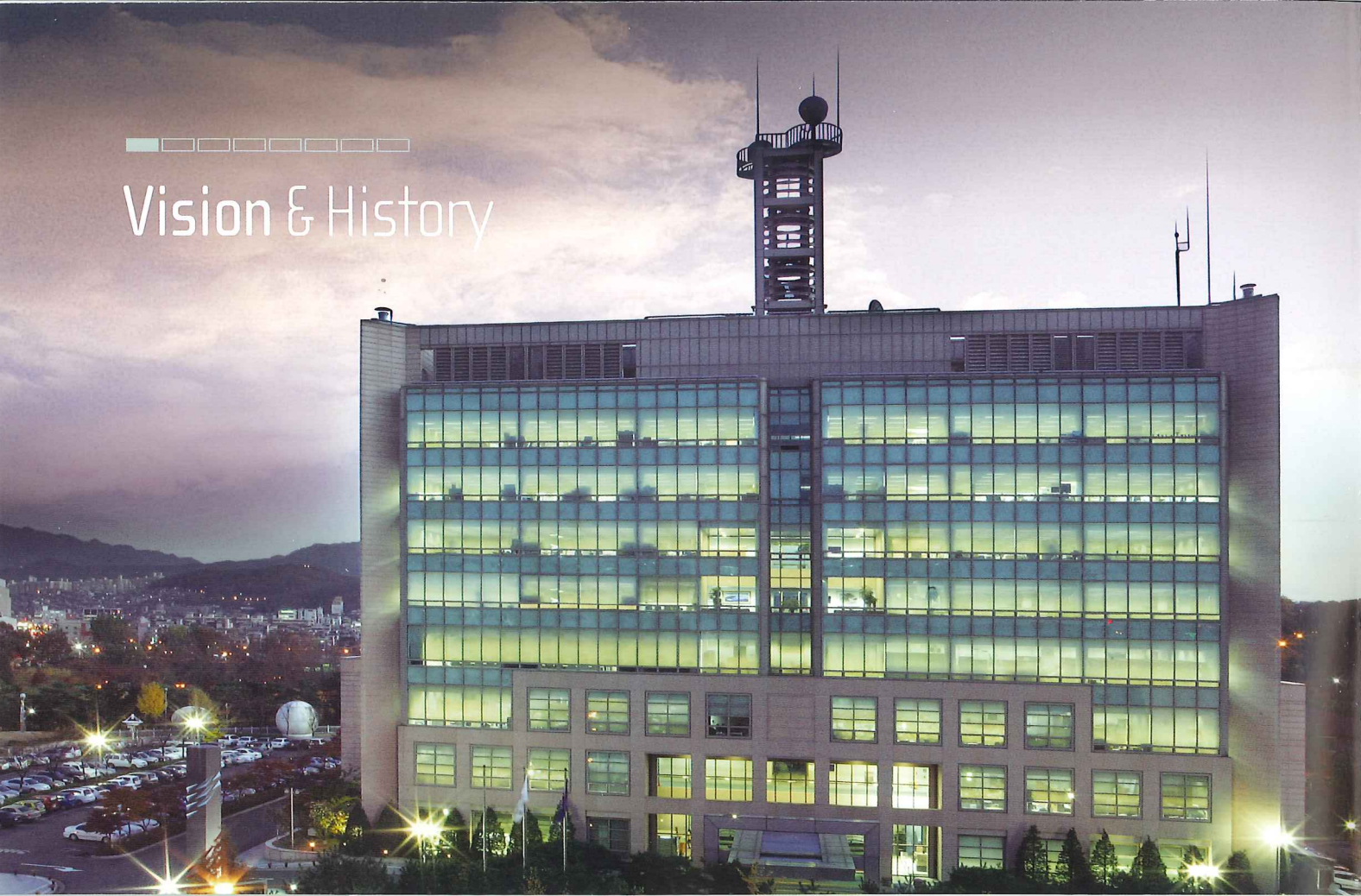


Korea Meteorological Administration

*Watching the sky friendly;
Serving the people faithfully*

Vision & History



Vision

World's Best 365

To provide prompt, accurate and valuable weather information 365 days all year round

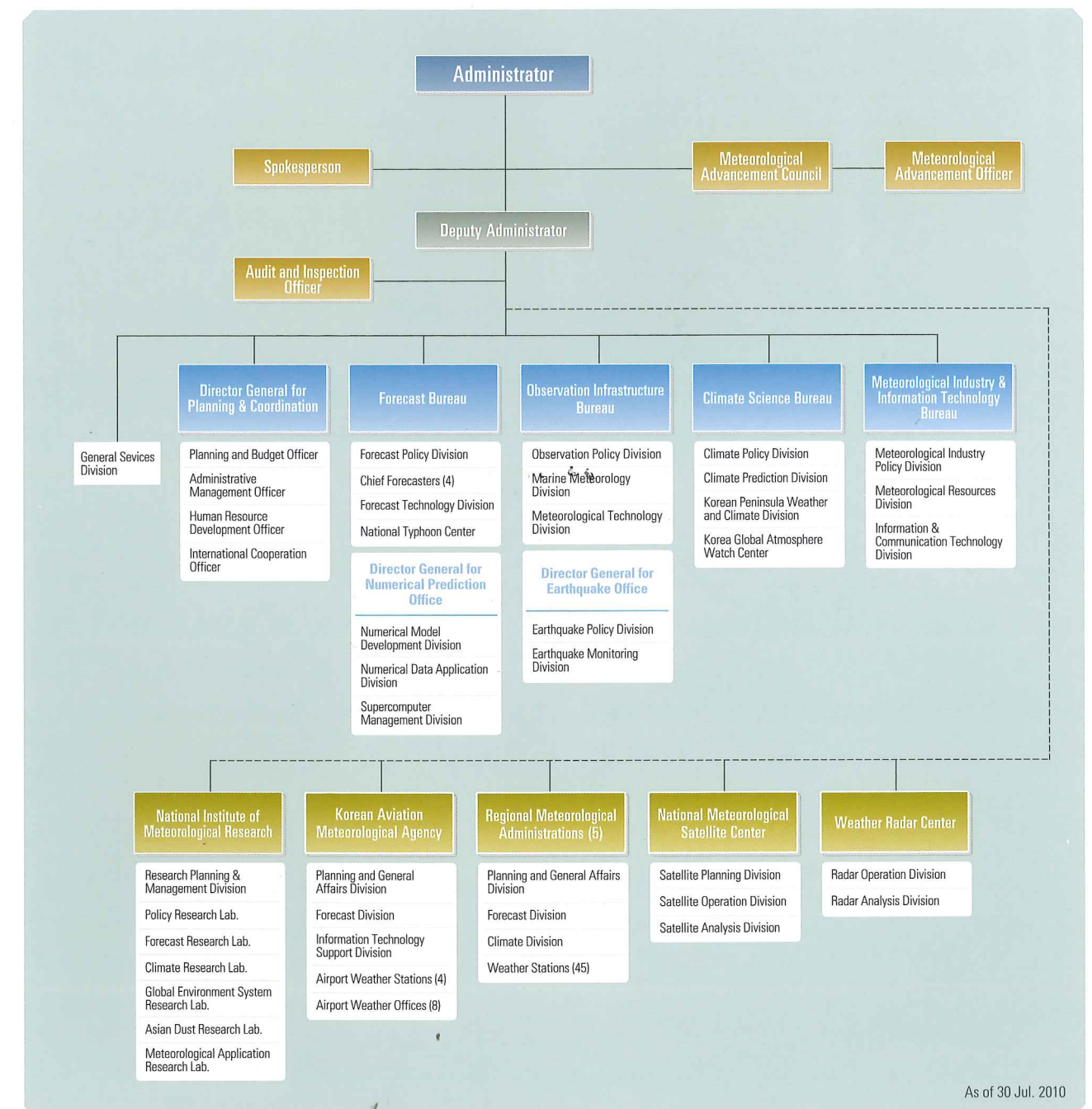


- Mar. 1904** Korea starts modern meteorological observation (Busan, Mokpo, Incheon, Wonsan, Yongampo)
- Aug. 1949** National meteorological service is established under the name "Centra Meteorological Office (CMO)"
- Feb. 1956** Korea joins the World Meteorological Organization (WMO)
- Jun. 1971** Dedicated Seoul-Tokyo international communication network is launched
- Apr. 1978** Meteorological Research Institute is established
- Dec. 1981** Organization is renamed "Korea Meteorological Service (KMS)"
- May 1985** Computer communication network is completed
- Jan. 1989** Meteorological observations begin at Sejong Base in Antarctica
- Dec. 1990** KMS is promoted to an Administration (renamed "Korea Meteorological Administration")
- Jul. 1993** Dedicated Seoul-Beijing international communication network is launched
- Jun. 1999** Supercomputer No. 1 is introduced
- Oct. 2004** Supercomputer No. 2 is introduced
- May 2007** KMA Administrator is elected to the WMO Executive Council
- Oct. 2008** Digital Forecast service is launched
- Jun. 2010** Communication, Ocean and Meteorological Satellite (COMS) is launched
- Oct. 2010** Supercomputer No. 3 is introduced

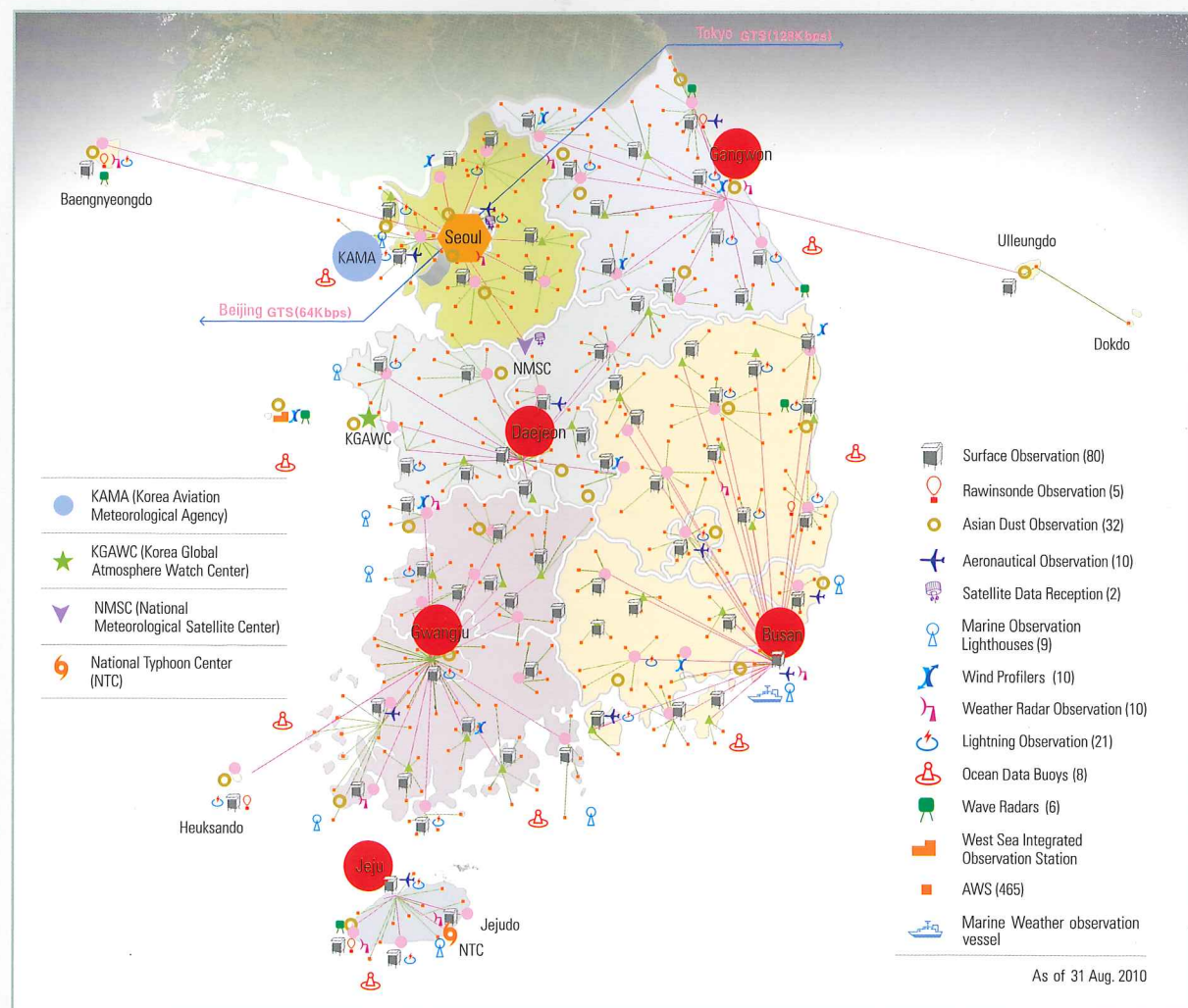
Function & Organization

The Korea Meteorological Administration conducts observations and analyses of meteorological phenomena and earthquake events on land and sea, and provides weather forecasts, warnings, weather data statistics, and industrial meteorological information. KMA also oversees research and development of meteorological technology and international cooperation with other weather services through the exchange of meteorological data and information with WMO Members. KMA's head administration consists of 1 deputy administrator, 1 vice administrator, 7 directors-general, 28 divisions, and 2 centers. Its subsidiaries include the National Institute of Meteorological Research (NIMR), 5 regional administrations (in Busan, Gwangju, Gangwon, Daejeon, and Jeju), the National Meteorological Satellite Center, the Weather Radar Center, and the Korea Aviation Meteorological Agency (KAMA). The total number of KMA staff is approximately 1,300.

Organization Chart



KMA operates a surface observation network consisting of 545 AWS sites, including 51 manned weather stations. KMA has also been operating three national intercomparison observatories at Chupungryeong, Boseong, and Gochang for the standardization of observation since 2008, an upper-air observation network consisting of 15 sites, a weather radar network with 10 sites, and an Asian Dust observation network with 32 sites. In addition, it operates 8 buoys, 9 lighthouses for marine observations, 6 wave radars and 1 marine observation vessel for marine weather observation. Furthermore, KMA manages the West Sea Integrated Observation Station at Bukkyeongnyeolbido in the West Sea, the Korea Global Atmosphere Watch Center at Anmyeondo, 49 seismic stations and 110 accelerometers.



» Meteorological satellite



» Rawinsonde observation



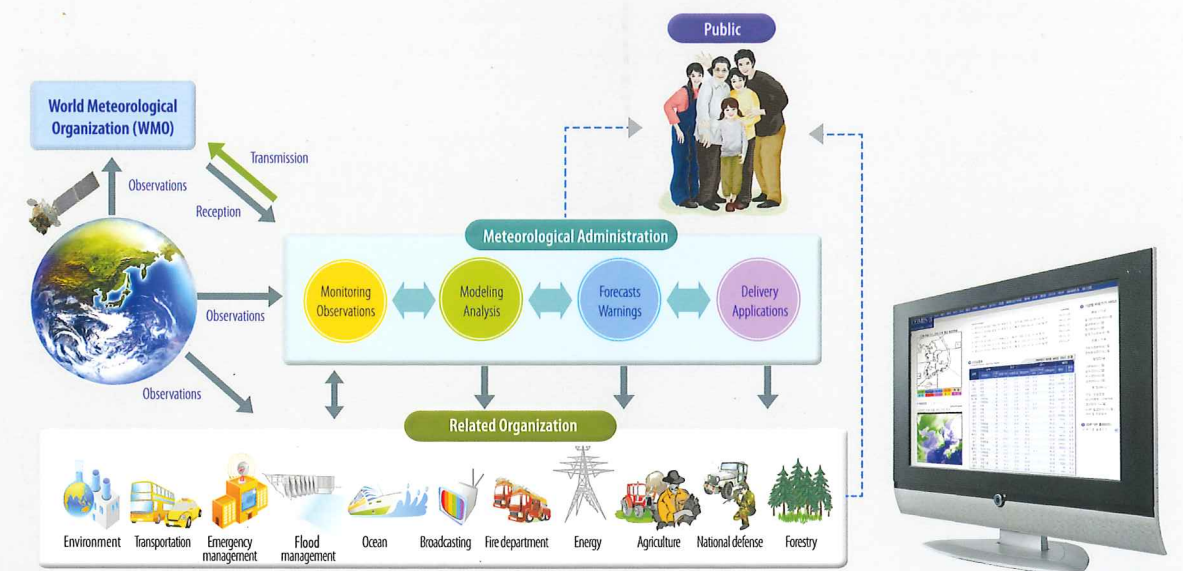
» Automatic weather station



>> Marine weather observation vessel

COMBINED
METEOROLOGICAL
INFORMATION SYSTEM

The Combined Meteorological Information System (COMIS) is KMA's system for collecting, processing, storing and disseminating the continuous flow of high-volume real-time data. This system enables the exchange of domestic and global (distributed via the Global Telecommunication System) surface, marine, upper-air, and satellite observations, all of which are used as initial data for numerical weather prediction models



Weather Forecast Services

Digital Forecast

The Digital Forecast service divides the southern half of the Korean Peninsula into approximately 3,500 sections, and provides detailed and quantitative 3-day forecasts in a variety of formats for 3-hour intervals. This digital service provides nationwide forecast at a resolution of 5km by 5km for convenient use and customization by users.

Forecast elements	Spot temperature, maximum temperature, minimum temperature, precipitation type, probability of precipitation, precipitation amount, snow depth, sky cover, humidity, wind direction, wind speed and wave height
Forecast period & intervals	3 days; 3-hour intervals
Forecast service areas	Inland and nearby sea areas, divided into 5km-by-5km grid squares

Weather Webcast 'Weather ON'

KMA's weather webcast "Weather ON" is Korea's sole weather-only broadcast. All "Weather ON" presenters are staff of the National Meteorological Center (NMC), ensuring round-the-clock broadcast for prompt and accurate weather services. Unlike regular TV weather reporting, "Weather ON" provides a unique service with weather coverage that includes discussion of the scientific basis for its weather forecasts. This accounts for the high viewer ratings the service has received. Since its launch in Jul. 2008, "Weather ON" has been developing into a medium for direct communication between KMA and the Korean public, and will continue to offer a variety of contents to help prevent weather disasters and raise awareness about meteorology.

131 Meteorological Call Center

KMA opened the 131 Meteorological Call Center for its Weather Forecast Information Telephone Service (131). Proficient operators are available at the center 24 hours a day seven days a week to provide weather consultation.



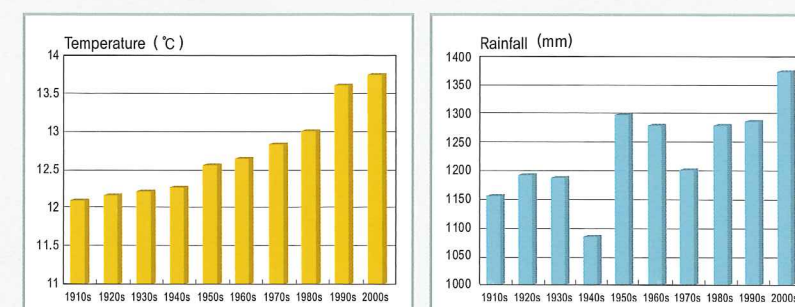
Climate

Climate Change

Climate Change on the Korean Peninsula

Temperature and precipitation

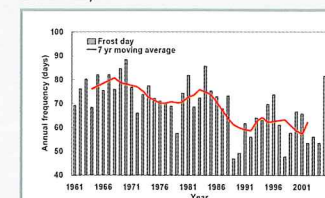
Analyses of observed temperatures from 6 stations (Seoul, Incheon, Gangneung, Daegu, Mokpo, and Busan) reveal an unequivocal warming trend at a rate of 1.7°C over the last 100 years. Precipitation amounts for the same period also show an increasing trend; however, the number of precipitation days has decreased, pointing to a gradual increase in localized downpours.



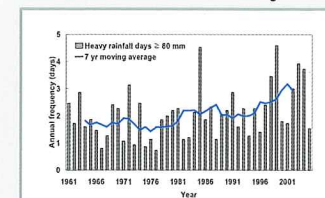
Extreme climate events

In the last 50 years, the number of days with heavy rainfall exceeding 80 mm/day and 150 mm/day has gradually increased, especially in the early 1980's and late 1990's. According to temperature extremes indices, the number of frost days has significantly decreased, by about 3.9 days/decade, while that of tropical nights has increased, by about 1.2 days/decade. Changes in temperature over the peninsula affect the duration of seasons, leading to longer summers and shorter winters.

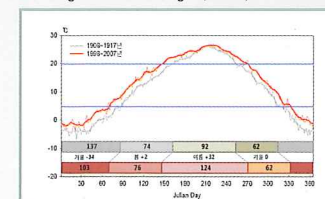
Frost days



Number of rainfall events exceeding 80mm



Change in season length (Seoul)



Climate change impact on the Korean Peninsula

Natural disasters are increasing in frequency and severity as a result of climate change. Precipitation has increased especially for summer monsoon season. Heavy rainfall exceeding 80mm/day increased by more than 2 times recently, which caused more frequent floods due to increased precipitation intensity. Changes in agricultural and forest ecosystems trigger a multiplication of pests and a shift in animal and vegetative habitats. The main producer of apples has now been replaced by a location further north, and subtropical butterfly species are increasingly found in northern regions. The sea surface temperature and sea levels have risen 0.2°C and 10-20mm in the past decade, respectively. Marine habitats are also reported to be altering. In the field of public health, death rates associated with excessive heat or epidemics are expected to increase.

Korea Global Atmosphere Watch Center (KGAWC)

The Korea Meteorological Administration began Global Atmosphere Watch (GAW) activities at Mt. Sobaek Meteorological Observatory (Danyang-gun, Chungcheongbuk-do) in 1995 to ensure a timely national-scale response to the pressing issue of climate change. This is the first site on the Peninsula for continuously monitoring the ambient atmosphere.

Technologies for observing climate change-inducing substances in the ambient atmosphere have seen brisk development since the relocation of the site to the island of Anmyeon-do in Taejeon-gun, Chungcheongnam-do (36°2'N, 126°9'E; 45.7m above sea level) in 1996 (Figure 1). The site has been renamed the "Korea Global Atmosphere Watch Center (KGAWC)" in 2008. At present, 36 parameters, including greenhouse gases, aerosols, ultraviolet radiation, ozone, and precipitation chemistry, are being measured at the Center.

The concentration levels for the five greenhouse gas (GHS) species observed at Anmyeon-do from 1999 to 2009, along with the NOAA/GMD (National Oceanic and Atmospheric Administration/Global Monitoring Division) global CO₂ concentration trends are shown in Figure 2. The CO₂ concentrations at Anmyeon-do are substantially higher than the global average. The average CO₂ concentration for the year 2009 recorded 392.5 ppm, an increase of 21.8 ppm (5.9%) relative to the annual average of 370.7 ppm for 1999, and 6.2 ppm higher than the global average of 386.3 ppm for the same year as documented by NOAA/GMD. The annual growth rate of CO₂ for the 11-year period from 1999 through 2009 was 2.2 ppm/year, higher than the global average of 1.9 ppm/year. In addition, the CH₄ and N₂O concentrations are increasing, while CFCs (CFC-11, CFC-12) exhibit a declining trend (Figure 2).

KGAWC was designated a regional station (station number: 47132) in 1998, and the Center has been actively engaged in international activities, participating in intercomparison events, organizing international workshops, and sharing data from WDCGG (World Data Centre for Greenhouse Gases). Thanks to its relatively pollution-free environment, KGAWC provides an ideal setting for observations that are geographically representative of the ambient atmosphere of Northeast Asia including the Korean Peninsula.

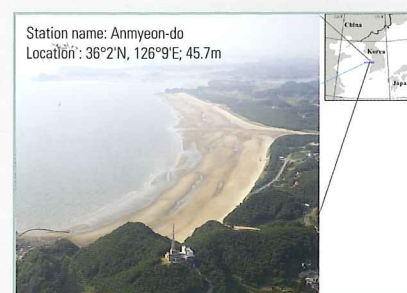


Figure 1. The Korea Global Atmosphere Watch center is located at the relatively Uncontaminated western coastal area.

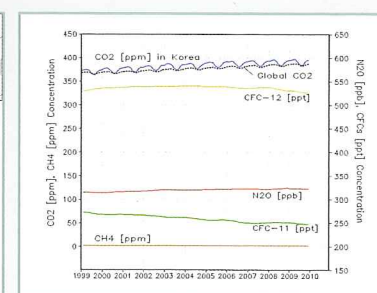
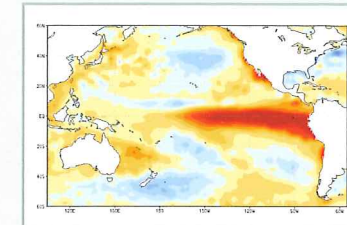


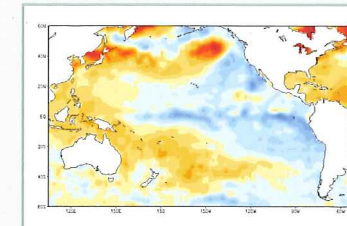
Figure 2. Annual averages of greenhouse gases (CO₂, CH₄, N₂O, CFCs) concentrations for 1999-2009 (CO₂ and CH₄ concentrations refer to axis on the left, while N₂O and CFCs refer to axis on the right).

Climate Prediction

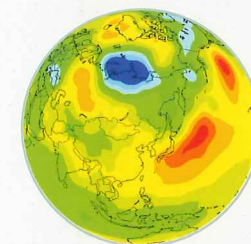
El Niño (1997-1998)



La Niña (2010)



El Niño(La Niña) episodes feature the development of abnormally warm(cold) sea surface temperature across the eastern tropical Pacific.



Mean sea level pressure anomalies for the summer 2010

Climate Monitoring and Prediction

Given the growing demand for climate prediction across sectors, including the society, economy, industry and culture, KMA has developed a climate monitoring and prediction system to detect the development of El Niño/La Niña and subsequent changes in global and regional climate and to prepare against natural disasters.

Long-range forecast and El Niño prediction system are operated in KMA supercomputing system, and the climate monitoring and prediction information are released to the public and the competent authorities regularly and timely for their understanding of current condition and for better measures to mitigate possible disasters caused by abnormal climate.

WMO LC-LRFMME

KMA has established and is operating the WMO Lead Centre for Long-Range Forecast Multi-Model Ensemble (LC-LRFMME; <http://www.wmolc.org>) in collaboration with the National Centers for Environmental Prediction (NCEP, USA). LC-LRFMME aims to provide a conduit for sharing global predictions with WMO members and to develop advanced climate prediction techniques for more reliable climate predictions.

National Climate Change Scenarios

KMA's National Institute of Meteorological Research (NIMR) has contributed to the 4th Assessment Report (AR4) of the IPCC by producing and providing global climate data to the IPCC Data Distribution Center. It is also developing high-resolution climate change scenarios, assessing climate change impact on various sectors such as agriculture, water resources, and health, and providing information for decision-making to the relevant ministries. NIMR will continue to contribution to the assessment of climate change impact and decision-making for climate change countermeasures at the national level by creating national climate change scenarios based on the new GHG scenarios of AR5.

APEC Climate Center



The APEC Climate Center (APCC) was established in 2005 with consensus of the APEC member economies to set up an institutionalized communication channel for more effective exchanges of regional climate information within the APEC region.

The APCC mission is to enhance the socio-economic well-being of member economies capitalizing on up-to-date scientific knowledge and innovative climate prediction techniques through:

- Developing a value-added reliable real-time climate prediction system, through a state-of-the-art multi-model climate prediction system utilizing model predictions from member economies;
- Acting as a center for climate data and related information with open access to member economies;
- Helping build the capacity of member economies for producing and using reliable climate predictions;
- Developing improved methods of utilizing socio-economic innovation to mitigate and adapt to climate variability and change and guide member economies towards optimum utilization of APCC climate predictions.

International Cooperation

Multilateral Cooperation

Given the transboundary nature of weather, cooperation among nations in meteorology is not a matter of choice. Every nation is contributing to the development of global meteorological services through WMO-coordinated international cooperation. In addition to cooperative initiatives of WMO, the Korea Meteorological Administration (KMA) is actively engaged in multi- and bilateral cooperative endeavors.

● Cooperation with the World Meteorological Organization (WMO)

KMA has remained an active participant in efforts to assist WMO in improving meteorological technologies for a safer world, and has been expanding its contribution to WMO Programmes under the WMO framework in keeping with its increasing visibility in the international community. Former and current KMA Administrators and Permanent Representatives of the Republic of Korea with WMO were elected to the WMO Executive Council (EC).

KMA has hosted many significant WMO events, including:

- The 12th session of Regional Association II (Asia) in 2000;
- Extraordinary session of the Commission for Basic Systems in 2006;
- The 15th session of the Commission for Atmospheric Sciences in 2009;

KMA is a dedicated participant in the following WMO Programmes:

- WMO pilot and demonstration projects for Regional Association II and the World Weather Watch Programme, GPC, LC-LRFMME;
- WMO CBS, CIMO, CAS, CAeM, CAgM, JCOMM, CCI, CHy, ICAO, IOC, TC, ITSU, IPCC, UNFCCC, GEO



» Fifteenth session of the Commission for Atmospheric Sciences (Nov. 2009; Incheon)

Bilateral Cooperation

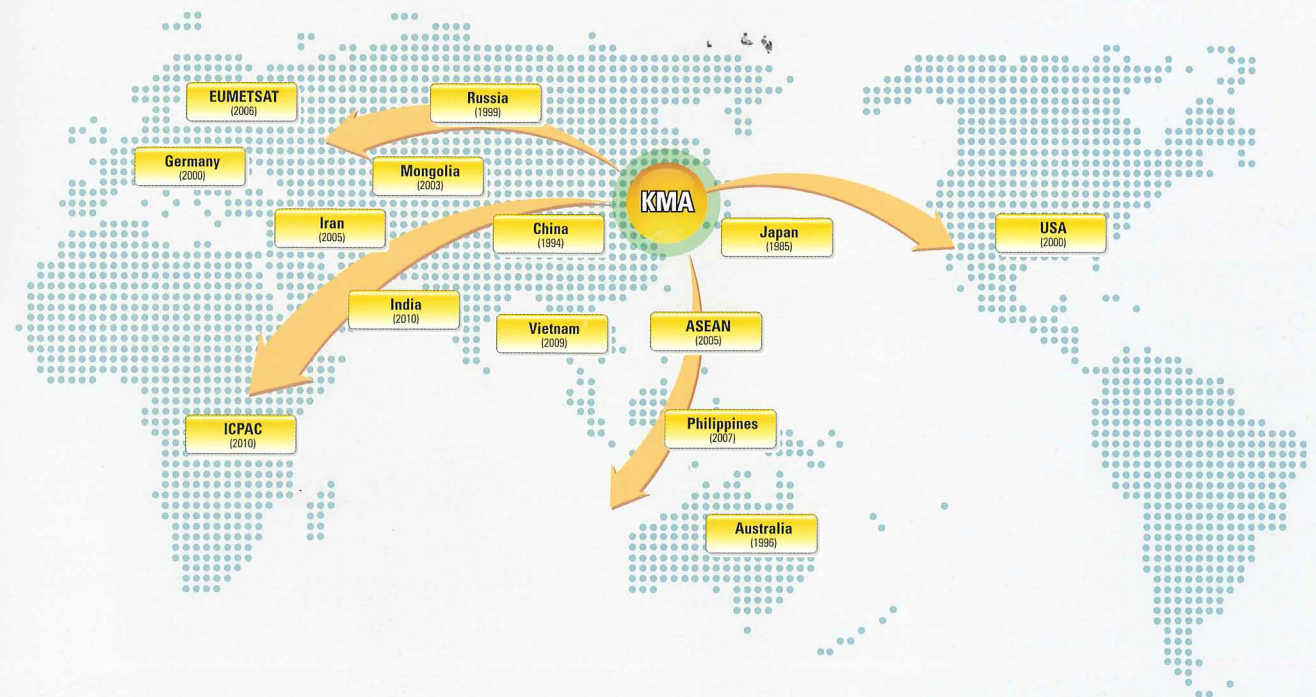
In addition to its active role in WMO activities, KMA has expanded its bilateral cooperation with other countries. KMA has signed arrangements on bilateral cooperation in meteorological activities with 14 countries, including China, Russia, Australia, the USA, and Germany.

KMA established a formal linkage with the ASEAN Sub-Committee on Meteorology and Geophysics (SCMG) in August 2005, when both sides signed an arrangement to promote and strengthen mutual cooperation in meteorological activities. KMA also signed an MoU with 10 East African countries in April 2010 to cooperate in the field of climate variability and change adaptation technologies mainly through the channel of the Intergovernmental Authority on Development Climate Prediction and Applications Centre (ICPAC). KMA plans to renew an earlier MoU with EUMETSAT, signed in November 2006, to further facilitate exchange of satellite data and products and cooperate in the field of meteorological satellites and satellite meteorology, following the successful launch of COMS in June 2010.

The earthquake services of the three Northeast Asian neighbors - KMA, CEA (China Earthquake Administration), and JMA (Japan Meteorological Agency) - have been strengthening their partnership through high-level meetings on the mitigation of earthquake impact since 2004. KMA further contributes to global efforts to prevent earthquakes and tsunamis through its participation in a number of intergovernmental mechanisms.



» ① MoU exchange between KMA and ICPAC
» ② Fourth bilateral meeting between KMA and NAMEM of Mongolia



International Cooperation

Technical Development Assistance Program

With the Republic of Korea continuously growing in national potential and economic power, KMA has also been enhancing its visibility in the international community by collaborating in the development of new meteorological technologies and by supporting activities for developing countries, especially the Least Developed Countries (LDCs).

KMA's assistance for developing countries primarily takes the form of programs such as project aid, training, and overseas volunteer missions, co-sponsored by the Korea International Cooperation Agency (KOICA).

KMA will provide expertise support for the \$3 million KOICA project 'Establishment of an Early Warning and Response System for Disaster Mitigation in Metro Manila (Pasig-Marikina River Basin)' from 2010 to 2012.



» Signing of MoU between KMA and Vietnam's NHMS

PROGRAM	COUNTRY
Building an Early Warning System for Disaster Mitigation	Philippines
Regional Climate Framework in Eastern Africa to Support Adaptation to Climate Change	Africa
Weather and Climate Impact on Community Health and Public Health Services	Africa
Project on NHMS Modernization	Vietnam
Regional Model/Data Rescue/Sand Dust Monitoring Network	Mongolia

Education and Training Programs

KMA involvement in KOICA training programs started with the 1998 Training Course on Weather Forecasting for Operational Meteorologists, which was succeeded in 2006 by the Training Course on Information and Communication Technologies (ICT) for Meteorological Services. The ICT course aims to share with developing countries the knowledge and expertise accumulated by KMA in the course of developing its weather services based on Korea's advanced ICT.

Other notable KMA-organized courses include the workshop on meteorological disaster responsiveness for African countries for improved countermeasures to high-impact weather and climate change, the Climate Prediction Expert course for the acquisition of innovative techniques on climate prediction for operational use, and Advanced Analysis of COMS Data for enhancing understanding of products from various meteorological satellites, including COMS, for improved analysis and forecasting. KMA will continue to expand such contributions in the future.



» Training Course on Advanced Analysis of COMS Data



» Training Course on ICT for Meteorological Services

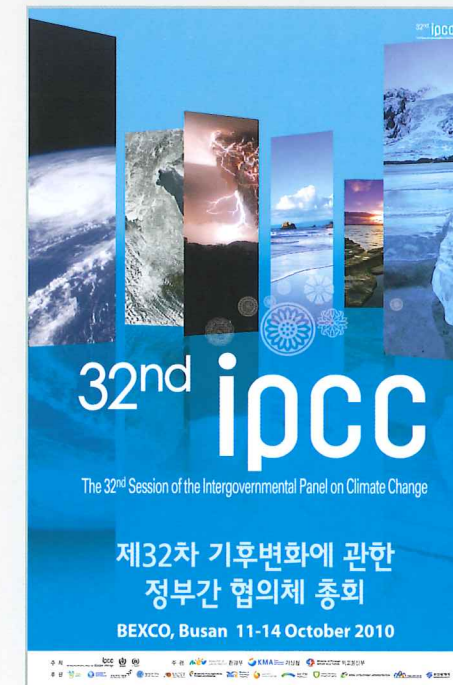
32nd Session of the IPCC

KMA's campaign to attract the 32nd session of the IPCC to Korea to raise the nation's visibility in global climate change initiatives and to realize a low-carbon society through Green Growth has been successful. The 32nd session of the IPCC is scheduled to be held on 11-14 October 2010 in Busan, Korea.

The event will help KMA build upon IPCC reports that provide scientific discussions on climate change to stimulate communication between ministries, other government institutions, and the public, and upon improved administrative efficiency to play a central role in government-wide efforts to realize Low Carbon Green Growth.

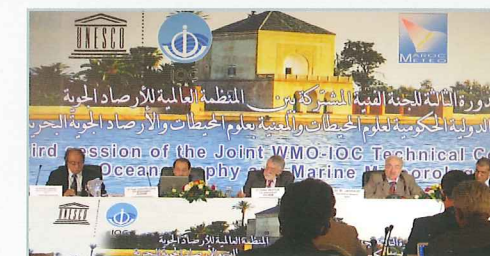
IPCC sessions are regularly attended by over 450 government officials, experts, and NGOs from 190 countries. The 32nd session will consist of reviews and discussions for the next IPCC assessment report, which will study climate change trends, identify factors, evaluate ecological and socio-economic impacts of climate change, and analyze countermeasures and strategies.

Recognizing the importance of the IPCC assessment report, KMA has been publishing its Korean version. KMA is making a significant contribution to the nation's crosscutting climate change countermeasures and Green Growth strategies by raising awareness about the man-made nature of climate change and its urgency to the global community.



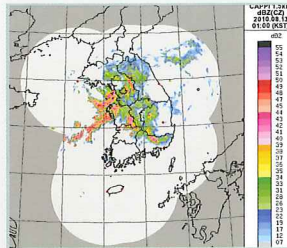
4th Session of the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM-IV)

KMA will also host JCOMM-IV in 2012 in Yeosu, Korea. JCOMM-IV will be held in conjunction with the Yeosu World Expo (12 May-12 Aug.), and is expected to attract world-class scholars in oceanography and marine meteorology from over 100 countries.



Center for Special Mission

Weather Radar Center

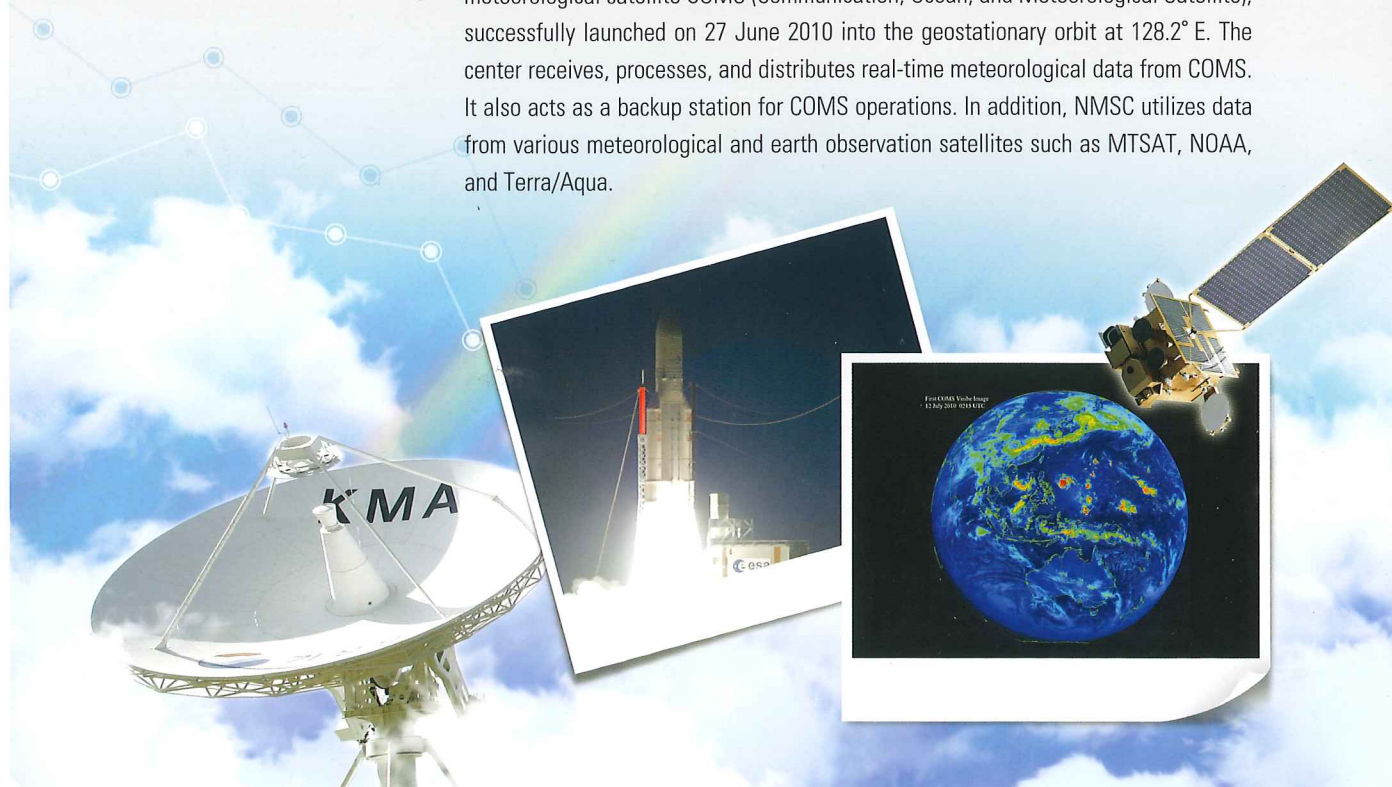


The increasing frequency of high-impact weather (HIW) events such as localized downpours and typhoons, possibly associated with global warming has greatly stimulated the community's need and demand for reliable weather information. As a result, there is a growing emphasis on radar data, which are used not only for real-time HIW monitoring but also as input data for numerical prediction and hydrological models. There is accordingly a particularly pressing need to have in place an optimal radar operation framework so as to maximize the accuracy of radar observations. The Weather Radar Center (WRC) was established in April 2010 to play a major role not only in sharing radar data but also in developing data analysis technology such as data quality control, QPE (Quantitative Precipitation Estimation) and QPF (Quantitative Precipitation Forecast). A primary goal of WRC is to become the nation's radar data hub for coordinating all radar data available in Korea.

National Meteorological Satellite Center

The National Meteorological Satellite Center (NMSC) is the central organization for satellite meteorology located in Jincheon, Chungcheongbuk-do. This specialized center was founded in 2009, four decades after satellite data were first received at KMA in 1970.

The main mission of NMSC is the operation and utilization of Korea's first meteorological satellite COMS (Communication, Ocean, and Meteorological Satellite), successfully launched on 27 June 2010 into the geostationary orbit at 128.2° E. The center receives, processes, and distributes real-time meteorological data from COMS. It also acts as a backup station for COMS operations. In addition, NMSC utilizes data from various meteorological and earth observation satellites such as MTSAT, NOAA, and Terra/Aqua.



National Typhoon Center



KMA opened its National Typhoon Center (NTC) in Seogwipo City, Jeju, in April 2008 to develop a more systematic and efficient response to typhoon disasters, whose scale is increasingly expanding with climate change. The Center plays a crucial role in enhancing the ability to monitor and predict all typhoons that occur in the Northwest Pacific as well as typhoons that approach the Korean Peninsula, and in preventing and mitigating typhoon-related disasters.

The Center conducts research on typhoon structure and development mechanisms, helping curtail typhoon damage on the Peninsula, and develops typhoon prediction technology for more efficient services by improving capacity for typhoon prediction and typhoon model performance. As a Member of the World Meteorological Organization (WMO) Typhoon Committee, it also conducts a wide range of research projects in addition to international activities (e.g., organization of international conferences).

National Center for Meteorological Supercomputing



The center was built on 29 March 2010 in Ochang, Chungcheongbuk-do, and began its operations with 26 government employees and 35 contract engineers. The Center houses KMA's third supercomputer, which consists of an interim component (Cray XT5), an initial component (Cray XT5) and a final component (Cray XE6). The new system has a speed of 683 Tflops and is dedicated to NWP tasks (data assimilation and prediction). Associated application models receive high-priority treatment, with remaining resources allocated to R&D activities. The system runs seventeen different numerical models to produce forecast products two to four times daily for KMA forecasters. The older system (Cray X1E) is scheduled to be relocated to the center in December 2010, and will be used to generate IPCC climate change scenarios for the next two years.



KMA Korea
Meteorological
Administration

45 Gisangcheong-gil, Dongjak-gu, Seoul 156-720, Republic of KOREA
TEL. 82-2-836-2385 FAX. 82-2-836-2386
www.kma.go.kr