) below 10,000ft.

Medium-level Significant Weather Forecast

This forecast is issued four times a day, providing information on typhoon, turbulence, and jet stream, for operating aircraft within Korea's FIR (Flight Information Region) at medium level (10,000~25,000ft).

Aeronautical Meteorological Warning

The KAMA issues aeronautical meteorological warnings when significant weather conditions are observed or predicted, which may cause damages to aircraft, airport facilities, aircraft operation and safety.

Terminal Aerodrome Warning

The KAMA issues terminal aerodrome warnings when significant weather conditions are observed or predicted, including typhoon, low visibility, strong wind, heavy rain, heavy snow and Asian Dust, which may adversely affect parked aircraftat the airport, airport facilities and services.

Wind Shear Warning

Wind shear warning is issued when wind shear is observed or predicted, whichcould affect aircraft safety during take-off or approaching the runway.

*** Wind shear: A strong local blast that may suddenly alter wind direction and speed as a result of irregular air circulation.**

SIGMET (Significant Meteorological Information)

SIGMET is issued when significant weather phenomenon is observed or predicted in Korea's FIR (Flight Information Region), such as thunderstorms, typhoons, strong turbulence, volcanic ash, strong icing and strong mountain wave.

*** Icing: A phenomenon where cooled water drops in the air turn into ice and adhere to object's surface.**

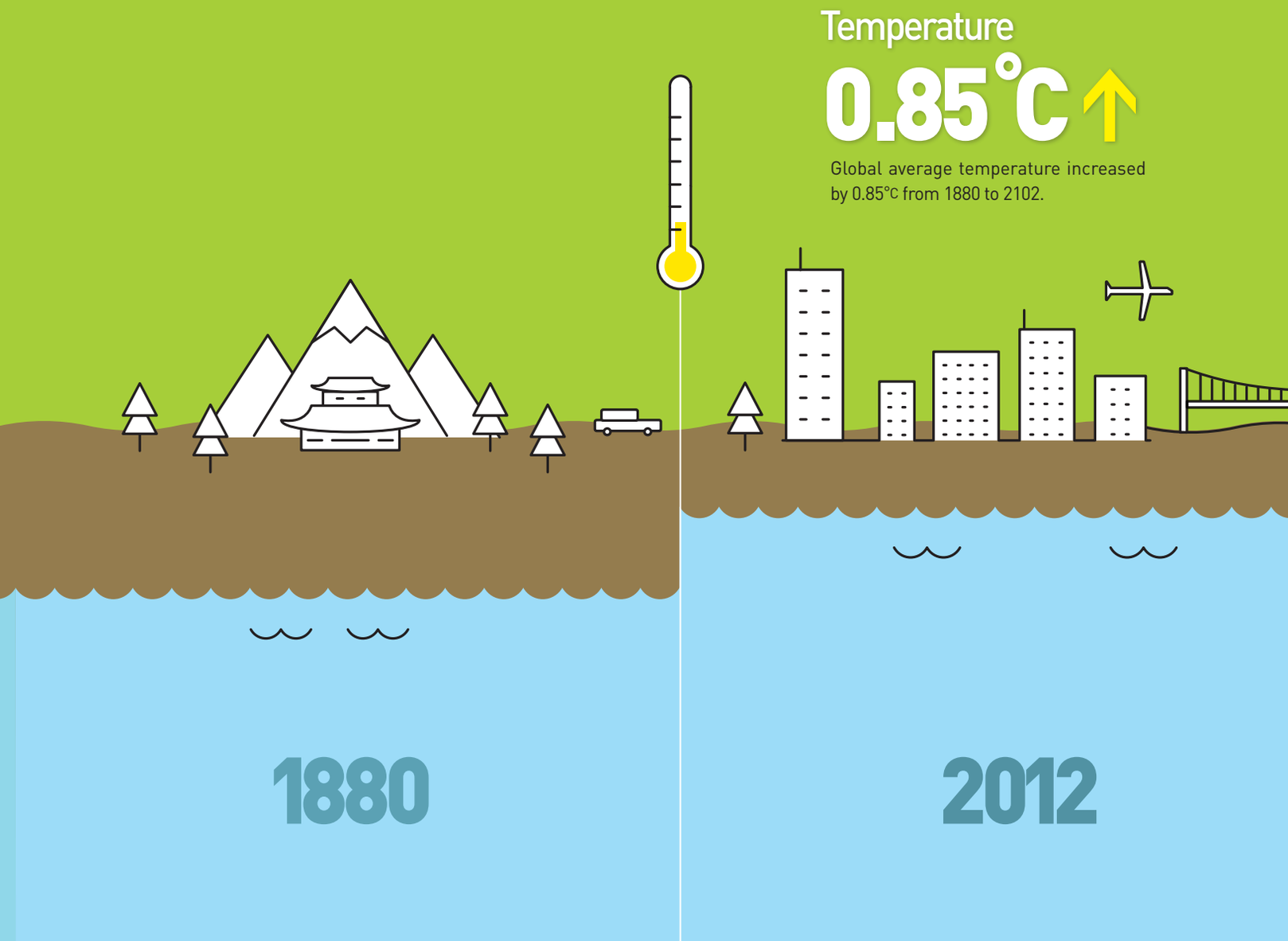
AIRMET (Airmen's Meteorological Information)

AIRMET is issued when significant weather phenomenon is observed or predicted, which may affect aircraft operating below 10,000ft in Korea's FIR (Flight Information Region), such as strong surface wind, low visibility, thunderstorm, normal turbulence, normal icing and mountain blockage.

TIP | Korea Aviation Meteorological Agency (KAMA)

Korea Aviation Meteorological Agency (KAMA)is in charge of providing aviation weather services in Korea in accordance with standards and recommendations of the ICAO (International Civil Aviation Organization). KAMA governs nationwide aviation weather services; issues weather observation, forecast/warning and significant weather information and collects airport weather information around the world through the AFTN (Aeronautical Fixed Telecommunication Network) to provide airlines and relevant organization

CLIMATE CHANGE



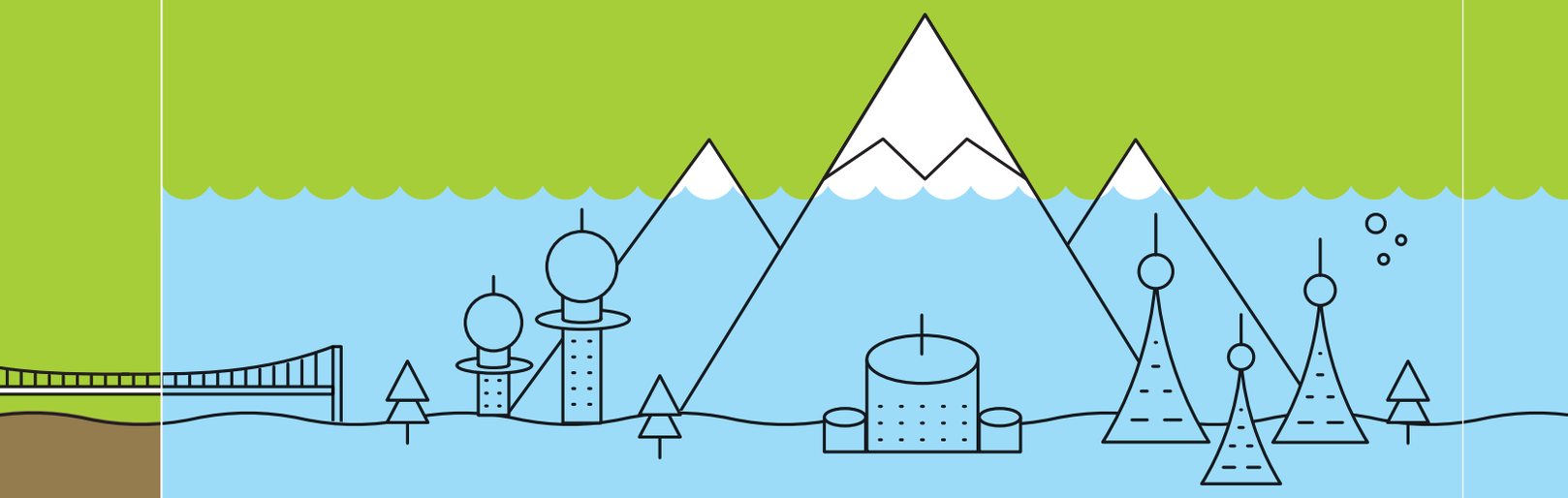
Temperature

3.7°C ↑

It is expected that the global average temperature and mean sea level will increase by 3.7°C and 63 cm, respectively by the late 21st Century, if we maintain the status quo in terms of using fossil fuels.

Surface of the Sea

63cm ↑



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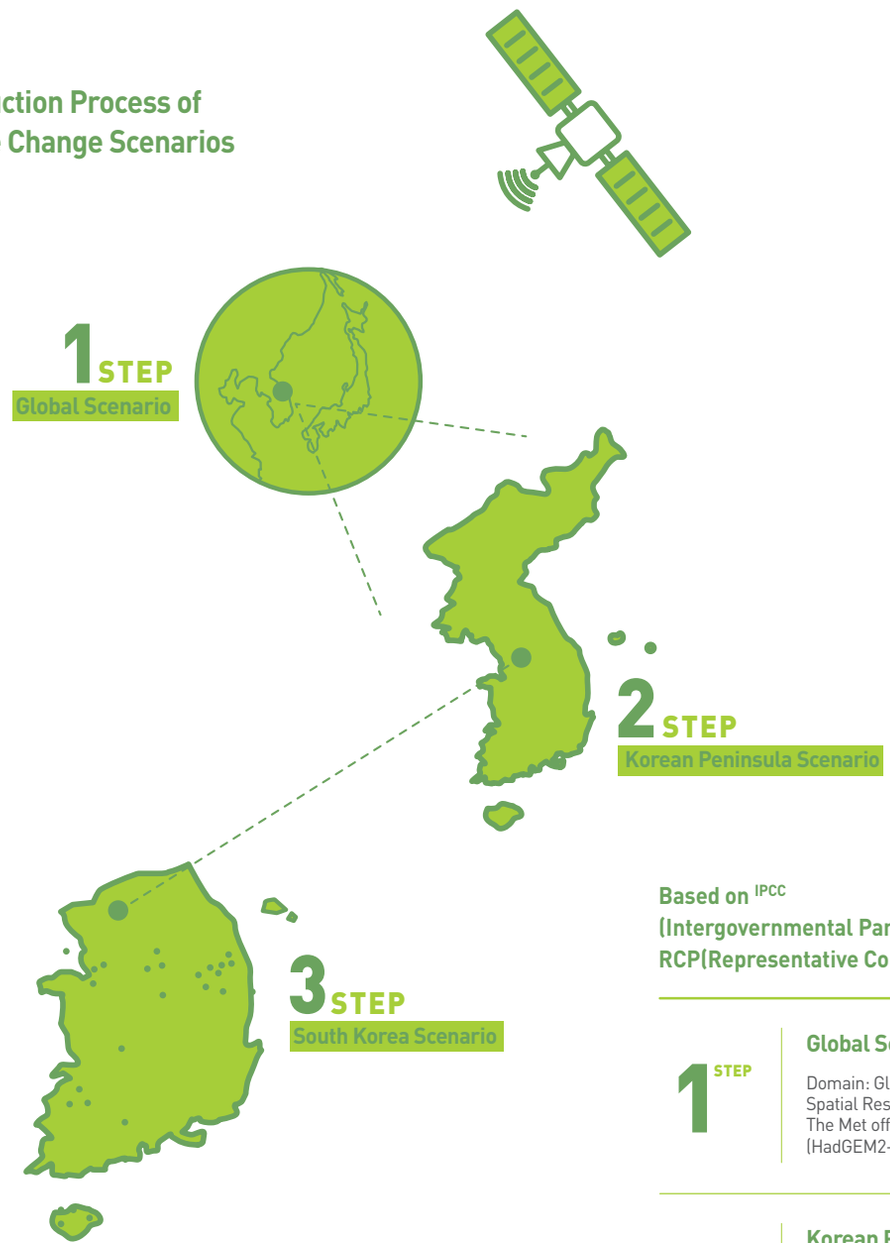
CLIMATE CHANGE

Production Process of Climate Change Scenarios



Based on IPCC (Intergovernmental Panel on Climate Change)'s RCP(Representative Concentration Pathways)

1 STEP Global Scenario

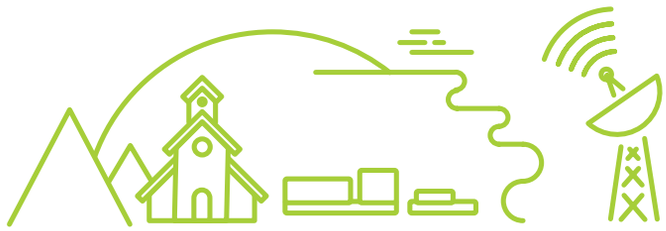
Domain: Globe
Spatial Resolution: 135km
The Met office Hadley Centre model (HadGEM2-A0)

2 STEP Korean Peninsula Scenario

Domain: Globe
Spatial Resolution: 12.5km
The Met office Hadley Centre Regional Climate Model (HadGEM3-RA)

3 STEP South Korea Scenario

Domain: South Korea
Spatial Resolution: 1km
Statistical model of Kongju National University (PRIDE: PRISM based Downscaling Estimation Model)



Climate Change Scenario

""What will the climatebe in 2100, if no action is taken to curb greenhouse gas emissions?"" ""How much would temperature and precipitation change, and how much impact would it have?"" The KMA produces forecastingdata to answer those questions. It is so-called ""climate change scenario."" Climate change scenario consists of a set of future climate prediction information,including temperature, precipitation, humidity, and wind, based on the climate change model and is used to look into man-made climate change caused by such as green house gases and aerosol change.

The climate change scenario has four types based on the increasing trend of greenhouse gas emissions. According to the RCP 8.5 which is a business as usual scenario, if CO2 concentration reaches to 940ppm by the end of the 21 century, the temperature of the globe and Korean Peninsula would rise by 3.7℃ and 5.9℃, respectively, compared to that of1986-2005 period. Such scenarios are used effectively to minimizeimpacts on food production, pest eradication, water resource management, and changes in forest ecosystem and natural disasters,and prepare for future challenges.

New Climate Change Scenario

Climate change scenarios that are being produced in recent days are 100 times more specific than the existing ones. Now three types of scenarios were made depending on differentspatial domains: Scenarios for the globe, Korean Peninsula and South Korea.
In particular, South Korea climate change scenario representshow temperature and precipitation would change in each 1km x 1km grid square. Using those scenarios, we can take a closer look at the impacts of climate change oneach city/county/district, as well as Eup/Myeon/Dong.

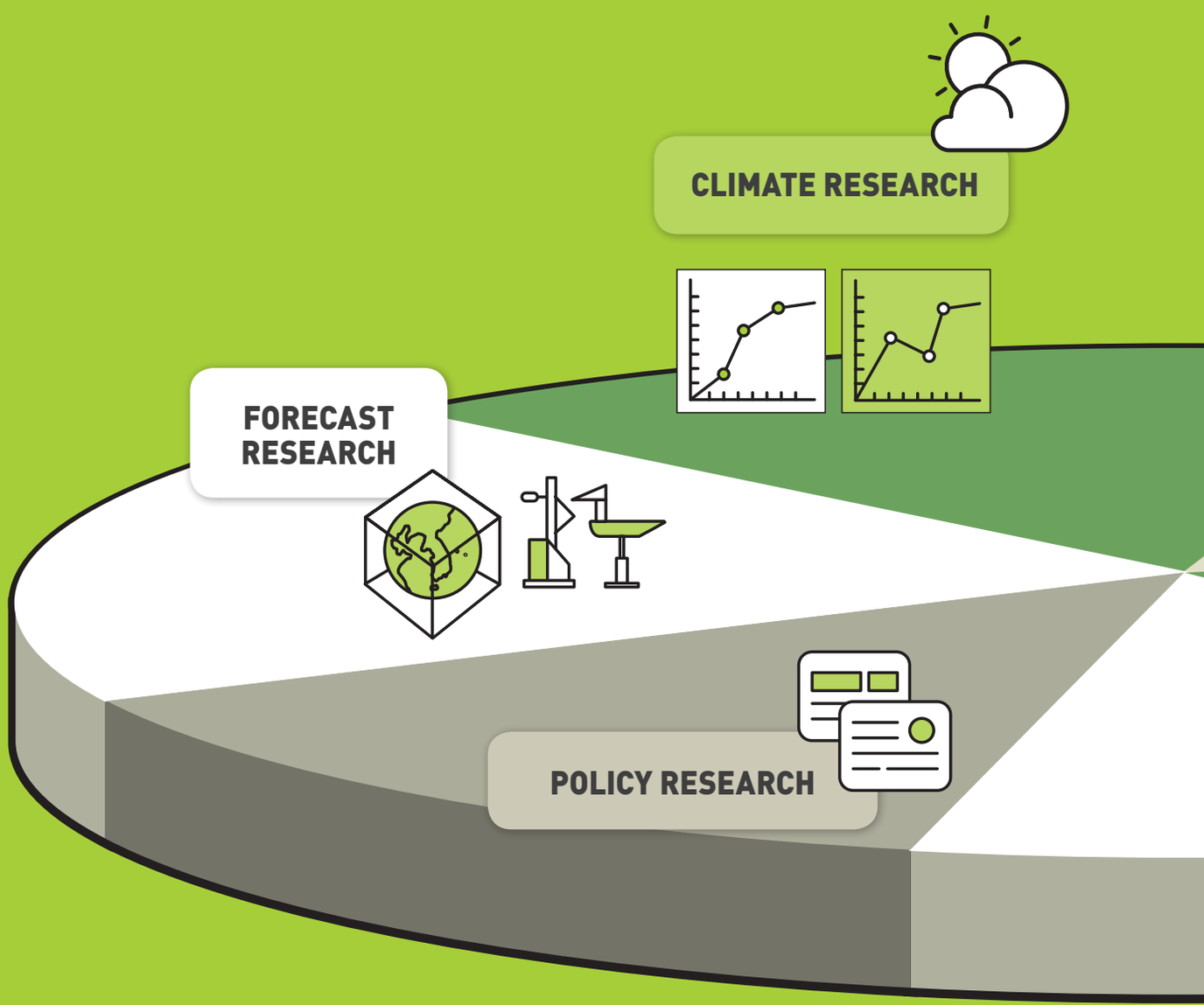
Carbon Tracking System

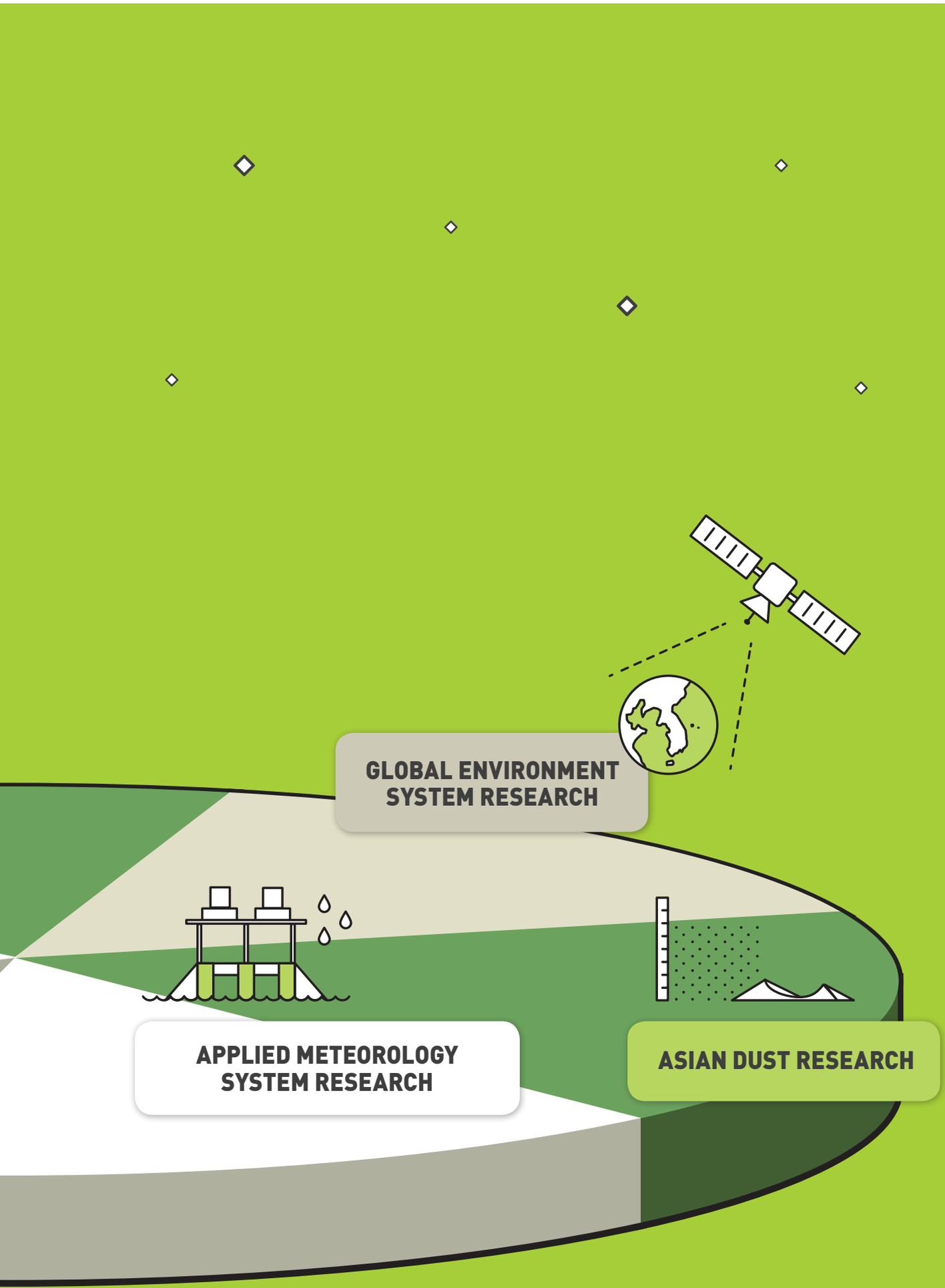
CO2 is one of the main causes of climate change. Carbon tracking system enables us to find out where and how much CO2 is being produced and absorbed by tracing the path of CO2 movement. It also secures the foundation, enabling the global community to verify carbon dioxide reduction activities.

Virtual Resource Map

Wind/solar power resource map illustrates which area gets more sun and wind. It is a special and important map, showing our natural resource distribution. The map also provides information about the best place to build wind and solar power plants and serves as grounds to determine the type of generator to establish. In other words, it gives us important scientific information in generating new renewable energy, replacing fossil fuels.

METEOROLOGICAL RESEARCH




GLOBAL ENVIRONMENT
SYSTEM RESEARCH
APPLIED METEOROLOGY
SYSTEM RESEARCH
ASIAN DUST RESEARCH

MAJOR ACHIEVEMENTS OF NATIONAL INSTITUTE OF METEOROLOGICAL RESEARCH (NIMR)

Economic value assessment of spring precipitation

The NIMR analyzed a total of 12 precipitation cases of April in the pastthree years (2009-2011) and found out that spring precipitation is worth as much as at least 21.76 billion won per 1mm (Worth of approximately 700 million and 20.56 billion won in terms of water resource security and air quality improvement, respectively). In addition, spring precipitation can prevent forest fires during the dry spring season. If rainless days last longer, the economic value of spring precipitation increases.

Technology development for erratic weather forecast

The NIMR has developed FAS (Forecaster's Analysis System), forecasting specific weather conditions for the next 20 minutes on every hour with 5-km resolution, to give accurate and quick forecast on erratic weather.This system made it possible to provide real-time town weather forecasts and very short-range forecasts since June 2010.

Forecasting socio-economic impacts of meteorological disaster

Going beyond regular weather forecasts, the NIMR conducts research on forecasting of direct and indirect socio-economic impacts of natural disasters, such as torrential rain or heavy snowfall, for the purpose of disaster prevention.

3D Earth Environment

The NIMR displays research results from different fields, such as weather, climate, marine weather and earth quake, on the globe in three dimensions. The results are illustrated close to the reality for easy and better understanding about weather and climate.

Sea and Arctic Sea Ice Monitoring

The NIMR carries out real-time monitoring on global ocean with ARGO (Array for Real-time Geostrophic Oceanography), observing the flow of ocean currents and marine weather to accumulate high quality marine observationdata. It also develops technology that can distinguish physical characteristics (water/ice) of ice on the Arctic sea through earth observation satellite and predicts when the Arcticsea ice reaches minimum extent, in order to provide information for the economically efficient use of an Arctic Ocean route.

Artificial Rain/Snowfall & Fog Dissipation Technology Development

The NIMR develops weather modification technology including artificial rain/snowfall and fog dissipation to support PyeongChang 2018 Winter Olympics and to reduce damages from drought and fog.

Hydrometeorlogical Technology Development

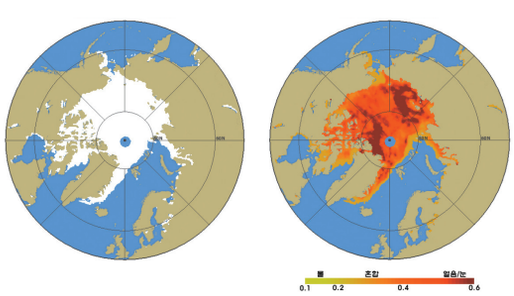
To strengthen response capacity to floods and drought, the NIMR designated Nakdong River Basin as a pilot area to develop technology, generating hydrometeorlogical information, including soil moisture, underground water level and runoff, andanalysis technology on impacts of water environmental changes on the weather.

Evaluation of Land Development Impacts on the Weather

The NIMR develops and provides a system to evaluate what impacts large-scale land development -- such as urban renewal, new town development, dam construction, and consequent changes on the surface of the land -- have on the weather and climate in the region.

Study on Meteorological History of the Korean Peninsula

The NIMR finds out weather·climate events throughout the history of the Korean Peninsula. This data serves as important basics to study on the weather and climate change in the Korean Peninsula. It published 《Meteorological Records including Astronomical and Seismological Records ①》 from 《SAMGUK SAGI (History of the Three Kingdoms)》 and 《SAMGUK YUSA (Memorabilia of the Three Kingdom)》. The NIMR also released 《History of Korean meteorology》, containing South Korea's weather observation history ranging from the Three Kingdom Period to modern times, and it continues to study on the weather history, such as by restoring the inscription of Rain Gauge Pedestal in Changdeok Palace.



- TRAINING & EDUCATION FOR DEVELOPING COUNTRIES
- PROJECTS TO SUPPORT DEVELOPING COUNTRIES WITH TECHNOLOGIES AND INFRASTRUCTURE
- NATIONS WITH MOU
- COUNTRIES SUPPORTED WITH KMA'S NWP DATA
- COUNTRIES WITH KMA'S DISPATCHED EXPERTS

TRAINING & EDUCATION FOR DEVELOPING COUNTRIES

TRAINING COURSE FOR FOREIGN FORECASTERS (1998~2005)

KOREA-ASEAN TRAINING WORKSHOP
TRAINING COURSE TO IMPROVE WEATHER SERVICES USING ICT (2006~)

CAPACITY BUILDING FOR CLIMATE PREDICTION EXPERTS (2006~2008)

TRAINING COURSE ON NWP (2007~)
TRAINING COURSE ON COMS DATA ANALYSIS (2007~)

CAPACITY BUILDING ON DISASTER PREVENTION IN AFRICA (2009~)

TRAINING COURSE FOR OPERATORS OF YELLOW DUST OBSERVING NETWORK IN KOREA AND CHINA (2010~)

TRAINING COURSE ON RADAR OPERATIONS AND DATA APPLICATIONS (2012~)

PROJECTS TO SUPPORT DEVELOPING COUNTRIES WITH TECHNOLOGIES AND INFRASTRUCTURE

KOREA-CHINA JOINT OBSERVING NETWORK FOR SDS (CHINA, 2003~2008)

PC CLUSTER NWP SYSTEM IN SRI LANKA (SRI LANKA, 2005)

EARLY WARNING SYSTEM FOR DISASTER PREVENTION, PROJECT TO DEAL WITH HIWS (PHILIPPINES, 2007~2008, 2010~2012)

MODERNIZATION ON DATA MANAGEMENT AND CLIMATE DATA RESTORATION (MONGOLIA, 2008~2009)
LOCAL CLIMATE CENTER FOR EASTERN AFRICA (2009~2012)

TYPHOON ANALYSIS AND FORECAST SYSTEM (VIETNAM, 2010~2012)

SATELLITE DATA RECEIVING SYSTEM (SRI LANKA, 2010~2012)

INTERNATIONAL COOPERATION

NATIONS WITH MOU

JAPAN(1985), CHINA(1994), AUSTRALIA(1995), RUSSIA(1999), USA(2000), GERMANY(2000), MONGOLIA(2003), ASEAN(2005), IRAN(2005), EUMETSAT(2006), PHILIPPINES(2007), VIETNAM(2009), ICPAC(2010), INDIA(2010), HONG KONG(2012), UK(2012), INDONESIA(2012)

COUNTRIES SUPPORTED WITH KMA'S NWP DATA

MONGOLIA, HONG KONG, PHILIPPINES, VIETNAM, CAMBODIA, THAILAND, LAOS, MYANMA, BANGLADESH, BUTAN, NEPAL, KYRGYZSTAN, KAZAKHSTAN, UZBEKISTAN, PAKISTAN, IRAN, BAHRAIN, OMAN

COUNTRIES WITH KMA'S DISPATCHED EXPERTS

ADVISORS

- KENYA(2010~2011), MONGOLIA(2010~2013), VIETNAM(2010~2013), MALAYSIA(2011~2012), UZBEKISTAN(2012~2013)
- WMO RAP
- GEO SECRETARIAT
- SEJONG ANTARCTIC RESEARCH STATION

GLOBAL LEADERSHIP IN INTERNATIONAL ORGANIZATIONS

Designated as the WMO Lead Centre for Long-Range Forecast

The KMA was designated as the WMO Lead Centre for Long-Range Forecast. The WMO Lead Centre for Long-Range Forecast standardizes the global climate prediction data; develops a new prediction method and regularly provide various data for WMO member countries. In other words, the KMA is playing a central role in climate prediction on the global stage.

Hosted GISC in Seoul

The KMA hosted GISC Global Information System Center Seoul as the 6th administration in the world after Germany, China, Japan, the United Kingdom, and France. GISC is a hub center for data exchange and distribution for WMO member countries. With the KMA's hosting GISC-Seoul, South Korea now plays a central role in providing data, related service and core technology, based on its advanced IT and meteorological technology.

Playing a major role in IPCC

IPCC Intergovernmental Panel on Climate Change is a scientific intergovernmental body that accesses the scientific·technical information produced worldwide relevant to the understanding of climate change and come up with global measures. South Korea produced the Vice Chair of the IPCC for the first time in 2008, and since then it has actively participated in its decision making process by joining task force team and executive committee activities. In addition, the 32nd session of the IPCC in 2010 was successfully held in South Korea.

Presidency of the Commission for Agricultural Meteorology of WMO

South Korea has held the presidency of the Commission for Agricultural Meteorology, which is one of the eight technical commissions of WMO. Its presidency means that the nation now plays a leading role in supporting disaster response and food security to mitigate climate change impacts in the world. It also indicates the higher expectations from the international community and elevated status of South Korea on the global stage.

Member of ESCAP/WMO Typhoon Committee

The Typhoon Committee is an intergovernmental body established in 1968 under the UN Economic and Social Commission for Asia and the Pacific ESCAP and the World Meteorological Organization WMO. South Korea, as one of the founding members of the Committee, has attended the annual TC session to exchange technology and knowledge about typhoon prediction and disaster prevention. At the 44th TC session in 2012, the KMA was awarded ""Kintanar Award"", presented every year to organizations for their dedicated effort in mitigating risks of typhoon-caused disasters.

Joint International Research

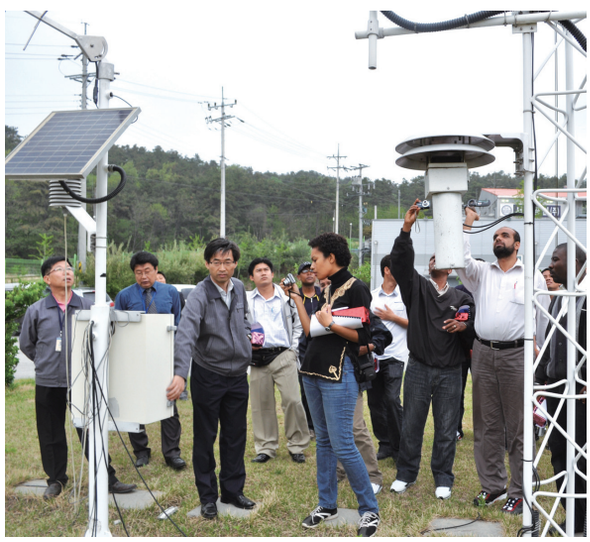
The KMA participates in several international research projects such as CMIP5 Coupled Model Intercomparison Project 5 and CORDEX COordinated Regional Climate Downscaling Experiment. It is also a member of the international ARGO research project, established by the WMO and UNESCO-IOC (Intergovernmental Oceanographic Commission) to build a global real-time system for ocean monitoring network, andto observe global precipitation, it participates in the joint international research for ground verification of GPM Global Precipitation Measurement, which is joined by many countries centered on NASA (National Aeronautics and Space Administration) and JAXA (Japan Aerospace Exploration Agency). In addition, the KMA takes part in several joint research: research for examination and prediction on impacts of heat waves on health with the United States; improvement of the microscaleweather observation data assimilation system and development of point prediction system for meteorological resource analysis with NCAR (National Center for Atmospheric Research) and software development for climate map based on urban area-focused climate data analysis and assessment with Germany.

Elected as a Member of WMO Executive Council Twice in a Row

The WMO Executive Council (EC) is the key body of the organization, directing and coordinating various programs and the utilization of budgets to lead international meteorological policies. The Administrator of the KMA was elected as a member of the WMO EC in 2007 for the first time in 51 years since South Korea's joining the organization as the 68th member in 1956. The next Administrator also succeeded in retaining the post for the second time in a row in 2011, playing a leading role in the international community.

Training and Support Expansion for Developing Countries

The KMA has started to deliver training course for developing countries since 1998. From 1998 to 2012, the course was joined by a total of 548 people from 56 countries including the Philippines, Vietnam, Sri Lanka, and African countries. The KMA also carried out projects to support meteorological technology and infrastructure for 16 countries including Mongolia and the Philippines to mitigate damages of meteorological disasters. Such supporting projects for developing countries will help South Korea to enhance its contributions to the international community and expand opportunities for local private meteorological businesses to advance into foreign markets, leading to opening a new export channel for local meteorological equipment.



METEOROLOGICAL INDUSTRY

Size of Meteorological Market ›


2015
500 million

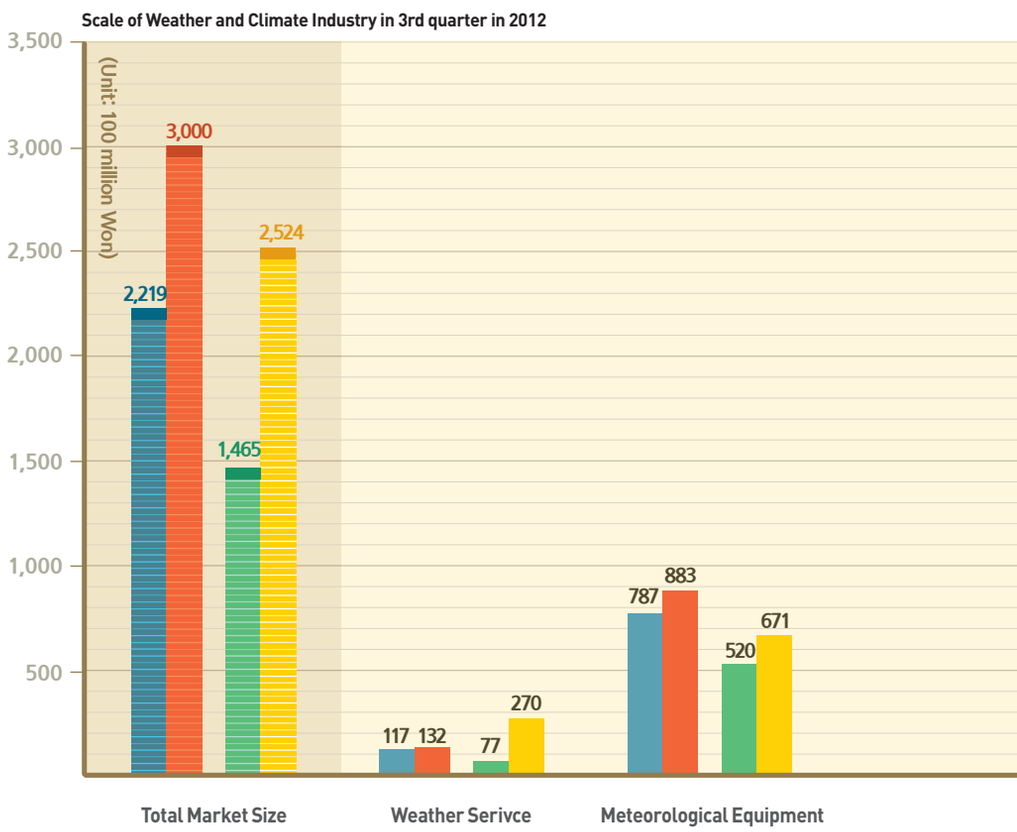
METEOROLOGICAL INDUSTRY

Institutional Foundation for the Weather Industry Promotion

In 2009 "Weather Industry Promotion Act" was enacted and implemented to support and foster the weather industry for the purpose of laying the foundation for the development of the weather industry. Korea Meteorological Industry Promotion Agency (KMIPA) was established to bridge between the KMA and weather business operators.

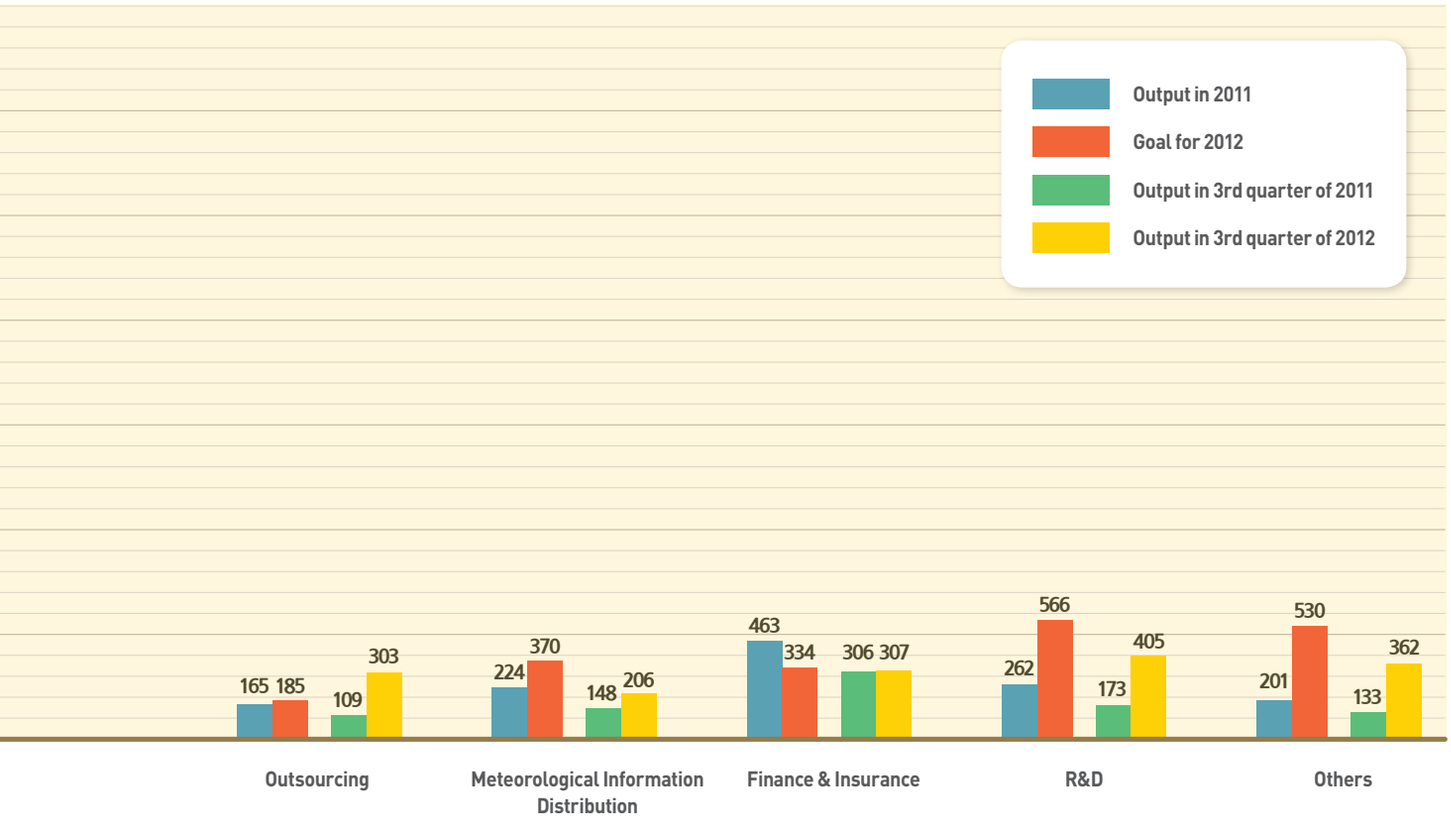
Support for Private Weather Services

The Weather Business Operator System has operated since 1997 to enable private businesses to provide customer-oriented weather information. Implementation of ""Weather Industry Promotion Act"" since 2009 segmented the weather industry into weather prediction business, weather appraisal business, weather consulting business, and weather equipment business,and it enabled weather prediction operators to give weather forecast to general consumers (disaster prevention information such as severe weather alert can be issued only by the KMA). In addition, the KMA has established an equipment performance certification program and other legal grounds to support the weather industry to make inroads into foreign markets with competitive edge.

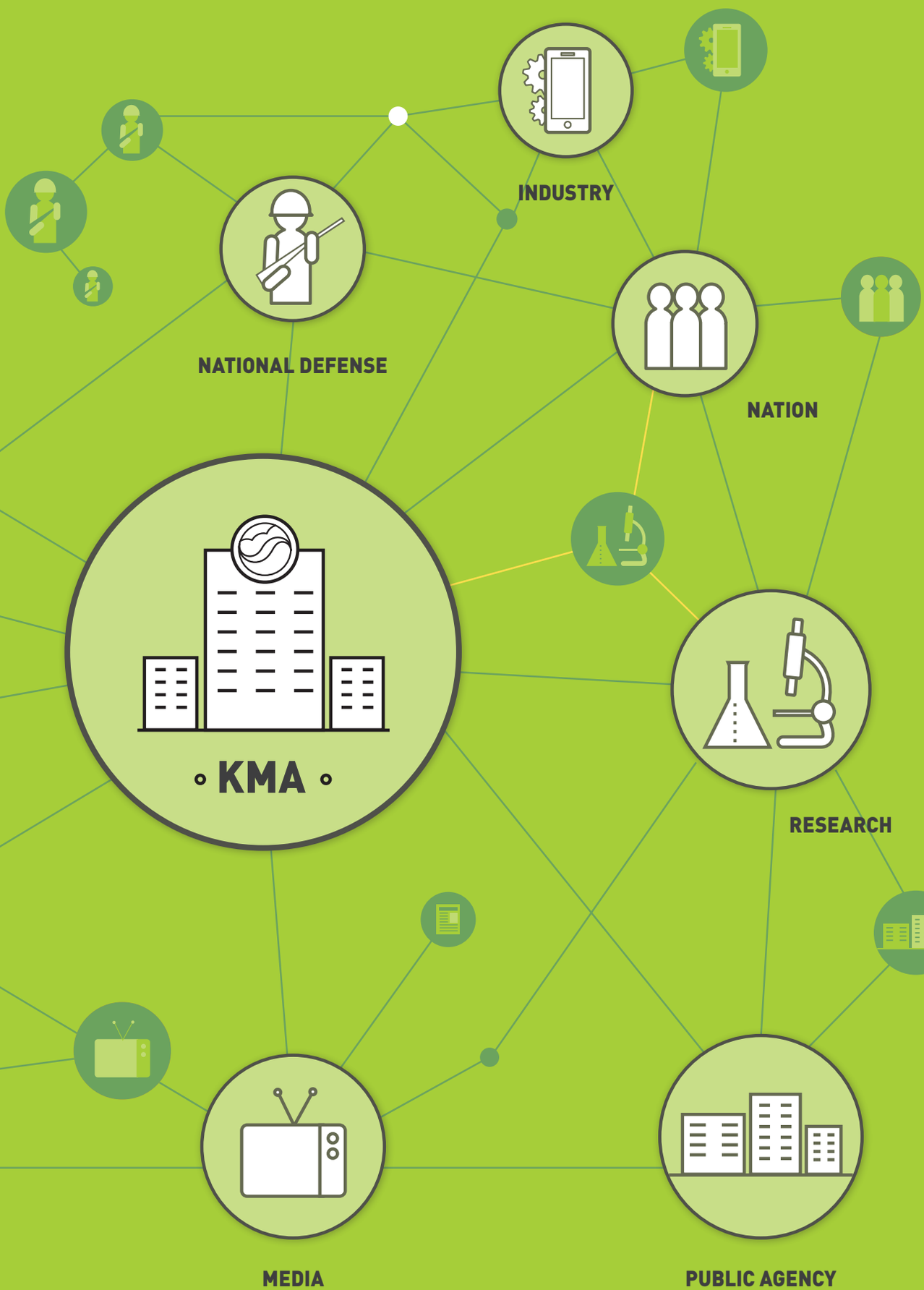


Fostering the Weather·Climate Industry

The KMA has implemented the ""Weather Management Certification System"" for the first time in 2012 to enable companies to create added value by utilizingweather information for their management and to certify companies that reduceddamages from weather events. Furthermore, various policy supports have been provided to increaseinvestment in R&D to manufacture weather equipment in South Korea and transfer weather technology to private operators. As a result, the weather and climate industry reached 300 billion won in its size and grew into approximately 380 billion won in 2013.



INTEGRATED ADMINISTRATION


INDUSTRY
NATIONAL DEFENSE
NATION
KMA
RESEARCH
MEDIA
PUBLIC AGENCY

CENTER

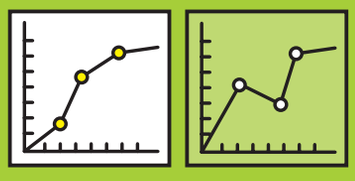

BAEKRYEONGDO
WEATHER STATION
CLIMATE CHANGE MONITORING CENTER IN
ULLEUNGDO/DOKDO
IEODO OCEAN RESEARCH STATION
CLIMATE CHANGE MONITORING CENTER
NATIONAL METEOROLOGICAL SATELLITE CENTER
NATIONAL METEOROLOGICAL SUPERCOMPUTER CENTER
WEATHER RADAR CENTER
NATIONAL TYPHOON CENTER

NATIONAL METEOROLOGICAL SATELLITE CENTER

WEATHER RADAR CENTER

NATIONAL TYPHOON CENTER

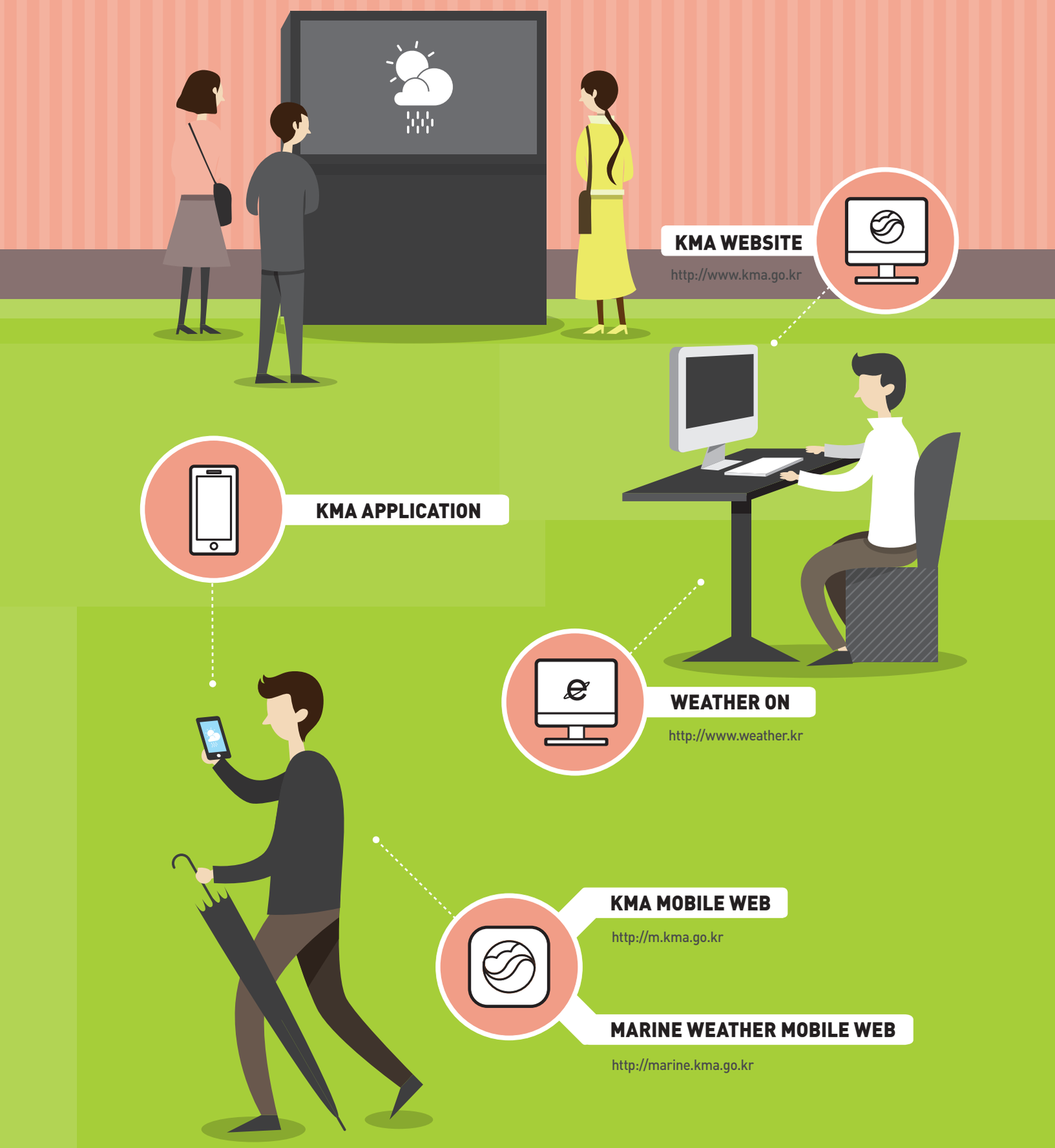
NATIONAL CENTER FOR METEOROLOGICAL SUPERCOMPUTER



KOREA GLOBAL ATMOSPHERE WATCH CENTER


SOCIAL NETWORKING SERVICE (SNS)
http://twitter.com/kma_skylove
http://twitter.com/kma_Weather
http://twitter.com/kma_earthquake
http://me2day.net/kma_skylove
http://me2day.net/kma_Weather
http://me2day.net/kma_quake
http://www.facebook.com/kmaskylove
131 METEOROLOGICAL CALL CENTER

SERVICE


KMA WEBSITE
http://www.kma.go.kr
KMA APPLICATION
WEATHER ON
http://www.weather.kr
KMA MOBILE WEB
http://m.kma.go.kr
MARINE WEATHER MOBILE WEB
http://marine.kma.go.kr

USING WEATHER / CLIMATE SERVICE

- Customized SMS Service
- Motion Sickness Index
- Main Uphill Path Weather Information
- Weekend Weather Forecast
- Weavigation Service
- Regional Service
  - Local Weather Officer
  - Local Climate Service
  - Marine Weather Radio Broadcasting Service
- Business and Industry Service
  - Weather Management Certification System
  - Space Weather Forecast·Alert Service
  - Multi-language Weather Information Service

Life·Health·Industry Weather Index

The KMA has developed different weather indices to help people's lives by using various meteorological data. Diverse information is provided to improve people's daily lives, health and industrial activities.

	Information	Service Period
Life Weather Index	Ultraviolet Index	March - November
	Food Poisoning Index	March - November
	Decomposition Index	March-November
	Discomfort Index	June-September
	Sensible Temperature	November-March
	Water Pipe Freeze Possibility Index	December-February
	Frostbite Possibility Index: December	February
	Air Pollution Dissipation Index: November	May
Health Weather Index	Flu Infection Index	September-April
	Asthma·Lung Disease Possibility Index	Throughout the year
	Stroke Possibility Index	Throughout the year
	Skin Disease Possibility Index	Throughout the year
	Pollen Concentration Index	April-May, September-October
Industry Weather Index	Agriculture Index	(2 Types)
	Agricultural Facilities	Throughout the year
	Pesticide Application	April-October
	Construction Index (4 Types)	Throughout the year Energy (4 Types)
	Heating Energy, Heating Degree Day	October-April
	Cooling Energy, Cooling Degree Day	April-October
Expiration Index	Frozen Dessert	April-October
	Items Except for Frozen Dessert	Throughout the year
	Expressway Weather Index	Throughout the year

KMA Korea Meteorological Administration

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KMA

KMA Korea Meteorological Administration