

**The Importance of an Integrated Earth Observation System
and the Current Status and Plan of Observation in the Republic of Korea**

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Acquisition of global observing data is essential for climate prediction, including medium- and long-range weather forecasts. Now, we have some observing data, but most of the available data are restricted by time and space. For the improvement of climate prediction, we need some observation data: atmospheric sounding over the ocean; three-dimensional observation data for water vapor, ozone, and aerosol; three-dimensional ocean temperature, salinity and currents and greenhouse gas concentration in global oceans; soil temperature and soil moisture, snow cover and snow depth over the continents; change on vegetation type, and runoff or drainage flow in rivers. When these data are collected, the global water cycle structure, mechanisms of global warming, and effects of the ocean on meteorology and climatology are examined as well as their contributions to the prediction of occurrence of abnormal climatological events such as floods and droughts. Moreover, this assists energy and water management, disaster mitigation and sustainable development. The same is true for the observation data of earthquakes and volcanoes.

Considering the increasing potential of vulnerability to natural disasters, and the economic benefits of earth observation, the comprehensive, coordinated and sustained Earth Observation System proposed by the United States is appropriate and Korea strongly supports the establishment of the system.

However, for the success of the Integrated Earth Observation System, an institutional scheme for the participation of developed and developing countries will be necessary. Its success also requires effective integration of the global observing system for developing new observing methods and equipment, minimizing the gap of observing data, and improving the sharing process of production, report and archiving.

Recently, severe rainfall and typhoons have influenced the Korean Peninsula, costing lives and property. For example, Typhoon Rusa passed through Korea on August 31 of last year with a center pressure of 960 hPa and a maximum wind speed of 36 m/s. Heavy rainfall associated with Rusa reached 898.00 mm on the eastern coast of Korea, recording the greatest daily precipitation in history. As a result, 246 people were killed by the typhoon.

As the Korea Meteorological Administration (KMA) fully recognizes that a dense observation network is needed for accurate prediction of mesoscale severe weather events, it operates the following observation

network: 10 climatological observation stations, 534 automatic weather stations (AWSs), seven upper-air observation stations, seven buoys and seven weather radar sites. In particular, the horizontal resolution of AWSs is 15 km, and the observation data from AWSs are collected every minute through the dedicated line. The Korea Ocean Research and Development Institute opened the Marine Science Research Center on June 11, 2003. The center is located on a reef 149 km south of Mara Island, which is the southernmost tip of the Republic of Korea and lies 11 km south of Jeju Island.

KMA has plans for strengthening its observational networks within three years: to improve the resolutions of AWSs from 15 km to 13 km; to establish 2 radar sites; to deploy 10 buoys; to build a Composite Site for Marine Meteorological Observation on an uninhabited island located at the westernmost tip of Korea; and to install 10 wind profilers across the country.

The GAW observation network, operated under the national climate change monitoring program by KMA, includes the Korea GAW Observatory (No. 47132) which observes about 30 kinds of greenhouse gases, atmospheric quality, radiation and acid rain. In addition, the Pohang Meteorological Station, WMO GAW station (No. 47138) / GO₃OS station (No. 332), which observes the total ozone amount, vertical profile of ozone and earth surface ultraviolet radiation, and the Ultraviolet Observing Sites (Mokpo, Gosan, Gangreung) and the Acid Rain Monitoring Sites (Gosan, Uljin, Ulleung-Do). To enhance the GAW activities in Korea, KMA will actively participate in the international comparison projects of greenhouse gases, precipitation chemistry and ozone. To do this, KMA developed the CO₂ national standard gas in 2002, and will continue to develop national standard gases of CH₄, N₂O, CFC-11 and CFC-12 by 2004.

Furthermore, KMA has a plan to observe atmospheric cloud condensation nuclei and ice nuclei, and atmospheric radioactive substances such as ⁸⁵Kr and ²²²Rn, which are not yet observed species. It will also make an effort to establish the three-dimensional observing network by 2008, using satellite, aircraft and rockets, known as space-borne and up-to-date equipment.

As a part of the Global Climate observation System/Global Ocean Observing System, the Government of Republic of Korea has deployed 15 Argo floats in the open sea adjacent to Korea and the west Pacific Ocean every year starting in 2001, in conjunction with the Argo Program, to understand better global climate variability and to improve ocean models. The Korean government will continuously deploy the floats until 2006.

Korea is carrying out the first Korean geosynchronous multi-functional satellite (COMeS) development program as a part of the National Space Development Plan of Korea. The first and second COMeS are scheduled to be launched in 2008 and 2014, respectively, and their missions will be 7 years long.

The mission of COMeS is three-fold. The first mission is the acquisition of real-time meteorological observation data that provides higher time, spatial and spectral resolution data than currently available,

especially in cases of severe weather in the Korean Peninsula. The second mission is ocean monitoring on the geosynchronous orbit for public services. The third mission is the verification of space technology for the communications payload.

Four ministries in the Korean government are involved with the COMeS development. Each ministry is charged with the individual requirements and development objectives in their specialty of COMeS program. MOST (Ministry Of Science and Technology) supports the satellite systems and bus development, MIC (Ministry of Information and Communication) supports the communication payload and satellite control development. MOMAF (Ministry Of Maritime Affairs and Fisheries) supports the ocean observation payload development with the oceanic data application, and KMA is in charge of the meteorological payload development with the meteorological data application. The COMeS program is under the control of National Committee of Space Development in the way of the political support.

KMA plans to use the data from COMeS to provide frequent and continuous cloud imagery in addition to geophysical products such as cloud and water vapor distributions, cloud motion wind vectors, sea surface temperatures, layered water vapor contents and stability indexes, etc. to support day-to-day weather forecasts, monitoring and forecasting of severe weather phenomena, and long-term climate monitoring. The observational mode of 3-hourly, global and 15-minute intervals of a region is considered as normal operation of a meteorological payload.

The MOMAF will use COMeS for ocean color monitoring to provide advanced information for natural sea resources. Daily scans of the east and west sides of the Korean Peninsula will be performed eight times a day.

Korea has actively participated in The Observing system Research and Predictability Experiment (THORPEX) through conduct of Korea Enhanced Observations with the following objectives: to advance basic knowledge of global-to-regional influence on the predictability of high-impact weather and to contribute to the development of a dynamically-controlled interactive forecast system.

Korea will organize an International Conference on March 2004 in Seoul, in commemoration of the centennial anniversary of modern meteorological observation in KMA and the 40th anniversary of the Korean Meteorological Society. We would like to organize a sub-session on Asian THORpex in this conference.

In conclusion, the Korean government will actively participate in the establishment of the Integrated Earth Observation System through the enhancement of domestic and international observation activities as far as our resources are available.