

The 150th Anniversary of Meteorological Services in Japan

**- A 150-Year Journey: Preventing Disasters
for a Better Future -**

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On 1 June 1875, the Tokyo Meteorological Observatory (now the Japan Meteorological Agency, or JMA), began observation using meteorological instruments and seismometers from Western countries. Since then, JMA has incorporated cutting-edge science and technology into its operational services, from observation to service delivery.

In 1883, it began issuing weather maps and storm warnings, followed the next year by the first weather forecast. To support this work, the country's telegraph system (introduced in 1870) was used to quickly gather nationwide observation data. In the 1910s, wireless communication was introduced and used to transmit forecasts and warnings. In the 1930s, upper-air observation requiring wireless communication was fully implemented.

After World War II, JMA promoted the modernization of meteorological observation networks through the introduction of meteorological radar (1954 –), the Automated Meteorological Data Acquisition System (AMeDAS) (1974 –) and geostationary meteorological satellites (1977 –), underpinned by the establishment of the World Weather Watch (WWW) programme as the basis for international observation and forecasting services. In addition, the observation networks for earthquakes, tsunamis and volcanoes have also been expanded.

Furthermore, the advances in Information Technology have enabled JMA to introduce supercomputers and develop/operationalize numerical models (1959 –) and various operational systems for data processing and information dissemination. In addition, the proliferation of television, the Internet, mobile phones and social media has also made it possible for JMA to provide timely information to a wide range of consumers.

Looking back on the 150 years of meteorological services in Japan, I believe the progress we see today have been made not only with the advancement of science and technology but also through collaborative efforts with domestic and international partners, including bilateral cooperation with National Meteorological and Hydrological Services (NMHSs) of other countries and international organizations such as the World Meteorological Organization. As Japan's contribution to the international community, JMA assumes the responsibilities of a number of international centers within such frameworks, and provides data and services to other countries, particularly for the support for NMHSs in developing countries.

Climate change today poses a number of challenges, including an increased risk of hydrometeorological hazards. JMA has advanced its services based on lessons learnt from such disasters and will continue to do so to fulfill its mission to save the lives and properties keeping the people affected in mind.



(NOMURA Ryoichi)
Director-General
Japan Meteorological Agency

1875–1915

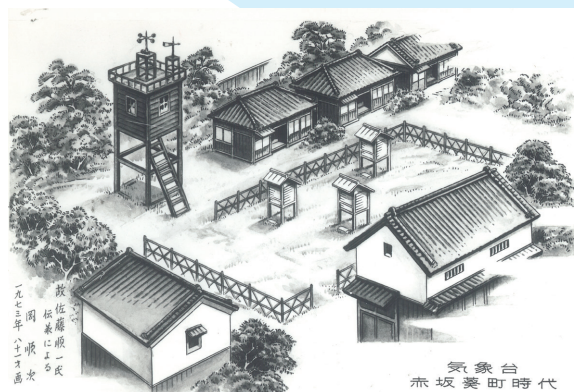
On 1 June 1875, meteorological services began in Japan.

The Tokyo Meteorological Observatory of the Surveying Department under the Home Ministry began observation using meteorological instruments and seismometers imported from the UK and Italy at the suggestion of the British person employed by the government of Japan.

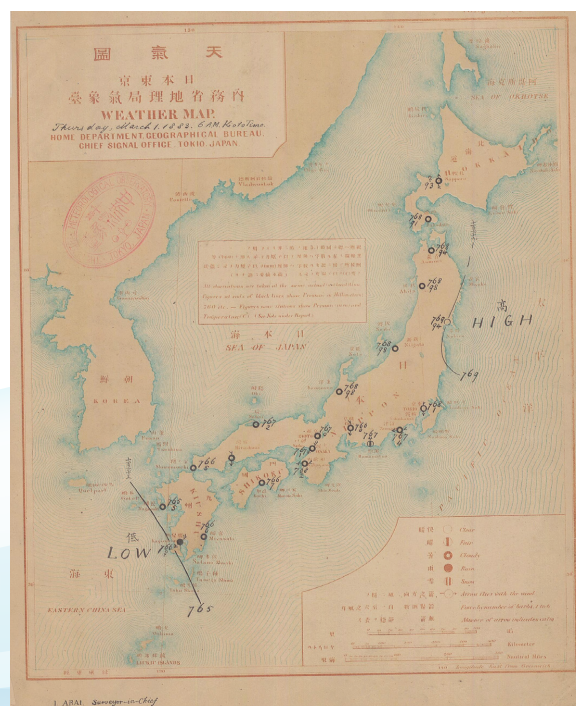
Later, based on using the observation of meteorological offices established throughout Japan, storm warning and weather forecasting services were also started.

In 1890, the Central Meteorological Observatory was established. In 1911, volcanic observations began.

This period laid the foundations for the subsequent development of meteorological services in Japan.



Tokyo Meteorological Observatory (TMO)



First weather map issued by TMO



Mt. Asama Volcanological Observatory

1875 Tokyo Meteorological Observatory (TMO; now JMA) established.

1878 First TMO local meteorological office established at Nagasaki.

1883 First weather map issued.
Geomagnetic observation begun.

1884 First national weather forecast issued.
Nationwide seismic intensity observation begun.

1890 CMO established.

1892 First local weather forecast issued.

1911 First volcanological observatory established at Mt. Asama.
Volcanic observation begun.

1891 Nobi Earthquake

1896 The 1896 Meiji Sanriku Earthquake

1914 Sakurajima volcano eruption

1916–1945

In the 1910s, weather services expanded around Japan against the backdrop of the international situation before and after World War I. At the same time, disaster risk management became increasingly important in the wake of the Sakurajima volcano eruption and the Great Kanto Earthquake.

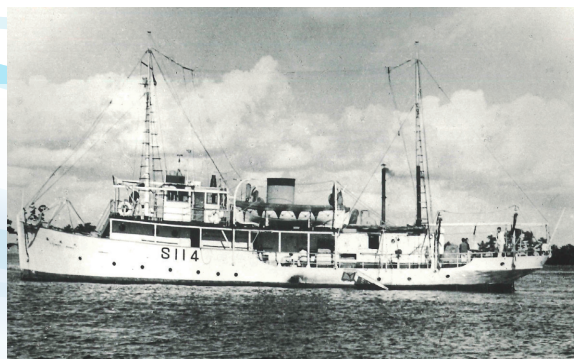
In the 1930s, aviation weather services were begun and full-scale upper-air, oceanographic and marine meteorological observation was developed. As the international situation moved toward World War II, meteorological services were also put on the war footing.

Newspaper and radio weather forecasts, which had been popular since the 1920s, were discontinued with the outbreak of the Pacific War in 1941.



Mt. Fuji Weather Station

- 1920** First Marine Observatory established at Kobe.
Aerological Observatory established at Tateno.
- 1921** Oceanographic and marine meteorological observation begun.
- 1922** Training School for Technical Experts in Meteorology (now the Meteorological College) established.
- 1930** Aviation weather service begun.
- 1932** Mt. Fuji Weather Station established.
- 1938** Routine upper-air observation using radiosondes begun.
- 1941** Tsunami warning system for the Sanriku coast established.



Shumpu Maru research vessel

- 1923** Great Kanto Earthquake
- 1933** The 1933 Showa Sanriku Earthquake
- 1934** The 1934 Muroto Typhoon
- 1943** The 1943 Tottori Earthquake
- 1944** The 1944 Tonankai Earthquake
- 1945** The 1945 Mikawa Earthquake
Typhoon Ida

1946–1960

After World War II, Japan was reorganized under the directives of General Headquarters, the Supreme Commander for the Allied Powers. At the same time, Japan faced a series of earthquakes and typhoons.

After the restoration of Japan's sovereignty, domestic legislation was established through the Meteorological Service Act in 1952. In 1953, Japan returned to the international meteorological community by joining the World Meteorological Organization (WMO).

In 1956, the Japan Meteorological Agency (JMA) was established.

During the era of high economic growth, JMA successively installed meteorological radars throughout Japan, started numerical forecasting using large computers, and strengthened typhoon observation and tsunami warning systems in the wake of Typhoon Vera and the 1960 Chile Earthquake Tsunami.



*First-generation large computer system
(1959 – 1967)*

1946 **Meteorological Research Institute established.**

1952 **Meteorological Service Act established.**

1953 **Japan joined the World Meteorological Organization (WMO).**

1954 First routine weather radar operation begun in Osaka.

1956 **CMO became the Japan Meteorological Agency (JMA).**

1957 Meteorological observation at Showa Station in Antarctica begun.

1959 Numerical weather prediction begun.

1946 The 1946 Nankai Earthquake

1947 Typhoon Kathleen

1948 The 1948 Fukui Earthquake



WORLD
METEOROLOGICAL
ORGANIZATION

1954 Typhoon Marie



気象庁

Japan Meteorological Agency

1957 The Heavy Rain Event of July 1957

1958 Typhoon Ida

1959 Typhoon Vera

1960 The 1960 Chile Earthquake Tsunami

1961–1990

In the 1960s and 70s, IT development brought improved ability to monitor frequent heavy rain through the nationwide surface observation network named Automated Meteorological Data Acquisition System (AMeDAS) and weather radar observation networks.

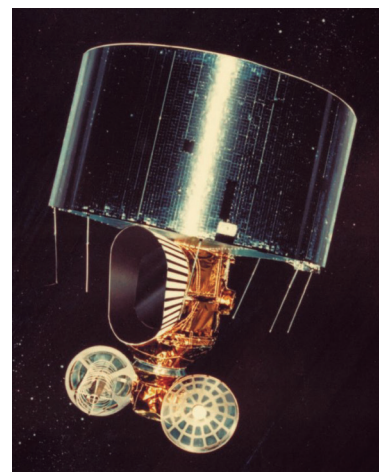
In 1978, Himawari Geostationary Meteorological Satellite observation began.

In the 1980s, today's widely referenced probabilistic precipitation forecasts and probability circles for tropical cyclones were introduced.

Global economic growth made environmental issues increasingly prominent, creating a rising sense of urgency. In response, JMA expanded its services to contribute to ozone layer protection and climate change countermeasures.



Mt. Fuji weather radar site



Himawari – JMA's first GMS

- 1965** Mt. Fuji weather radar operation begun (continued until 1999).
- 1968** **Regional Telecommunication Hub established.**
- 1971** **Nationwide weather radar network established.**
- 1974** **Automated Meteorological Data Acquisition System (AMeDAS) established.**
- 1977** **Himawari (JMA's first geostationary meteorological satellite) launched.**
- 1980** Probabilistic precipitation forecast service begun.
- 1987** Greenhouse gas observation at Ryori begun.
- 1989** **RSMC tropical cyclone Tokyo Typhoon Centre established.**
- 1990** **World Data Centre for Greenhouse Gases (WDCGG) established.**

- 1961** Typhoon Nancy
- 1963** The Heavy Snow Event of 1963
- 1967** The Heavy Rain Event of July 1967
The Heavy Rain Event of August 1967
- 1968** The Heavy Rain Event of August 1968
- 1972** The Heavy Rain Event of July 1972
- 1977** Mt. Usu eruption
- 1982** The Heavy Rain Event of July 1982
- 1986** Izu-Oshima volcano eruption

1991–2010

In the 1990s, a series of disasters (e.g., the Mt. Unzen eruption, the 1993 off the southwest coast of Hokkaido Earthquake, and the Great Hanshin-Awaji Earthquake) prompted JMA to further strengthen observation and improve information.

Technical advancement and diverse user needs for meteorological services led to a rearrangement of roles and responsibilities between the public and private sectors through deregulation of private weather services, and central government reform led to a reorganization of the role of the JMA within the government.

With the masses of diverse information brought by the IT revolution, public relations and accountability were further emphasized, and a performance evaluation system was established.

This revolution also led to the sophistication of information, as exemplified by the introduction of Earthquake Early Warning.



Seismic intensity meter

1991 Seismic intensity meter observation begun.

1993 **Certified Weather Forecaster system established.**

1997 **Volcanic Ash Advisory Center (VAAC) Tokyo established. RSMC Tokyo for the nuclear Emergency Response Activities (ERA) established.**

1998 **Regional Instrument Centre (RIC) Tsukuba established.**

1999 Quantitative tsunami prediction service begun.

2005 Landslide Alert Information service begun.

2007 **Provision of Volcanic Warnings begun. Provision of public Earthquake Early Warnings begun.**

2009 **Tokyo Climate Centre (TCC) established.**

1991 Mt. Unzen eruption

1993 The 1993 off the southwest coast of Hokkaido Earthquake

1995 The Great Hanshin-Awaji Earthquake (The 1995 southern Hyogo Prefecture Earthquake)

2000 Mt. Usu eruption
Miyakejima volcano eruption

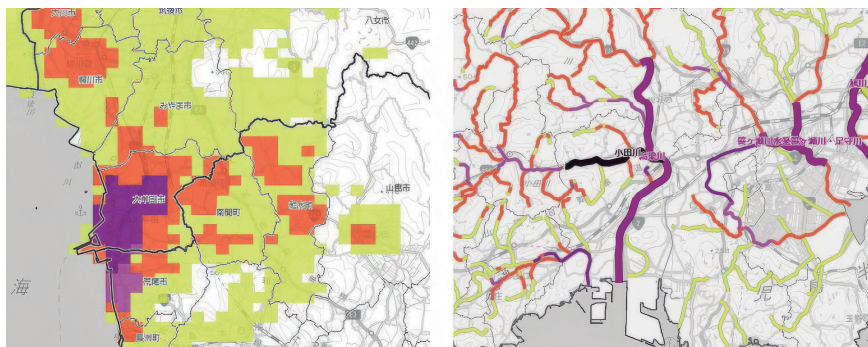
2004 The mid Niigata prefecture Earthquake in 2004

2011–2024

The Great East Japan Earthquake of 2011 brought new challenges to JMA, such as the need to improve tsunami information.

In addition, through a series of heavy rain disasters, JMA also strengthened its warning services (e.g., the introduction of Emergency Warnings) to support key roles in disaster management.

In response to frequent occurrence of heavy-rain disasters with Stationary Linear Mesoscale Convective Systems (SLMCSs), JMA prioritized the accuracy of SLMCS forecasts and strengthened decision support services for local disaster management authorities to promote effective use of JMA's information.



Kikikuru Real-time Risk Maps

2011 Global Information System Centre (GISC) Tokyo established.

2013 Issuance of Emergency Warning begun.

2016 Weather Business Consortium (WXBC) established.

2017 Kikikuru Real-time Risk Map information service begun.
World Meteorological Centre (WMC) Tokyo established.

2018 JMA Emergency Task Team (JETT) service begun.
RSMC Nowcasting Tokyo established.

2019 Nankai Trough Earthquake Information service begun.

2021 Regional WIGOS Centre (RWC) Tokyo established.

2011 The Great East Japan Earthquake (The 2011 off the Pacific coast of Tohoku Earthquake)
Typhoon Talas

2014 Mt. Ontake eruption

2015 Kuchinoerabujima volcano eruption
The Heavy Rain Event of September 2015 in Kanto and Tohoku

2016 The 2016 Kumamoto Earthquake
Typhoon Lionrock

2017 The Heavy Rain Event of July 2017 in Northern Kyushu

2018 The Heavy Rain Event of July 2018
Typhoon Jebi
The 2018 Hokkaido Eastern Iburi Earthquake

2019 Typhoon Faxai
Typhoon Hagibis

2020 The Heavy Rain Event of July 2020

2024 The 2024 Noto Peninsula Earthquake