www.kma.go.kr

The Friend-like Sky,
The Sky God-like People . . .

KMA KOREA METEOROLOGICAL ADMINISTRATION

VISION

World Best 365

To Realize In-time, Accurate, and Valuable Meteorological Services

(The World-Best Meteorological Services 365 Days Through The Year)

3 Goals To Advance

- To mitigate weather and climate disasters
- To realize ubiquitous services for meteorological information that leads to the improvement of the quality of life and sustainable development
- To strengthen international cooperation and the role in the world

To Achieve the 6th Advanced Country in Meteorology of the World

5 Strategies

- To enhance the prevention capacity for mitigation of weather and climate disasters
- To enhance the utilization of meteorological information for the better quality of life
- To create highly value-added weather information to lead the sustainable development
- To strengthen the capacity for international cooperation and the understanding on weather-related issues
- To supply advanced meteorological services to strengthen the leap for future

Night view of KMA

CONTENTS

We do our best to actualize the World Best 365 Vision : we protect the life and property of the public from any weather-related disaster, improve the quality of life and public welfare, support national economic activities, and therefore try to achieve higher status in international relations.

History

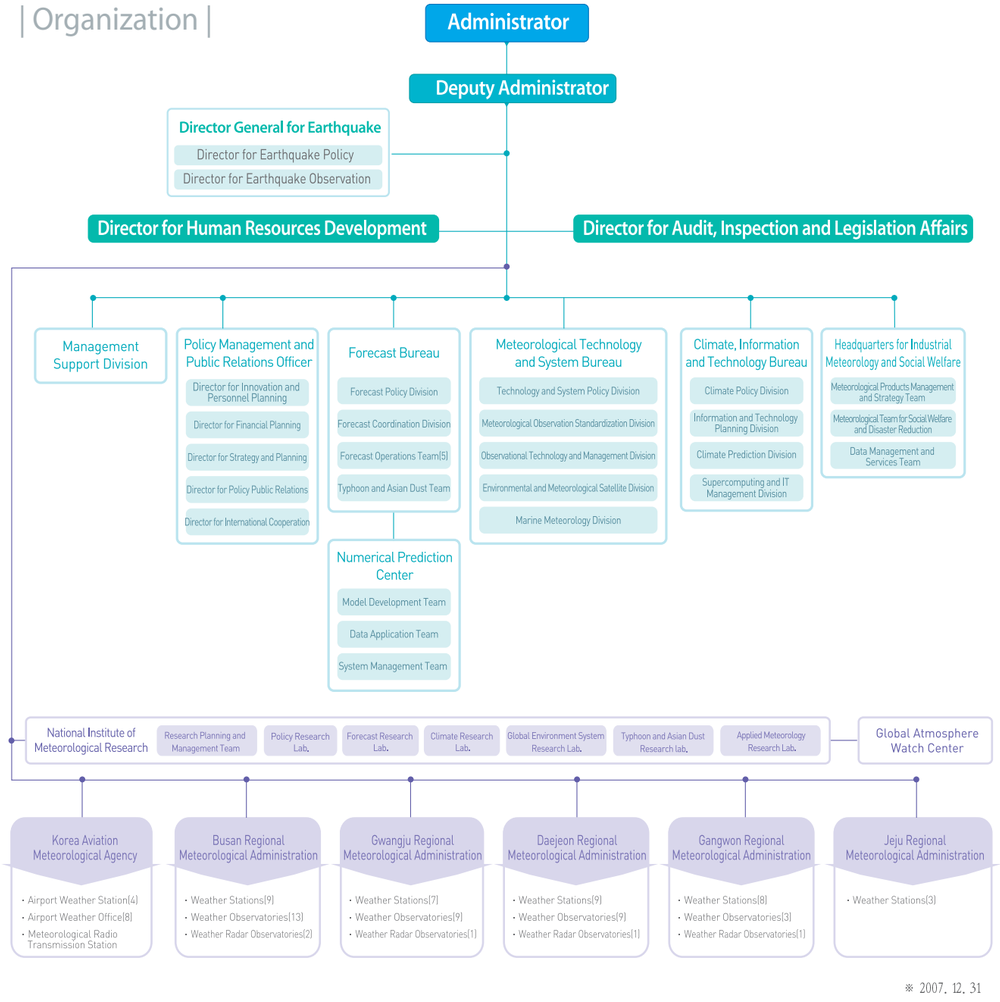
| Mar. 1904 | Commencement of modern meteorological services
| Aug. 1949 | The Central Meteorological Office (CMO) established
| Feb. 1956 | Joined the World Meteorological Organization (WMO)
| Jan. 1959 | Aviation Meteorological services started
| Aug. 1961 | Meteorological Service Law enacted
| Sep. 1963 | Commencement of routine upper-air observations
| Dec. 1969 | Commencement of weather radar observation
| Dec. 1970 | Commencement of meteorological satellite reception
| Jun. 1971 | Meteorological telecommunication circuit between Seoul and Tokyo established
| Apr. 1978 | The Meteorological Research Institute (METRI) established
| Jan. 1982 | CMO renamed as the Korea Meteorological Service (KMS)
| May 1985 | Computer communication network implemented
| Sep. 1987 | Background air pollution monitoring started
| Jan. 1989 | Meteorological observation at the Antarctica started
| Dec. 1990 | KMS elevated to the Korea Meteorological Administration (KMA)
| Jul. 1993 | Meteorological telecommunication circuit between Seoul and Beijing established
| Dec. 1998 | KMA headquarters relocated to a new facility
| Jun. 1999 | Supercomputer system (128 Gflops) installed
| Dec. 2001 | Three-hourly forecasting started
| Oct. 2004 | Implanted of the second Supercomputer system
| Jul. 2005 | KMA Administrator elevated to the level of Vice Minister
| Dec. 2006 | Established the Meteorological Act & Meteorological observation standardization Act
| Mar. 2007 | Established the Earthquake Monitoring Center, the Numerical Prediction Center, and the Headquarters for Industrial Meteorology and Social Welfare
| May 2007 | Joined the WMO Executive Council

※ 2007. 12. 31

Function and Organization

KMA provides long- and short-range weather forecasts and warnings by observing and analyzing the meteorological phenomena on the ground, in the ocean, and in the atmosphere, as well as the earthquake events. It also presents climate statistics and industrial meteorological information. In addition, it conducts research and technology development activities and international cooperations by exchanging meteorological data and information, both domestically and internationally.
KMA is composed of one deputy administrator, two offices, three bureaus, one headquarters, one center, 21 divisions, 12 teams, the National Institute of Meteorological Research, Aviation Meteorological Office, and five Regional Meteorological Offices(Busan, Gwangju, Deajeon, Gangwon, and Jeju), with 1,285 workers.

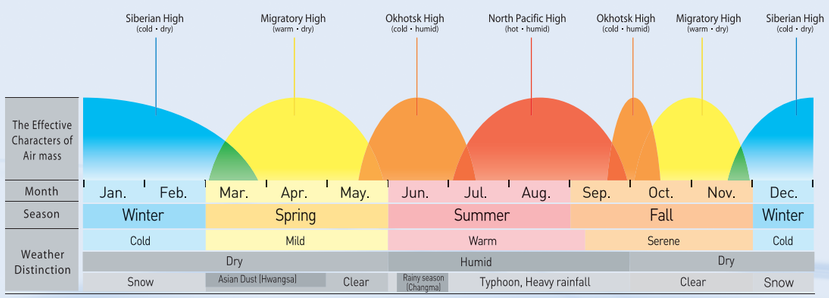
| Organization |



※ 2007. 12. 31

| Seasons in Korea |

There are the characteristics of the seasonal climates variation in Korea which can be understood categorizing properties of acting air. The dominant air masses characterize different climatic features each season. Sometimes the crashing air masses cause distinct weather phenomena. As the result, various weather features occur in Korea such as drought, rainy season known as "Changma", the Asian dust or yellow sand known as "Hwangsa", typhoons, cold waves. and heavy rainfall and snowfall, the phenomena which directly affect people's life in all four seasons.



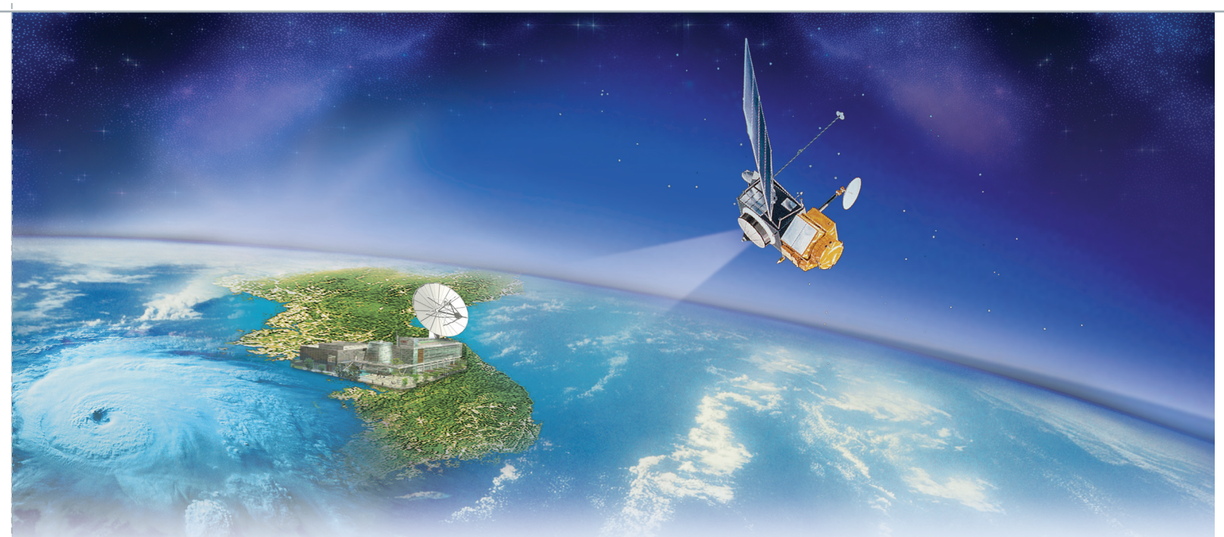
• Seasonal climate characteristics chart •

| Characteristics of Weather Elements |

The annual mean temperature ranges from 10℃ to 16℃. It is from 23℃ to 27℃ during August, the hottest month, and from -6℃ to 7℃ in January, the coldest month of the year.
This illustrates the large temperature difference between seasons. The annual precipitation ranges from 1,000mm to 1,800mm in the southern area, and from 1,100mm to 1,400mm in the central area of the Korean Peninsula. Up to 50 to 60% of the annual mean precipitation intensely pours during the summer.
As for the wind, the monsoon winds are quite severe. A northwesterly wind which travels from north to west during the winter gusts harder than the southwesterly one during the summer. From September to October, when the wind changes from a southwesterly to a northwesterly one, the monsoon wind generally weakens, but well-developed land-to-ocean breezes become prominent. From December to February, a northwesterly wind blows more strongly. The mean humidity is the highest in July, reaching 80 to 90% across the country. It is 30 to 50% in January and April. Yet it is approximately 75% September to October, producing fairly pleasant weather.
The rainy season, called "Changma", begins from the southern area of the Korean Peninsula in late June and appears in succession in the northern area. It lasts for around 30 days on average. Two to three typhoons out of about 27 typhoons annually occurring in the Northwest Pacific have direct influences on the Korean Peninsula between June and October.

Parameter		Value	Place	Date
Temperature (℃)	Maximum	40.0	Daegu	Aug. 1, 1942
	Minimum	-32.6	Yangpyeong	Jan. 5, 1981
Precipitation (mm)	Daily maximum	870.5	Gangneung	Aug. 31, 2002
	Hourly maximum	145.0	Suncheon	Jul. 31, 1998
	10-min. maximum	47.2	Seoul	Jun. 22, 1956
Wind speed (m/sec)	Maximum	51.1	Gosan	Sep. 12, 2003
	Maximum gust	63.7	Sokcho	Oct. 23. 2006
Snow depth (cm)	Maximum depth of snowfall	150.9	Ulleungdo	Jan. 20, 1955
	Maximum depth of snow cover	293.6	Ulleungdo	Jan. 31, 1962

• Climate Extremes Value •



The main task of KMA is to get weather data quantitatively by using various observation equipment, in order to pinpoint accurately the constantly changing atmospheric conditions. KMA observes atmospheric and marine conditions all the time in the upper air, on the ground and in oceans using various observational equipment.

KMA then gathers the data and provides them to people and the related authorities requiring them. In addition to traditional meteorological observation methods and tools, the equipment with cutting-edge scientific technology such as a radar, a satellite, and an observation vessel are used for weather observation.

The observed data from around the world are collected through information and communications technologies. They are then inputted into a weather forecast supercomputer as preliminary information. The supercomputer applies the data to dynamics and physical formulas, and records the details of any changes of the atmospheric conditions in forms of diagram. The data are then transformed into various information which is required for weather forecasts.

Every single datum is shared through information and communications technologies and is used as preliminary information. The cumulative meteorological observation data become climate data. It is based on these data that we obtain information related to the meteorological environment.

| Surface observation |

Surface observation is conducted at the 76 manned stations with automated equipment. The 15 elements, including pressure, temperature, humidity, precipitation, cloud coverage, wind, solar radiation and so on, are measured once every three hours. Under special conditions, such as in heavy rains or severe weather, observations are done every hour or 30 minutes. In addition to the 76 manned stations, KMA has 464 AWSs (Automatic Weather Stations) which collect data on wind direction, wind speed, temperature and precipitation every minute.

AWSs installed in high mountains and on isolated islands contribute to early and small-scale detection of severe weather such as localized torrential downpours. AWS also plays an important role in the preparation of the initial conditions for the numerical prediction models. KMA operates Asian dust observation stations of PM_{10} and LIDAR. In addition to the domestic networks, KMA has installed each PM_{10} and the Total Suspended Particle (TSP) in the five source areas of Asian dust in China and monitors its intensity on real-time basis.

● Automatic weather station ●

| Upper-air Observation |

The information on the vertical profile of the atmosphere is essential to understand atmospheric conditions and accurate weather forecasting. Rawinsonde observations are conducted at 0-35 km heights concerning pressure, geopotential height, temperature, dew point temperature, wind direction, and wind speed twice a day (0000 UTC, 12 00 UTC) under regular weather conditions and four times a day (0000 UTC, 0600 UTC, 1200 UTC, 1800 UTC) under severe weather conditions.

The wind profilers are also installed to observe the upper-air at more detailed intervals.

Those equipments are installed and operated 70m - 5km observation heights concerning wind direction, wind speed, signal to noise ratio, and spectral width at 10-minute intervals. These observation data are utilized to analyze of rainfall types, to identify of weather fronts, and to input data for numerical prediction models.

● Wind profiler ●

● Rawinsonde observation ●

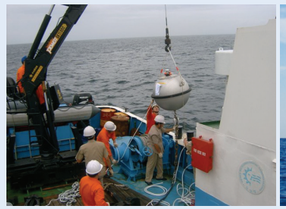
| Observation Network |

The meteorological observation network in KMA consists of various fields of observation such as surface, upper-air, ocean, weather satellite, and weather radar. There are 94 weather stations, 464 AWSs, 27 Asian dust observation stations, five moored buoys, and one weather vessel in operation. KMA network includes 76 manned observation stations, one Base station of Oceanic-Meteorological Observation (BOMO), ten upper-air observation stations, eleven weather radar observations, and ten aviation meteorological stations. KMA also operates Korea Global Atmosphere Watch Center in Anmyeondo. To receive satellite data, MESDAS-II, including three Medium-scale Data Utilization Stations (MDUS), is operating.

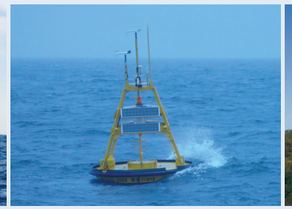
● Observation network ●

| Marine Observation |

Korea, a peninsula, has constant and enormous demand for marine meteorological information. KMA gathers marine and coastal information from the marine observation stations, buoys, and a weather vessel. The vessel (150 tons) is also used for the maintenance of buoys, research expeditions, and special observations. KMA operates moored buoys in the Yellow Sea, the South Sea, and in the East Sea to monitor not only various meteorological components (wind, air pressure, humidity, air temperature), but also the height and direction of the waves and sea surface temperature.
KMA has also established the Base station of Oceanic-Meteorological Observation (BOMO) at Geokryeolbi-do in the Yellow Sea and started to measure the atmospheric variables, wave, and Asian Dust.



• Weather vessel •

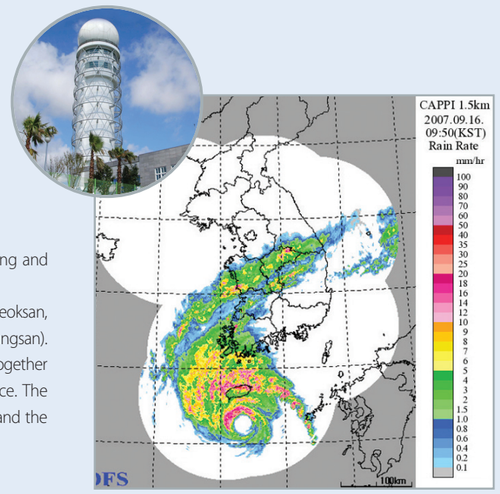


• Buoy •

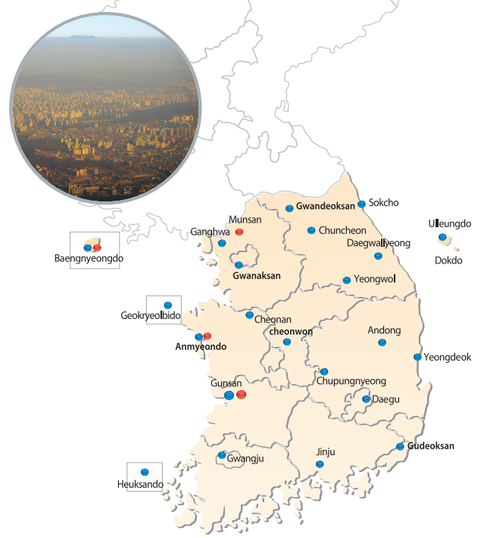
• Base station of Oceanic- Meteorological Observation •

| Weather Radar Observation |

High resolution radar data greatly contribute to the short-range forecast by monitoring and tracing an early stage of the torrential rain, hailstone and typhoon, etc.
KMA has placed doppler radars at eleven sites (Gwanaksan, Baengnyeongdo, Gwangdeoksan, Myeonbongsan, Gudeoksan, Gosan, Oseongsan, Jindo, Donghae, Youngjongdo, and Sungsan). In addition, radar data from a neighboring country (seven sites in Japan) are utilized, together with existing images of KMA and data from the Korea Air Force and the U.S. Air Force. The individual and mosaic radar images are distributed to all weather stations, authorities, and the general public via Internet.



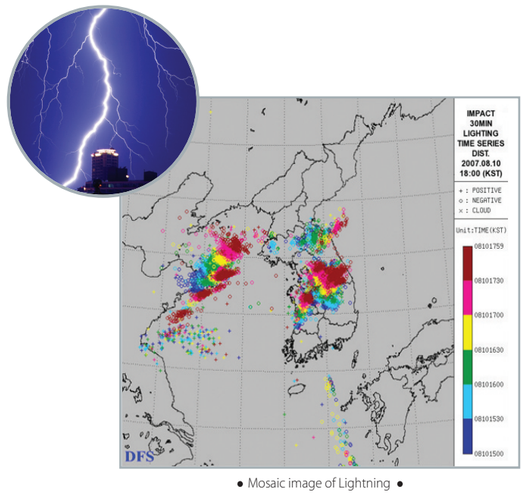
• Composit radar image of a Typhoon •



• Asian dust observation network •

| Asian dust Observation |

The Korean peninsula has a long history of Asian dust blown by winds from the arid deserts of Mongolia and China. Public concern about the possible adverse effects of this dust has increased. KMA operates Asian dust observation network of PM_{10} and LIDAR.
In Korea and the main source areas of Asian dust in China and monitors its intensity on real-time basis.



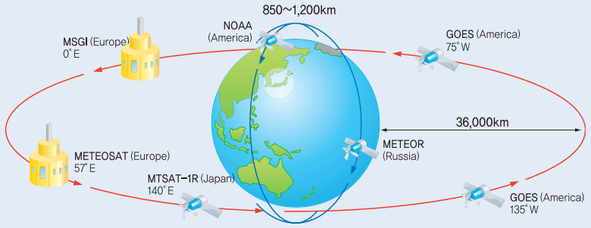
• Mosaic image of Lightning •

| Lightning Observation |

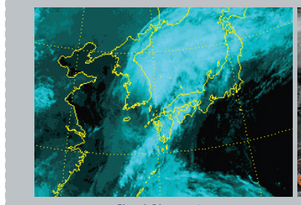
A typical lightning stroke carries an electric charge of several million volts. Recent increase in outdoor activities and use of electromagnetic products has multiplied the number of victims by lightning. It sometimes causes life loss, forest fires, and severe facility damages.
Lightning activities are monitored through a nationwide network consisting of impact sensors and LDAR-II sensors which detect cloud to ground and cloud to cloud discharges, respectively. The information on the direction, time and intensity of lightning are transferred to the analysis workstation at the headquarters. The analyzed data are displayed in images and used as an auxiliary tool to issue weather advisories for flash floods with lightning. KMA utilizes the mosaic images of satellite-lightning and radar-lightning as well as real-time cloud to ground discharges.

| Satellite Observation |

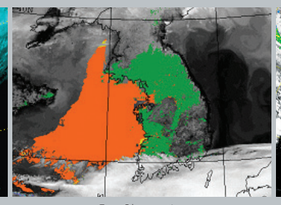
Meteorological satellites yield precise visual data of clouds in real time. The satellite image has been used for the small-scale detection of various meteorological phenomena, which usually can be applied quickly and locally to the large-scale detection such as jet streams and global climate change. With the recent advances in sensor technology, satellite observation plays a critical role in weather forecasting and meteorological research. KMA receives and analyzes the real-time data from geostationary satellites, including MTSAT-1R, Meteosat-5, FY-2C and polar orbiting satellites such as NOAA, EOS and FY-1D.



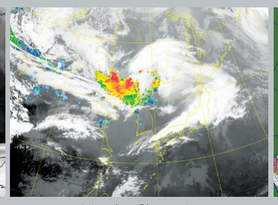
● Global Satellite Observation Network ●



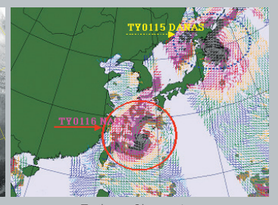
● Cloud Observation ●



● Fog Observation ●



● Asian dust Observation ●



● Typhoon Observation ●

KMA provides various satellite Images regarding to fog/stratus, yellow sand, rain rate, and cloud products, sea surface temperature, atmospheric motion vectors, cloud classification, etc. The products are distributed in real time to forecasters and users through Internet and Intranet. Some of these products are also ingested into the data assimilation of numerical weather prediction models.

Antenna of geostationary meteorological satellite

The satellite is located above the earth's equator at an altitude of about 36,000 km and revolves along the equator at the same velocity as the earth's rotation. MTSAT-1R is positioned at 140° E and scans the Asian region 44 times a day.

Antenna of polar-orbit meteorological satellite

The polar orbiter, at the altitudes of 800 to 900 km, is a sun-synchronous satellite. It orbits the earth about 14 times a day and covers the whole region of the Earth approximately once a day. It visits Korea about every 12 hours.

● Bird's-eye view of National Meteorological Satelite Center ●

| Standardization of Meteorological Observation |

KMA conducts a project for the standardization of meteorological observation in order to promote the production of highly reliable observation data by applying observation standards to every meteorological instrument installed and operated by KMA. This will reduce annual expenditure by optimizing the meteorological observation network through repetitive functions used to control meteorological observation equipment.

An observation organization needs a great deal of interest and understanding so that high quality observation data of a good quality can be produced and used by the public. With this in mind, KMA has established a Meteorological Observation Standards Committee and consultation organization. It is currently working on announcements about meteorological observation standardization policies, observation equipment standards, etc.

To produce the meteorological data recommended by Meteorological Observation Standardization Act, KMA must implement the following two goals: the establishment of standardized observation circumstances and observation with inspection-only meteorological equipment. Further, any observation data should be transmitted to KMA after quality control. Weather observation equipment is supposed to be approved by KMA, but, according to Provision 1 of Article 14 of a relevant law, the Korea Weather Industry Promotion Agency is obliged, as an authorized inspection agency, to conduct inspections, and has done these since July 1, 2007.

● 2007 national meteorological observation facility ●

| Earthquake and Tsunami Monitoring |

■ Seismological Network, Earthquake Data Collection and Analysis

To monitor and analyze the earthquake phenomena occurring in Korea and nearby seas, KMA operates a total of 45 velocity seismograph stations in Korea. Also, to analyze seismic intensity of earthquake as per respective areas in Korea, KMA operates 106 accelerograph stations. On average 24 earthquakes (above 2.0 on Richter scale) occur annually, about seven of which are the ones that may be felt by an overuse person.

The most recent earthquake incurring damages in Korea was the earthquake of 5.0 on Richter scale at Hongseong in 1978, which caused injuries to two persons as well as breakage and crack damages to 1,120 buildings.

■ Tsunami Monitoring and Warning

Korea is surrounded by three seas. The possibility of tsunami occurrence is high particularly in the East Sea. In fact, in 1983 and 1993, damages to life and properties have occurred in East Coast Area. KMA has constructed and operated its own tsunami warning system.

■ Earthquake Analysis and Broadcasting System

Earthquake Analysis System of KMA collects real-time digital earthquake observation data from 45 velocity seismograph stations, and produces earthquake information such as origin time, epicenter, magnitude etc., through automatic analysis procedure if necessary. Such produced earthquake information shall be automatically conveyed to the earthquake warning system.

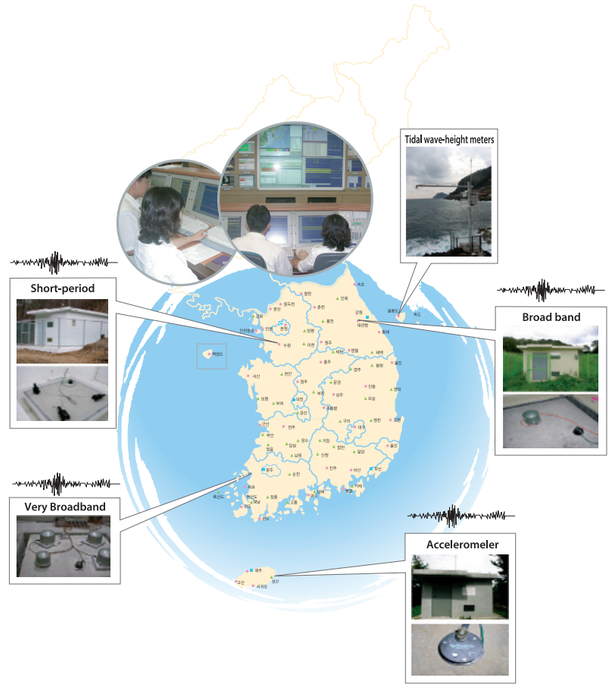
The Earthquake Broadcasting System (EBS) receives analyzed seismic information from Earthquake Analysis System and automatically generates earthquake warning in plain language for easy understanding of final users and conveys earthquake information to disaster prevention organizations such as National Emergency Management Agency and Local Autonomous Organizations, etc. through various media of such as facimile, short-message service, e-mail, and computer warning reception system, etc., and immediately posts the information on the website of KMA (http://www.kma.go.kr).

■ Seismological Research and International Cooperation

The seismological research of KMA focuses on development of practical technology to enhance the capability of earthquake detection and broadcast and tsunami forecasting.

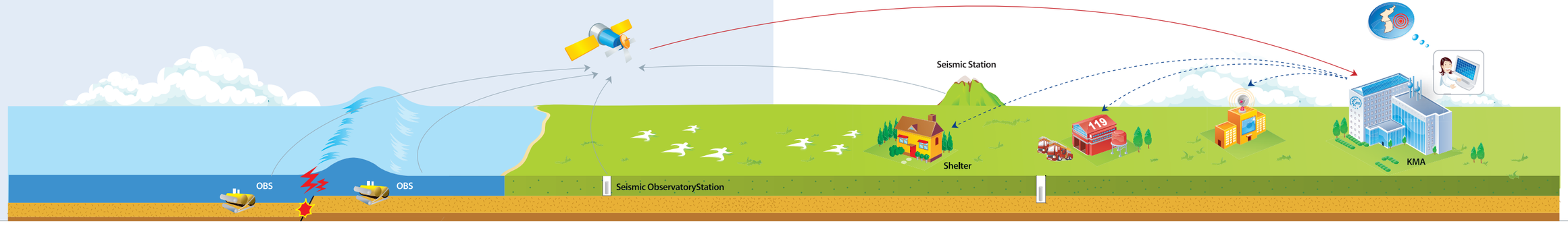
The neighboring countries regarding earthquake, Korea, China, and Japan have maintained mutual cooperation through the Tripartite Meeting on Earthquake Disaster Mitigation among KMA, the China Earthquake Administration (CEA) and the Japan Metrological Agency (JMA) every year since 2004. A close cooperation system is particularly maintained with JMA, such as exchange of real-time earthquake observation data and instant reception of water depth estimation information in case of tsunami occurrence, etc.

KMA has joined in international efforts to prevent disaster due to earthquake and tsunami through continuous participation in international meetings, international monitoring network building, and simulation training participation, etc.



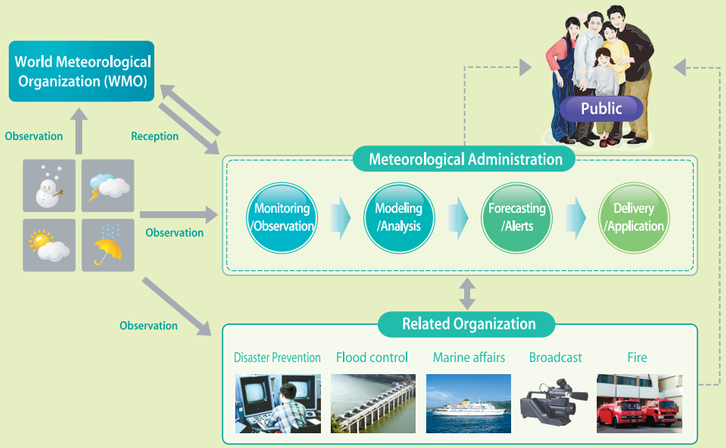
■ Outlook of Seismological Service

Although earthquake prediction still remains an area not fully understood by modern science, tsunami forecasting is possible to some extent through analysis of earthquake data and international cooperation. Extension of seismological network and sustaining investment in research and development shall contribute to the advancement of earthquake disaster prevention capability.



| Combined Meteorological Information System (COMIS) |

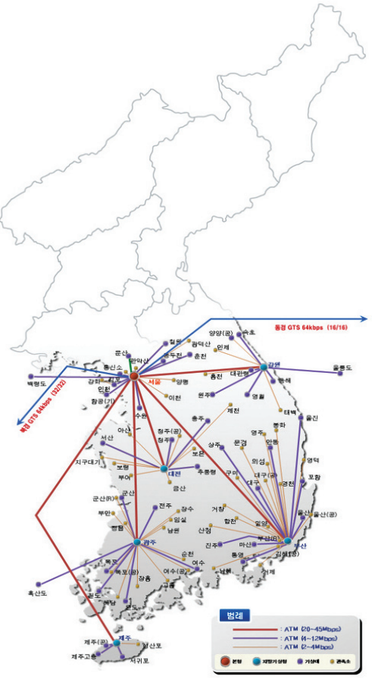
The COMIS of KMA consists of the main system for data communication and the subsystems for forecasting, database, satellite data processing, research, etc. This system collects, analyzes, and disseminates the enormous amount of data on real-time basis. It also exchanges meteorological data with other countries through the Global Telecommunication System (GTS), under which KMA is connected to the Regional Telecommunication Hub (RTH) Tokyo and Beijing with the dedicated lines. More than 20 kinds of surface and upper-air observation data and severe weather prediction maps are disseminated to all domestic weather stations and relevant organizations.

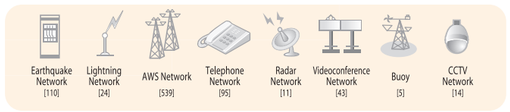


- **Disaster Prevention/Earthquake :** NSC, Ministry of Government Administration and Home Affairs, National Emergency Management, Local Autonomous Entity, Broadcasting station
- **Traffic :** Aviation Administration, Airlines, Railroad Corporation, Expressway Corporation
- **National Defense :** National Intelligence Service, Air Force, Naval Service, U.S. Air Force
- **Flood :** Food Control Office, Water Resource Corporation
- **Ocean :** Ministry of Maritime Affairs & Fisheries, Coast Guard
- **Bombs :** Korea Institute of Nuclear Safety
- **Farming :** Ministry of Agriculture and Forestry
- **Asian Dust :** Ministry of the Environment
- **Forest Fire :** Forest Service, Ministry of the Environment

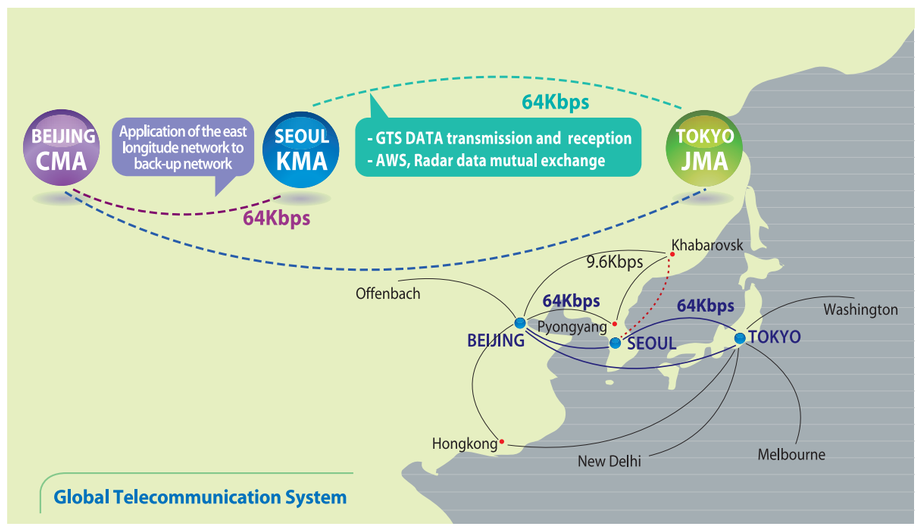
| High-speed network for the Meteorological Information |

A wide area telecommunication network has been established using the Asynchronous Transfer Mode (ATM). It integrates all of the data lines for voice, facsimile transmission, video, and alpha/numeric and graphic data. The main trunk circuit of this network is the ATM of e-Government Network of Korea.
In 2007, KMA initiated a transition program to migrate an All-IP network.



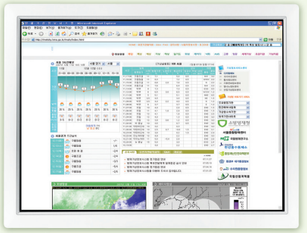


| GTS : Global Telecommunication System |



■ Internet Web Service (www.kma.go.kr)

KMA homepage is one of the favorite websites among the public. It provides current and future weather information, special weather reports, as well as various other data such as satellite, radar, lightning observation image, and numerical weather prediction data. It also offers real-time image services. The weather information used in people's daily lives, industrial activities, and for the prevention of disasters is also becoming increasingly important. Based on this situation, the correct understanding of meteorological science is directly linked to the application of weather information.

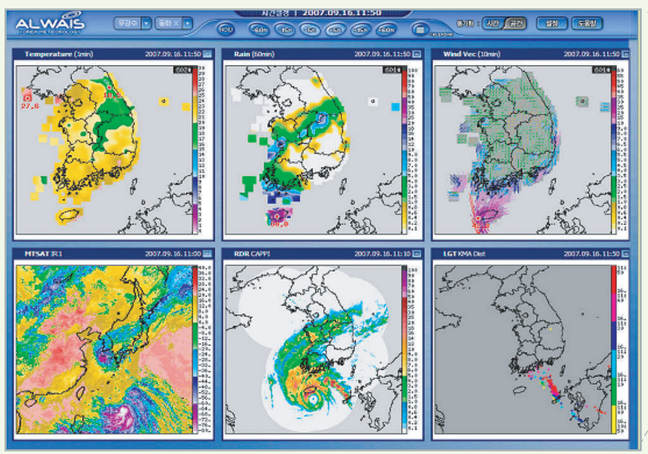


■ Meteorological Information Service System for Disaster Prevention (MISS-DP) (metsky.kma.go.kr)

KMA rapidly provides various weather information in real-time via MISS-DP to every agency working for disaster prevention. Through this system the agencies can monitor weather conditions and apply disaster prevention measures and countermeasures.

| Automatic Local WeAther Information System (ALWAIS) |

ALWAIS has been set up for monitoring the real-time nationwide weather conditions and ensuring appropriate responses against severe weather. It collects and analyzes observation data collected from 464 AWSs, weather radars, and weather satellites. It also displays and distributes the data in forms of weather charts, composite images and warning levels. On KMA Intranet and MISS-DP, Open-KMA AWS data are updated once every minute.

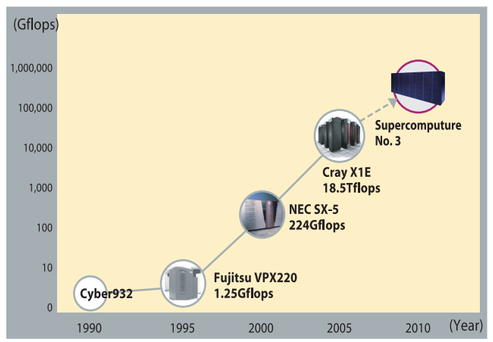


| Supercomputer System |

Weather forecasting is certainly beyond the scope of merely predicting natural hazards and severe weather conditions. It is now regarded as an important element affecting a nation in many socioeconomic aspects. KMA believes that it should acquire both advancement of core infrastructure and supercomputing power essential to develop a highly reliable weather forecasting system into which observations, data analysis, and forecasting are tightly integrated. To meet these demands, KMA decided in 2004 to procure its "second supercomputer" system from Cray US (X1E) that was installed through two phases: the initial system (2.4 Tflops of theoretical speed) in October 2004 and the final system in December 2005, respectively.

The Cray X1E system is used to develop of high resolution numerical models for more accurate forecasts, implementation of KMA "Digital Forecasting System" through exploitation of advanced IT technology, and enhancement of the medium to long range forecasting service. The system consists of the main computing server of eight Cray X1E cabinets, login servers, pre-post servers, and storage system. The theoretical performance of the computing server is 18.5 Tflops, more than 90 times as high as that of "first supercomputer system" which had the theoretical performance of 0.2 Tflops. The sustained performance of the new system is 15.7 Tflops, putting it at the 16th position among the world's most powerful supercomputers. The X1E system is a liquid cooled parallel vector processor system. Each X1E module contains four Multi-streaming processors (MSPs) and has 16 GB of the Uniform Memory Access (UMA) shared memory. Each MSP has four scalars and four vector processors sharing a cache chip placed in an Multi-Chip Module (MCM).

To maintain the system in more secured environment with constant electricity, temperature, and humidity, the system is housed in an the Internet Data Center (IDC), located outside KMA. Communication network between IDC and KMA is through four dedicated lines with one-Gigabit bandwidth each.
In addition, KMA has secured a location for the installation and operation of a third supercomputer to be procured in 2009, and are now building a facility at the Ochang Scientific Industrial Complex, Chungbuk Province.



• The current situation of introducing the supercomputer of the KMA •

Specification	Units
Introduction Year	2005
Name of Model	Cray X1E
Number of CPUs	1,024
Performance(Tflops)	18.5Tflops
Memory Capacity (GB)	4,096GB
Disk Capacity(TB)	98TB
Number of Nodes	256
Tape Storage(PB)	1.2PB

• Supercomputer No. 2 •

| Types of Forecast |

KMA issues serveral kinds of weather forecasts such as short-, medium-, and long-range weather forecasts. KMA also issues warnings/advisories for severe weather such as typhoon, heavy rain, heavy snow, etc. All weather information issued by KMA is disseminated in real time to the public, mass media, and the related authorities via e-mail, internet, intranet, dedicated line, facimile, DMB, PDA, SMS, etc.

■ Short-range Weather Forecast

The quantified information is Issued eight times a day at three-hour intervals, up to 24 hours. The information includes temperature, precipitation, daily maximum/minimum temperatures, precipitation probabilities, precipitation types, snow cover, sky conditions, wind directions, and wind velocities.

■ Medium-range Weather Forecast

Forecasts of daily weather conditions, maximum/minimum temperatures, sky condition and wave height for the forthcoming week are issued twices a day.

■ Long-range Weather Forecast

KMA produces three types of long-range weather forecasts: the monthly, the three-month (seasonal), and six-month forecast. The monthly forecasts are announced three times a month including temperature, precipitation, and trends of synoptic pattern for the next 30 days. The seasonal forecasts which are issued four times a year include the trends of temperature and precipitation for the next three months. The six-month forecasts presented in May and November include the temporal changes of temperature and precipitation for the next six months.

■ Severe Weather Alert

Occasionally KMA issues meteorological advisories whenever sudden and important changes of the weather conditions are detected or severe weather is anticipated. Severe weather alerts include watches and warnings. Preliminary warnings are issued before severe weather alerts, and give information about the type, place and time of the expected severe weather. The Preliminary warning is usually issued several hours earlier than Severe weather alert and gives a crucial time advantage for the mitigation of weather disasters.

■ Meteorological Weather Information

The SIGnificant METeorological information (SIGMET) means that weather conditions, the present situation of the special report, and so on, have to be specially announced, when continuous delivery to the public is very significant.

■ Weather Bulletin

KMA issues Weather Bulletin when a severe weather situation or a serious meteorological disaster is anticipated. Weather Bulletin includes weather status, forecast, and required specific attentions.

■ Typhoon Forecast

When a typhoon originates in the Northwest Pacific, KMA analyzes and predicts the track, scale and intensity of the typhoon for 72hours. When considerable damages are anticipated in Korea, typhoon advisories or warning are issued to the public and the related authorities to take prompt measures against the typhoon.

■ The other Forecasts

There are aviation forecasts needed for flight safety, the route forecasts for passenger ship, expressway forecasts announced by each block, mountain forecasts for national mountain parks, and beach/resort forecasts for major summertime beach/resorts.

| Forecasting Area |

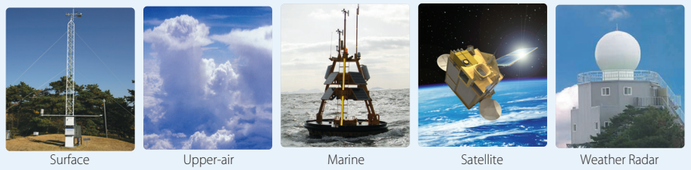
The Forecast Area consists of Regionalized and Localized areas. The Regionalized Forecast Area consists of 17 land and 18 marine forecast regions, while the Localized Forecast Area consists of 63 land and 24 marine forecast subregions.

• Regionalized Forecast Area •

| Process of Weather Forecast |

■ Observation ■

The atmospheric conditions surrounding the earth are three-dimensionally measured with various observatory equipments and the flows and characteristics of air are observed by utilizing weather satellites and radars.



Surface | Upper-air | Marine | Satellite | Weather Radar

■ Data Process ■

The observation data which are collected throughout the world by telecommunication networks are input into the operational supercomputer loaded with physics equations that are constructing the changes of atmospheric conditions. Later the data are transferred for various processes required to produce forecasts.

High-speed network for the meteorological weather data | Data Input into KMA | Weather forecasts supercomputer | Telecommunications offices

■ Data Analysis and Forecast ■

A weather forecaster with technical knowledge and experience produces weather forecasts and analyzes current meteorological conditions based on various observation data. The forecaster also reflects regional meteorological characteristics, considers results of a numerical weather prediction model, and makes weather forecasts that are necessary for people's lives and industrial activities.

Forecast Briefing

■ Provision to Users ■

The weather forecasts are provided by various media to be easily available to customers anywhere and anytime.

Homepage | Mass Media | Internet broadcast 'Nalsee on' | Automatically answering call for weather forecasts | Wireless communications

| Numerical Weather Prediction (NWP) |

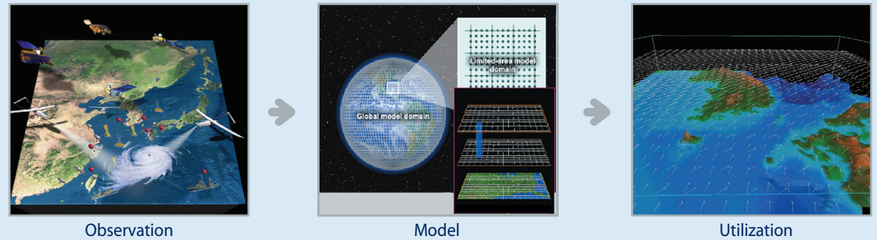
Numerical weather prediction is a method of calculating the future weather in numerics, based on current weather informations by using the supercomputer. The earth's atmosphere is divided into a number of grids like a fixed checkerboard. On every grid points, the current weather is calculated according to the meteorological observation data. The current weather data obtained by such an analysis method are used as inputs to numerical models operated in the supercomputer. The numerical model is a combination of equations governing weather changes. Weather prediction is conducted with the numerical models by changing the input of current weather. Such a series of processes constitutes a numerical weather prediction.

Nature constantly exhibits irregular changes. This is the so-called "chaos-theory" of modern science. The butterfly effect referring to the idea that a butterfly's wings flapping in Beijing may ultimately cause a tornado in New York presents the idea that any small weather change somewhere on earth can result in significant weather events anywhere else. This notion helps explain the complexity and uncertainty of the atmosphere. It is not possible for the numerical weather prediction to be 100% correct, because it cannot count every uncertainties in weather. To make up for such incompleteness, therefore, weather forecasters armed with knowledge of meteorological theories and their own experiences analyzes the output of the numerical weather prediction, corrects it, and provides the public with a final forecast.

What is the numerical forecasts?

Numerical weather prediction (NWP) :
A process of calculating and predicting coming weather changes by use of a numerical model

Numerical model :
A computer program that calculates atmospheric movements and physical processes that cause weather changes



Observation | Model | Utilization

● Procedure of NWP ●

| Digital Forecast |

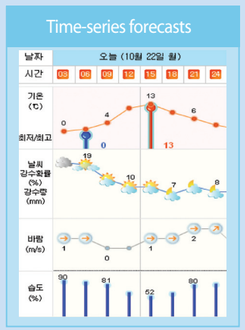
KMA Digital Forecast System provides the detailed, quantitative weather information up to 48-hour period at 3-hour interval. This easy-to-process information is available in a variety of forms such as graphic, table, text and voice.

Forecast element	Air temperature (every 3-hour/ max. /min. temperature), rainfall probability, sky cover, probability/ type/ amount of precipitation, relative humidity, wind direction/ speed, significant wave height, and snow depth.
Forecast range	Up to 48-hour period at 3-hour interval.
Coverage	The weather conditions are forecasted on the district scale dividing the whole Korean peninsula and the surrounding sea into a 5km grid.

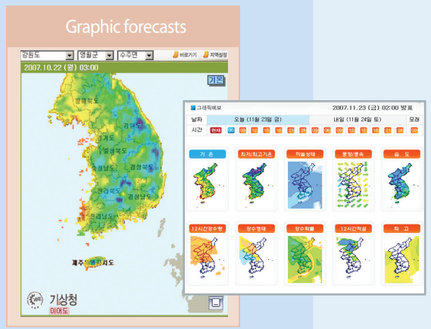
■ Contents

Grid data sevices

Time-series forecasts



Graphic forecasts



Voice forecasts

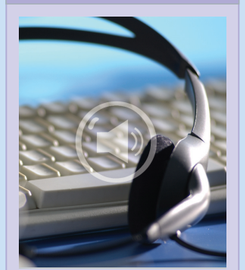


Chart forecasts

날짜	오늘 (10월 22일 월)							
시간	03	06	09	12	15	18	21	24
기온 (℃)	0	1	4	11	13	9	6	3
최저/최고	0/13							
날씨	흐림	구름많음	구름조금	구름조금	구름조금	구름조금	구름조금	구름조금
강수확률 (%)	20	19	13	10	10	7	10	8
강수량 (mm)	0				0			
풍향/풍속 (m/s)	서 1	서 1	- 0	- 0	서 1	서 1	서 2	남서 2
습도 (%)	90	87	81	61	52	60	80	82

SMS forecasts

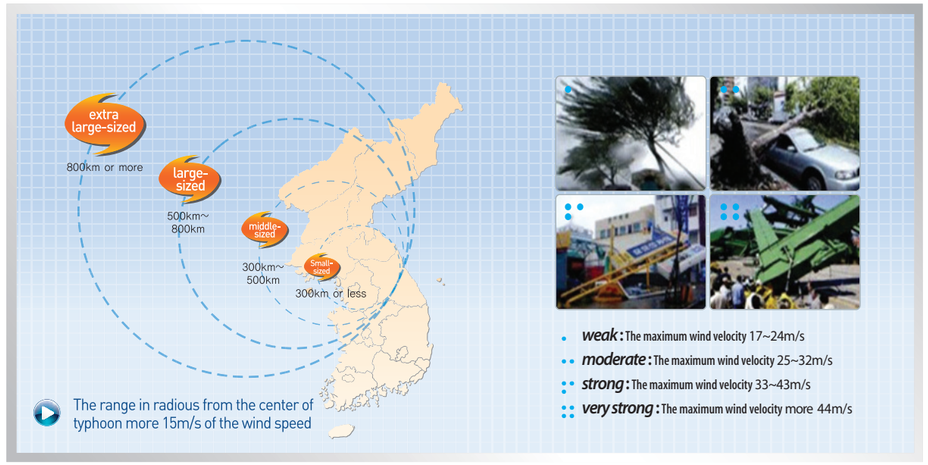
서울특별시 동작구 신대방2동

오늘 오전

서~북서풍, 초속 1~2m
구름많음
강수확률 20%
최저기온 9℃
습도 60~90%

| Typhoon Forecast |

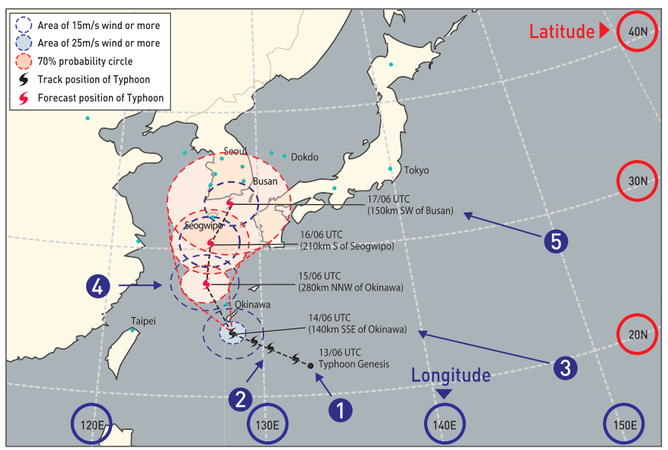
■ Typhoon Scale and Intensity



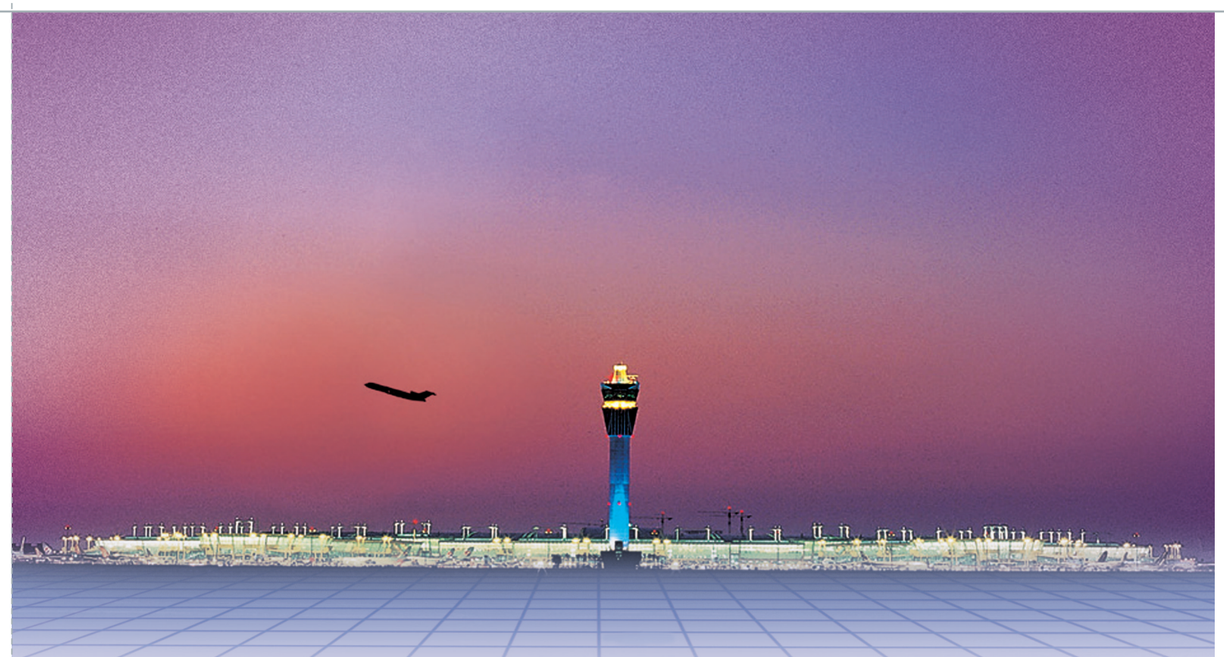
■ The Example of Typhoon Information

No. 11 Typhoon NARI — KMA | 2007. 9. 14 16:00

ANALYSIS	Present Position	Minimum Surface Pressure(hPa) Maximum Sustained Wind(m/s)	Radius of 15 m/s(km)	Moving Direction and Speed(km/h)
ANALYSIS 1500 UTC 14 Sep.	25.0 N, 128.1 E	955, 44 (158km/h)	200	WNW, 22
FORECAST 1500 UTC 15Sep.	28.4 N, 126.3 E	950, 46 (166km/h)	220	NNW, 18
FORECAST 1500 UTC 16Sep.	31.3 N, 126.6 E	955, 44 (158km/h)	200	N, 13
FORECAST 1500 UTC 17Sep.	34.1 N, 128.0 E	980, 32 (115km/h)	180 (NW 160)	NNE, 14



1. The formation location and time of the typhoon
2. The typhoon passed track
3. The current typhoon location and the distance with major point
4. The expected range where the strong wind more than 15 m/s due to the typhoon blows.
5. The expected location where the typhoon travels after 3 days, and the distance with the major places



| Aviation weather |

The Korea Aviation Meteorological Agency (KAMA) aims to provide aviation weather services to contribute to safety improvement, regularity, and efficiency of air navigation. It conducts aviation weather services according to the technical provisions of the International Civil Aviation Organization (ICAO), Annex 3 and the World Meteorological Organization (WMO), as well as standards and recommended practices of regional agreements and conventions in air navigation.

KAMA, located at Incheon International Airport, generally manages Korea's national aeronautical meteorology services. KAMA operates an airport weather station at each airport in Kimpo, Jeju, Ulsan, and Muan, and an airport weather observatory at each airport of Kimhae, Daegu, Yeosu, Cheongju, Yangyang, Gwangju, Pohang, and Sacheon.

KAMA issues aeronautical meteorological observation information, aeronautical meteorological forecast and warning, as well as the SIGnificant METeorological information (SIGMET). In addition, it provides airlines and related agencies with worldwide aviation weather information that has been collected via the Aeronautical Fixed Telecommunications Network (AFTN).

■ Aeronautical Meteorological Observation

Aeronautical Meteorological Observation services are automated. These services include the observation of wind direction, wind speed, the Runway Visual Range (RVR), temperature, air pressure, precipitation, etc, after setting the, the Aerodrome Meteorological Observation System (AMOS), in each civil airport and region-controlled airport across the nation.

The agency analyzes aviation observation elements and then conducts various observation activities, such as METAR, local MET Report, SPECI, and local SPECIAL in order to produce and provide weather information necessary for flight safety.

■ Aeronautical Meteorological Forecast

Based on aviation weather observation data, various numerical forecast data, and international preliminary data about aircraft received by the WAFS, the KAMA produces and provides TAF, landing and take-off forecasts, area forecast for low-level flight, and SIGWX Forecasts, SIGMET, etc., all of which are necessary for safe airplane operation. TAF, area forecast for low-level flight, SIGWX Forecasts, and SIGMET are issued four times a day, landing forecasts every half hour, and take-off forecasts every hour.

■ Warning and Significant Meteorological Information

The KAMA issues aeronautical meteorology special reports concerning meteorological conditions that may affect flights on the ground, airport facilities, airport services, and safe flight services on the airway. The types of special reports are as follows:

Type	Countents
Aerodrome Warning	Issued when a weather phenomenon that may damage a flight on the ground, airport facilities, and airport services is observed or predicted
Wind Shear Warning	Issued when a wind shear that may damage a flight under takeoff or access is observed or predicted
SIGMET info	Issued when a SIGMET phenomenon that may threaten the safety of a flight in the flight information region (FIR) is observed or predicted - Thunder and lightning, typhoon, warm currents, ice, etc.
AIRMET info	Issued when a weather phenomenon on a specific airway that may damage a flight below 10,000ft is observed or predicted

■ Aeronautical Meteorology Information Service System

World Area Forecast System (WAFS) : WAFS receives major meteorological forecasts by air altitude, upper wind, and temperature forecasts in a digital format and meteorological data from around 2400 airports in a character/number format provided by the World Area Forecast Center via satellite. It then provides necessary meteorological information for the safety of international airlines services.

High-Level Air-Navigation Meteorological Information Service (HAMIS) : A membership-only homepage service designed to support aeronautical meteorology for domestic and international airline services. It provides scheduled airlines, such as Korea Airlines, Asiana Airlines, and foreign airlines with important meteorological information.

Low-Level Air-Navigation Meteorological Information Service (LAMIS) : A membership-only homepage service designed to support aeronautical meteorology for domestic and low-altitude nonscheduled airlines services. It provides the Korea Coast Guard, the National 119 Rescue Services, and nonscheduled airlines with important meteorological information.

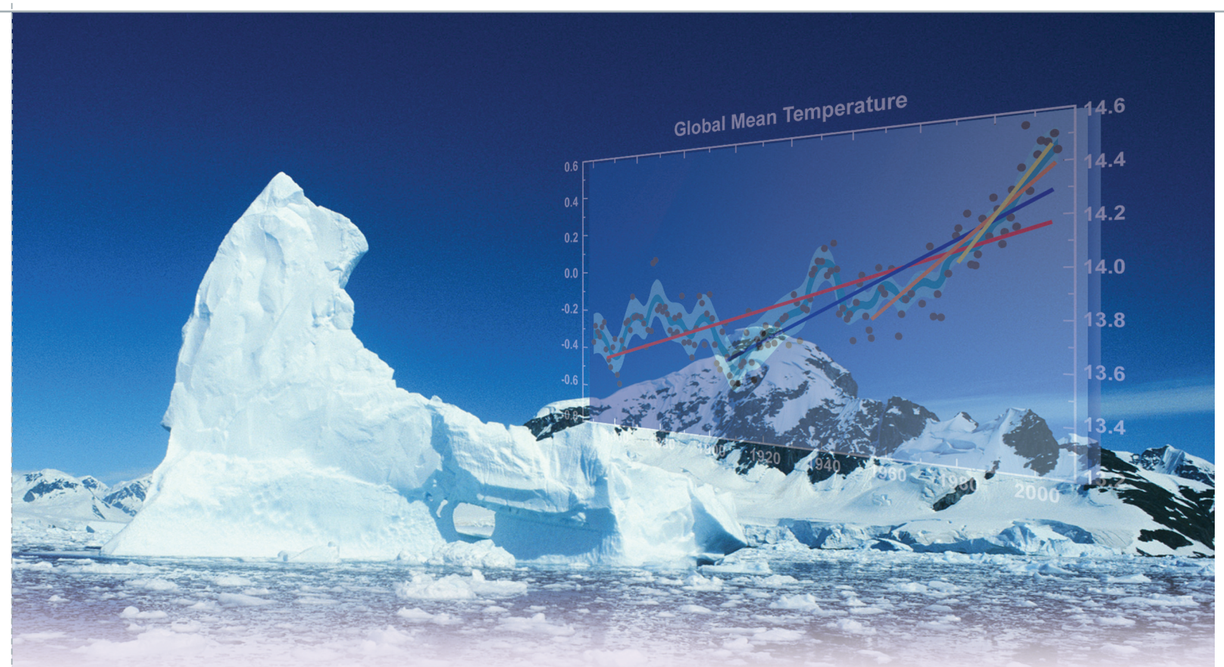
Airport Control Weather Information System (ACWIS) : An Internet system that can monitor, in real-time, weather conditions of an airport and the area around the airport, which is necessary for aeronautical transportation control.

• Wind Profiler •

• World Area Forecast System •

• Visibility sensor •

• The Korea Aviation Meteorological Agency •

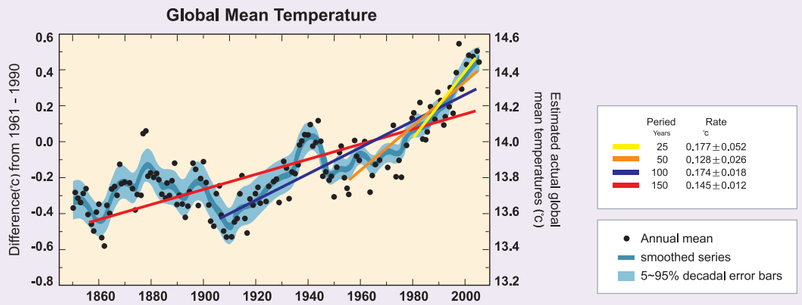


| Global Climate Change |

■ Unequivocal evidences of the global climate change

Recently the Intergovernmental Panel on Climate Change (IPCC) reported that warming of the climate system is unequivocal based on observational evidences with increases in global mean air temperature, accelerated melting of glacier, and steady rise of global mean sea level. It is also noted that eleven of the last 12 years (1995-2006) rank among the 12 warmest years on record since 1850.
In particular, if consumption of fossil fuels continues to increase further, global-mean temperature and sea level are projected to increase up to 6.4℃ and rise by 59cm, respectively, at the end of the 21st century.

■ Increases in the global mean temperature

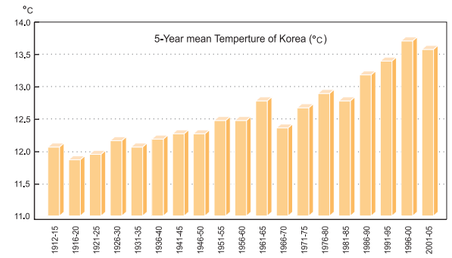


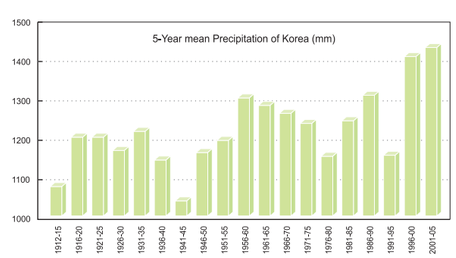
| Climate Change in the Korean Peninsula |

■ The impacts of the climate change on the Korean Peninsula

One major impact of climate change in the Korean Peninsula attributable to global warming is changes in frequency and scale of natural disasters. This includes the increases of property damages caused by floods and landslides due to heavy rainfalls and by landfalls of strong typhoons. Intense droughts and heat waves have increased while cold waves have remarkably decreased.
Changes in the agriculture and forest ecosystems appear in the increases of blight and harmful insects including the pine wood nematode, and the changes of animals and plants' habitats. For example, the major apple-growing areas are migrating from Daegu to Jaecheon and species of subtropical butterflies are found at Mt. Seorak and Baekryung Island.
As for changes in the oceanic ecosystem and fisheries, the sea surface temperature has increased by 0.2℃ in the recent decade. The mean sea level has risen by 10-20cm. Discoveries of subtropical jellyfish in adjoining seas and changes of marine animals and plants' habitats are also reported. As for the impacts on national health, human mortality due to heat waves or epidemic diseases is predicted to increase.

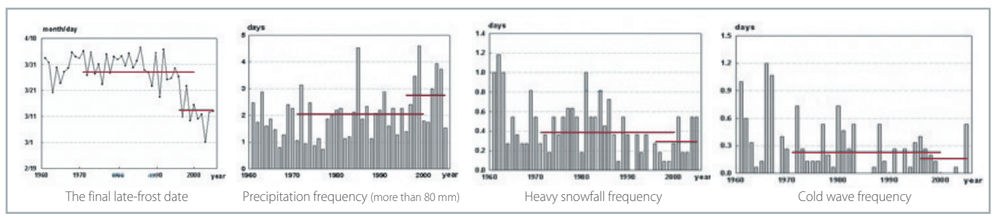
■ Trends of temperature and precipitation in the Korean Peninsula





According to the analysis from six station observational data (Seoul, Incheon, Gangneung, Daegu, Mokpo, and Busan) between 1912 to 2005, the annual mean temperature (including 20-30% of urbanization effects) continued to rise by 1.5℃ in Korea. Precipitation shows an increasing trend but it contains large natural variability.

■ Analysis of climatic change in the recent decade

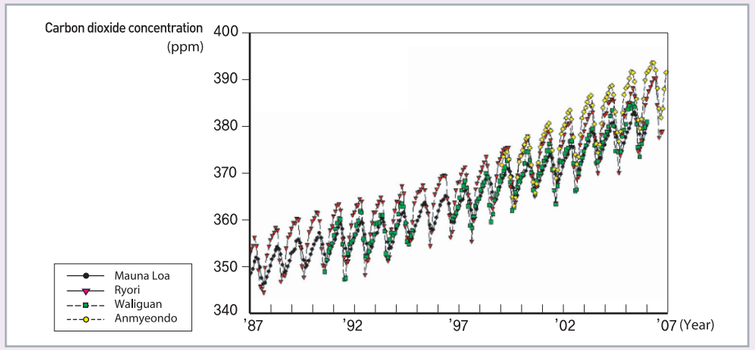


The data from 1970 to the present shows that the property damages attributable to natural disasters have increased progressively while casualties have decreased.

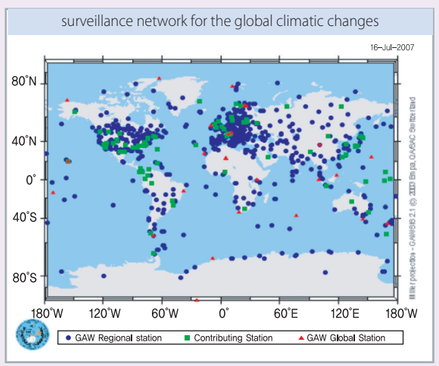
| Global Atmosphere Watch |

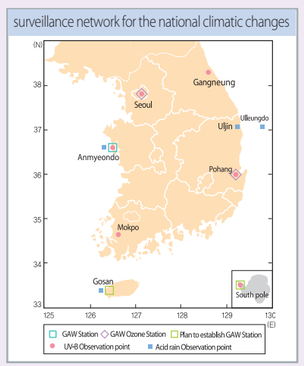
KMA has been driving a construction of the climate change monitoring system since 1992, based on WMO Global Atmosphere Watch (GAW) Strategic Plan, and operating the Korea Global Atmosphere Watch Center (KGAWC ; WMO/GAW Station 47132), the regional observatory in Anmyeon Island, Korea since 1996, in order to understand the actual condition of the global environment, predict long-term global weather changes, and set its countermeasures. The data produced by KGAWC is domestically utilized to produce the background information on the climate monitoring in the Korean Peninsula, support the site operation of the Asian Dust monitoring, and research jointly with universities and/or laboratories, etc. They are also internationally utilized to exchange the data with the World Archive Center and technologies with other GAW Stations in the world, and promote the professionals' reciprocal visitation to other nations, so KGAWC will ultimately contribute to the production of the high quality data that WMO is satisfied with.

The Anmyeon Island KGAWC has been executing overall tasks related to global weather change monitoring such as observing recommended elements in WMO/GAW Strategic Plan, which are greenhouse gas, reaction gas, chemical component of precipitation-drop particle, atmospheric radiation, aerosol, ozone, ultraviolet rays, etc. As for the field of greenhouse gases, KGAWC has monitored greenhouse gases at the background area of the Korean Peninsula (Anmyeon, Uljin, and Gosan), participated in a global cooperation program, and exchanged data with the World Data Center for Greenhouse Gases (WDCGG). Also, KGAWC, in the area of the precipitation chemistry, has conducted analysis on acid rain at the background area, participated in the international comparison and analysis on acid precipitation, and exchanged data with the World Data Center for Precipitation Chemistry (WDCPC).



● The comparison of the greenhouse gas concentration ●





● surveillance network for the global and national climatic changes ●

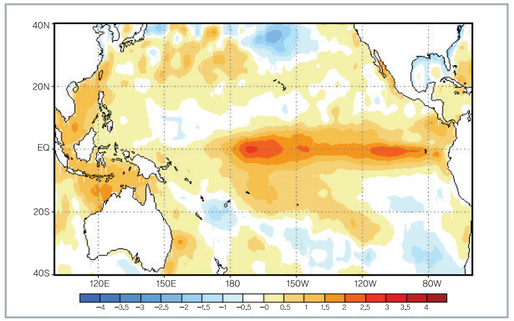
| El Niño |

El Niño often causes extreme weather and climate conditions such as severe drought and floods, which result in life loss, destruction of shelters and food reserves, disruption of food production and transportation systems, and environmental/health risks. It is anticipated that the occurrence of extreme climate and erratic ocean behavior will become more frequent due to global warming. The severe impacts, particularly on vulnerable communities, will increase unless concrete actions are taken towards integrated preventive strategies.

Natural disasters associated with unusual weather and climate are also one of the most serious problems in the 21st century. To prepare against natural disasters, KMA has developed a climate monitoring and prediction system to detect the development of El Niño or La Niña and subsequent changes in global and regional climate. Long-range forecast and El Niño prediction system are operated in KMA supercomputing system, and the climate monitoring and prediction information are exchanged through the regular meeting among the expert committes and government agencies to figure for the possibilities of unusual weather and climate.

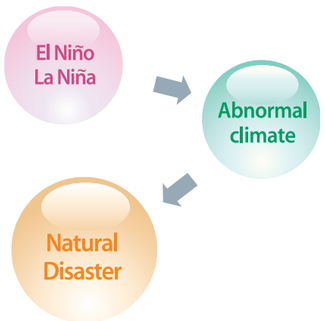
KMA's El Niño prediction model is a state-of-the-art ocean dynamic model in which the processes in the ocean-atmosphere interface are statistically formulated so as to enhance the reliability of prediction. The El Niño model is used for continuous monitoring and predicting the ocean temperature over the tropical Pacific for up to six months.

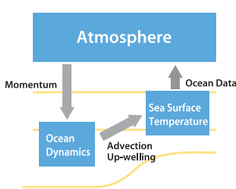
A research effort to improve the El Niño prediction model for the coupling with global atmospheric model is in progress. The ocean-atmosphere coupled system will provide the high-quality climate prediction information required for natural disaster prevention.



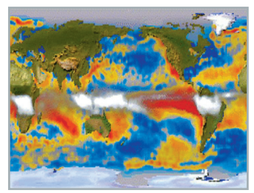
● El Niño (2002~2003) ●

* El Niño episodes feature the develpoment of abnormally warm sea surface temperature across the eastern tropical Pacific.

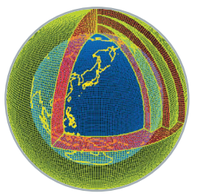




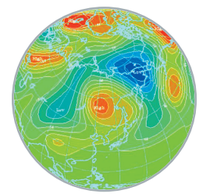
● El Niño prediction model ●



● Monitoring and prediction of sea surface temperature change ●



● Climate prediction model ●



● Production of climate prediction data ●

| Cooperate with APEC Climate Center |

APEC Climate Center(APCC) was established in Busan on Nov. 18, 2005 during the 13th APEC summit. It has a highly significant meaning to KMA because APCC based in Korea is the fruit of KMA's continuous effort to expand and develop APEC Climate Network (APCN) for 21 APEC member economies.

APCC is expected to play a leading role in solving the worldwide problems under abnormal climate by minimizing the effects of natural disasters resulting from abnormal weather conditions through providing valuable climate prediction information and sharing human and economic resources in Asian-Pacific region.

• APEC Climate Center International Symposium (Busan. 9. 2007) •

| GPC SEOUL |

GPC Seoul (by KMA) was officially designated for the Global Producing Center (GPC) at the extraordinary session of the Commission for Basic Systems 2006 (CBS-Ext.06) held in Seoul November 2006 (Refer to WMO-No.1017). To accomplish the mission of GPC, GPC Seoul (KMA) has been providing the Long Range Forecast data periodically to the GPCs and NMHs since July 2007.

The Long Range Forecast data provided by GPC will be used in the various sectors such as agriculture, water resources managements, disaster managements, the weather sensitive industries and socio-economic activities, etc.

• GPC •

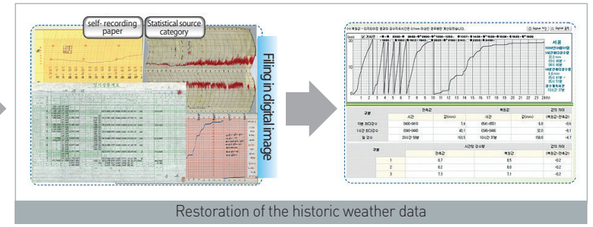
| Climate Data |

■ The Restoration of Historical Climate Data

Since 1904, when modern meteorological observation began, the KMA has been the owner of the paper type meteorological observation data comprising over 6,000,000 pages. It is currently executing processes that modernize the preservation system of the historical climate data, in order to protect against possible data damage or loss. The process include saving paper data as image files through scanning, inputting and data-basing the meteorological observation records in the image file (observed values by time, such as the temperature, rainfall, wind velocity and direction), expressing numerically, and digitalizing the observed data as linear information.

Historical climate data contain significant resources collected over 100 years. The data describe the history of climate in Korea, and are now designated as permanent archive status. The image files and numerical data are provided though the KMA website and at civil affairs offices.

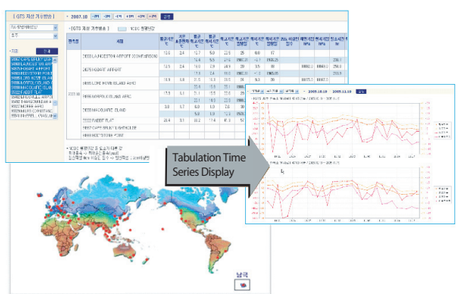
Old self - recording paper



Restoration of the historic weather data

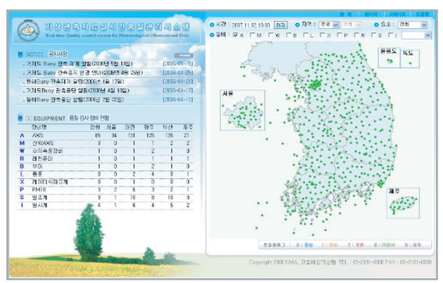
■ World Climate DB Construction

As the necessity of world climate data is emphasized when checking abnormal weather and climate changes, the KMA has gradually executed this project since 2005, working to construct and utilize the world climate DB. The quality of data collected by the Global Telecommunication System (GTS) is inspected, and the database is built. The data are then expressed in graphic forms and provided to supply. KMA has strengthened its function to monitor world weather changes, and extended its services in support of national policy, studies and research, industry, and the public.



■ Quality Management of Climate Data

The data are stored in the climate DB. After the data quality management on the surface, upper layer, and ocean are stored and real-time inspections are conducted. These data then undergo daily quality testing and statistical analysis processes. Finally, high quality data are produced.



The National Institute of Meteorological Research (METRI) is the main meteorological research organization in Korea. Begun as a part of KMA in 1978, it has undergone several changes before becoming an independent organization. METRI emphasizes its role of research and development in the fields of weather and climate prediction, climate change and its effects, and background air pollution monitoring, including earthquake and marine meteorology.

| Policy Research |

■ Policy Trend Analysis

- Investigation, analysis and management of the meteorology-related policy, technology, and research trend

■ Policy Planning

- Exploring a new strategic meteorology technology
- Conducting KMA-demanded policy project

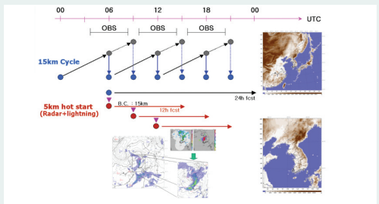
■ Strategy Development

- Expanding meteorological R&D investment
- Exploring future strategic meteorological fields
- Remodeling KMA's R&D organization

| Forecast Research |

■ Short-range Analysis and Prediction

Warm season quantitative precipitation forecast has been a challenging issue due to its high societal impact and the low level operational forecast skill. To provide more accurate precipitation forecast guidance , FRL has developed the Short-Range Analysis and Prediction System (SRAPS).



■ Korean Enhanced Observing Program (KEOP)

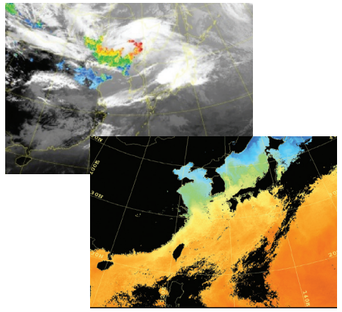
KEOP has carried out for about seven years to advance understanding of meso- and storm-scale phenomena in the atmosphere and to improve the predictability of the high resolution numerical weather prediction model.

| Global Environment System Research |

■ Study on the Application of Next-Generation Satellite Data

This study aims to derive and apply meteorological parameters from next generation satellite data with special attention to improve the accuracy for both operational weather forecasting and atmospheric research in general. The major goals for this study are;

- Development of retrieval algorithms to derive the meteorological parameters
- Characterization of new channel observation data from new instruments
- Special emphasis on the application of microwave and hyper-spectral instrument data-research and development of key strategical technologies related to meteorology



• Examples of parameter using geostationary satellite data •

■ Operation of the X-band Doppler Radar and Data Analysis

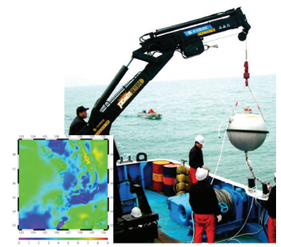
GESRL operates a mobile X-band Doppler radar at Muan Observatory, located southwest coast of the peninsula. Although it is a research radar, it has been operated to support severe weather monitoring in real-time. The major research goals of this project are;

- Develop the Quantitative Precipitation Estimation (QPE) algorithm
- Implement the Quantitative Precipitation Forecast (QPF)
- Improve the horizontal wind retrieval from Doppler radars analysis

■ Marine Meteorological Observation and Analysis

Disturbing factors on our ocean environment require better observational system for the marine meteorology. With all the efforts, METRI eventually aim to intensify monitoring ability and prevent marine meteorological disasters. To meet this requirement, METRI tries to achieve the following goals;

- Increase the reliability of wave data
- Perform the operational test of new observational technologies
- Improve the estimation of the sea surface wind (10 m).



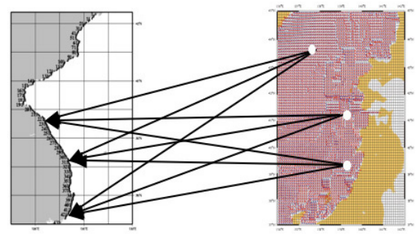
■ Earthquake Monitoring and Tsunami Prediction

Early warning system for Tsunami

Tsunami source range
- Sea area around the Korean peninsula
- a criterion of KMA Tsunami inform
- 0.2ox0.2o grid

Set up of Fault solution
- Select the fault solution which can induce the maximum wave height
- Use of TIME Tsunami propagation model
- Depth data of water : 1.1km grid

DB construction of each point about the coast
- Arrival time for source range and Magnitude
- Maximum wave height DB

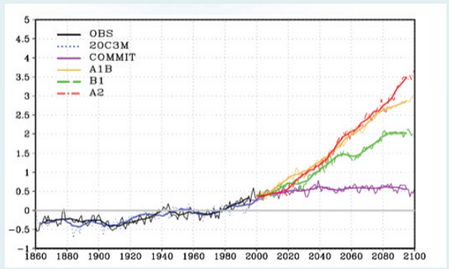


•Tsunami DB Construction Plan •

| Climate Research |

■ Climate Change

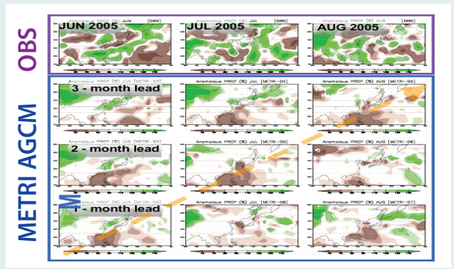
Many climate scientists agree that over the past century, global warming is associated with the buildup of human-induced greenhouse gases in the atmosphere. In recent decades, significant progresses have been made in understanding various feedback mechanism of the climate system and in projecting the future climate change. METRI has made tremendous efforts to produce enhanced future climate scenarios using various atmosphere-ocean coupled models.



Observed and simulated time series of annual mean surface air temperature anomalies

■ Predicting Seasonal Climate

METRI has carried out various analyses of observational data and climate modeling to improve seasonal climate prediction skills. They include studies on intra-and interseasonal variability of , ENSO, AO, Asian monsoon, etc. METRI has provided the information on seasonal climate prediction using METRI climate prediction system. Since March 2006, monthly prediction data provided to various operational divisions under KMA.

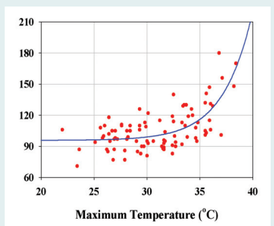


| Applied Meteorology Research |

■ Studies on Human Biometeorology

Development of a bioclimate map for human well-being

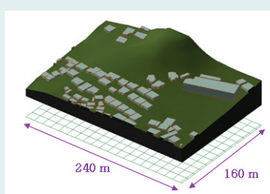
- Investigation of weather impacts on human health, behavior, and quality of life
- Perceived Temperature (PT) : human thermal comfort index under hot or cold environment
- PT incorporates wind and solar radiation factors in evaluating human thermal comfort



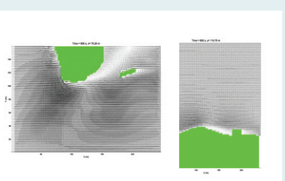
■ Monitoring and Prediction of Urban Climate Change

Characterization of local urban climate

- Long term meteorological monitoring throughout large scale land use changes in urban development
- Impact assessment of large scale urban planning
- Simulation of meteorological variability by virtual scenarios using local-scale meteorological diagnostic models



● Model domain ●



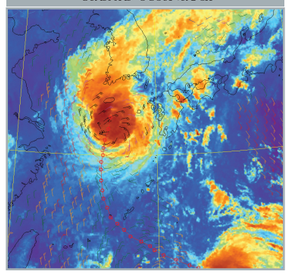
● CFD model output (3D Wind Vector) ●

| Typhoon and Asian Dust Research |

■ Typhoon Analysis and Prediction

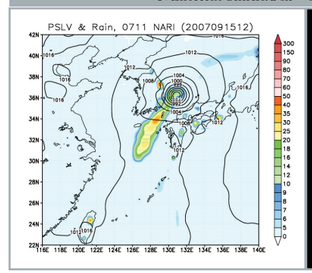
Typhoon development and structure change are influenced by environmental forcing such as ocean heat flux and mid-latitude troughs. The relationship among these forcing is studied using several numerical models and observation data. Since typhoon is formed and developed over the open ocean, satellite-observed data are used to study typhoon intensity and structure change as well as understand the influences of mid-latitude environment on the typhoon development mechanism.

Satellite Observation

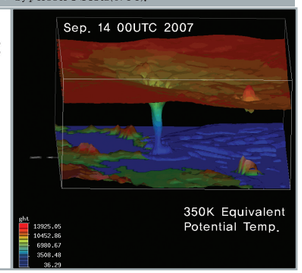


● MTSAT infrared and QuickScat wind images (Sep. 16 00UTC 2007) ●

Numerical Simulation : Typhoon NARI(0711).



● Sea level pressure and rain distribution ●



● 3-dimensional temperature structure ●

Asian Dust Monitoring and Prediction

The source region of "Asian Dust"

Asian Dust known as Hwangsa that affects the Korean peninsula occurs most frequently in the spring season, and originates in the arid and semi-arid regions of sand deserts in Mongolia and northern China., including Badainjaran, Tengger, Mu Us, Hunsandakue, and Keoeolchin, Gobi region and Loess regions of the Asian continent. The southeastward moving low-pressure system accompanied with the cold fronts disseminates sand and dust into the atmospheres, often resulting in the low visibility of less than one km in the downwind region such as NE China and Korea.

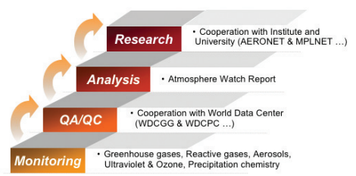
● Dust storm monitoring towers at Duolun in the source region ●

| Korea Global Atmosphere Watch |

■ Mission

Monitoring and analysis for atmospheric physical properties and chemical composition to climate watch Monitoring and analysis for acid rain, ultraviolet and asian dust, etc.

■ Accomplishment Flowchart



| International Cooperation Policy |

■ Policy Focus

Upgrading meteorological technology necessary to achieve of mission and vision through promoting international cooperation

■ Direction

- Strengthen bilateral cooperation and cooperation with the World Meteorological Organization (WMO)
- Support the capacity building of developing countries
- Secure human and financial resources through increased public awareness of international cooperation activities

■ Implementing Tasks

- Active participation in WMO programmes
- Increased frequency of facilitated important international meetings
- Differentiation of bilateral cooperation projects
- Development of research projects with advanced foreign institutes and universities
- Expansion of technical donation to developing countries
- Monitoring and evaluating internatonal cooperative activities

| Cooperation with the World Meteorological Organization |

Since the Republic of Korea joined WMO in 1956, KMA as the official agency in charge of the national meteorological services in Korea has abided by the regulations and advice of WMO and actively participated in the efforts to improve enthusiastically the meteorological technologies for the safer world together with WMO. In addition, KMA has been expanding its contribution to WMO Programmes under the WMO framework corresponding to its elevated status in the international society.

KMA hosted many significant WMO events such as the twelfth session of Regional Association II (Asia) in 2000 and the extraordinary session of the Commission for Basic Systems in 2006.

KMA has also actively participated in and contributed to WMO Programmes such as VCP, AMDAR, THORPEX, etc. It has also increased the initiatives to share its technology and experience with the developing countries. Thanks to these activities, KMA is now considered as one of the most important contributors to WMO in both technical and financial aspects. Mr Lee Man-Ki, Administrator of KMA was elected as member of WMO Executive Council (EC) during the fifteenth World Meteorological Congress in May 2007 for the first time since Korea's joining the Organization in 1956.

● 15th WMO general meeting (5. 2007, Geneve) ●

| Major International Events hosted by KMA |

- WMO Regional Association II (Asia) the 12th Session-September 2000, Seoul
- Extraordinary session of the Commission for Basic Systems-November 2006, Seoul
- 1st JCOMM Scientific/Technical Symposium on Storm Surges-October 2007, Seoul

The twelfth session of the Regional Association (RA) II (Asia) was held in Seoul, from 19 to 27 September 2000. About 120 people participated in the session, including seventy-six delegates from twenty-eight countries. RA II, now composed of thirty-four members, meets every four years to discuss matters of general interest and coordinate meteorological and operational hydrological activities within its Region.

● Twelfth Session of Regional Association II (Asia) ●

During the session, RA II discussed and made decisions about activities and implementations of WMO Programmes and other activities in the Region. At this meeting, the then Administrator of KMA, was elected President of RA II.

The extraordinary session of the Commission for Basic Systems (CBS) was held in Seoul, from 9 to 16 November 2006. Around 200 people from seventy countries and international organizations participated in the session. CBS meets normally every four years.
In-between extra-ordinary session as held in Seoul in 2006 could take place by decision of WMO Congress or the Executive Council to study and make recommendations to Congress and the Executive Council on subjects within its terms of reference and in particular on matters directly referred to the commission by Congress and the Executive Council.

● Extraordinary Session of the Commission for Basic Systems (11. 2006, Seoul) ●

| Participation in ESCAP/WMO Typhoon Committee |

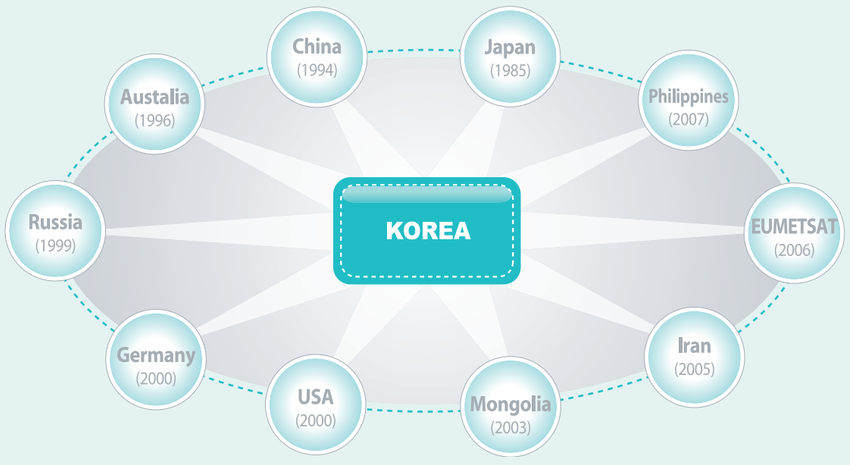
KMA devotes itself to the activities of the ESCAP/WMO Typhoon Committee (TC), which was established in 1968 to promote and coordinate programs for minimizing typhoon disasters in the Asia-Pacific region. Since the foundation of TC, KMA has exchanged technology and the ideas relevant to typhoon forecasting and prevention of disasters with other member countries in order to improve the accuracy of typhoon forecasting and set up a prompt communication system. KMA has attended annual TC sessions and hosted the 23rd (1990) and the 32nd (1999) sessions in Seoul.

| Bilateral Cooperation Activities |

On top of active participation in WMO, KMA has expanded bilateral cooperation with other countries. KMA has made agreements on bilateral cooperation in meteorological activities with various countries such as China (1994), Australia (1996), Russia (1999), Germany (2000), the United States of America (2000), Mongolia (2003), and the Islamic Republic of Iran (2005), to achieve common goals in meteorological services. In 2005, KMA has succeeded to make agreement with the National Oceanic and Atmospheric Administration (NOAA) in order to share technology and human resources in mutually beneficial ways. KMA also held the Second Tripartite Meeting on Earthquake Disaster Mitigation with the China Earthquake Administration (CEA) and Japan Meteorological Agency (JMA) in Seoul to work together for strengthening the cooperation among the three countries.

KMA also has a formal linkage with ASEAN Sub-Committee on Meteorology and Geophysics (SCMG) where both sides exchanged a letter in August 2005 to promote and strengthen cooperation activities in the area of meteorology between the KMA and SCMG.

As further evidence of KMA's commitment to cooperation with other organizations, KMA signed a Memorandum of Understanding in November 2006 with the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT).



Korea-ASEAN special cooperation Fund

- *Holding of Training Workshops.*
  - Training Workshop on Seasonal Monsoon Rain Prediction Schemes (16 to 19 July 2002)
  - Training Workshop for the use of Numerical Weather Prediction Products (30 October to 3 November 2006)
- *KMA and ASEAN Sub-Committee on Meteorology and Geophysics agreed the establishment of a formal Cooperation linkage in 2005.*
  - Cooperation activities can be implemented on a case-by-case basis

| Support for Developing Countries |

As the Republic of Korea has increased its national potential and economic power, KMA has gradually come to play a role as contributor in the field of meteorology. Also, KMA is continuously raising its status in the international communities including the Organization through collaborating in the development of new meteorological technologies and sharing the role in supporting developing countries, especially the Least Developed Countries (LDCs).

Technical donation-offer of NWP system based on PC clusters

- *To run numerical models by using two or more PCs that work together - can do parallel process - to provide best solution, connecting with network.*
  - Resolution : 30km, 10km
  - Forecast hours : 72 hours, twice a day
- *The system was installed in Mongolia Met. Service in 2004, and in Sri Lanka Met. Service in 2005.*
- *NWP System Support will be expanded to other developing countries under financial support of KOICA.*

| Technical Transfer through International Traininig Courses & Programs |

KMA started to train forecasters mainly from developing countries through opening the Training Course on Weather Forecasting for Operational Meteorologists from 1998 with financial support by the Korea International Cooperation Agency (KOICA). The course was designed to train operational meteorologists in Asia and the Pacific region, to improve cooperation among the developing countries and mitigate weather-caused damages caused by weather.


Training Course on the Information and Communication Technologies (ICT) for Meteorological Services, June 2007, Seoul

In 2006, as it changed the subject of the course from weather forecast to the information and communication technologies (ICT) for meteorological services, KMA shifted the target trainees of the training course from the forecasters to engineers or observation experts, aiming to increase the abilities to use WMO basic IT technologies and the state-of-the-art IT technologies applied to WMO pilot projects; to understand various ICT to provide weather information, including NWP products; to understand and gain the techniques for agrometeorological information including the use of the World Agro-Meteorological Information Service (WAMIS); and to gain the techniques to establish and manage the Automatic Weather Station (AWS) Network, including real-time data collection.

KMA also opens some training courses or programs whenever the fund is available. One of these held in 2007 was the Expert Program for Climate Prediction in Asia-Pacific under the auspice of the Korea International Cooperation Agency (KOICA), whose objectives were to enhance the participants' professional knowledge on climate prediction; to acquire the innovative techniques on climate prediction for operational use during the course of their services; and to exchange more effectively the information on regional climate prediction.


Training Course on Analysis of COMS Data
(2 – 17 September 2007, KMA, Seoul)

Another KOICA supporting course titled Analysis of the Communication, Ocean, and Meteorological Satellite (COMS) Data also opened in 2007. The objectives of this course were to introduce the COMS which is the first Geostationary Meteorological Satellite to be launched by Korea in 2009; to enhance overall knowledge on meteorological satellite about how to receive and use the data in their own countries; to form a user community to share various information on COMS that would cover the Asia-Pacific area, etc.

| Internet Broadcasting System “Nalsee ON” |

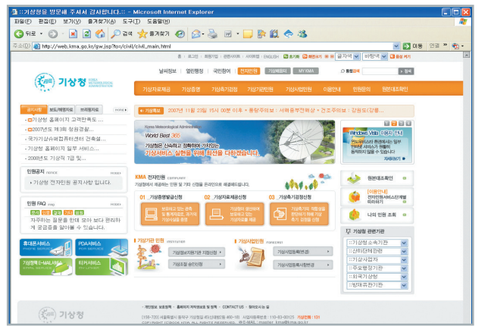
기상청 인터넷 기상방송 날씨ON tv.kma.go.kr

KMA operates an Internet weather broadcasting system called “Nalsee ON” to provide high-quality weather information to the general public in real-time, and to provide weather disaster and weather science-related information in movie. It commenced the pilot operation in September 2007, and is scheduled to operate full service in July 2008. “Nalsee ON” provides VOD (Video On Demand) services, weather information services, and CCTV screens depicting present sea condition status. The weather forecast explanation and weather-related breaking news services are directly recorded and broadcast in real-time by the KMA forecaster. Periodically, daily weather forecasts, monthly weather forecasts, and three-month weather forecasts are broadcast via the Internet. Through the “I am VJ” project, only members can directly upload weather-related UCC. “Nalsee ON” owns and provides a diverse VIDEO content related to weather, utilizing it jointly with related institutions, such as the broadcasting authority, the Korea Science Foundation, the National Institute for Disaster Prevention, and the Traffic Broadcasting System. In the future, "Nalsee ON" will be utilized as a precious channel capable of directly communicating weather conditions to the public. “Nalsee ON” is hoped to be possibly developed as special broadcasting services for weather science, including weather disaster prevention through promoting the importance of weather information and using video services in education.

| Weather Certificate and Data Provision |

As the economical value of weather data improves, and given its impact on the daily life of the public, meteorological observation data are observed in use in a number of different fields including architecture, civil engineering, agriculture, fisheries, stock breeding, research, the environment, law, and insurance.
KMA issues certificates and provides data supply services on past meteorological data so as to enable the public to actively utilize the meteorological data. The ‘meteorological phenomenon certificate’ issued by the KMA is used as documentary evidence of the need for construction delays in courts of law and at police stations. Data are utilized for reference purposes, such as in academic research and report preparation.
KMA has strived to develop the public services by executing an ‘Internet automatic issuance service’ that can certify meteorological phenomena and provide data supply services through website.

• The Public service •



• On-line civil affair service •

| Applied Meteorological Information Services |

KMA provides various kinds of applied meteorological indices such as discomfort index, ultraviolet index, food poisoning index, etc., for daily life. The interest for the public health has recently increased, and KMA also provides biometeorological information such as asthma, skin disease, chronic obstructive pulmonary disease, etc.
In addition, KMA provides information not only for public activities such as travel and leisure but also for industrial activities related to agriculture, fisheries and construction.
KMA also has contributed to the improvement of quality of life by publishing seasonally appropriate weather information such as blooming of cherry blossoms, forsythia, and azalea in spring, and fall foliage and time to make Kimchi for winter time.

| Education and Training |

KMA provides employees with professional re-education in order to cultivate professionalism in the weather technology industry and to help establish new weather theories and practice. It also has widely distributed weather-related knowledge to various levels of students and weather-sensitive workers in order to strengthen the public awareness of weather-related knowledge.

With respect to its employees°Ø job-related education and training, KMA conducts basic job training to strengthen personal capabilities of its four occupation groups, (forecasting, observation, etc.), based on the frequent learning system. Additionally, there are Upgrading Courses for Career Forecast(UCC) to strengthen the practical capabilities of forecasters, and weather observation-specialized courses to help observer using the latest observing equipment, improvement of accurate observation data quality. The agency also supports an Academic Credit Bank System to encourage employees to study college-level information of Atmosphere Science courses.

To reduce weather-related disasters by distributing weather knowledge to the public, and to improve value-added services by utilizing weather information, KMA permits private weather education institutions to provide weather education to weather-related staffs as well as to elementary and middle school science teachers. Further, KMA has concentrated on the spread of weather knowledge by conducting on-the-spot studies and weather science camps for the public and students, through its nationwide meteorological offices.

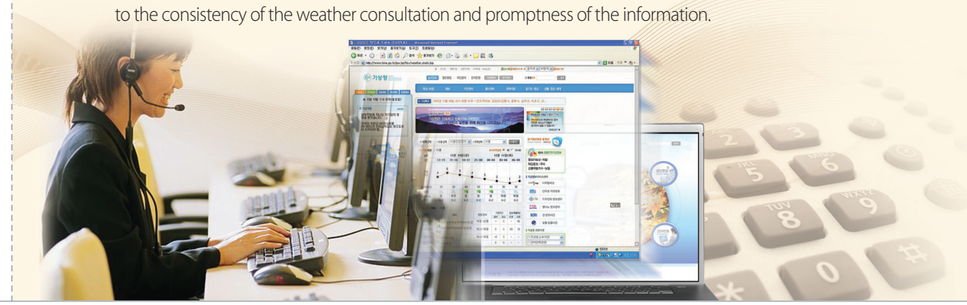
• Invitation camp •

• Meteorological information training program •

| Weather Call Center |

KMA has been operating a call center since 2008, through which specialized counselors provide weather information to the callers.
The Call Center can be connected through "131" Automatic Response System(ARS)

For this service, KMA integrated the existing response services performed by individual offices into the center which contributes to the consistency of the weather consultation and promptness of the information.



| Weather Business |

Business needs for weather-related information vary based on industry. KMA has natural limits in terms of resources, and cannot provide all the information that might be needed.
It therefore started to execute In 1997 the weather enterpriser policy, for the purpose of concentrating on the prevention of weather disasters and of providing a variety of weather information services. Currently, 14 enterprisers, (with one company suspended), are in operation.

Through this policy, the weather enterpriser can provide detailed weather forecasts for small regions, certain places, and a specified period of time. A customer satisfaction-based weather service era, offering custom-made weather information required for certain users, has opened. The weather enterprisers currently provide a great diversity of weather services, including weather forecasts for certain regions, such as golf courses, weather insurance for certain events, weather consulting services for companies, and weather information ARS services.
KMA also designated an information support center on December 1, 2005 in order to provide weather information efficiently to weather enterprisers. It is important to note that weather data related to disaster prevention, such as special weather reports, (including weather forecasts and warnings for the general public) should be published only by KMA.

The half-faced sun and the wavy lines circled by the titles of KMA in Korean and English symbolize the harmony between humanity and nature. The smiling sun symbolizes the eternal energy source of the earth while the wavy lines signify the ceaseless wind and ocean wave.

KMA's official character "Gisang-I"
Its face symbolizes a thermometer.
The blue color of the body symbolizes the sky.

Future

- Enhancement of prevention capacity for mitigation of weather and climate disasters
- Upgrade of the quality of life pertinent enhancement of meteorological information
- Leading the sustainable development by invention of higher value-added meteorological information
- Promotion of international cooperation to upgrade global meteorological issue
- Fortification of the fundamentals for innovation to provide the advanced meteorological services

KMA's public relation ambassador Mr. Um Hong Gil is smiling on top of one Himalayan Summit, higher than 8000 meters.

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