Tokyo Climate Center, Japan Meteorological Agency

TCC News

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Winter 2018

Contents

Global surface temperature for 2017 was the third highest since 1891

JMA analysis indicated that the annual anomaly of the global average surface temperature for 2017 (i.e., the combined average of the near-surface air temperature over land and the sea surface temperature) was +0.38°C above the 1981 – 2010 average. This was the third-warmest year on record for the 127-year period since 1891, behind 2016 (warmest) and 2015 (second warmest), and was the warmest without an El Niño event (Figure 1). In 2017, warm temperature deviations are especially seen over wide area of Eurasia, North America and the North Pacific (Figure 2). On a longer time scale, the annual global average surface temperature has been rising at a rate of about 0.73°C per century.

Eleven of the 12 warmest years on record since 1891 have occurred during this century (Table 1). The recent high temperatures are thought to be affected by the global warming trend due to increase in anthropogenic greenhouse gas concentrations including carbon dioxide. Moreover the global averaged surface temperature is affected by inter-annual to decadal natural fluctuations intrinsic to the earth's climate.

JMA monitors monthly, seasonal and annual average anomalies of global surface temperature. Those results are routinely updated on the following TCC website: http://ds.data.jma.go.jp/tcc/tcc/products/gwp/temp/ann_wld.html

(Shotaro Tanaka, Tokyo Climate Center)

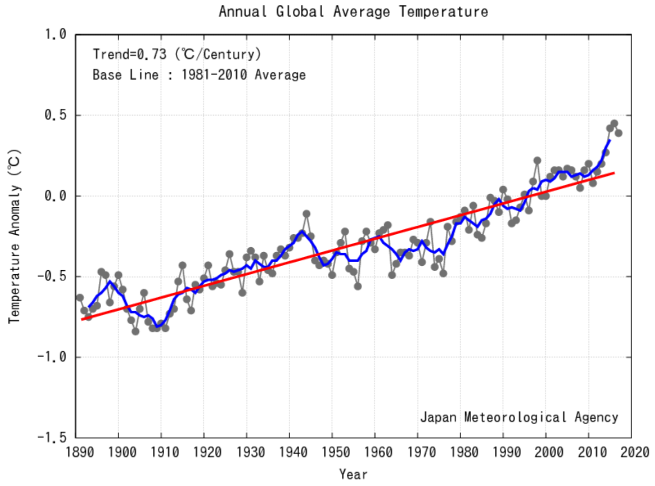

Figure 1 Long-term change in annual mean surface temperature anomalies over the globe (1891 – 2017)
The black line with filled circles indicates anomalies of surface temperature in each year. The blue line indicates five-year running mean, and the red line indicates a long-term linear trend. Anomalies are represented as deviations from the 1981 – 2010 average.

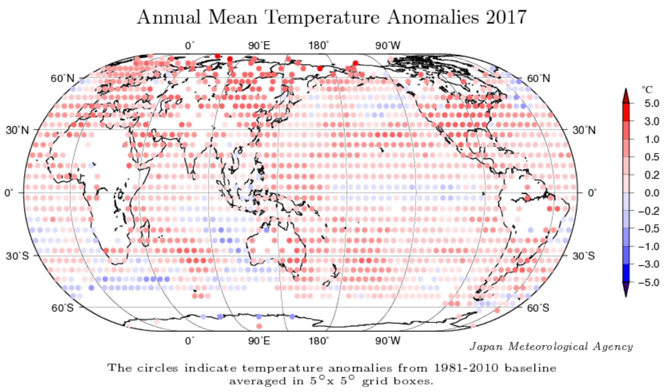

Figure 2 Annual mean temperature anomalies in 2017
The circles indicate anomalies of surface temperature averaged in 5° x 5° grid boxes. Anomalies are deviations from the 1981 – 2010 average.

Table 1 Ranking of annual global average temperatures

Rank	Year	Temperature Anomaly w.r.t. 1981 – 2010 average
1	2016	+0.45
2	2015	+0.42
3	**2017**	**+0.38**
4	2014	+0.27
5	1998	+0.22
6	2013	+0.20
	2010	+0.20
8	2005	+0.17
9	2009	+0.16
	2006	+0.16
	2003	+0.16
	2002	+0.16

Highlights of the Global Climate in 2017

Annual mean temperatures were above normal in most parts of the world, and were exceptionally high in the eastern Eurasian Continent, the southern North American Continent, the South American Continent, and the Australian Continent (except from central to northwestern parts).

Extremely high temperatures were frequently observed in many parts of the world, although not as frequently as in 2016 when the effects of the El Niño event were globally extensive. Extremely high temperatures continued for eight months (from April to November) in and around Saudi Arabia and for six months or more in eastern Australia, from Mauritius to northeastern Mozambique, in and around the southern part of Western Africa, from the southwestern USA to Mexico, and from southern India to Sri Lanka.

Annual precipitation amounts were above normal in Southeast Asia, and in and around northeastern Europe, and were below normal in and around the Arabian Peninsula, from southern Europe to the northwestern part of Northern Africa, and in eastern Brazil.

Extremely high precipitation amounts were frequently observed in northeastern Europe, while extremely low amounts were frequently observed from the Iberian Peninsula to the northwestern part of Northern Africa.

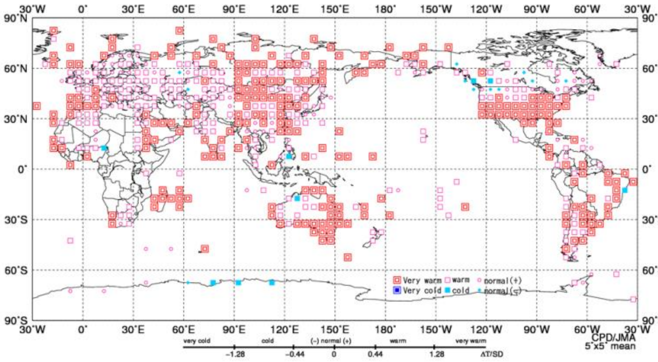

Figure 3 Annual mean temperature anomalies for 2017
Categories are defined by the annual mean temperature anomaly against the normal divided by its standard deviation and averaged in 5° × 5° grid boxes. The thresholds of each category are -1.28, -0.44, 0, +0.44 and +1.28. The normal values and standard deviations are calculated from 1981 – 2010 statistics. Land areas without graphics represent regions for which the observation data sample is insufficient or normal data are unavailable.

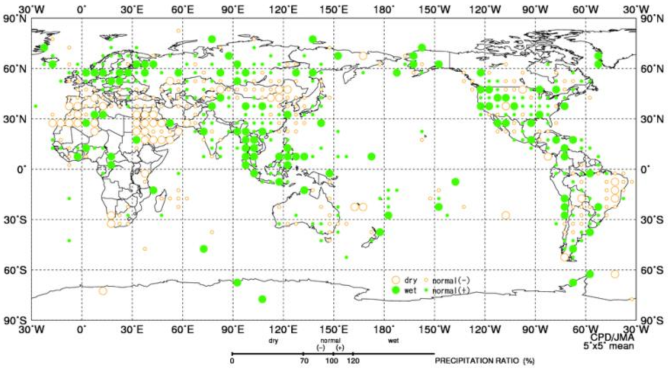

Figure 4 Annual total precipitation amount ratios for 2017
Categories are defined by the annual precipitation ratio to the normal averaged in 5° × 5° grid boxes. The thresholds of each category are 70, 100 and 120%. Land areas without graphics represent regions for which the observation data sample is insufficient or normal data are unavailable.

Major extreme climatic events and weather-related disasters occurring in 2017 are listed below (also see Figure 5).

(1) Warm: northwestern Alaska to the northern part of Eastern Siberia (March – April, November – December)
(2) Heavy rain and Typhoon: southern China (June – August)
(3) Warm: Okinawa/Amami region of Japan to southeastern China (August – October)
(4) Typhoon: Philippines (December)
(5) Typhoon and Heavy rain: Vietnam (September – November)
(6) Heavy rain: southern Sri Lanka (May)
(7) Warm: southern India to Sri Lanka (April, July – November)
(8) Heavy rain: South Asia to northeastern Afghanistan (June – September)
(9) Warm: the southeastern part of Central Asia (May, July, September)
(10) Warm: in and around Saudi Arabia (April – November)
(11) Wet: northeastern Europe (April, September – October, December)
(12) Warm: southeastern Europe (June – August)
(13) Warm (April – June, October) and Dry (March – May, September, November): the Iberian Peninsula to the northwestern part of Northern Africa
(14) Warm: in and around the southern part of Western Africa (March – April, August – December)
(15) Landslide: western Sierra Leone (August)
(16) Landslide: northeastern Democratic Republic of the Congo (August)
(17) Cyclone: Zimbabwe (February)
(18) Warm: Mauritius to northeastern Mozambique (February, April, June – November)
(19) Warm: southeastern Canada to the eastern USA (February, April, October)
(20) Warm: the southwestern USA to Mexico (March, June, August, October – December)
(21) Hurricane: the southeastern USA to Caribbean countries (August – September)
(22) Heavy rain: southwestern Colombia to Peru (February –April)
(23) Warm: eastern Brazil (January, March – April, June, October)
(24) Warm: in and around northwestern Argentina (January – February, July)
(25) Warm: eastern Australia (January – March, May, July, October – December)

(Kenji Kamiguchi, Tokyo Climate Center)

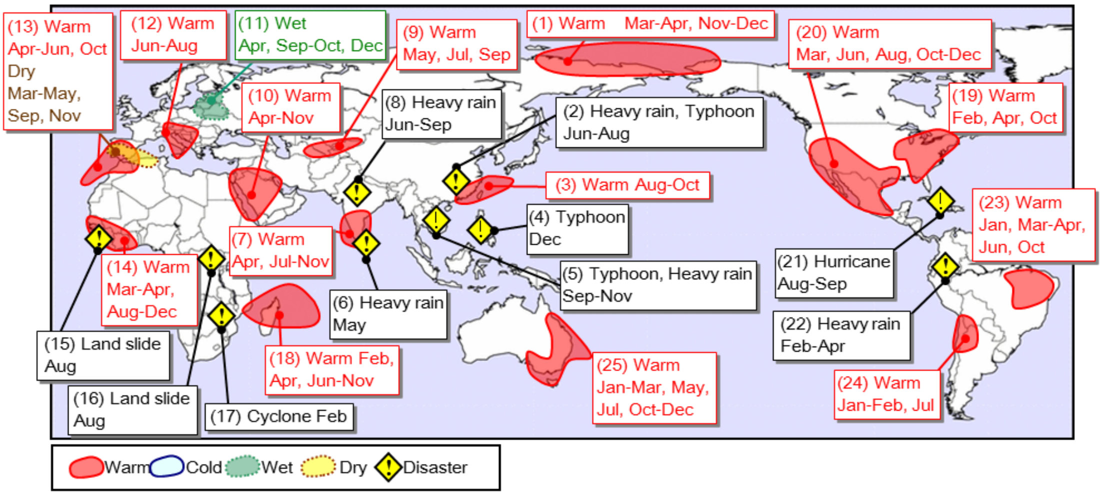

Figure 5 Major extreme climate events and weather-related disasters across the world in 2017
Schematic representation of major extreme climate events and weather-related disasters occurring during the year

Summary of Japan's Climatic Characteristics for 2017

1. Annual characteristics

Japan's climatic characteristics for 2017 can be summarized as follows:

- Record precipitation amounts were observed in some regions during the rainy season (June – July).
- Cloudy or rainy conditions prevailed on the Pacific side of northern/eastern Japan in August.
- Precipitation amounts and sunshine durations in October were significantly above and below normal, respectively, from northern to western Japan.
- Markedly high temperatures persisted from summer to autumn in Okinawa/Amami.

2. Seasonal characteristics

(a) Winter (December 2016 – February 2017)

Although seasonal mean temperatures were above normal all over Japan due to the weaker-than-normal winter monsoon, strong masses of cold air occasionally flowed over the country and heavy snowfall was observed on the Sea of Japan side of western Japan in the second half of January and the first half of February, affecting traffic and agricultural facilities.

(b) Spring (March – May)

Seasonal precipitation amounts were below normal and sunshine durations were above normal from northern to western Japan due to a tendency for high-pressure system coverage over these regions. Seasonal mean temperatures there were also above normal due to the frequent incidence of southerly winds blowing toward low-pressure systems located to the north of Japan and warm air flowing over the country.

(c) Summer (June – August)

In Okinawa/Amami, seasonal mean temperatures were significantly above normal, seasonal precipitation amounts were below normal and seasonal sunshine durations were above normal due to sunny, hot conditions brought by an enhanced Pacific High to the south of Japan. Seasonal mean temperatures in eastern/western Japan were also above normal.

The Baiu front, which had remained south of Japan in June, shifted toward the Sea of Japan in July, indicating that the region from western Japan to the Pacific side of eastern Japan was not likely to be affected by the front. Precipitation during the rainy season (June – July) was below normal over many parts of the region. However, the Baiu front was occasionally active and record precipitation was observed in northern Kyushu, Hokuriku, Tohoku and other regions.

The Okhotsk High emerged in August and cool, humid air flowed over the Pacific side of northern/eastern Japan, bringing cloudy or rainy conditions. Monthly sunshine durations in August over these regions were significantly below normal. The end of the rainy season was not declared in Tohoku for the first time since 2009.

(d) Autumn (September – November)

The seasonal mean temperature in Okinawa/Amami was significantly above normal due to a strong persistent Pacific High to the south of Japan, and warm air tended to flow over the region. Meanwhile, the value for northern Japan was below normal due to intermittent cold air inflow.

The autumn rain front tended to stay over Japan, and three typhoons (Talim (T1718), Lan (T1721) and Saola (T1722)) approached or made landfall on the country, bringing above-normal precipitation amounts nationwide. Monthly precipitation amounts and sunshine durations in October from northern to western Japan were significantly above and below normal, respectively, especially in western Japan.

From mid-November to December, cold air intermittently flowed over the country and heavy snowfall was observed in some areas on its Sea of Japan side.

(Hiroshi Ohno, Tokyo Climate Center)

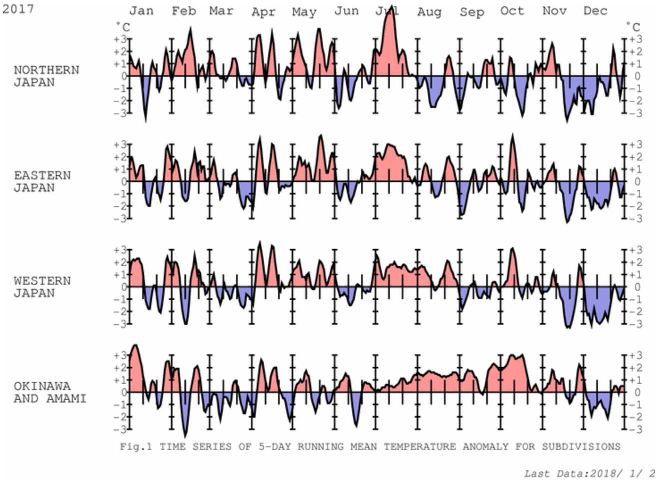

Figure 6 Time-series representation of five-day running mean temperature anomalies for subdivisions (January – December 2017)

The normal is the 1981 – 2010 average.

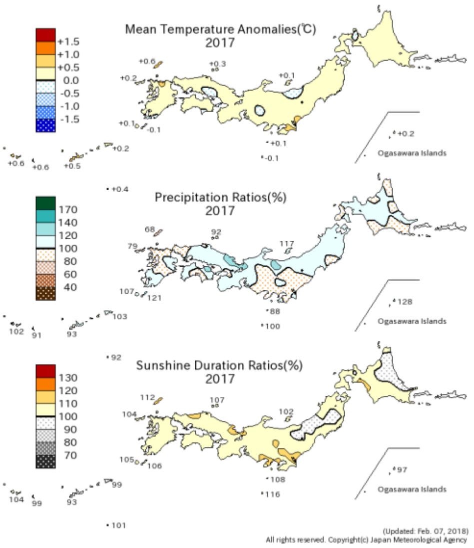

Figure 7 Annual climate anomalies/ratios for Japan in 2017

Cold Spell in Japan from late January 2018

TCC issued two press releases regarding the cold spell in Japan this winter. See also the next article.

An extremely cold spell lasting several days hit Japan and surrounding areas around 23rd January. This was caused by the movement of a significantly cold lower-troposphere air mass over the country due to a stronger-than-normal northwesterly monsoon from eastern Siberia, where the extraordinary cold air mass accumulated in association with the meandering of the polar front jet stream over the area.

1. Weather conditions

An extremely cold spell lasting several days hit Japan and surrounding areas around 23rd January. Cold air has prevailed throughout the country since then, especially in eastern and western parts. A record-low temperature of -9.8°C was observed in Saitama City just north of Tokyo.

2. Cause

The polar front jet stream over northern Eurasia exhibited clear meandering from mid-January onward (Figure 8 (a)) with southward meandering over eastern Siberia. These conditions caused extremely cold air to accumulate in the lower troposphere over eastern Siberia (Figure 9 (a)). Temperatures over this area are generally at their lowest at this time of year, but the air mass that accumulated there in January 2018 was much colder than usual. The area-averaged 850-hPa temperature over eastern Siberia in this event was significantly lower than the corresponding historical values (Figure 9 (a) and Table 2).

The mid-tropospheric trough over eastern Siberia subsequently shifted slightly eastward to cover Japan and again persisted (Figure 8 (b)). The northwesterly monsoon was enhanced (Figure 10 (b)) in association with upper-level jet meandering, which caused continuous flowing of the low-level cold air mass over Japan from eastern Siberia subsequently shifted slightly eastward to cover Japan and again persisted (Figure 8 (b)). The northwesterly monsoon was enhanced (Figure 10 (b)) in association with upper-level jet meandering, which caused continuous flowing of the low-level cold air mass over Japan from eastern Siberia (Figure 9 (b)). The 850-hPa temperature over Wajima in Japan's Ishikawa Prefecture at 12 UTC on 24 January was the lowest on record for 12UTC-observation since April 1957.

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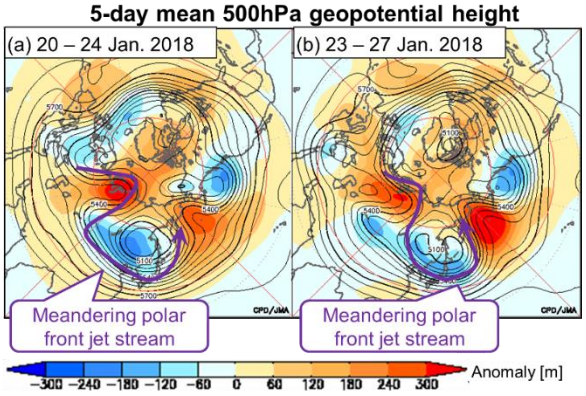

Figure 8 5-day mean 500-hPa geopotential height [m] (contours) and anomaly (shading) ((a) 20 -- 24 Jan. 2018, and (b) 23 -- 27 Jan. 2018)
Contour and shading intervals are 60 m. Anomalies are deviations from the 1981 – 2010 average.

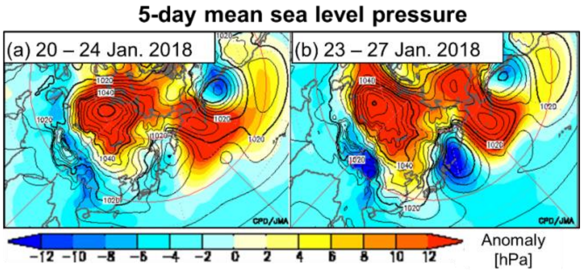

Figure 9 5-day mean 850-hPa temperature [°C] (contours) and anomaly (shading) ((a) 20 -- 24 Jan. 2018, and (b) 23 -- 27 Jan. 2018)
Contour and shading intervals are 4 and 2°C, respectively. Anomalies are deviations from the 1981 – 2010 average. Red boxes indicate areas referred to in Table 2.

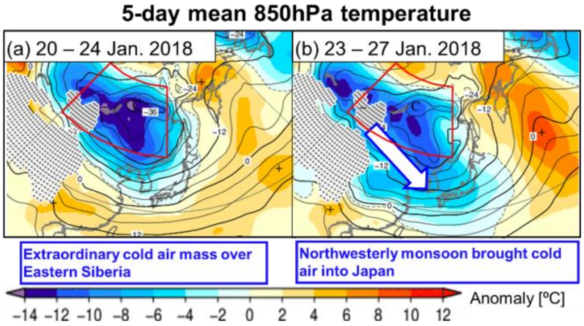

Figure 10 5-day mean sea level pressure [hPa] (contours) and anomaly (shading) ((a) 20 -- 24 Jan. 2018 and (b) 23 -- 27 Jan. 2018)
Contour and shading intervals are 4 and 2 hPa, respectively. Anomalies are deviations from the 1981 – 2010 average.

Table 2 Top six coldest events of 5-day mean 850-hPa temperature averaged over eastern Siberia [45° -- 65°N, 90° -- 135°E] (red boxes in Figure 10)

Data are based on based on JRA-55 (Kobayashi et al. 2015) from January 1958 onward. Anomalies are deviations from the 1981 – 2010 average.

Rank	Period (5 days)	Mean temperature (°C)	Anomaly (°C)
1	11 Feb. 1969 – 15 Feb. 1969	-31.6	-13.3
2	18 Jan. 1969 – 22 Jan. 1969	-30.6	-11.0
3	26 Jan. 1979 – 30 Jan. 1979	-30.1	-10.7
4	30 Dec. 1958 – 3 Jan. 1959	-29.0	-9.7
5	***20 Jan. 2018 – 24 Jan. 2018***	***-28.9***	***-9.4***
5 (tied)	1 Feb. 2001 – 5 Feb. 2001	-28.9	-9.9

Cold Waves and Heavy Snow in Japan from December 2017

Surface air temperatures throughout Japan fell repeatedly due to a series of cold waves from December 2017 onward, and some parts of the country intermittently experienced heavy snowfall during the peaks of these waves. A possible cause of these extreme climatic conditions was enhanced convective activity over the Maritime Continent in association with the persisting La Niña event from boreal autumn 2017 onward. This caused meandering of the subtropical jet stream over East Asia, resulting in continuous cold-air-mass flow over the country.

1. Weather conditions

A series of extreme cold spells hit Japan and its surrounding areas from December 2017 (Figure 11) onward, and cold air consequently prevailed nationwide. Some parts of the country intermittently experienced heavy snowfall associated with the peaks of these spells, with notable events in early-to-mid-January, late January and early February 2018. These led to unprecedented cumulative snow depths at certain observation stations throughout Japan (Figure 12).

2. Influence of La Niña conditions on the subtropical Jet stream around East Asia

La Niña conditions are expected to continue in the equatorial Pacific (see the El Niño Outlook updated on 9 February 2018). Over Eurasia, westerly jet streams exhibited clear meandering from December 2017 onward with southward over Japan, resulting in continuous cold-air-mass flow over the country. In the upper troposphere (Figure 13 and 14), an anticyclonic circulation anomaly over southern China and a cyclonic circulation anomaly downstream of the anticyclonic anomaly were clearly observed. Such meandering is recognized as a typical circulation anomaly pattern that has accompanied past La Niña events, and is thought to be due to stronger-than-normal convective activity over the Maritime Continent (Figure 14) as illustrated in Figure 15.

A numerical model experiment using the Linear Baroclinic Model (Watanabe and Kimoto 2000) was conducted to help clarify the relationship between convective activity over the Maritime Continent and the meandering of the subtropical jet stream over Japan in winter 2017/18. The LBM experiment result showed the Matsuno-Gill response (Matsuno 1966, Gill 1980) in the tropical troposphere and associated wave patterns (teleconnections) propagating in the mid-latitudes in background westerly wind fields. They were consistent with the observed circulation patterns of this winter, indicating stronger-than-normal and northwestern expansion of upper-level anti-cyclonic circulation over Southeast Asia (Figure 16). These anomalies resulted in the southward meandering of the subtropical jet stream over Japan. The results of statistical and numerical analysis indicate that the cold-air inflow observed over the country during this winter can be partly attributed to the current La Niña event.

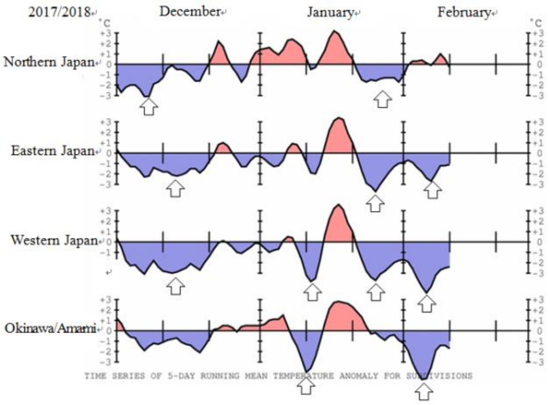

Figure 11 Time-series representations of 5-day running mean temperature anomalies [°C] from December 2017 onward (as of 15 Feb. 2018)

The base period for the normal is 1981 – 2010. Arrows indicate peak low temperatures.

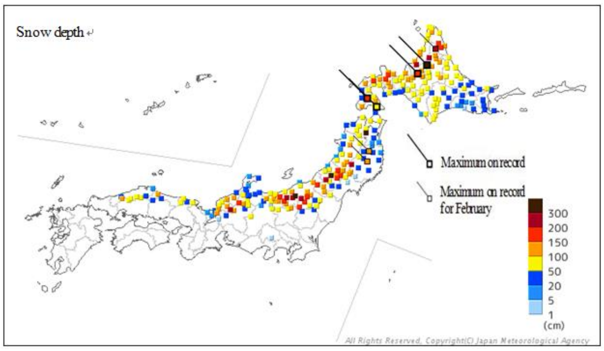

Figure 12 Snow depths [cm] (as of 8 a.m. 15 Feb. 2018)

The base period for the normal is 1981 – 2010.

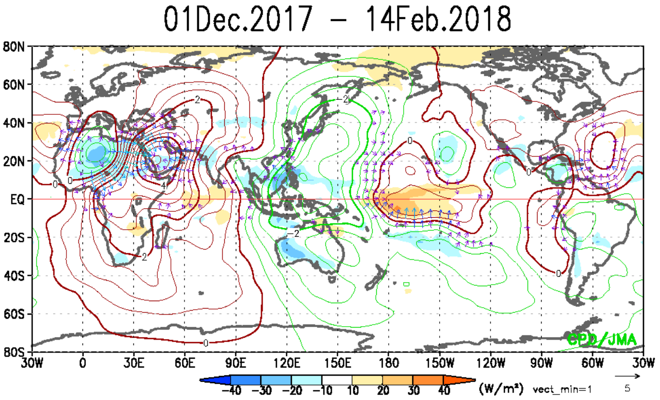

Figure 13 Velocity potential anomalies at 200 hPa (contours) and OLR anomalies (shading) averaged for the period from 1 December 2017 to 14 February 2018
Contour and shading intervals are 0.5 x 10^6 m^2/s and 10 W/m2, respectively, with shading corresponding to 0 W/m2 omitted. Vectors indicate divergent wind anomalies greater than 1 m/s. The base period for the normal is 1981 – 2010.

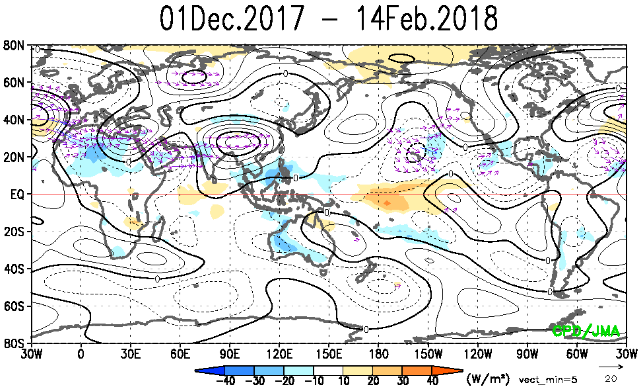

Figure 14 Stream function anomalies at 200 hPa (contours) and OLR anomalies (shading) averaged for the period from 1 December 2017 to 14 February 2018
Contour and shading intervals are 5 x 10^6 [m^2/s] and 10 W/m2, respectively, with shading corresponding to 0 W/m2 omitted. Vectors indicate wave activity flux (Takaya and Nakamura 2001) greater than 5 m^2/s^2. The base period for the normal is 1981 – 2010.

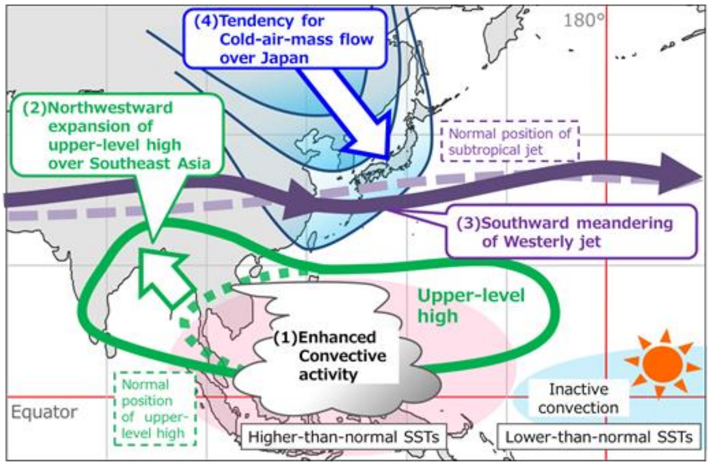

Figure 15 Primary factors contributing to the cold waves and heavy snow observed in Japan from December 2017 onward
The following numbers correspond to those in the above figure:
(1) Convective activity was enhanced over the Maritime Continent due to higher-than-normal SSTs in the tropical western Pacific region in association with the La Niña event observed from boreal autumn 2017 onward.
(2) The northwestern part of the upper-level high located over Southeast Asia strengthened in association with active convection (1).
(3) The subtropical jet stream meandered southward over Japan in association with the stronger-than-normal upper-level high (2).
(4) Cold air accumulating over eastern Siberia tended to flow over Japan in association with the southward meandering of the westerly jet over Japan (3).

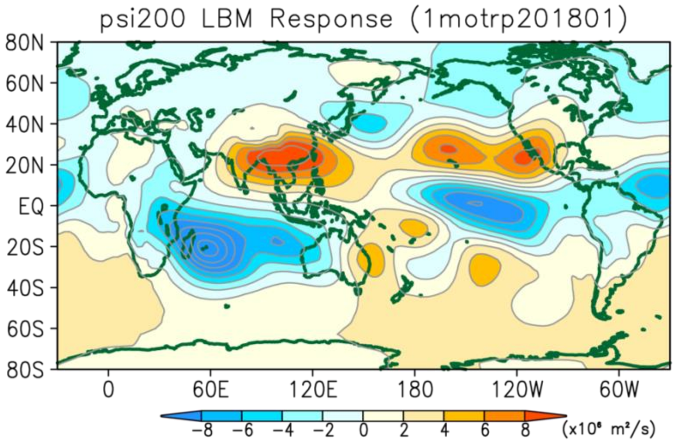

Figure 16 Atmospheric response (stream function at 200 hPa) in the LBM experiment using diabatic heating over the tropics for January 2018
Diabatic heating over the tropics was estimated from JRA-55.

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TCC Training Seminar on Seasonal Forecast

JMA's Tokyo Climate Center (TCC) assists National Meteorological and Hydrological Services (NMHSs) in improving their climate services. The Center's two major activities in this regard involve providing basic climate data, products and tools to NMHSs through its website and assisting with capacity development at NMHSs in the Asia-Pacific region. TCC holds annual training seminars as part of capacity development activities in its role as an RCC in the WMO RA II area. In addition to running annual training seminars, it also arranges expert visits to NMHSs to promote effective transfer of technology and discuss support for climate services.

TCC held its Training Seminar on Seasonal Forecast from 29 January to 2 February 2018 at the JMA Headquarters in Tokyo. The event was attended by 19 experts from NMHSs in Bangladesh, Bhutan, Fiji, Hong Kong (China), Indonesia, Lao People’s Democratic Republic, Malaysia, Mongolia, Myanmar, Nepal, Pakistan, the Philippines, Singapore, the Solomon Islands, Sri Lanka, Thailand and Viet Nam. The number of attendees from 27 countries and territories in the Asia-Pacific region at this 10th training seminar since its introduction in 2008 brought the total to 146.

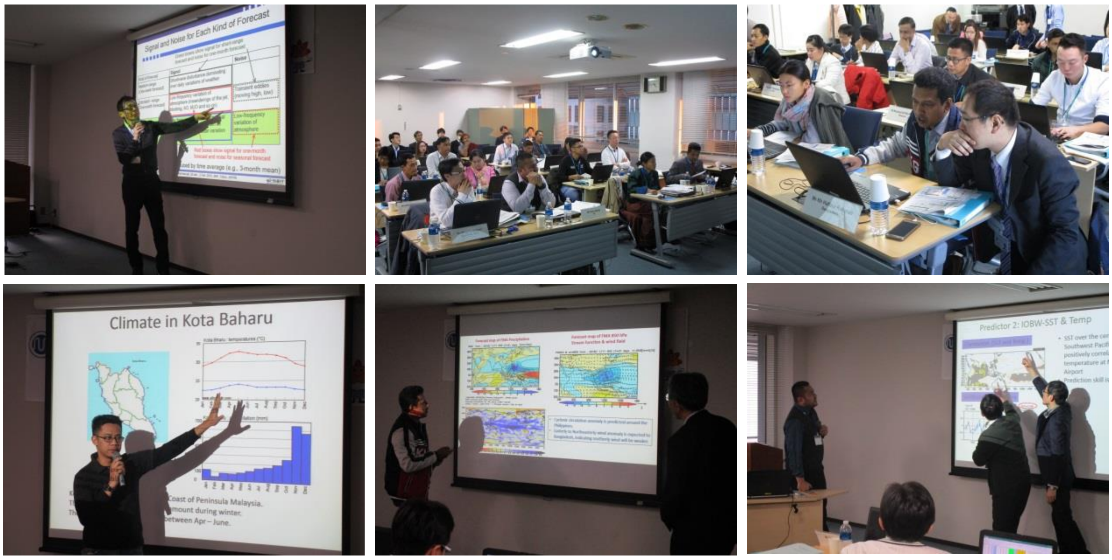
The event focused on improving awareness of seasonal forecasting and enhancing capacity for the generation of seasonal forecast products using statistical downscaling methods. It included lectures and practical exercises using data, products and a web-based app available on the TCC website, as well as the use of in-situ observation data from attendees’ own countries. At the end of the seminar, all participants gave presentations on seasonal forecasts in their own countries for the coming three months and engaged in fruitful discussions with lecturers and others present.

The content of lectures is available on the TCC website at http://ds.data.jma.go.jp/tcc/tcc/library/library2017.html.

(Atsushi Minami, Tokyo Climate Center)

Attendees on a courtesy visit to JMA Director-General Dr. Toshihiko Hashida (29 January 2018, Director-General’s office)

Attendees with JMA Global Environment and Marine Department Director-General Mr. Shogo Tanaka and other JMA staff



Lectures and practical exercises at the seminar

TCC Activity Report for 2017

In 2017, the Tokyo Climate Center (TCC) continued to support the climate services of NMHSs in Asia-Pacific countries by providing and enhancing data and products, holding training seminars, dispatching experts and hosting visitors.

1. Enhancement of data/products/tools on the TCC website

1.1 Launch of JMA's Global Ensemble Prediction System for one-month prediction

JMA replaced the previous One-month EPS (Ensemble Prediction System) with the Global EPS (GEPS) on Thursday 23 March 2017, which produces prediction maps and gridded datasets for one-month predictions on the TCC website. The GEPS is an integrated solution supporting JMA's issuance of typhoon information, one-week forecasts and one-month forecasts.

Changes in the new system include enhanced model resolution, improved physics in the model's atmospheric and oceanic components, and the introduction of a combination of the Local Ensemble Transform Kalman Filter (LETKF) method and the Singular Vector (SV) methods to produce initial perturbation as an alternative to the Breeding Growing Mode (BGM) method. The changes made improved predictive skill overall, among other things, ones for Asian summer monsoon and geopotential height at 500hPa over the Northern Hemisphere for all season. More detailed verification results are provided on the TCC website.

To support the provision of one-month prediction products on the TCC website every Thursday, the GEPS is run once a week with 50 members composed of 13 members each integrated from initial fields at 00 and 12 UTC every Tuesday and Wednesday. An outline of the model's configuration and its operation is provided on the TCC website and in TCC News No. 48.

1.2 Issuance of special reports on extreme events

In a mandate role as a WMO Regional Climate Center (RCC) in Regional Association II (RAII), TCC monitors world climate conditions with focus on Asia and its surrounding area. The Center issues reports on extreme climate events and summaries of the Asian summer/winter monsoon on its website (http://ds.data.jma.go.jp/tcc/tcc/products/clisys/reports/index.html).

In the first half of August 2017, the Pacific side of northern Japan experienced shorter-than-normal sunshine durations and cooler-than-normal conditions, and the Pacific side of eastern Japan also experienced shorter-than-normal sunshine durations. Under such climatic conditions, TCC issued press release on primary factors causing the unusual weather condition in Japan observed. The reports were issued in Japanese and English on the JMA website, and the English version was also made available on the TCC website (http://ds.data.jma.go.jp/tcc/tcc/news/press_20170822.pdf).

1.3 Update of website on RA II Information sharing for Climate Services website

For the improvement of climate services and the successful implementation of Global Framework for Climate Services, it is important to share information on the services, good practices and lessons learned in climate-related activities, especially among NMHSs in climatologically similar region. However, such important information has not so far been fully shared among NMHSs in WMO RA II.

In response to related decisions taken at the 15th and 16th sessions of Regional Association II (RA II) to improve information sharing on climate services in the region, TCC operates a dedicated website (http://ds.data.jma.go.jp/tcc/RaiiInfoshare/, see TCC News No.36 for more information).

A July 2017 questionnaire survey conducted by TCC to support updating of the website generated responses from more than 10 countries thanks to the kind cooperation of their involvement. Based on the information provided, the site was updated and refined in October 2017 with additions a clickable map to support usability and accessibility to individual NMHS' information on climate services.

2. Capacity development

TCC holds annual training seminars as part of capacity-development activities related to its role as an RCC in RA II. In addition to running annual training seminars, it also arranges expert visits to and hosts visitors from NMHSs to support exchanges of views on climate services and the effective transfer of technology.

2.1 Training seminar

TCC hold a training seminar in its each fiscal year from April to March. In 2017, preparations were made for the event to be held in January 2018. The Center put "Seasonal Forecast" as the theme of the annual event. Details of the training are reported in the previous article.

2.2 Expert visits and other follow-up activities

TCC experts visited the Meteorological, Climatological and Geophysical Agency (BMKG) of Indonesia in March and the Malaysian Meteorological Department (MMD) in July to hold a "TCC follow-up training seminar on Primary Modes of Global Climate Variability and Regional Climate and on the basic operation of TCC's Interactive Tool for Analysis of the Climate System (iTacs)". Discussions on future cooperation with BMKG and MMD were also held (TCC News No. 48 and TCC News No. 49).

A TCC expert also paid a visit to Sri Lanka's Department of Meteorology (DOM) to provide training on Operational Applications of Meteorology and Climate Monitoring in the Tropics under JICA's Project for Improving of Meteorological Observation, Weather Forecasting and Dissemination. The session provided opportunities for DOM experts to learn about meteorological aspects of Southern Asian monsoons via practical exercises using TCC's handy iTacs application.

Other follow-up to previous TCC training seminars included hosting visiting experts at TCC and conducting teleconferences to provide technical support.

3. International meetings

3.1 Regional Climate Outlook Forums

RCCs are expected to actively contribute to and lead profound discussions in Regional Climate Outlook Forums (RCOFs). In 2017, TCC experts participated in the following RCOFs in Asia:

- Thirteenth session of the Forum on Regional Climate Monitoring, Assessment and Prediction for Regional Association II (FOCRA II) held in Beijing, China, from 24 to 26 April
- Tenth session of the South Asian Climate Outlook Forum (SASCOF-10) held in Thimpu, Bhutan, from 24 to 26 April
- Eleventh session of the South Asian Climate Outlook Forum (SASCOF-11) held in Male, Maldives, from 25 to 27 September
- Fifth session of the East Asia winter Climate Outlook Forum (EASCOF-5) held in Tokyo, Japan, from 8 to 10 November (Hosted by JMA; see 3.2 for details.)

TCC attendees gave presentations on seasonal predictions based on JMA's numerical model and participated in discussions toward the formulation of a consensus statement on regional forecasts.

TCC also provided seasonal forecast materials to the 13th session of the North Eurasian Climate Outlook Forum (NEACOF-13) and the 9th session of the ASEAN Climate Outlook Forum (ASEANCOF-9).

3.2 EASCOF

The Fifth session of EASCOF (EASCOF-5) was held at JMA's headquarters in Tokyo, Japan, from 8 to 10 November 2017 (TCC News No. 50). More than 30 experts from China, Japan, Mongolia and the Republic of Korea attended the event, sharing information on the current status of and future plans for seasonal forecasting services in individual NMHSs. The attendees also discussed recent understandings of phenomena related to seasonal prediction of the East Asian Winter Monsoon and seasonal outlooks for the coming winter. A new session providing a platform for discussion of good practices toward user involvement in climate services was also held to encourage NMHS efforts in the promotion of climate service utilization. Presentation materials used in the session are available via the EASCOF portal website (http://ds.data.jma.go.jp/tcc/tcc/library/EASCOF/).

3.3 WMO Workshop on Global Review of RCOFs

In autumn 2017, TCC dispatched Yasushi Mochizuki and Shoji Hirahara as expert representatives to the WMO Workshop on Global Review of RCOFs, which was held from 5 to 7 September 2017 in Guayaquil, Ecuador. These TCC staff, who had been involved in RCOF processes, participated in the workshop and contributed to discussions on aspects of RCOF operations from regional- and global-center viewpoints (TCC News No. 50).

3.4 Other meetings

In 2017, TCC's Atsushi Goto and Shoji Hirahara attended the WMO International Workshop on Climate Services Information System (CSIS) Operations and Coordination held in Nanjing, China, to contribute to discussions on an action plan for climate service delivery via CSIS operations. TCC Head Kiyotoshi Takahashi and TCC expert Atsushi Goto also attended the fifth session of the Management Committee of the Intergovernmental Board on Climate Services held in Reading, the United Kingdom, to contribute to the implementation and management of GFCS.

4. Publications

TCC has published its newsletter (TCC News) on a quarterly basis since 2005. The publication is intended to enhance communication and provide information to NMHSs and related communities about recent TCC developments, events and activities as well as details of the Center's reports on the state of the climate, monitoring results and outlooks. In 2017, TCC News Nos. 48 – 51 were issued and made available on the TCC website.

Other English-language publications related to the climate, such as Climate Change Monitoring Report 2016 and Annual Report on the Climate System 2016, were also published on the TCC website.

5. Plans for 2018

– Contribution to the Global Framework for Climate Services (GFCS)

RCCs are expected to play a major role in the implementation of the GFCS. TCC plans to further strengthen its activities and lead RA II's contribution to the Framework. Such activities include the provision of further assistance to NMHSs for better climate services, as well as maintenance of the portal site for Information Sharing on Climate Services in RA II.

– New/upgraded data, products and tool development

To utilize the JRA-55 long-term reanalysis dataset, investigation on teleconnection indices (e.g., the Arctic Oscillation Index) is being conducted to enhance monitoring of atmospheric circulation. TCC plans to publish the investigation results and the indices on its website as soon as material is ready. In addition to its work on the above-listed products and tool, TCC is making efforts to develop information/products based on the Standardized Precipitation Index (SPI) toward better monitoring of droughts worldwide.

– Capacity development

In the last quarter of the year, TCC will hold its annual training seminar with a dozen invited experts as attendees. The Center will also continue to dispatch experts to NMHSs as necessary and host visitors from NMHSs upon request.

(Yasushi Mochizuki, Tokyo Climate Center)

You can also find the latest newsletter from Japan International Cooperation Agency (JICA).
JICA's World (January 2018)
https://www.jica.go.jp/english/publications/j-world/1801.html
JICA's World is the quarterly magazine published by JICA. It introduces various cooperation projects and partners along with the featured theme. The latest issue features "Disaster Risk Reduction Building a Foundation for Our Future".

Any comments or inquiry on this newsletter and/or the TCC website would be much appreciated. Please e-mail to tcc@met.kishou.go.jp.
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