Lectures

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Climate Services Perspective

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Summary and Purpose of Document

This document briefly presents the climate services of JMA, which monitors the global surface climate to detect climate variability and change (e.g., extreme climate events and global warming). JMA also operates a climate data assimilation system based on satellite, upper air, surface and ship data to provide diagnostic information on the climate system as background data to extreme climate events. The document will help to illustrate the importance of in-situ observation from the viewpoint of climate services.

Climate Services Perspective

1. Outline of climate services provided by CPD/JMA

The main tasks and activities of the Climate Prediction Division at the Japan Meteorological Agency are as follows:

· Provision of climatic information to the government and the public
  - Climate impact assessment
  - Climate system monitoring
  - Seasonal outlook & El Niño outlook
  - Climate change projection

· Development of climate models to support the above tasks
  (in conjunction with the Meteorological Research Institute)
  - Atmospheric GCM & Data Assimilation System (JCDAS[1])
  - Oceanic GCM & Data Assimilation System
  - Coupled Atmosphere-ocean General Circulation Model (CGCM)
  - Land surface analysis
  - Regional Climate Model
  - Long-term Re-analysis Project (JRA-25[2])

· Support for NMHS climate services in the Asia Pacific region
  (as the Tokyo Climate Center)

2. Surface climate monitoring

JMA monitors the global surface climate to detect indicators of climate variability and change (e.g., extreme climate events and global warming).

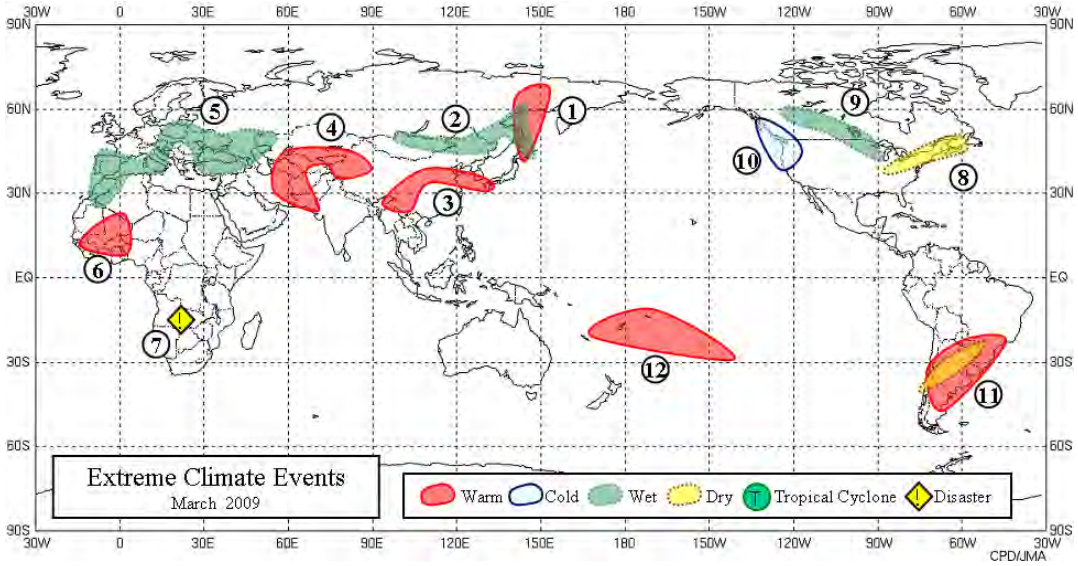
2.1 Monitoring of extreme climate events

JMA produces weekly, monthly, seasonal and annual reports on temperature, precipitation and hazardous climatic events (e.g., floods, droughts and tropical cyclones) using SYNOP and CLIMAT reports collected through GTS (Figure 1). This information is useful in international activities such as trading, transportation and disaster relief.

2.2 Monitoring of global warming

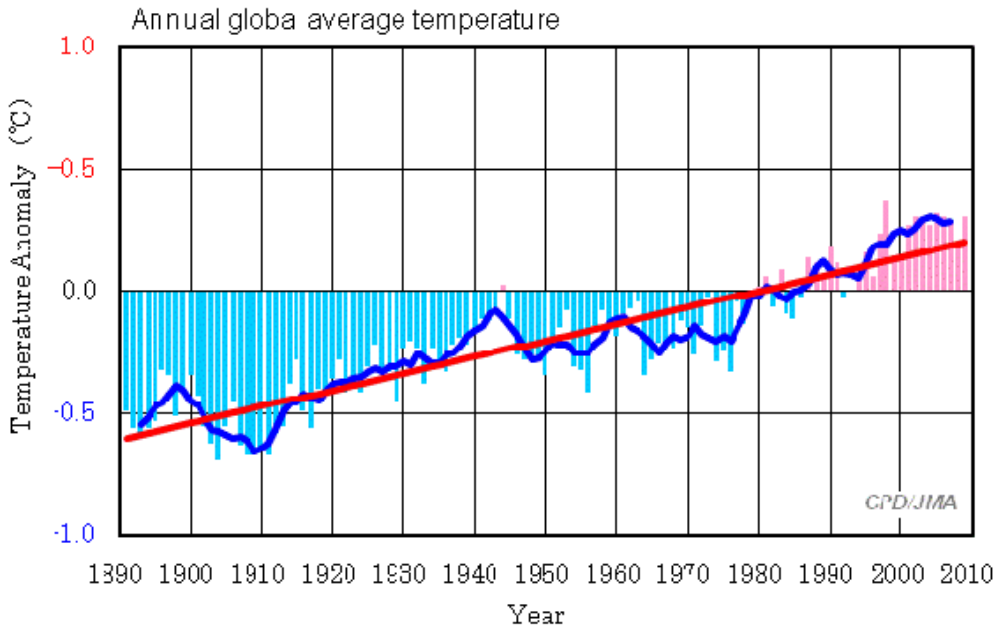
JMA calculates the annual global average temperature anomaly to keep track of the manifestation of ongoing global warming using land surface data (CLIMAT, GHCN-monthly) and the results of sea surface temperature analysis (COBE[3]-SST) (Figure 2).

[1] JCDAS: JMA Climate Data Assimilation System
[2] JRA-25: Japanese 25-year Re-analysis
[3] COBE: Centennial in-situ observation-based estimates of variability of SST and marine meteorological variables



1. High temperatures from eastern Siberia to northern Japan
2. Heavy precipitation from southeastern Siberia to northern Mongolia
3. High temperatures from western Japan to southern China
4. High temperatures from western China to eastern Iran
5. Heavy precipitation from western Kazakhstan to Morocco
6. High temperatures around Mali
7. Torrential rains in southern Africa
8. Light precipitation around the northeastern USA
9. Heavy precipitation from central Canada to the western area of the Great Lakes
10. Low temperatures from southwestern Canada to the northwestern USA
11. High temperatures and light precipitation in southern South America
12. High temperatures around southern Polynesia

Figure 1. A JMA report on extreme climate events (March 2009)



The annual anomaly of the global average surface temperature in 2009 (i.e., the average of the near-surface air temperature over land and the SST) was +0.31°C above normal (based on the 1971 – 2000 average), which was the third highest since 1891. On a longer time scale, global average surface temperatures have been rising at a rate of about 0.68°C per century.

Figure 2. JMA report on global warming (2009)

3. Climate system monitoring

The climate system consists of some subsystems including the atmosphere, oceans, land, the biosphere and so on. JMA monitors atmospheric general circulation and boundary conditions (sea surface temperature, sea-ice, snow cover, etc.) as follows:

· Atmospheric circulation (JRA/JCDAS data)
· Tropical convective activity (satellite observations: NOAA data)
· Sea surface temperature (COBE-SST)
· Snow and sea ice (CLIMAT reports & satellite observations: DMSP-SSM/I data)

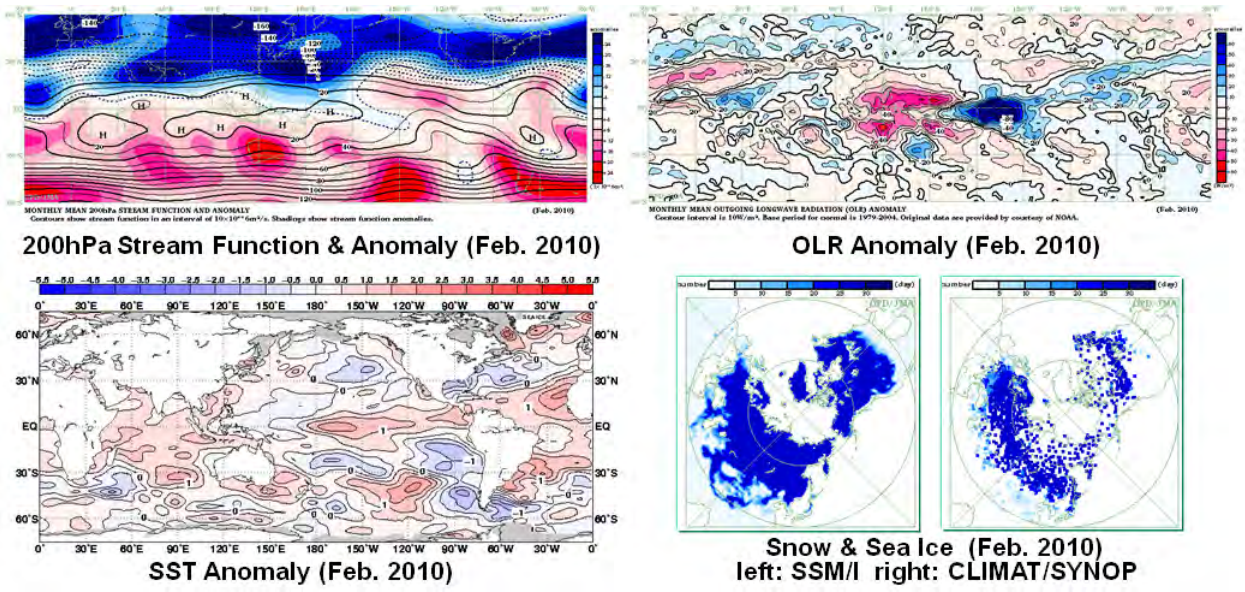


Fig. 3. Examples of JMA's climate system monitoring results

4. Diagnostic information on the climate system as background to extreme climate events

JMA provides diagnostic information on the climate system as background to extreme climate events through the TCC web site at:

http://ds.data.jma.go.jp/tcc/tcc/news/index.html

(*TCC News* is available in the "printable version" column.)

The following articles, for example, can be read in the latest TCC News (No. 20):

· Summary of Asian Winter Monsoon 2009/2010
  - Extremely low temperatures in northern Asia and extremely high temperatures in southern Asia
· Extremely Negative Arctic Oscillation in Winter 2009/2010

5. Importance of in-situ observation from the viewpoint of climate services

Surface monthly data are important for detecting not only extreme climate events but also global warming. All CLIMAT reports from around 3,000 RBCN stations (including around 1,000 GSN stations) are necessary for overall monitoring of the world climate. Past long-term monthly data sets are also important for calculating climatological normals, standard deviations and long-term trends. Accurate measurement and precise analysis are necessary to calculate the global surface temperature anomaly (which has a year-to-year variation of around 0.1°C).

Surface and upper-air daily data (SYNOP and TEMP reports) are important for monitoring and predicting the behavior of the climate system. Past long-term daily data sets are important for re-analysis projects.