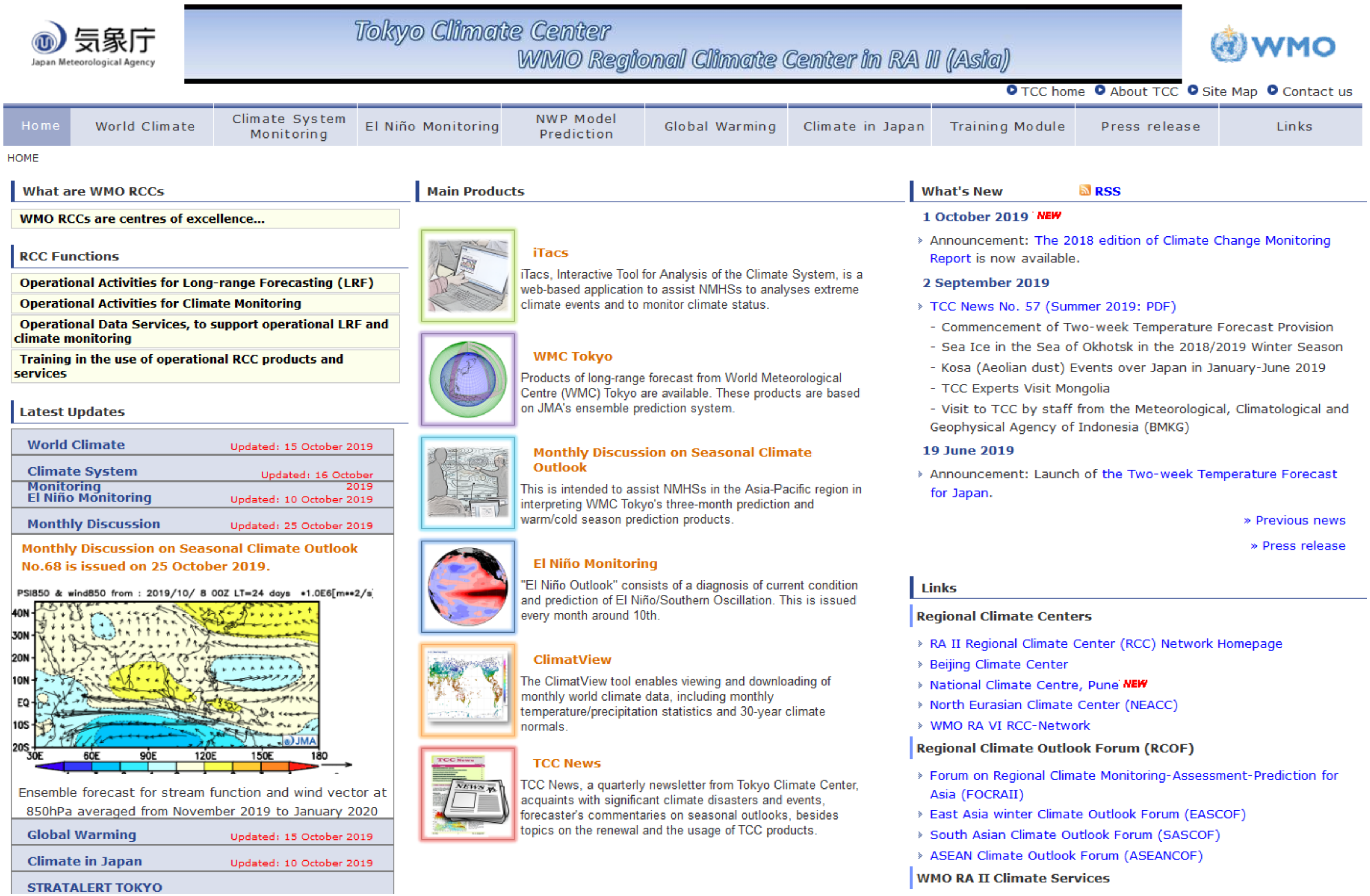
Tokyo Climate Center Website and its products

- for monitoring the world climate and ocean -

SATO Hitoshi
Tokyo Climate Center (TCC)
Japan Meteorological Agency (JMA)

TCC Website



気象庁 Japan Meteorological Agency

Tokyo Climate Center
WMO Regional Climate Center in RA II (Asia)

WMO

TCC home | About TCC | Site Map | Contact us

Home | World Climate | Climate System Monitoring | El Niño Monitoring | NWP Model Prediction | Global Warming | Climate in Japan | Training Module | Press release | Links

HOME

What are WMO RCCs

WMO RCCs are centres of excellence...

RCC Functions

- Operational Activities for Long-range Forecasting (LRF)
- Operational Activities for Climate Monitoring
- Operational Data Services, to support operational LRF and climate monitoring
- Training in the use of operational RCC products and services

Latest Updates

World Climate	Updated: 15 October 2019
Climate System Monitoring	Updated: 16 October 2019
El Niño Monitoring	Updated: 10 October 2019
Monthly Discussion	Updated: 25 October 2019

Monthly Discussion on Seasonal Climate Outlook No.68 is issued on 25 October 2019.

PSI850 & wind850 from : 2019/10/ 8 00Z LT=24 days *1.0E6[m**2/s]

Ensemble forecast for stream function and wind vector at 850hPa averaged from November 2019 to January 2020

Global Warming	Updated: 15 October 2019
Climate in Japan	Updated: 10 October 2019
STRATALERT TOKYO	

Main Products

iTacs
iTacs, Interactive Tool for Analysis of the Climate System, is a web-based application to assist NMHSs to analyses extreme climate events and to monitor climate status.

WMC Tokyo
Products of long-range forecast from World Meteorological Centre (WMC) Tokyo are available. These products are based on JMA's ensemble prediction system.

Monthly Discussion on Seasonal Climate Outlook
This is intended to assist NMHSs in the Asia-Pacific region in interpreting WMC Tokyo's three-month prediction and warm/cold season prediction products.

El Niño Monitoring
"El Niño Outlook" consists of a diagnosis of current condition and prediction of El Niño/Southern Oscillation. This is issued every month around 10th.

ClimatView
The ClimatView tool enables viewing and downloading of monthly world climate data, including monthly temperature/precipitation statistics and 30-year climate normals.

TCC News
TCC News, a quarterly newsletter from Tokyo Climate Center, acquaints with significant climate disasters and events, forecaster's commentaries on seasonal outlooks, besides topics on the renewal and the usage of TCC products.

What's New RSS

1 October 2019 NEW
- Announcement: The 2018 edition of Climate Change Monitoring Report is now available.

2 September 2019
- TCC News No. 57 (Summer 2019: PDF)
  - Commencement of Two-week Temperature Forecast Provision
  - Sea Ice in the Sea of Okhotsk in the 2018/2019 Winter Season
  - Kosa (Aeolian dust) Events over Japan in January-June 2019
  - TCC Experts Visit Mongolia
  - Visit to TCC by staff from the Meteorological, Climatological and Geophysical Agency of Indonesia (BMKG)

19 June 2019
- Announcement: Launch of the Two-week Temperature Forecast for Japan.

» Previous news
» Press release

Links

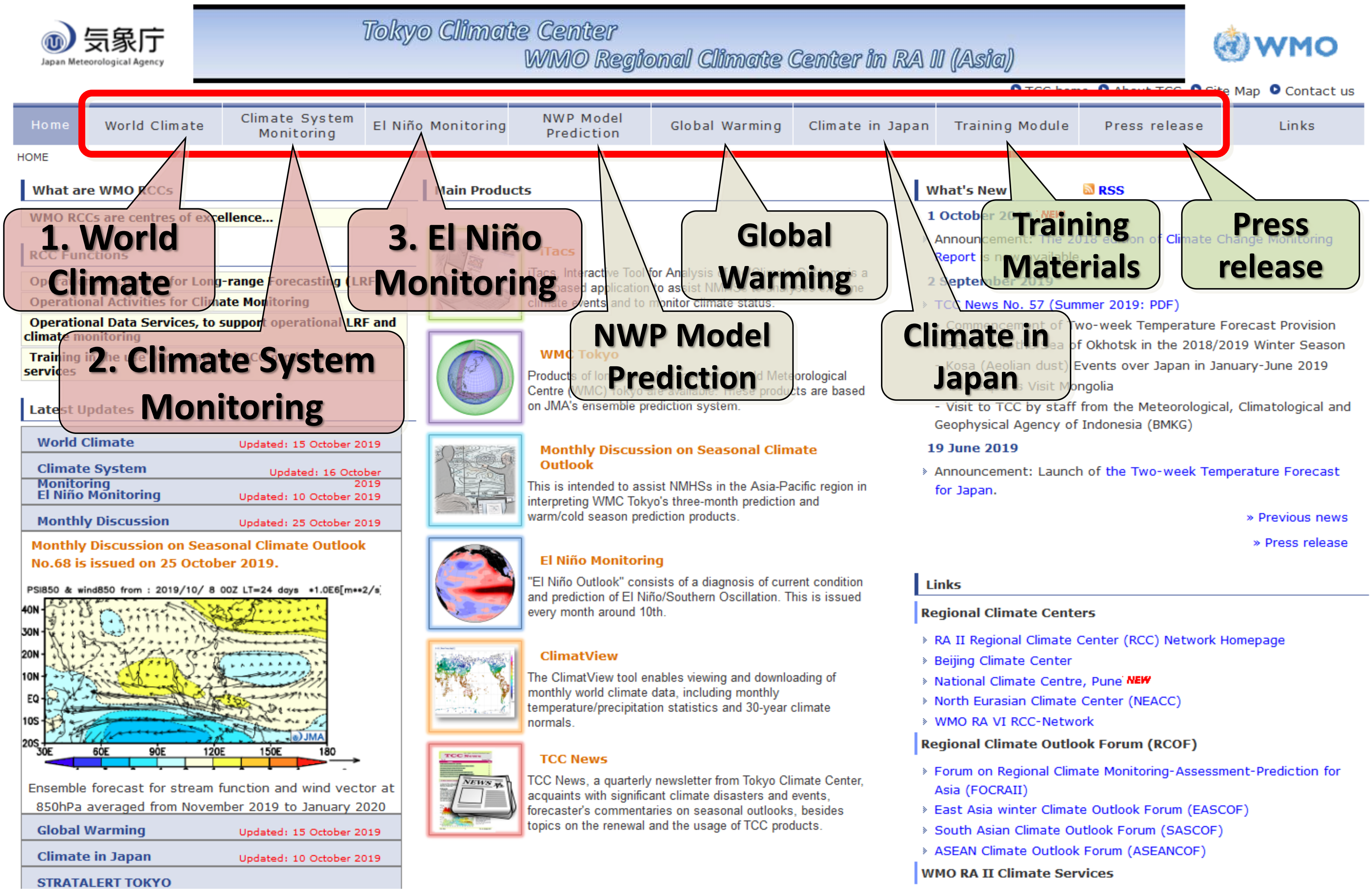
Regional Climate Centers
- RA II Regional Climate Center (RCC) Network Homepage
- Beijing Climate Center
- National Climate Centre, Pune NEW
- North Eurasian Climate Center (NEACC)
- WMO RA VI RCC-Network

Regional Climate Outlook Forum (RCOF)
- Forum on Regional Climate Monitoring-Assessment-Prediction for Asia (FOCRAII)
- East Asia winter Climate Outlook Forum (EASCOF)
- South Asian Climate Outlook Forum (SASCOF)
- ASEAN Climate Outlook Forum (ASEANCOF)

WMO RA II Climate Services

TCC website: https://ds.data.jma.go.jp/tcc/tcc/index.html

TCC Website



TCC website: https://ds.data.jma.go.jp/tcc/tcc/index.html

1. World Climate

World Climate

Home | World Climate | Climate System Monitoring | El Niño Monitoring | NWP Model Prediction | Global Warming | Climate in Japan | Training Module | Press release | Links

HOME > World Climate

World Climate

JMA monitors the global climate with CLIMAT and SYNOP reports from NMHSs through the Global Telecommunication System (GTS) of WMO. Quality-checked data on temperature and precipitation are assembled to assess extreme climate events. Weekly, monthly and seasonal monitoring reports on extreme climate events with brief descriptions of disastrous events are available on this page, along with world distribution maps of temperature and precipitation.
Climatological normals for temperature and precipitation are based on the period 1981-2010.

Main Products

Extreme Climate Monitoring

- Weekly Report(30 Oct 2019)
- Reports on Specific Events (11 Apr 2019)
- Monthly Report(15 Oct 2019)
- Seasonal Report(30 Sep 2019)
- Annual Report(15 Feb 2019)

Extreme Climate Monitoring

Normal & Historical Data

- World Climate Chart
- ClimatView: Monthly Historical & Normal Data (All available stations)
- 10-day/Half-monthly Mean Temperature and Precipitation (Regional Map)
- Monthly Normals Data (Principal Stations)(8 Dec 2011)

Normal & Historical Data

Data Descriptions & Analysis Procedures

- Extreme Climate Report
- Weekly, 10-day and half-monthly data
- Monthly Normals

Statistical Research

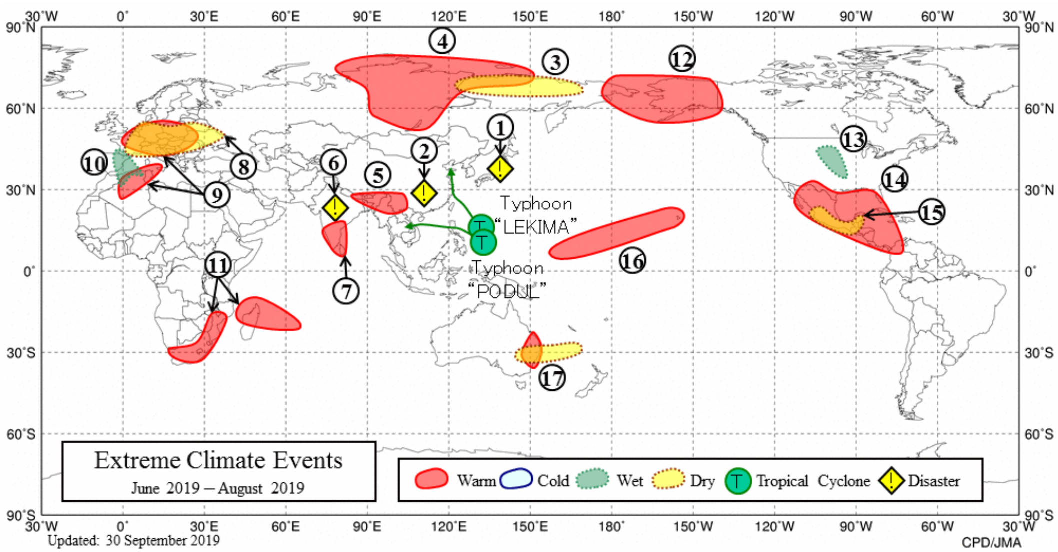
- Impacts of Tropical SST Variability on the Global Climate

Statistical Research

Data Descriptions & Analysis Procedures

Seasonal report on global extreme climate events

Seasonal Report on Global Extreme Climate Events ----- Period: < > Jun 2019 - Aug 2019 Show



	Type	Area	Remarks
1	**Heat Wave**	From northern to western Japan	• It was reported that heat waves from late July to mid August caused more than 100 fatalities from northern to western Japan (Fire and Disaster Management Agency of Japan, as of 3 September).
2	**Heavy Rain・Typhoon**	From eastern China to northern Thailand	• It was reported that heavy rains, Typhoon "LEKIMA" and "PODUL" caused more than 200 fatalities from eastern China to northern Thailand (the government of China, the government of Viet Nam, European Commission).
3	**Dry**	The northern part of Eastern Siberia	
4	**Warm**	In and around Central Siberia	
5	**Warm**	From southern China to Nepal	
6	**Heavy Rain**	In and around South Asia	• It was reported that heavy rains from July to August caused more than 1900 fatalities in and around South Asia (the government of India, the government of Pakistan, European Commission).
7	**Warm**	Southern India	• It was reported that heat waves in June caused more than 110 fatalities in India (European Commission).

Highlight

- **Seasonal mean temperatures were extremely high in and around Central Siberia, from southern China to Nepal, in southern India, from eastern Europe to the western part of Northern Africa, from the Comoros to Mauritius, from Mozambique to South Africa, in and around Alaska, in and around Central America, from northern Polynesia to central Micronesia, and in eastern Australia.**
- **Seasonal precipitation amounts were extremely high from western Europe to the western part of Northern Africa and the central USA.**
- **Seasonal precipitation amounts were extremely low in the northern part of Eastern Siberia, in and around the central Europe, and in southern Mexico.**

https://ds.data.jma.go.jp/tcc/tcc/products/climate/seasonal/index.html

Extreme climate event criteria

Extreme	Weekly	Monthly/Seasonal
Warm/ Cold	The positive/negative anomaly of weekly mean temperature exceeds three times the 31-day standard deviation.	Monthly/seasonal temperature anomaly is larger than 1.83 times of its standard deviation.
Wet	Precipitation in a week exceeds a threshold decided on the basis of the 29-day precipitation normal. If this normal is 10 mm / 100 mm / 200 mm / 500 mm, the threshold is 153% / 98% / 81% / 59% of the normal value.	Monthly/seasonal precipitation is more than any value in the climatological normal base period.
Dry	Precipitation in the last 30-day is less than any value in the climatological normal base period.	Monthly/seasonal precipitation is less than any value in the base period.

https://ds.data.jma.go.jp/tcc/tcc/products/climate/explanation/commentary.html

Reports on extreme climate events

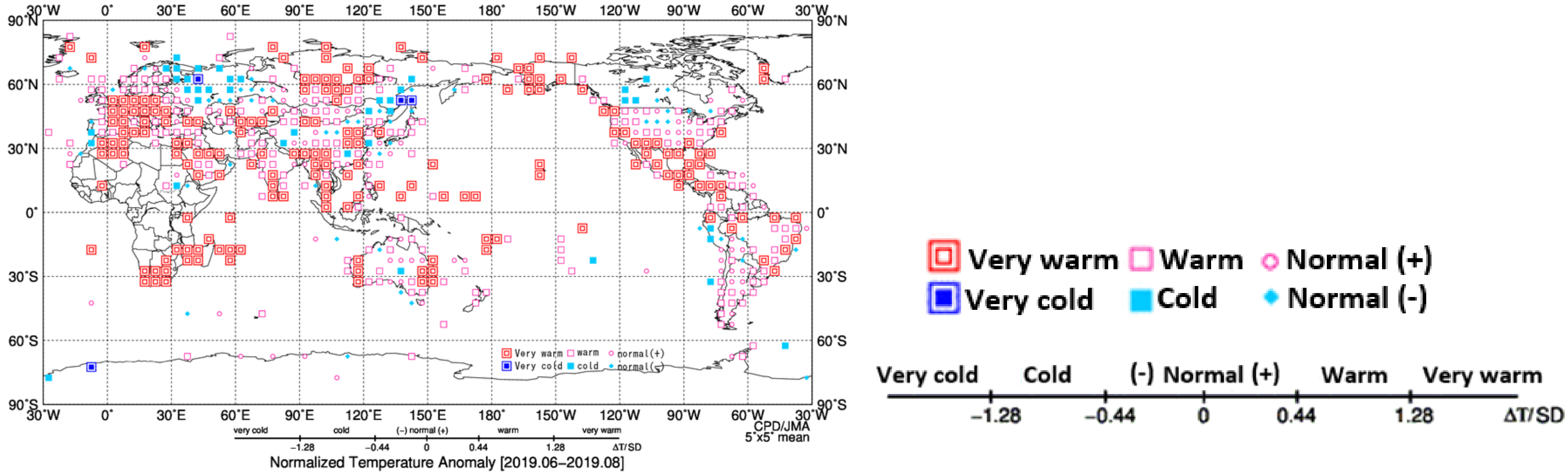
Reports on Extreme Climate Events

TCC/JMA issued reports on worldwide extreme climate events identified using the above criteria on regular basis (weekly, monthly, seasonally and annually). Information includes the locations of such events and weather-related disasters.

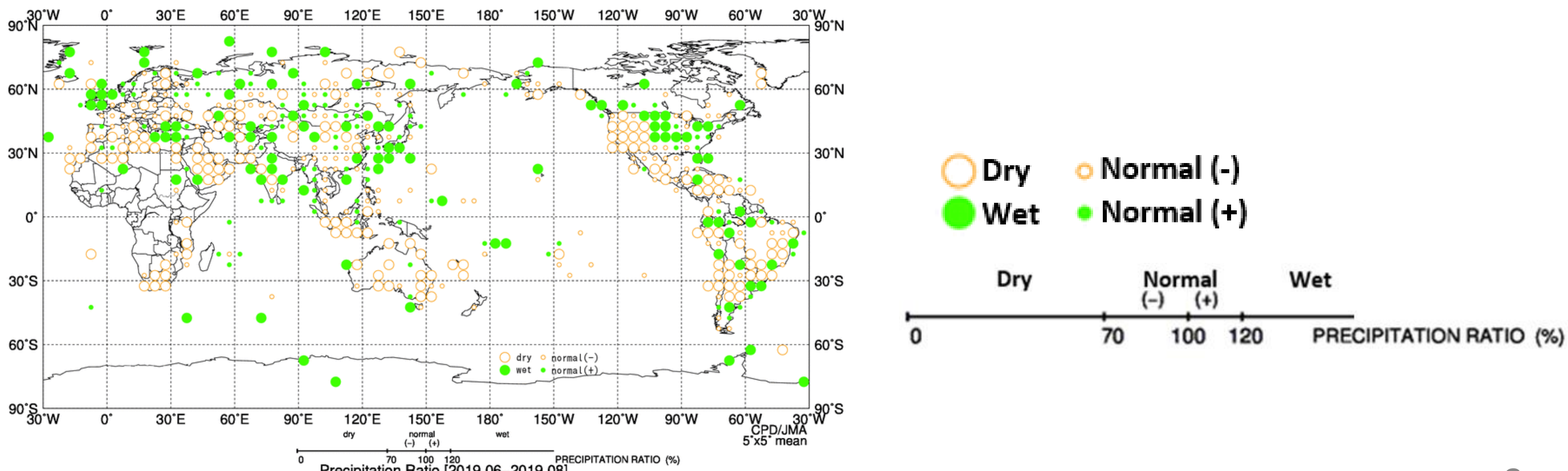
	Description	Schedule
Weekly Report	A weekly summary of extreme climate events and weather-related disasters around the world (target period: Wednesday to Tuesday)	Every Wednesday (except national holidays)
Monthly Report	A monthly summary of extreme climate events and weather-related disasters around the world	Around the 14th of every month
Seasonal Report	A seasonal summary of extreme climate events and weather-related disasters around the world with reference to boreal seasons: winter (December to February), spring (March to May), summer (June to August) and autumn (September to November)	Around the 14th of March, June, September and December
Annual Report	A annual summary of extreme climate events and weather-related disasters around the world	Around the 14th of January

Seasonal world climate chart (June - August 2019)

Normalized Temperature Anomaly



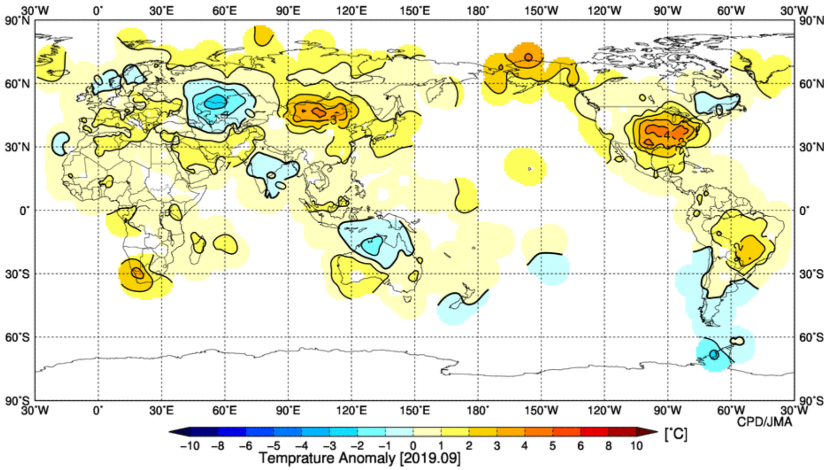
Precipitation Ratio (%)



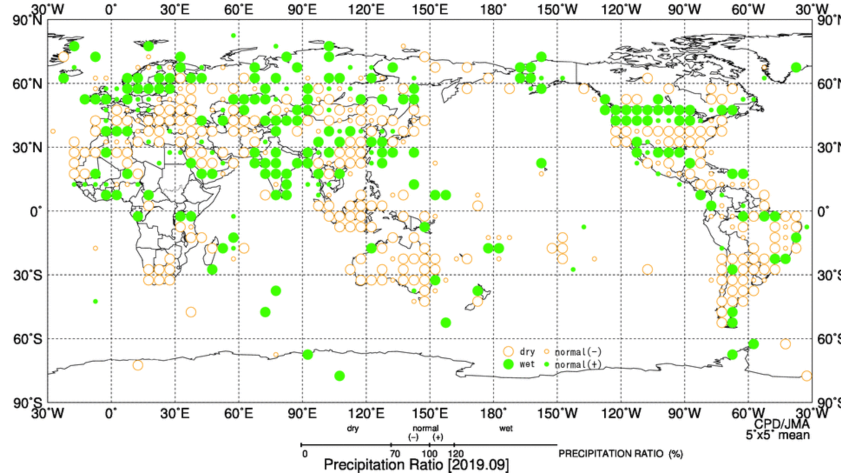
https://ds.data.jma.go.jp/tcc/tcc/products/climate/climfig/?tm=seasonal

Monthly world climate chart (September 2019)

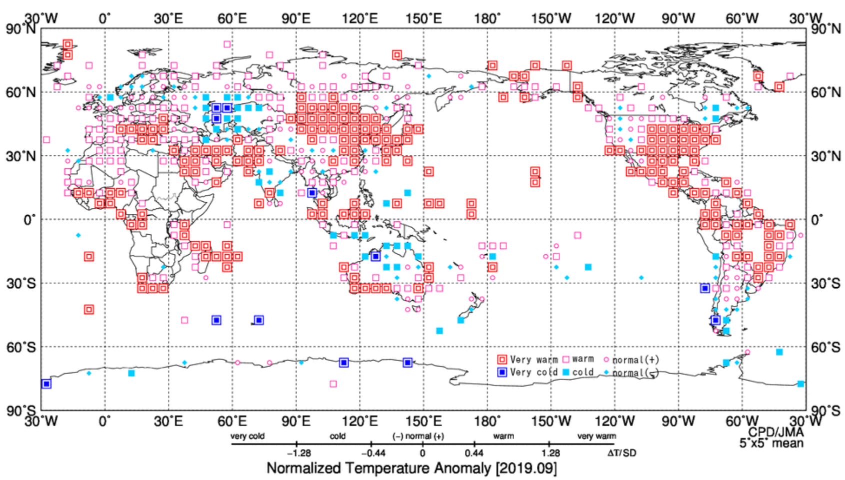
Temperature Anomaly (℃)



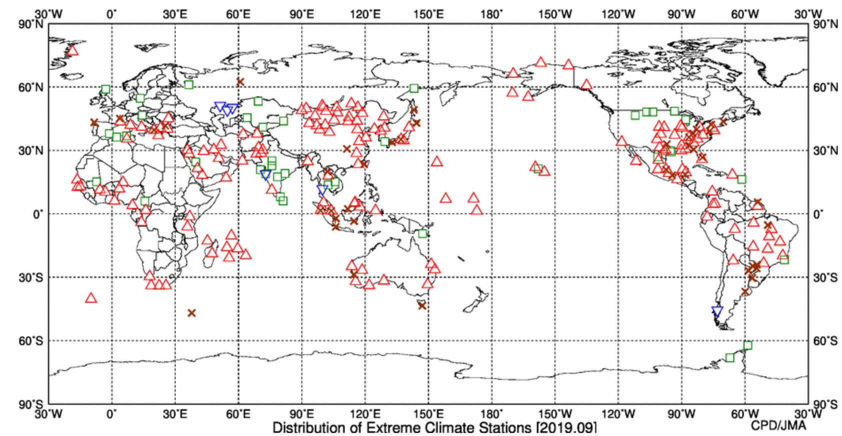
Precipitation Ratio (%)



Normalized Temperature Anomaly



Distribution of Extreme Climate Stations



△ Extremely high temperature (ΔT/SD> 1.83)
▽ Extremely low temperature (ΔT/SD< −1.83)
□ Extremely high precipitation (Rd=6)
× Extremely low precipitation (Rd=0)

https://ds.data.jma.go.jp/tcc/tcc/products/climate/climfig/?tm=monthly

List of climate charts

World

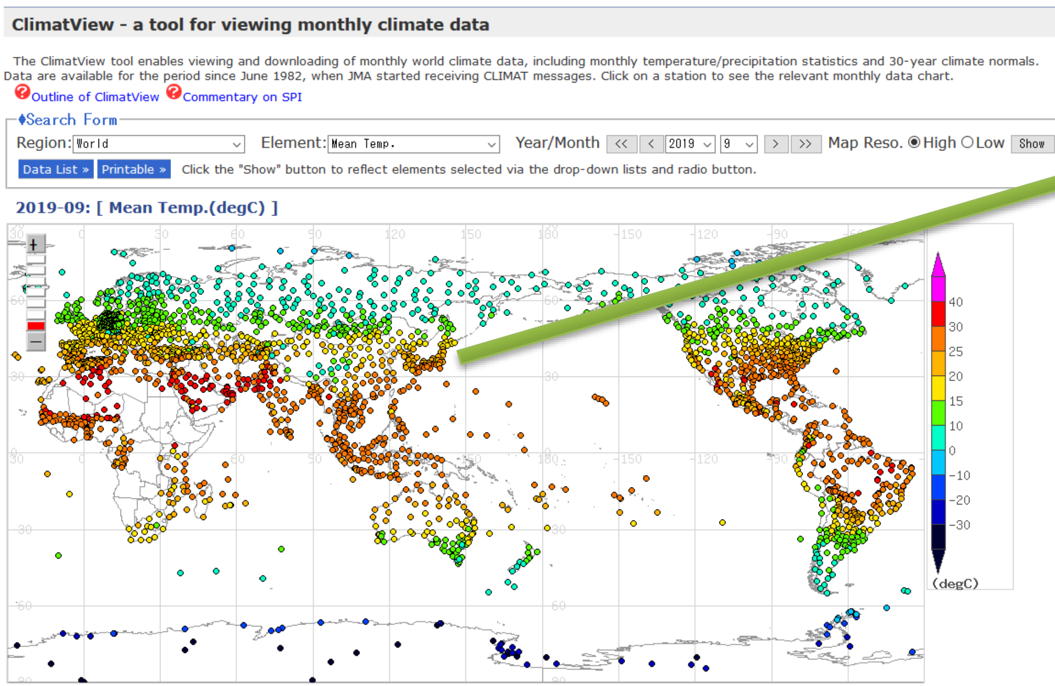
	Temperature			Precipitation		Extreme Climate	Data list
Weekly	Mean temperature	Temperature anomaly		7-day precipitation 30-day precipitation	7-day precipitation ratio 30-day precipitation ratio		
Monthly		Temperature anomaly	Temperature anomaly (normalized)	Precipitation	Precipitation ratio	Extreme climate station	Monthly data of selected stations Extreme climate station list
Seasonal			Temperature anomaly (normalized)		Precipitation ratio		
Annual			Temperature anomaly (normalized)		Precipitation ratio	Frequencies of extremely high/low temperature Frequencies of extremely high/low precipitation	
Monthly Normals	Temperature			Precipitation			Monthly Normals Data

Regional

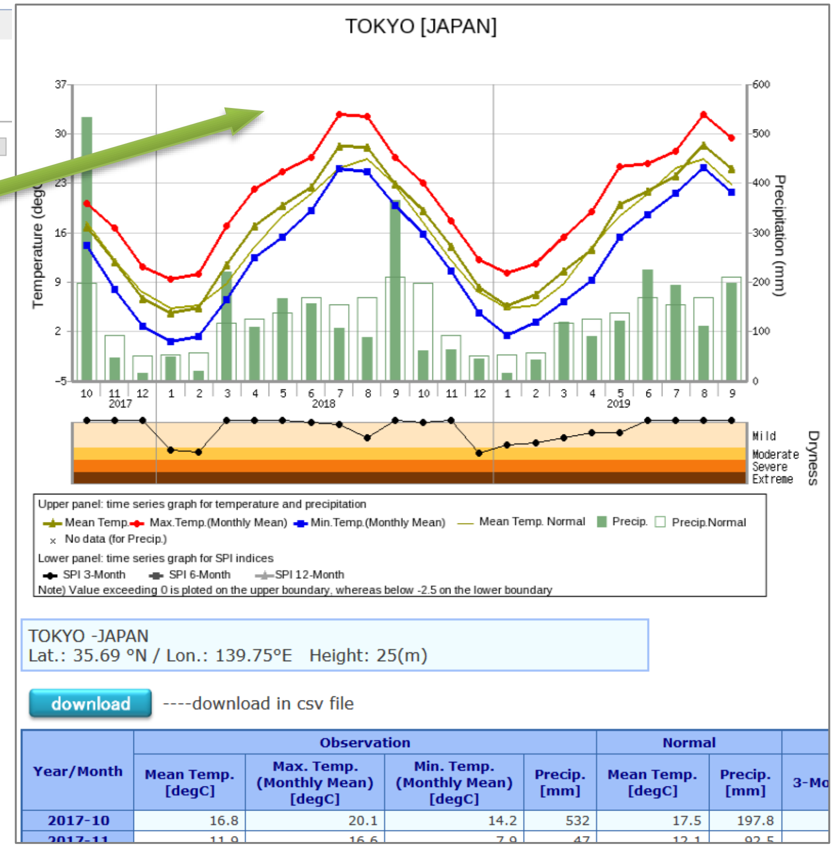
	Temperature		Precipitation	
10-day	Mean temperature	Temperature anomaly	Precipitation	Precipitation ratio
Half-monthly	Mean Temperature	Temperature anomaly	Precipitation	Precipitation ratio

ClimatView

The ClimatView tool enables viewing and downloading of monthly world climate data, giving users access to statistics on monthly mean temperatures, monthly total precipitation amounts and related anomalies or ratios for all available stations.



Monthly climate data over the world since 1982 can be accessed.



Time series of monthly temperatures, precipitation and SPI (Standardized Precipitation Index)

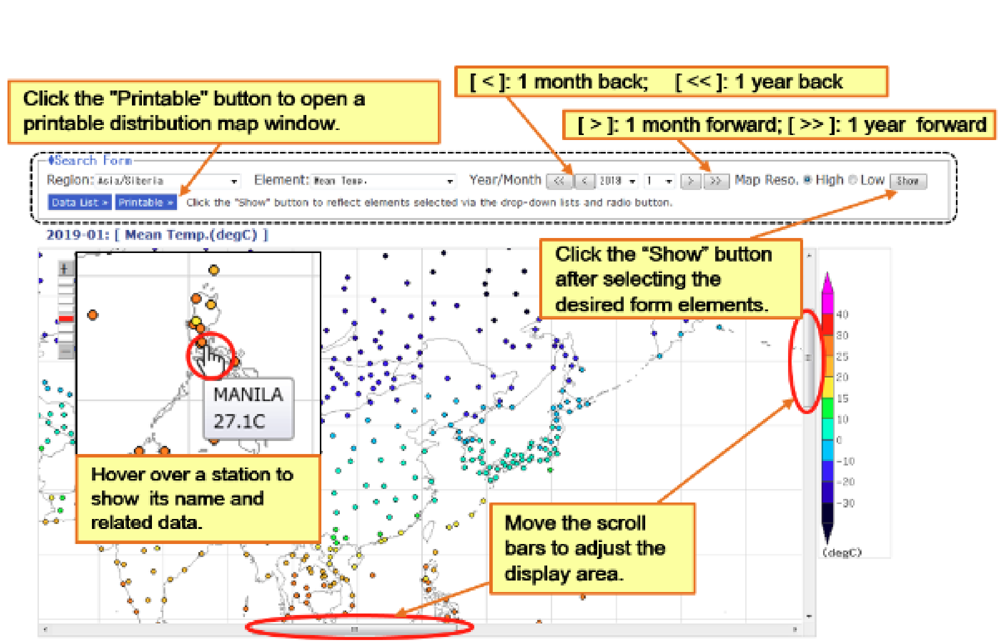
https://ds.data.jma.go.jp/tcc/tcc/products/climate/climatview/frame.php

Outline of ClimatView

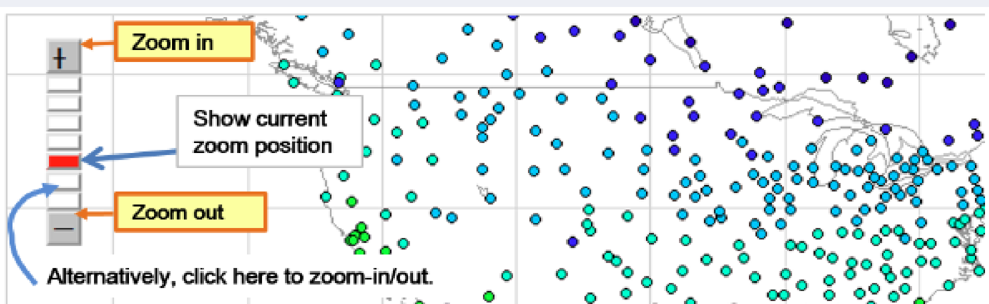
Using ClimatView

1. Distribution map

- On the distribution map, temperature, precipitation data and Standardized Precipitation Index (SPI) for each station are displayed as colored round marks for selected areas. A color legend is shown on the right.
- Hover over a station on the distribution map to show data on the chosen element and the name of the station in a pop-up balloon.
- Use the drop-down lists and radio button at the top of the page to change the region, element, year/month and map resolution.
- Click the [<] and [<<] buttons to go back 1 month and 1 year, respectively. Click the [>] and [>>] buttons to go forward 1 month and 1 year, respectively.
- Click the "Show" button to reflect elements selected via the drop-down lists and radio button.
- Drag the scroll bars on the right side and the bottom of the map to adjust the display area.
- Click the "Printable" button to display a figure in a new window for printing.
- Select "Low" for the map resolution if map drawing takes a long time due to a slow connection.



- Click the buttons on the zoom bar on the left to zoom in/out of the map.
- The red mark between the zoom bar buttons shows the degree of zoom (a higher position indicates a larger map).
- The white buttons on the bar can also be clicked to zoom in/out.



https://ds.data.jma.go.jp/tcc/tcc/products/climate/climatview/outline.html

Standardized Precipitation Index (SPI)

What is the SPI?

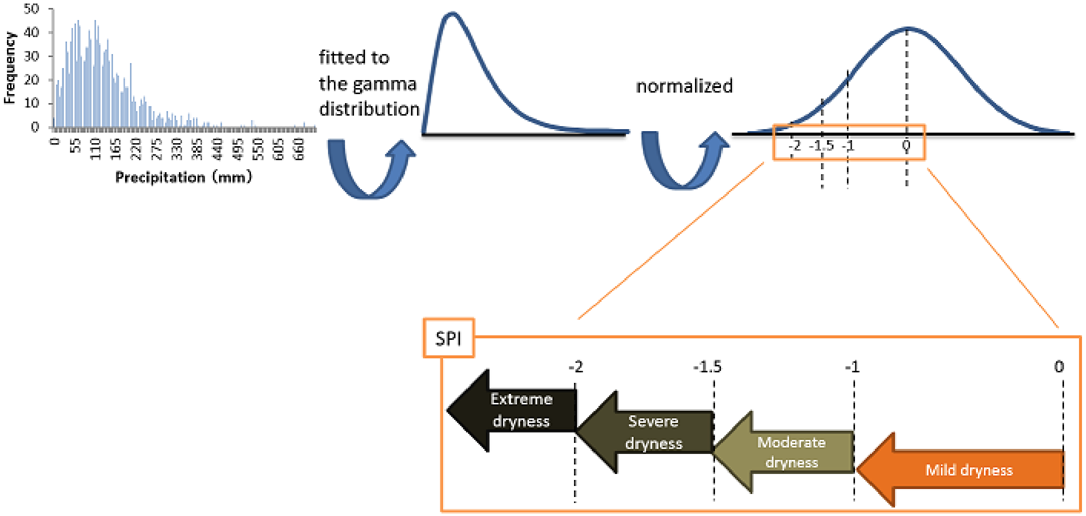
The Standardized Precipitation Index (SPI) is commonly used for operational drought monitoring by National Meteorological and Hydrological Services (NMHSs) around the world to quantify precipitation deficits on multiple timescales. Related calculation for specific locations is based on long-term precipitation records for the target period. The ability to compute index values on numerous time scales makes this metric useful in the quantification of risk regarding various types of droughts (e.g., meteorological, agricultural and hydrological). The need for only precipitation data as an input parameter facilitates SPI computation. However, it should be noted that no evapotranspiration effect is considered.

Refer to the WMO's SPI User Guide (WMO, 2012) for details of the background of the index, its introduction and a related description.

Data and Method

Calculation of the SPI indices shown in the TCC ClimatView tool is based on monthly precipitation totals from CLIMAT data for states worldwide and on Global Historical Climatology Network (GHCN) data provided by the National Oceanic and Atmospheric Administration (NOAA)'s National Centers for Environmental Information (Peterson and Vose, 1997). Both sets of data are based on observations conducted at surface weather stations worldwide, but CLIMAT data are available only as far back as June 1982. Where both are available for the same station, CLIMAT data are applied. To derive probability distribution for past precipitation amounts, monthly precipitation data are used wherever possible for the period from 1950 to 2010. SPI values are not calculated if the available data span is shorter than 30 years. The ClimatView tool shows SPI values only as far back as June 1982.

TCC uses the SPI calculation program provided by Colorado State University in the USA. In SPI computation, the long-term record of past precipitation is fitted to probability distribution before transformation to normal distribution (Figure 1). Accordingly, the mean SPI for the location and desired period is zero (Edwards and McKee, 1997). Negative SPI values indicate precipitation below the median value. Drought events may occur when the SPI is continuously negative and reaches a certain value, such as -1.0 or less (McKee et al. 1993).

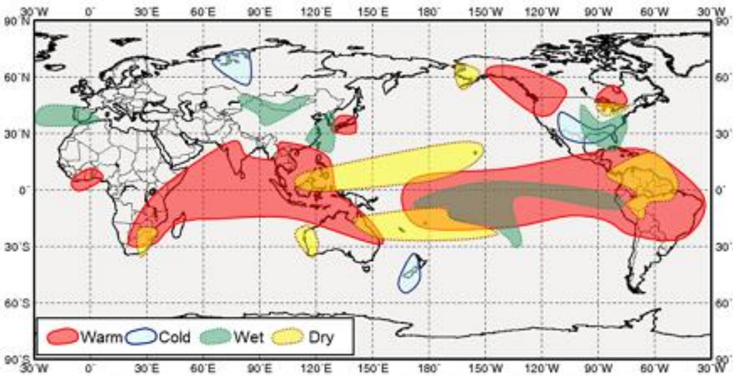


https://ds.data.jma.go.jp/tcc/tcc/products/climate/climatview/spi_commentary.html

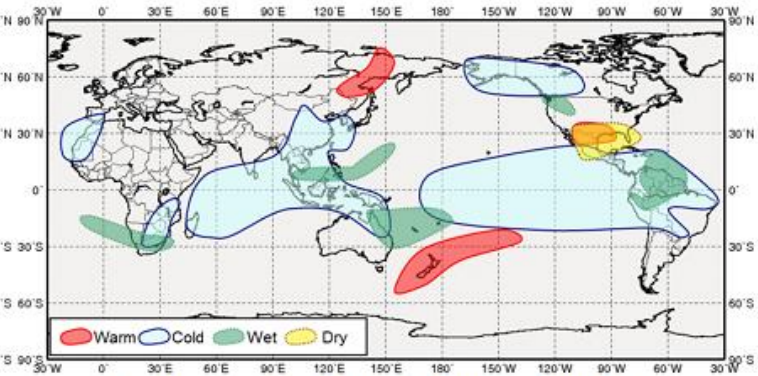
Statistical research:
Impacts of tropical SST variability on the global climate

Schematic Charts

Schematic charts indicate typical anomaly patterns of surface temperature and precipitation for each season (boreal spring, summer, autumn and winter) as seen in past warmer/cooler SST events in the area of NINO.3 (corresponding to El Niño/La Niña events), NINO.WEST and IOBW. The figures below are examples for El Niño and La Niña impacts in boreal winter (from December through February). These results are based on observation and Japanese 55-year Reanalysis (JRA-55) data from 1958 through 2012 (a period of 55 years).



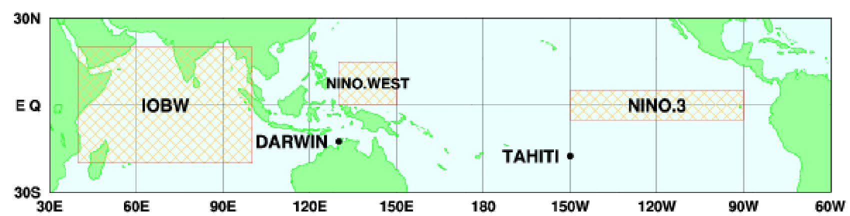
Impacts of El Niño in boreal winter
(Click the figure to jump to schematics for El Niño impacts.)



Impacts of La Niña in boreal winter
(Click the figure to jump to schematics for La Niña impacts.)

More schematic charts are available on the pages shown below.
Previous temperature and precipitation anomalies:

- El Niño events
- La Niña events
- Warmer SST events in the western tropical Pacific (NINO.WEST)
- Cooler SST events in the western tropical Pacific (NINO.WEST)
- Warmer SST events in the tropical Indian Ocean (IOBW)
- Cooler SST events in the tropical Indian Ocean (IOBW)



The **"Detailed Charts"** page shows anomaly patterns of three-month-mean temperature and precipitation fields centered on each calendar month for previous warmer/cooler SST events in each of the three tropical areas with 5° x 5°-grid representation, from which the schematic charts described above were derived.

https://ds.data.jma.go.jp/tcc/tcc/products/climate/ENSO/index.htm

2. Climate System Monitoring

Climate System Monitoring

Home | World Climate | Climate System Monitoring | El Niño Monitoring | NWP Model Prediction | Global Warming | Climate in Japan | Training Module | Press release

HOME > Climate System Monitoring

Climate System Monitoring

JMA monitors the climate system focusing on atmospheric circulation, tropical convection, oceanographic conditions and snow cover to understand backgrounds and factors of the present climate conditions including extreme events.

Main Products

Report on Climate System

- Reports on Specific Events (11 Apr 2019)
- Monthly Highlights on the Climate System (September 2019)
- Seasonal Highlights on the Climate System (Summer, June 2019 - August 2019)
- Annual Report on the Climate System (2016)

Report on Climate System

Monitoring and Statistical Analysis (Explanation)

- Analysis Charts and Monitoring Indices
- Asian monsoon monitoring (31 Oct 2019)
- Madden-Julian Oscillation (MJO) (31 Oct 2019)
- Stratospheric circulation (31 Oct 2019)
- Composite map for El Niño / La Niña events NEW

- Charts and indices
- Asian monsoon monitoring
- MJO
- Stratospheric circulation
- Composite maps

Analysis charts and monitoring indices

HOME > Climate System Monitoring > Analysis Charts and Monitoring Indices

Analysis Charts and Monitoring Indices

Analysis Charts

- Atmospheric Circulation (5-day, 10-day, month, 3-month)
- Time Cross Section, Indices
- Oceanic Figures and Tables
- Animation Maps (Asian Region, Global Area, Northern Hemisphere, Southern Hemisphere)

Monitoring Indices

- ENSO and Asian Monsoon Monitoring Indices

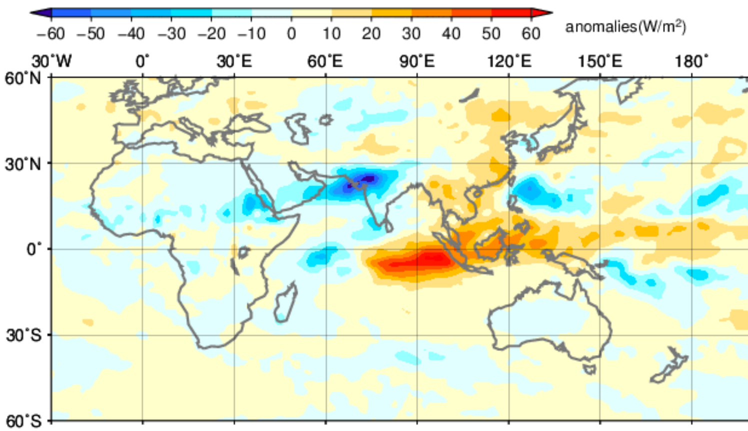
https://ds.data.jma.go.jp/tcc/tcc/products/clisys/acmi.html

Analysis charts - Atmospheric circulation -

HOME > Climate System Monitoring > Analysis Charts and Monitoring Indices > Monthly Mean Figures

Monthly Mean Figures of Atmospheric Circulation and Snow Cover

Field: Tropics | Hist/Norm: Hist & Anom
Element: Outgoing Longwave Radiation (OLR) Anomaly
Year: 2019 | Month: 9
Oldest | -1 month | +1 month | Latest | Animation: Start | Stop | Slow | Fast | Time Direction: Forward

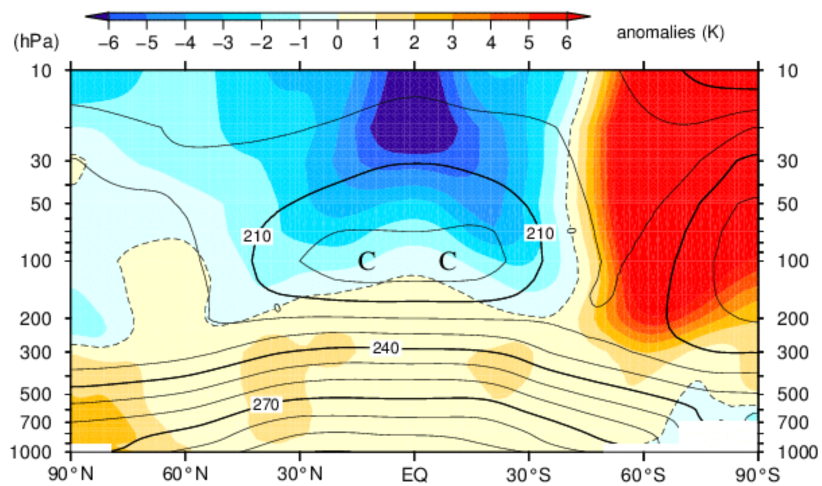


Monthly mean outgoing longwave radiation (OLR) anomaly (Sep.2019)
Anomalies are deviations from the 1981–2010 average.
Original data provided by NOAA.

HOME > Climate System Monitoring > Analysis Charts and Monitoring Indices > Monthly Mean Figures

Monthly Mean Figures of Atmospheric Circulation and Snow Cover

Field: Zonal Mean | Hist/Norm: Hist & Anom
Element: Temperature
Year: 2019 | Month: 9
Oldest | -1 month | +1 month | Latest | Animation: Start | Stop | Slow | Fast | Time Direction: Forward

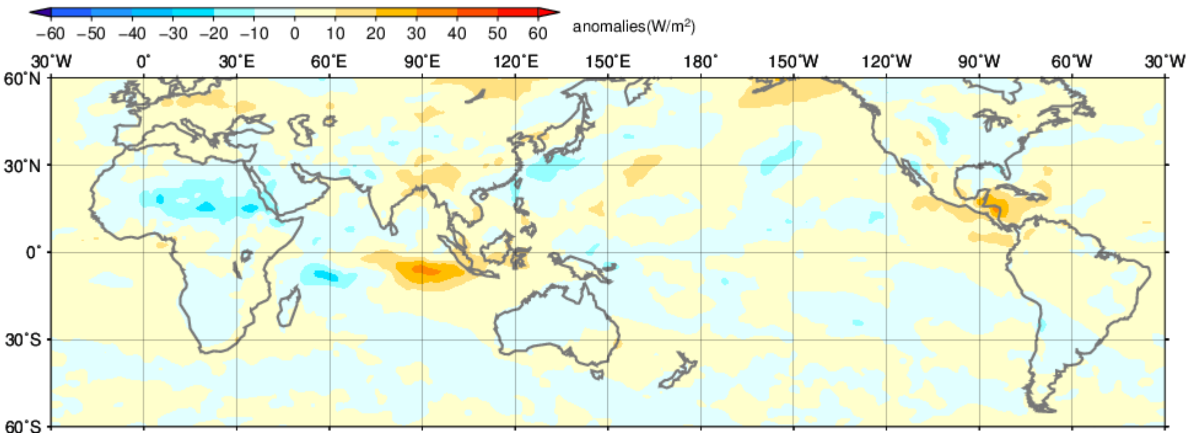


Latitude–height cross section of zonal mean temperature and anomaly (Sep.2019)
The contours indicate temperature at intervals of 10 K.
The shading indicates temperature anomalies.
Anomalies are deviations from the 1981–2010 average.

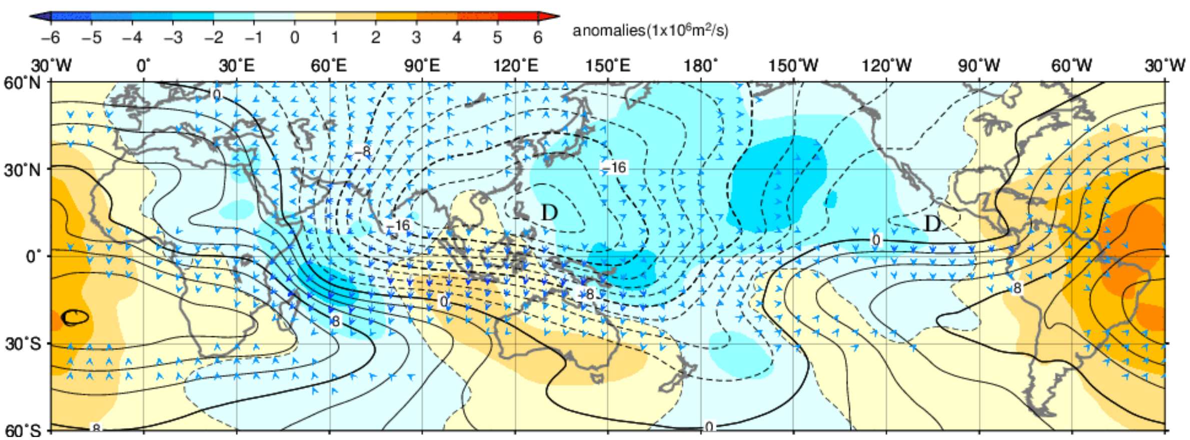
https://ds.data.jma.go.jp/tcc/tcc/products/clisys/figures/db_hist_mon_tcc.html

Atmospheric circulation for JJA 2019

OLR anomalies



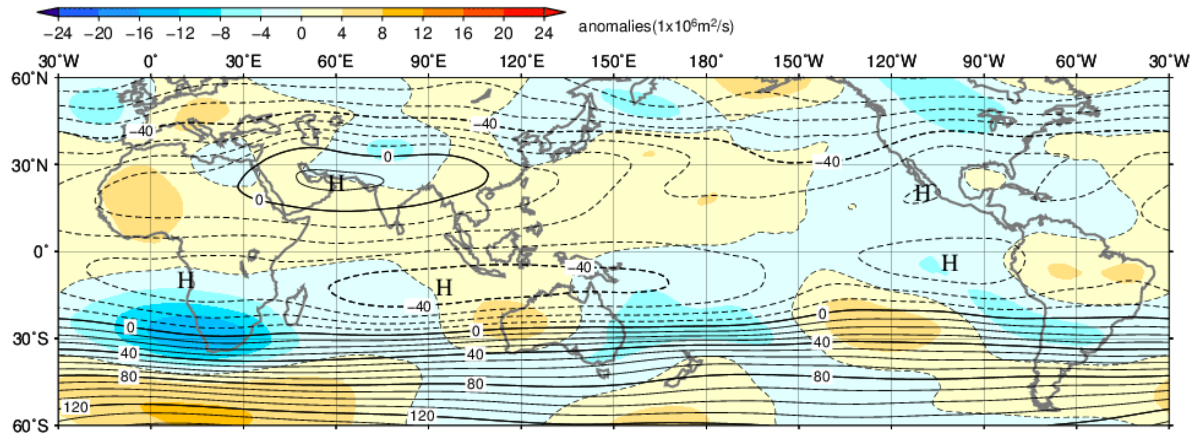
200hPa velocity potential, divergent wind vector and velocity potential anomaly



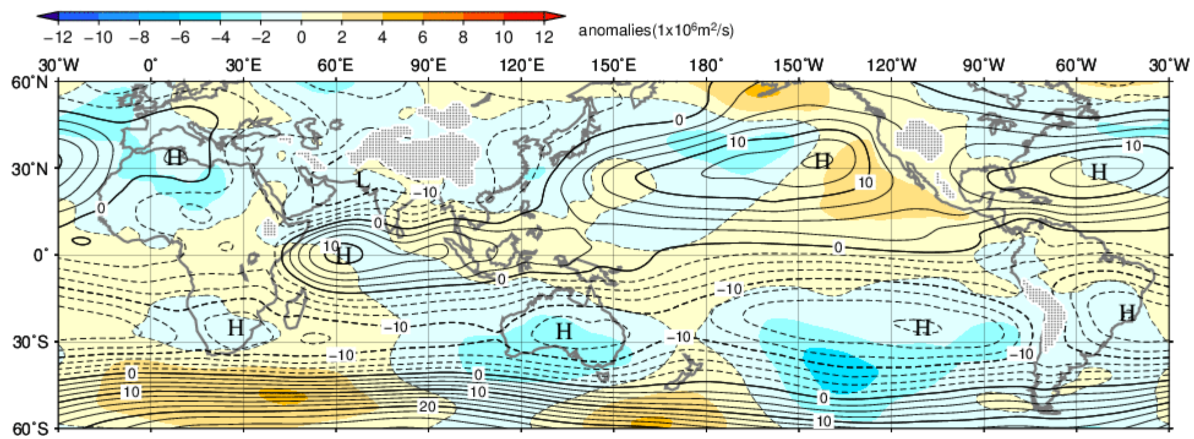
- Convective activity inferred from OLR was enhanced over Northern Africa and the southwestern tropical Indian Ocean, and was suppressed over the southeastern tropical Indian Ocean.
- In the upper troposphere, divergence anomalies were seen over the southwestern Indian Ocean, the western Pacific and the central North Pacific, and convergence anomalies were seen over the southeastern Indian Ocean.

Atmospheric circulation for JJA 2019

200hPa stream function and anomaly



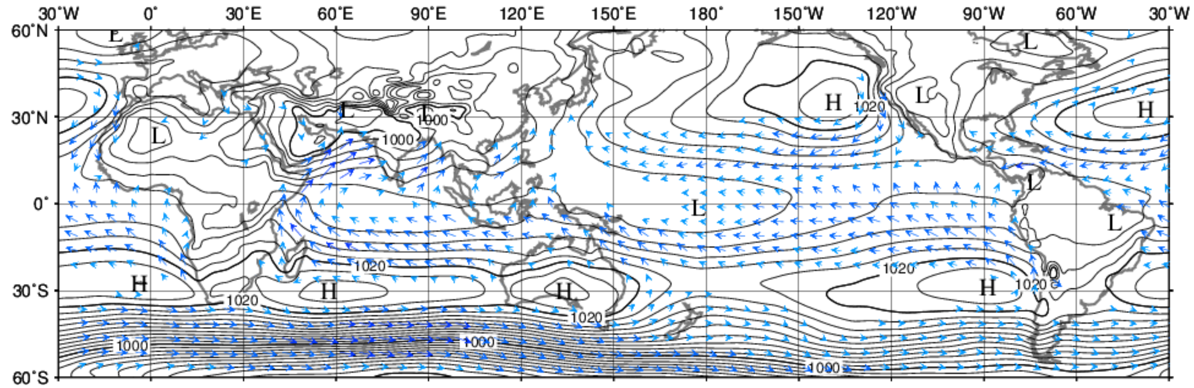
850hPa stream function and anomaly



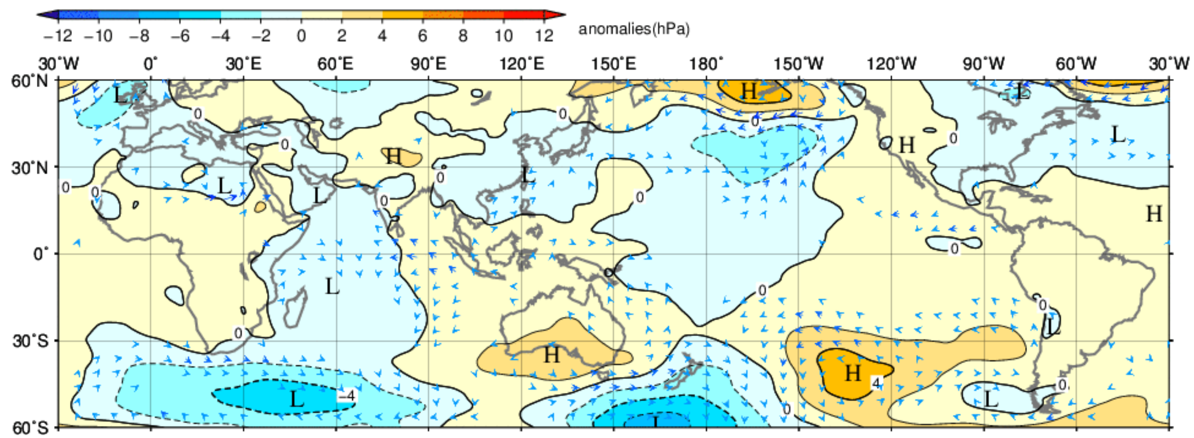
- In the upper troposphere, cyclonic circulation anomalies were seen over the western part of Australia, and anti-cyclonic circulation anomalies were seen over the northwestern and southern parts of Africa.
- In the lower troposphere, cyclonic circulation anomalies were seen over the northwestern part of Africa, and anti-cyclonic circulation anomalies were seen over Australia and the eastern Pacific.

Atmospheric circulation for JJA 2019

Sea level pressure and surface wind vector



Sea level pressure anomaly and surface wind vector anomaly



- In the sea level pressure field, in the equatorial area, positive anomalies were seen over the Maritime Continent, and negative anomalies were seen over the western Indian Ocean and near the date line.
- Westerly wind anomalies were seen over the eastern equatorial Indian Ocean.

Analysis charts - Animation maps -

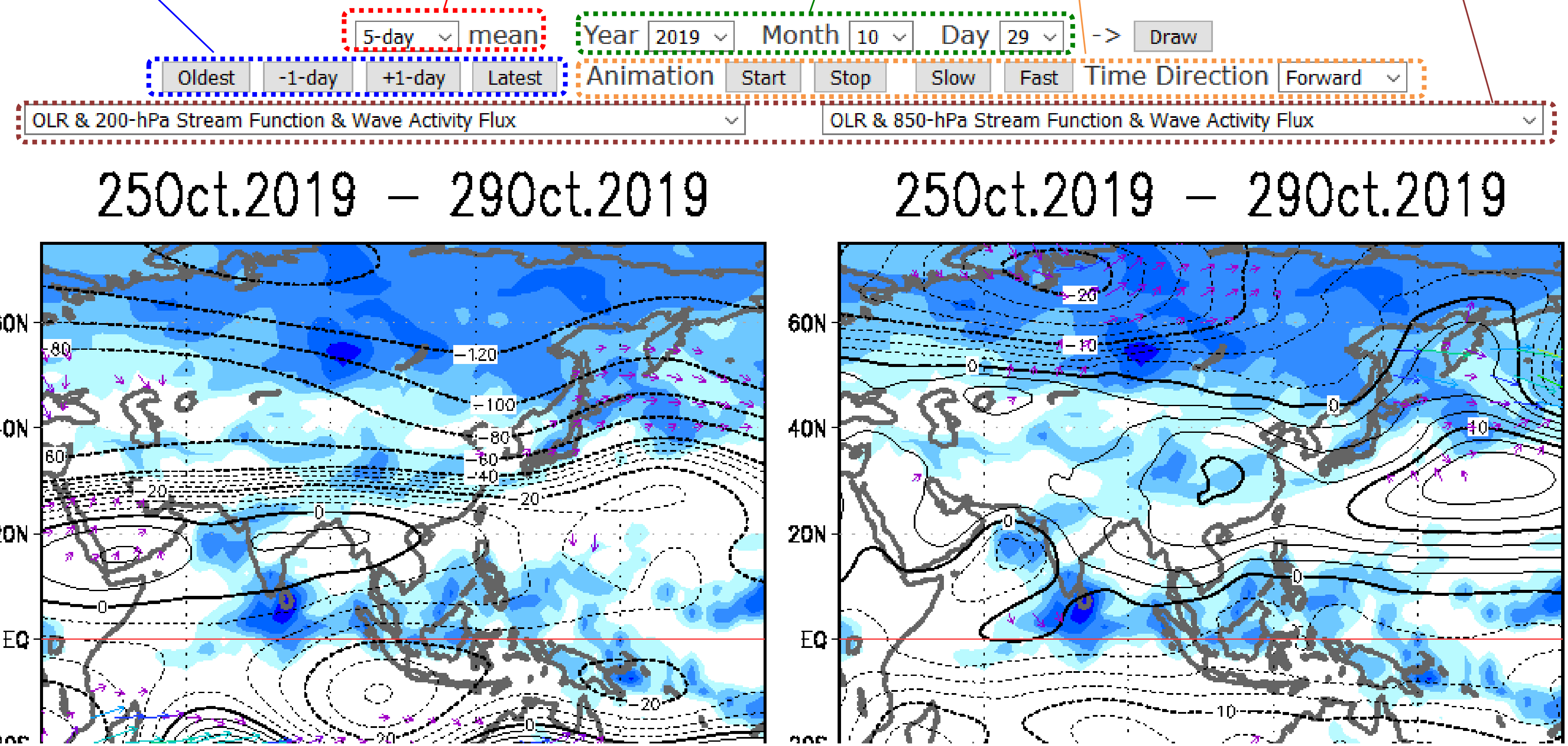
To put the date backward/forward

Average period (1, 5, 7, 10, 30-day)

Date

To control animation

Select elements

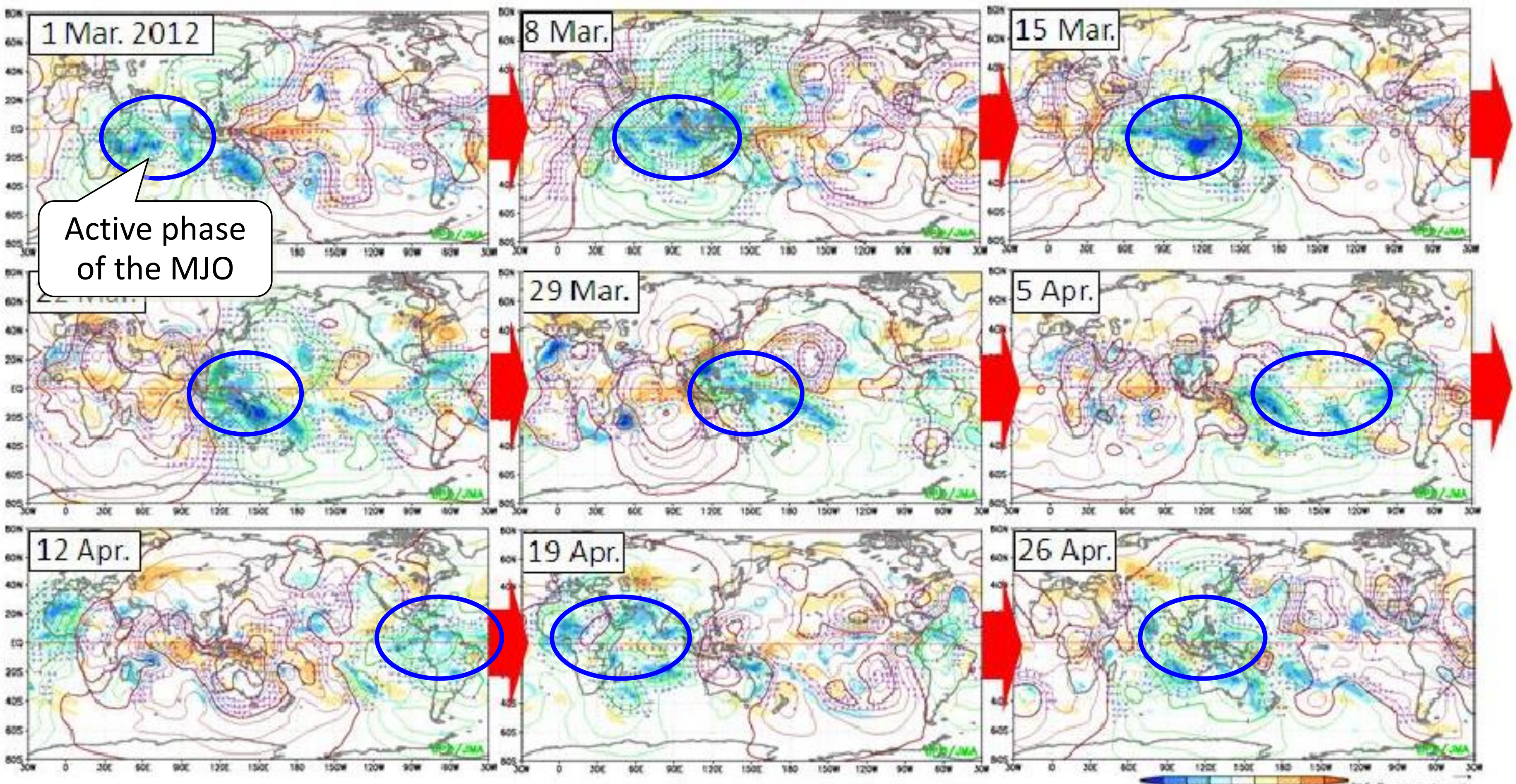


Available for the period from 1958 to 2 days prior, and updated every day.

https://ds.data.jma.go.jp/tcc/tcc/products/clisys/anim/anim_asia.html

Propagation of tropical intraseasonal oscillations

7-day mean OLR, 200hPa Velocity Potential and Divergent Wind Vector (Anomaly)



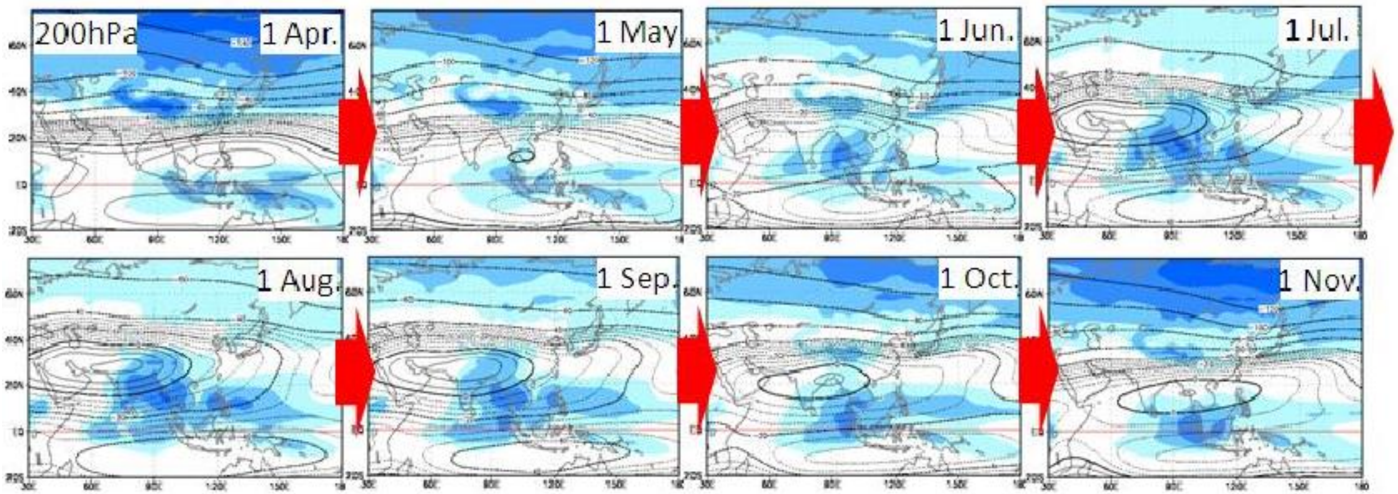
Blue shading: Active convection

Green contours: Stronger-than-normal divergence in the upper troposphere

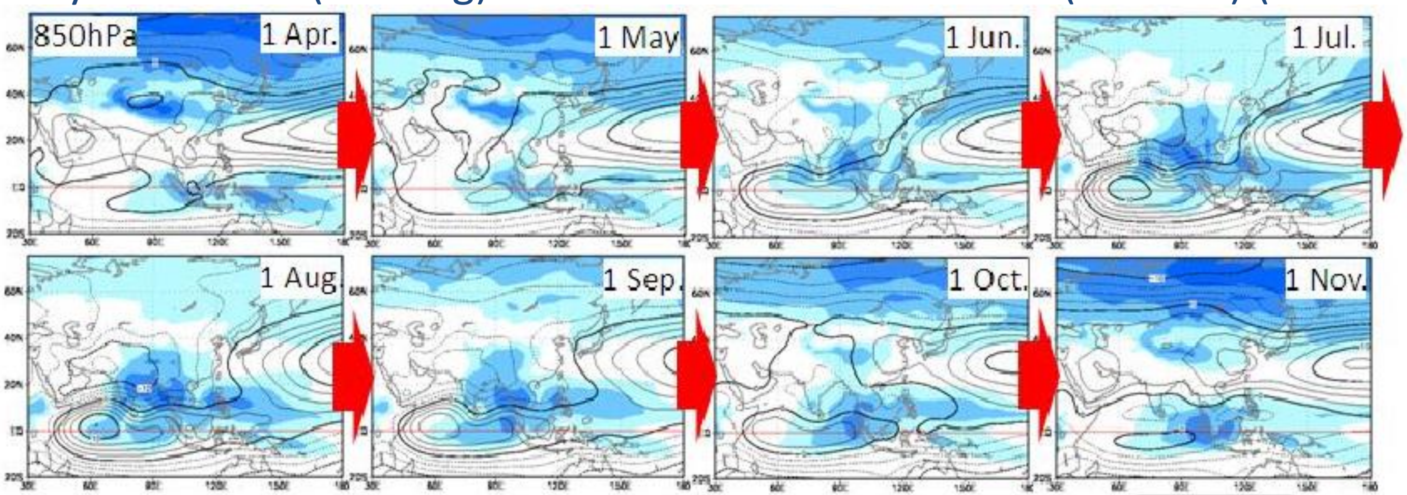
Animation Maps are useful for monitoring MJO which propagates eastward along the equator, and Boreal Summer Intraseasonal Oscillation (BSISO) which propagates northward over the northern Indian Ocean and the western North Pacific.

Seasonal march of the Asian summer monsoon

5-day mean OLR (shading) and 200hPa Stream Function(contour) (Normal)



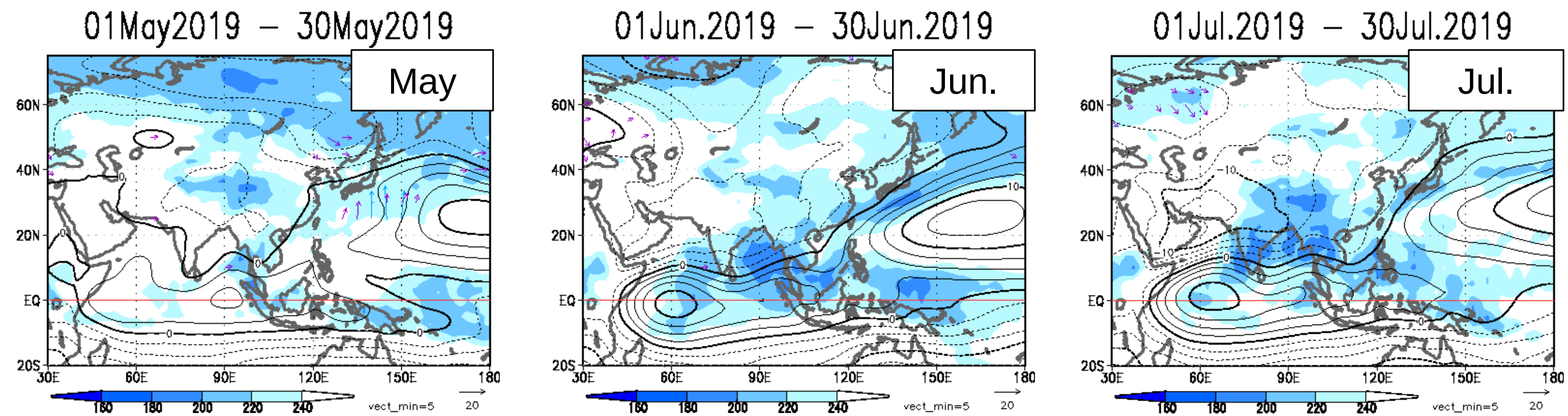
5-day mean OLR (shading) and 850hPa Stream Function(contour) (Normal)



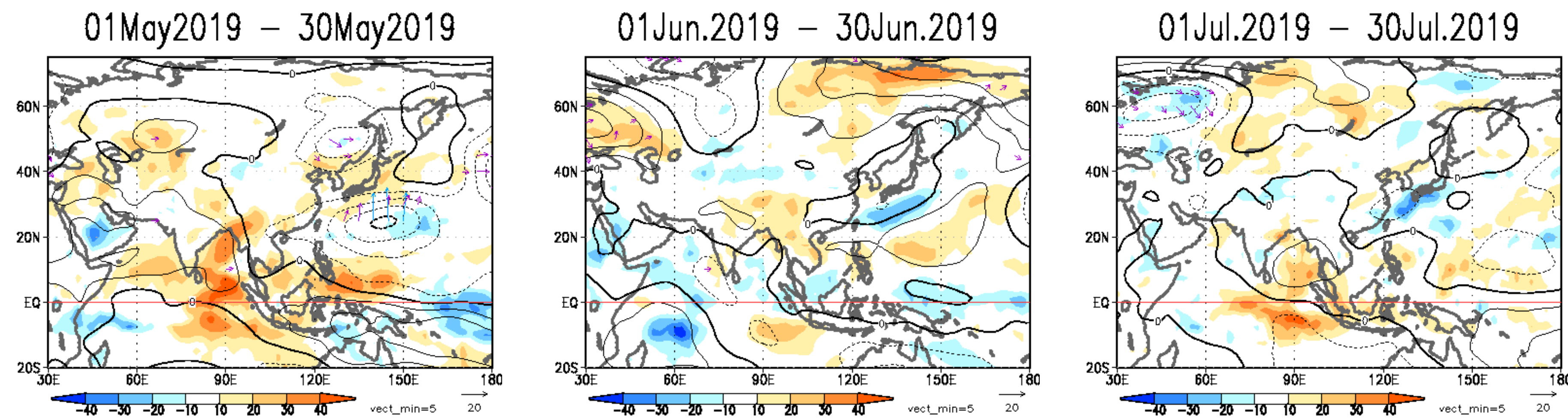
The maps exhibit a meridional transition of active convection areas, monsoon westerly winds in the lower troposphere, and the development of the Tibetan High in the upper troposphere.

Asian summer monsoon in 2019

30-day mean OLR (shading) and 850hPa stream function (contour)

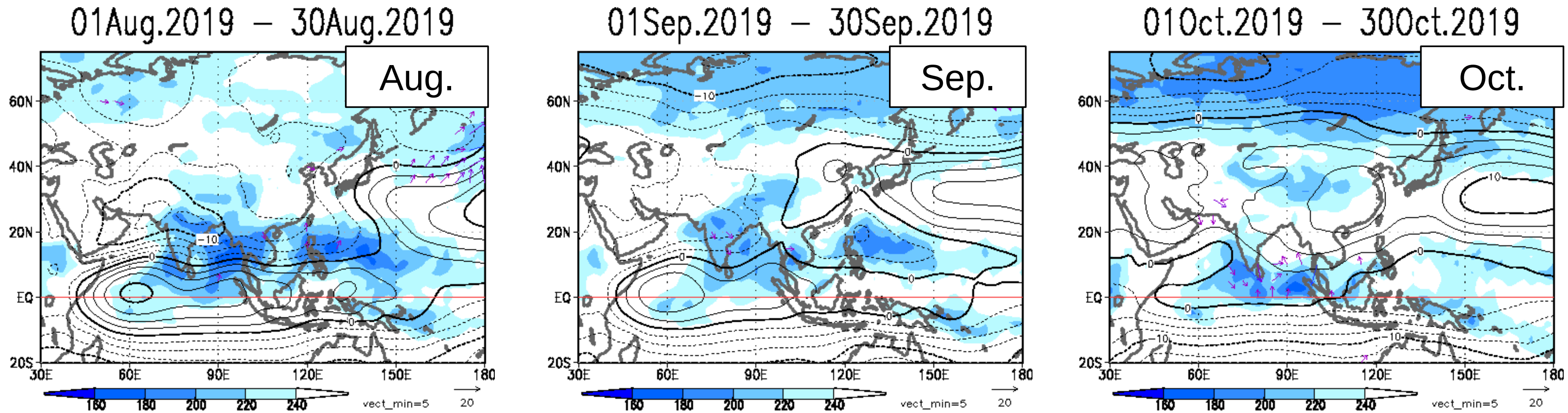


30-day mean OLR anomaly (shading) and 850hPa stream function anomaly (contour)

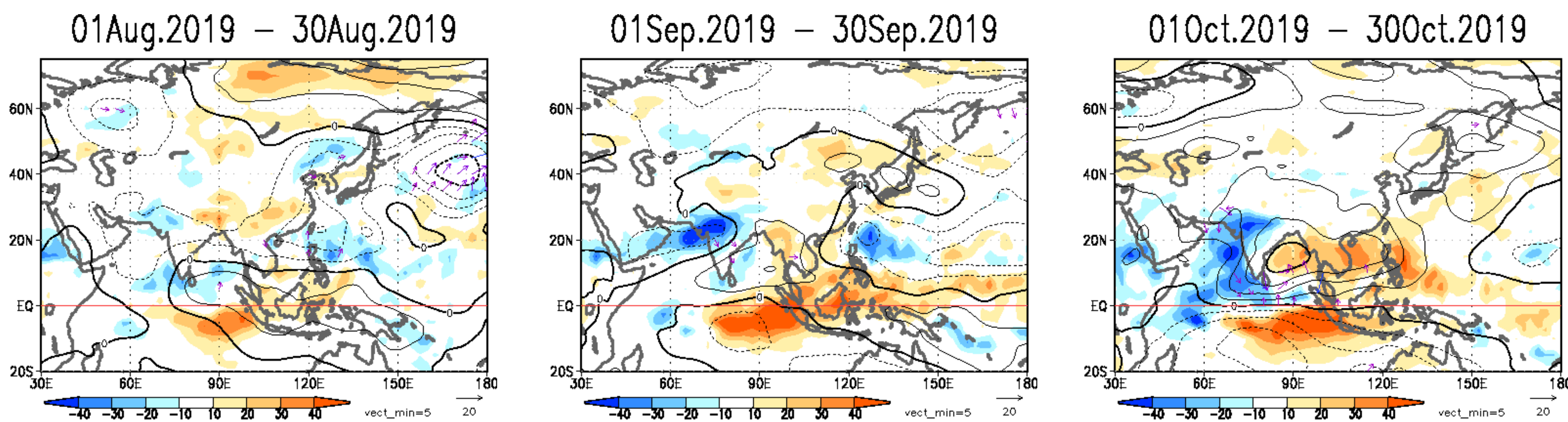


Asian summer monsoon in 2019

30-day mean OLR (shading) and 850hPa stream function (contour)



30-day mean OLR anomaly (shading) and 850hPa stream function anomaly (contour)



Asian monsoon monitoring

HOME > Climate System Monitoring > Asian Monsoon Monitoring

Asian Monsoon Monitoring

Reports

- Summary of summer and winter monsoon

Analysis charts and monitoring indices

- Explanation

Animation maps

- Asian Region, Global Area, Northern Hemisphere, Southern Hemisphere

Monitoring Indices

- ENSO and Asian monsoon monitoring indices (monthly)
- Asian monsoon monitoring indices (daily)

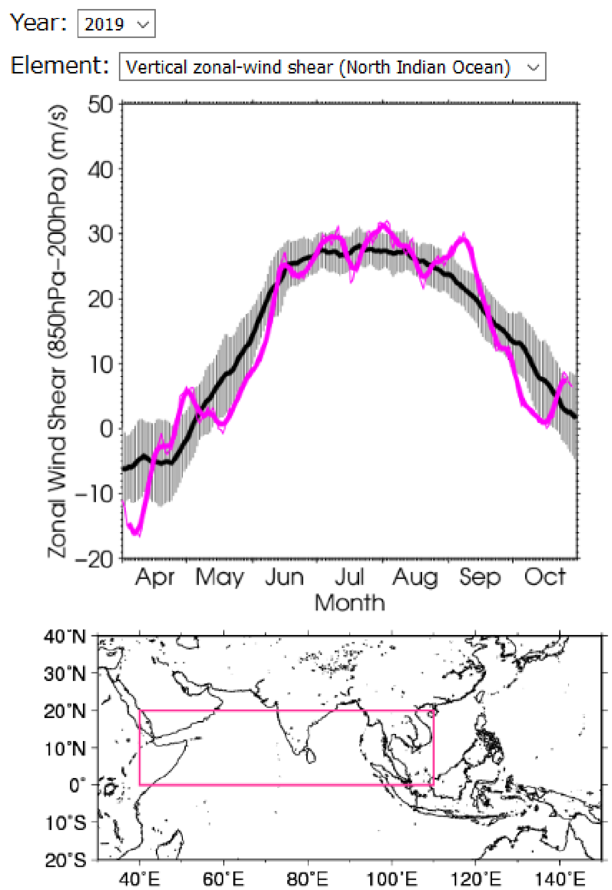
Daily time-series of Asian monsoon monitoring indices

Time-Longitude Cross Section

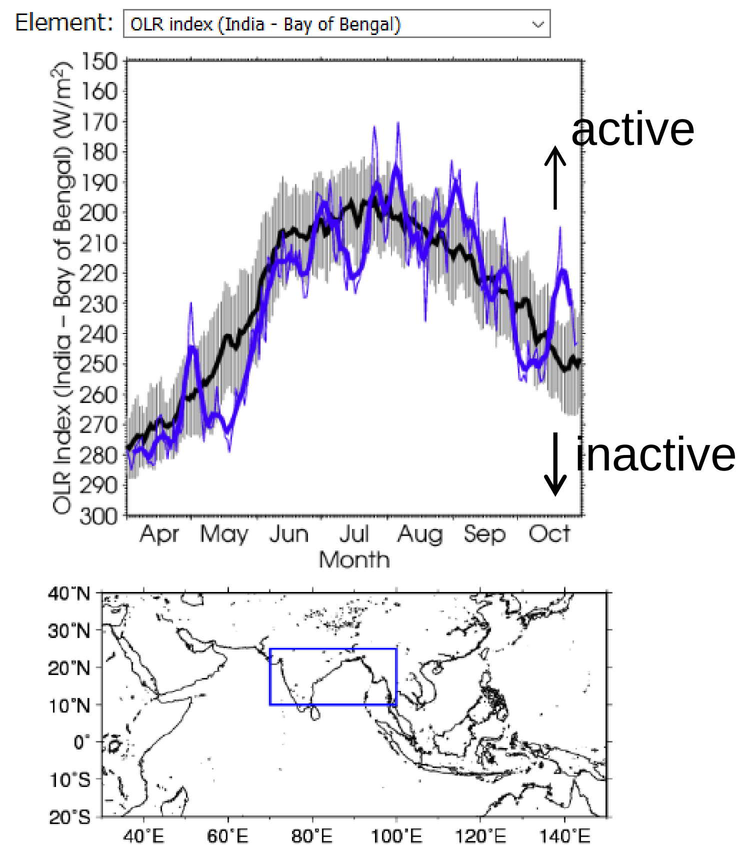
- OLR, Velocity Potential, Zonal Wind and SST

https://ds.data.jma.go.jp/tcc/tcc/products/clisys/ASIA_TCC/index.html

Asian monsoon monitoring indices



The vertical zonal-wind shear index between the upper and lower troposphere over the northern Indian Ocean and South Asia



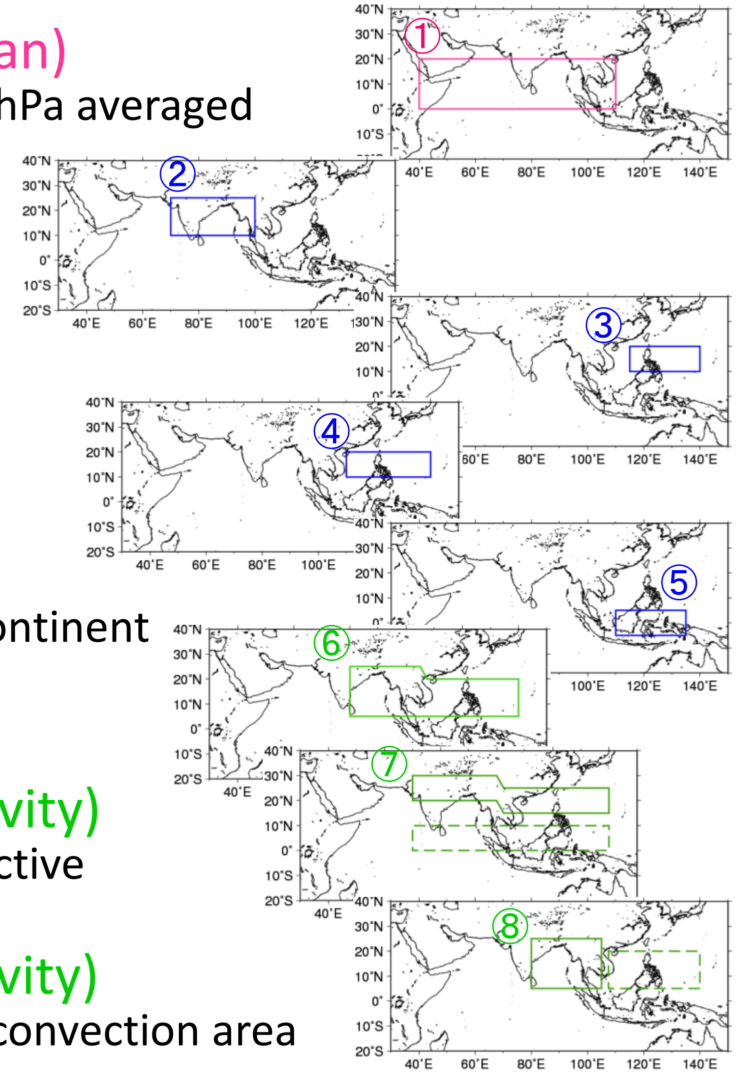
OLR averaged over India and the Bay of Bengal

These indices are useful in monitoring the strength and expansion of the Asian summer monsoon.

https://ds.data.jma.go.jp/tcc/tcc/products/clisys/ASIA_TCC/monsoon_index.html

Asian monsoon monitoring indices

Elements:



① Vertical zonal-wind shear (North Indian Ocean)
The zonal wind shear index between 200hPa and 850hPa averaged over the North Indian Ocean and southern Asia

② OLR index (India - Bay of Bengal)
OLR averaged over India and the Bay of Bengal

③ OLR index (Philippines)
OLR averaged over the Philippines

④ OLR-PH
The area-averaged OLR index around the Philippines

⑤ OLR-MC
The area-averaged OLR index around the Maritime Continent

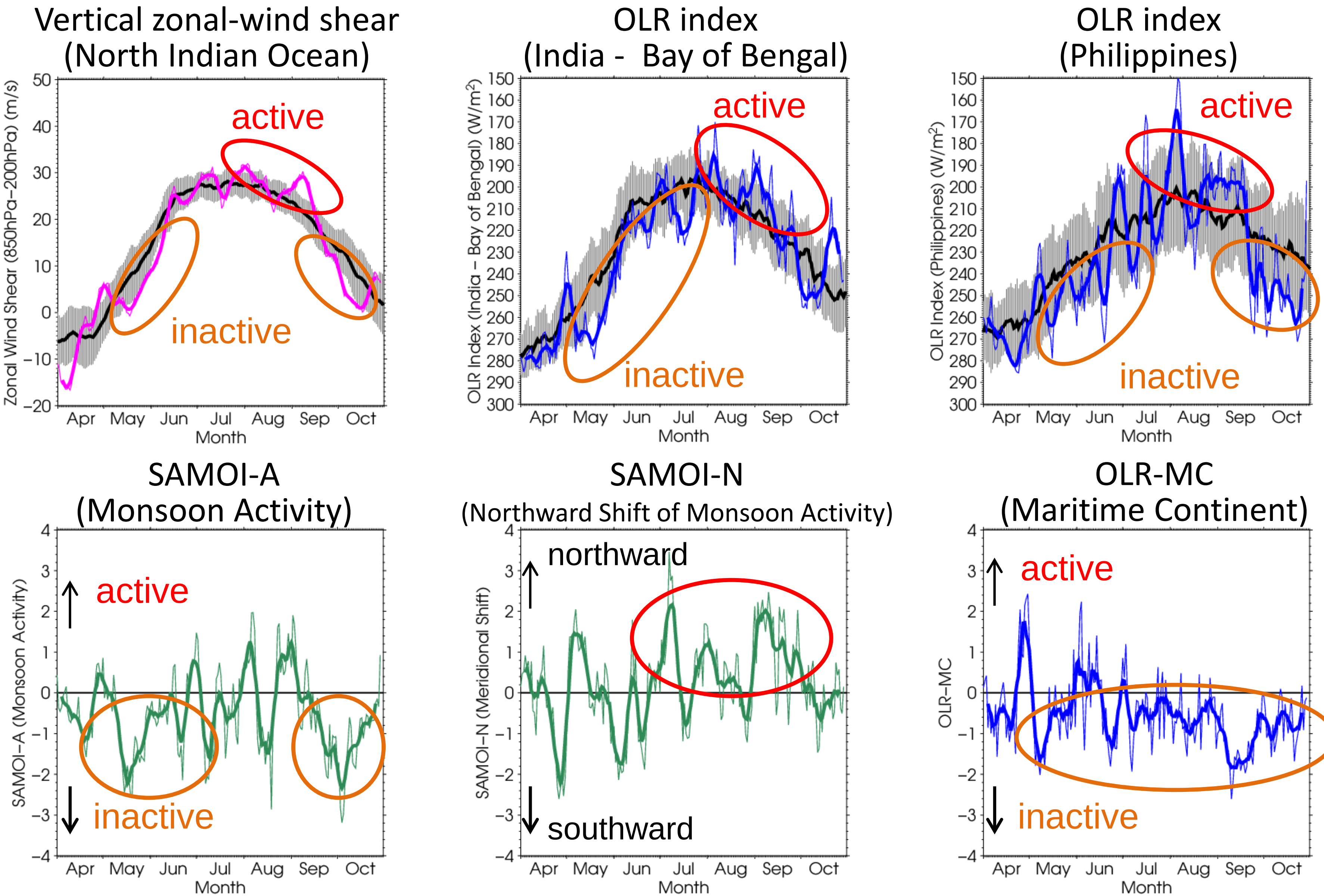
⑥ SAMOI-A (Monsoon Activity)
The OLR Index indicating the activity of the monsoon

⑦ SAMOI-N (Northward Shift of Monsoon Activity)
The OLR index indicating the meridional shift of the active convection area

⑧ SAMOI-W (Westward Shift of Monsoon Activity)
The OLR index indicating the zonal shift of the active convection area

https://ds.data.jma.go.jp/tcc/tcc/products/clisys/ASIA_TCC/monsoon_index.html

Time-series of the monsoon indices in 2019



Madden-Julian Oscillation (MJO)

HOME > Climate System Monitoring > Madden-Julian Oscillation (MJO)

Madden-Julian Oscillation (MJO)

- Explanation

Time-Longitude Cross Section

- OLR, Velocity Potential, Zonal Wind and SST

Time-longitude cross sections of OLR, velocity potential, zonal wind and SST

MJO Monitoring Indices

- Phase and Amplitude monitor (last 40-day)
- Time-longitude cross section of phase and amplitude
- Time series of RMM1 and RMM2

Real-time Multivariate MJO indices for monitoring MJO phase and amplitude

Principal components of EOF (1981-2010)

- 1st (RMM1), 2nd (RMM2)

Composite map of anomalies

- 8-phase (Apr. 1979 - Sep. 2012)

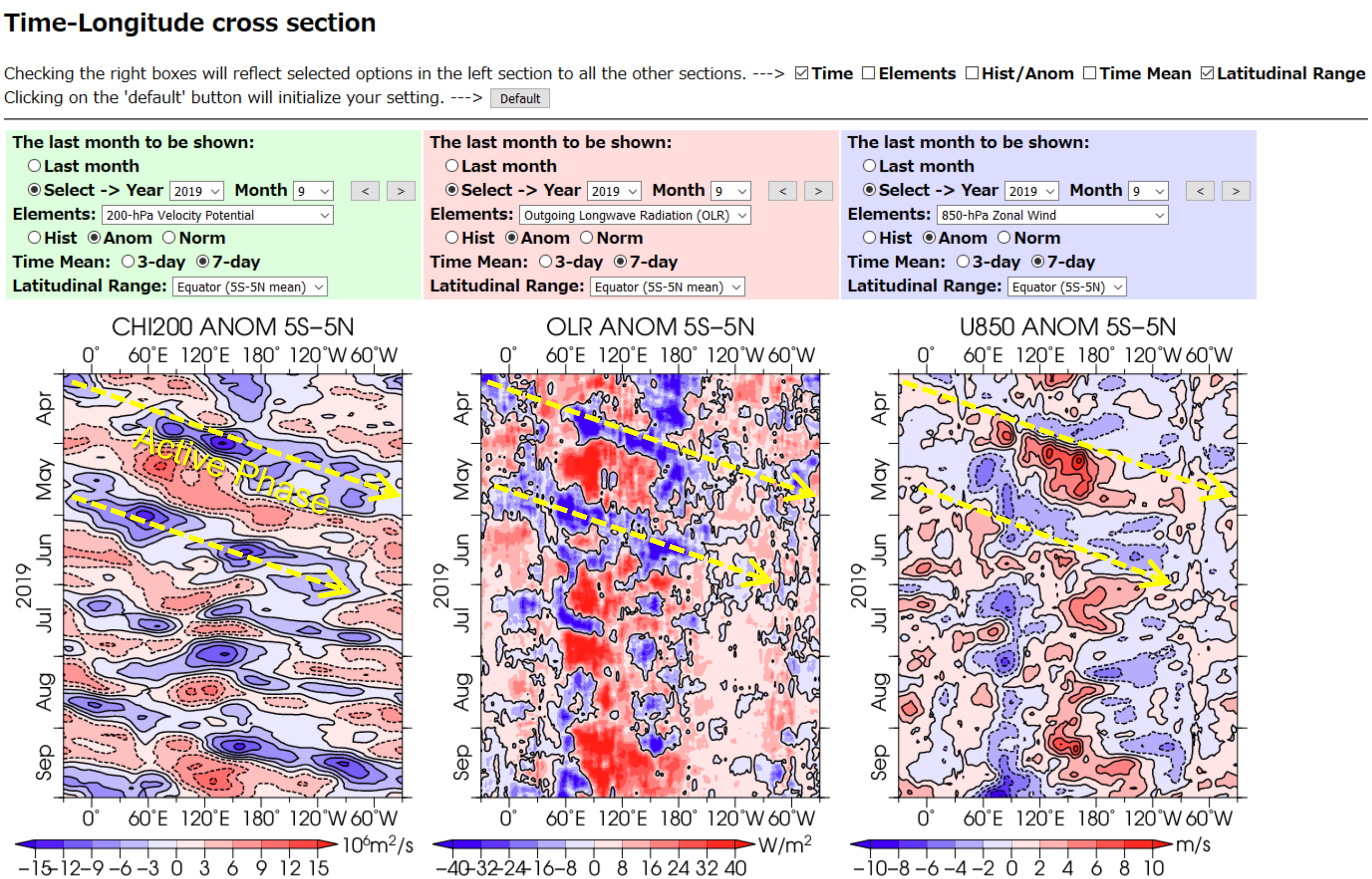
CSV file (1980-)

- RMM1, RMM2, phase and amplitude (OLR+u850+u200)
- RMM1, RMM2, phase and amplitude (chi200+u850+u200)

https://ds.data.jma.go.jp/tcc/tcc/products/clisys/mjo/moni_mjo.html

Time-longitude cross section

This web page provides time-longitude cross sections. These charts are useful in monitoring intraseasonal oscillations such as Madden-Julian Oscillation (MJO).



Elements:
OLR, 200hPa velocity potential, 10m/850hPa/200 hPa zonal wind and SST

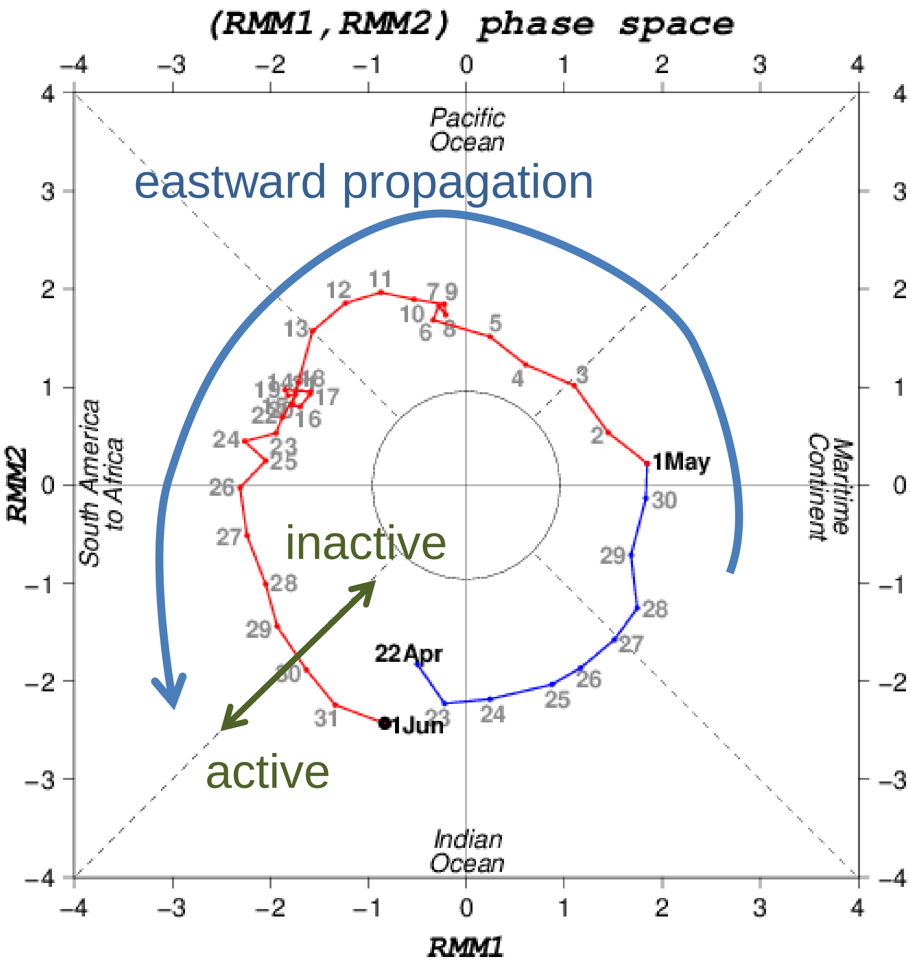
Average period:
3-day and 7-day average

Latitude Range :
15-25N, 5-15N, 5S-5N (equator), 15-5S

https://ds.data.jma.go.jp/tcc/tcc/products/clisys/ASIA_TCC/mjo_cross.html

MJO phase and amplitude monitor

The indices defined by Wheeler and Hendon (2004) are convenient for monitoring MJO phase and amplitude.



In the phase space, the equatorial zones are divided into 8 phases and each phase indicates the active phase of the MJO propagation.

In association with the eastward propagation of MJO, trajectory of RMM1 and RMM2 draws anti-clockwise circles in the phase space.

https://ds.data.jma.go.jp/tcc/tcc/products/clisys/mjo/monitor.html

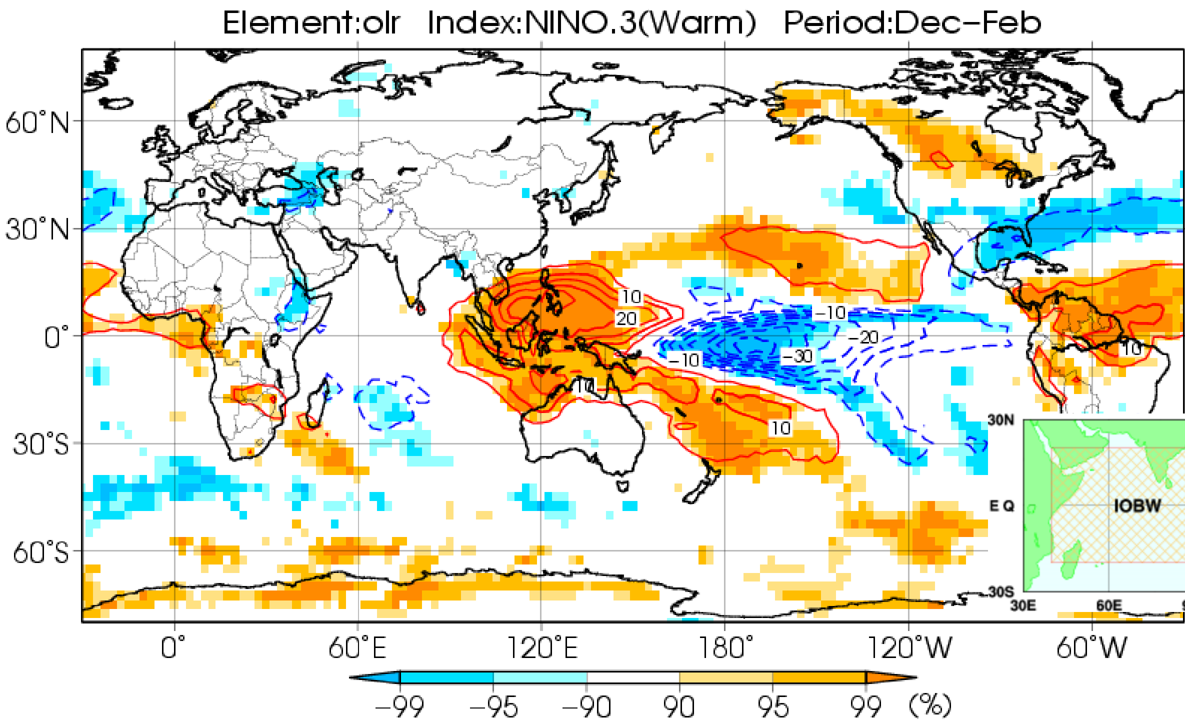
Composite map for El Niño / La Niña events

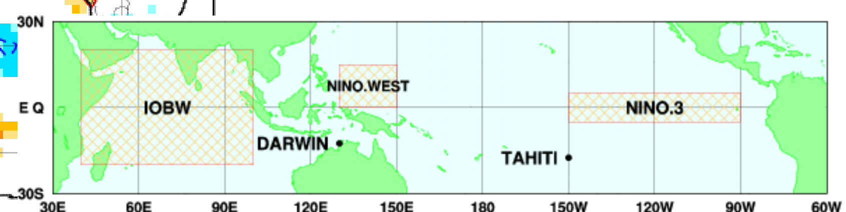
HOME > Climate System Monitoring > Composite map for El Niño / La Niña events

Composite map for El Niño / La Niña events

› Commentary (data and methods, statistical characteristics)

Elements: Outgoing longwave radiation (OLR) **ENSO Index:** NINO.3 **Phases:** positive (warm events)
Month: 1 **Time Mean:** 3-month mean





This product provides the statistical analysis on the relationship between ***warmer/cooler SST event in the areas of NINO.3, NINO.WEST and IOBW*** and ***atmospheric circulation***.

https://ds.data.jma.go.jp/tcc/tcc/products/clisys/enso_statistics/index.html

Statistical characteristics of composite anomalies

This page outlines ***the characteristics of seasonal mean composite anomalies*** in the positive and negative phases of the ENSO indices.

Statistical characteristics

This section outlines the characteristics of seasonal mean composite anomalies in the positive and

1. Atmospheric circulation in the El Niño (positive) phase of NINO.3

Winter (December - February)

OLR and precipitation anomalies indicate that convective activity is enhanced over the central to e
Pacific. Enhanced convective activity is seen over the Gulf of Mexico, and suppressed convective a
Convergence Zone (ITCZ) exhibits equatorward shift.

In the lower troposphere, cyclonic (anti-cyclonic) circulation anomalies straddling the equator are
and the Atlantic). These patterns are consistent with those of the gMatsuno - Gillh response (Mats
lower troposphere. Zonal wind anomalies in the lower and upper troposphere indicate weaker-tha

The subtropical jet stream demonstrates a southward shift over the area from the Middle East to E
hPa height field, wave trains such as the Pacific - North American (PNA) pattern (Wallace and Gut
anomalies, negative sea-level pressure anomalies are seen to the south of Alaska, indicating enhancement and eastward shifting of activity associ

Spring (March - May)

OLR and precipitation anomalies indicate that convective activity is enhanced over the central to eastern equatorial Pacific and suppressed over ar
Pacific. Suppressed convective activity is seen over the equatorial Atlantic and the north Indian Ocean.

In the lower troposphere, cyclonic (anti-cyclonic) circulation anomalies straddling the equator are seen, and westerly (easterly) wind anomalies a
Atlantic). In the upper troposphere, the signs of anomaly patterns are opposite to those observed in the lower troposphere, indicating weaker-tha

The subtropical jet stream exhibits a southward shift over the area from the Middle East to southern China. In the 500-hPa height field, positive ar

Summer (June - August)

OLR and precipitation anomalies indicate that convective activity is enhanced over the equatorial Pacific and suppressed over the Maritime Contin
activity is seen over India, indicating an inactive Indian monsoon. The coefficient of correlation between the NINO.3 index and the intensity of the
normal Asian monsoon circulation seen in El Niño events (not shown).

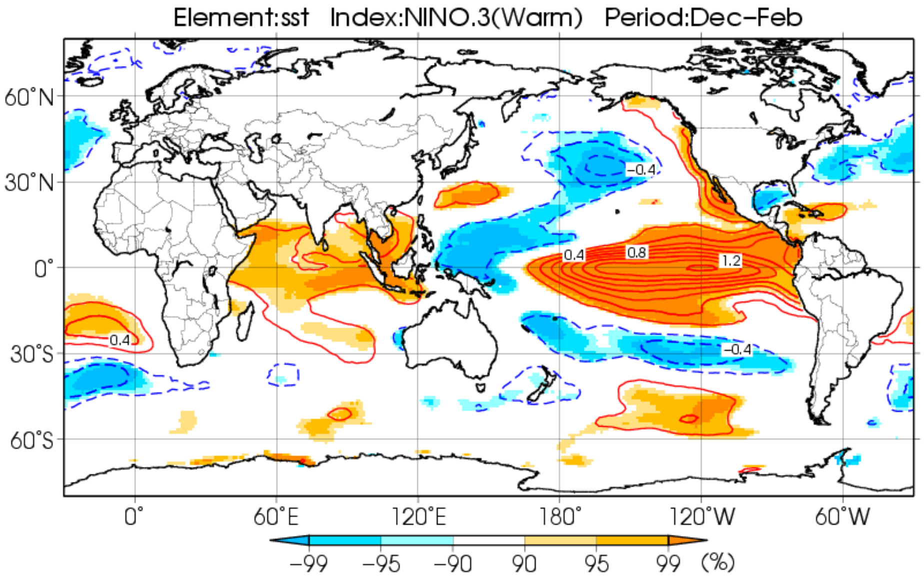
In the lower troposphere, cyclonic circulation anomalies straddling the equator are seen, and westerly wind anomalies are dominant over the Paci
troposphere. Cyclonic circulation anomalies are seen over vast areas of southern Eurasia, indicating a weaker-than-normal Tibetan High in its nort

Contents

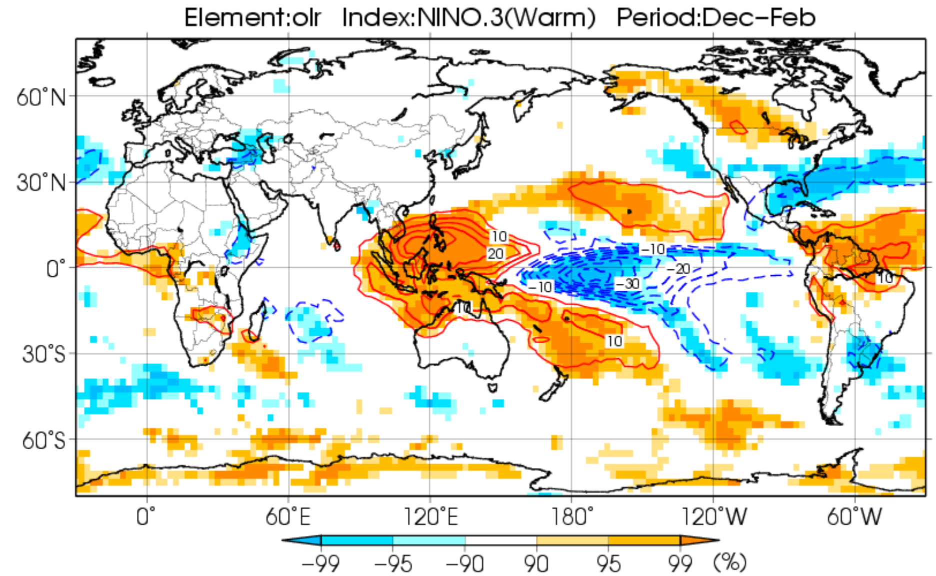
https://ds.data.jma.go.jp/tcc/tcc/products/clisys/enso_statistics/explanation.html

Composite maps for El Niño (positive) phase of NINO.3 in boreal winter (DJF)

SST



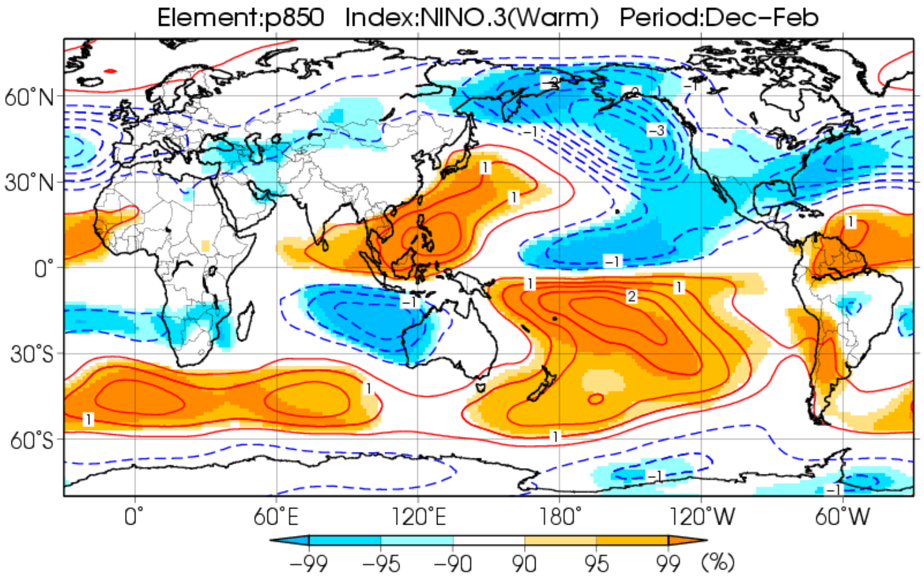
OLR



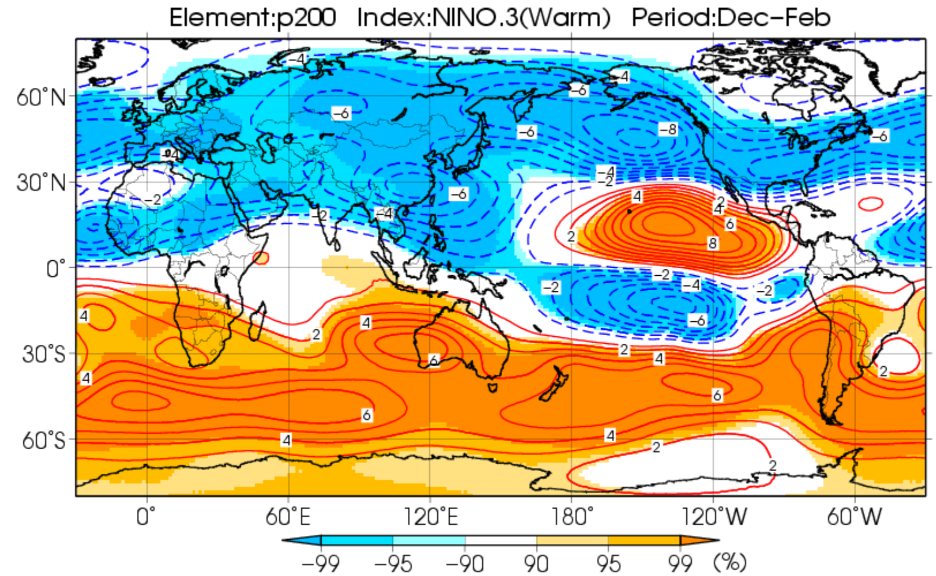
- OLR anomalies indicate that convective activity is enhanced over the central to eastern equatorial Pacific and suppressed over and around the Maritime Continent in response to the east-west contrast of SST anomalies over the equatorial Pacific.
- Enhanced convective activity is seen over the Gulf of Mexico, and suppressed convective activity is seen over the South Pacific Convergence Zone (SPCZ), the northern part of South America and the tropical North Atlantic. The Inter-Tropical Convergence Zone (ITCZ) exhibits equatorward shift.

Composite maps for El Niño (positive) phase of NINO.3 in boreal winter (DJF)

850hPa stream function



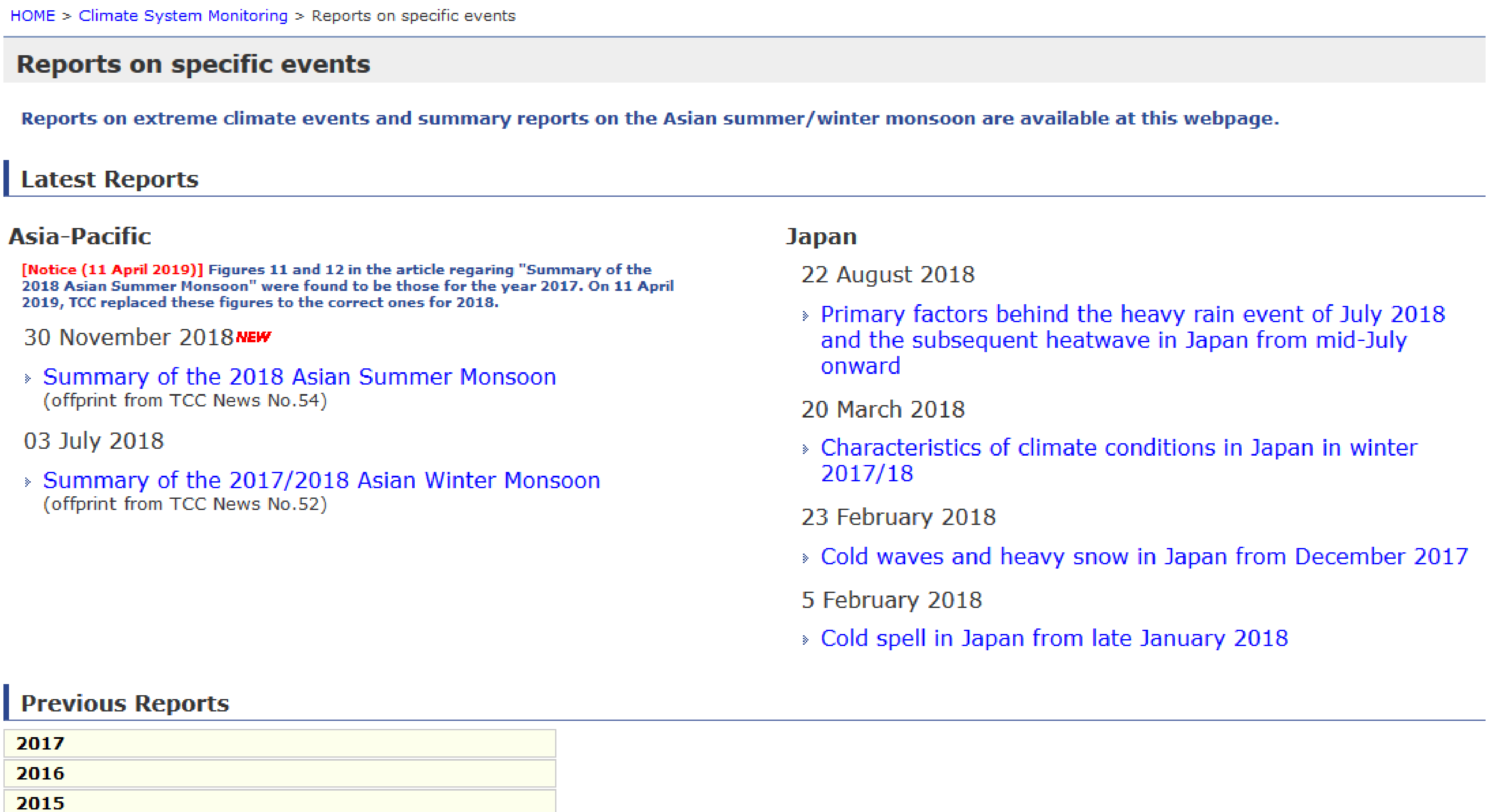
200hPa stream function



- In the lower troposphere, cyclonic (anti-cyclonic) circulation anomalies straddling the equator are seen, and westerly (easterly) wind anomalies are dominant over western to central parts of the Pacific (the eastern Indian Ocean to the Maritime Continent and the Atlantic).
- In the upper troposphere, the signs of anomaly patterns are opposite to those observed in the lower troposphere. Zonal wind anomalies in the lower and upper troposphere indicate weaker-than-normal Walker Circulation.

Reports on specific events

Reports on extreme climate events and summary reports on the Asian summer/winter monsoon are available at this webpage.



https://ds.data.jma.go.jp/tcc/tcc/products/clisys/reports/index.html

Reports on specific events

Summary of the 2018/2019 Asian Winter Monsoon

Primary Factors behind the Heavy Rain Event of July 2018 and the Subsequent Heatwave in Japan from Mid-July Onward

Summary of the 2018/2019 Asian Winter Monsoon

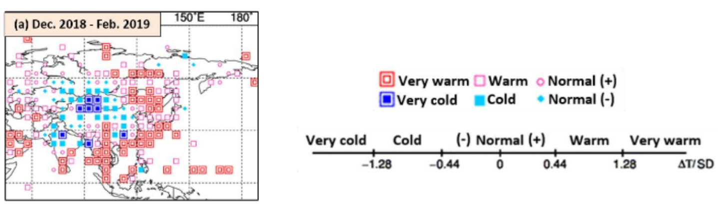
This report summarizes the characteristics of the surface climate and atmospheric/oceanographic considerations related to the Asian winter monsoon for 2018/2019.

Note: The Japanese 55-year Reanalysis (JRA-55; Kobayashi et al., 2015) atmospheric circulation data and COBE-SST (Ishii et al., 2005) sea surface temperature (SST) data were used for this investigation. NOAA Interpolated Outgoing Longwave Radiation (OLR) data (Liebmann and Smith 1996) provided online by the U.S. NOAA Earth System Research Laboratory (ESRL) at https://www.esrl.noaa.gov/psd/ was referenced to infer tropical convective activity. The base period for the normal is 1981 – 2010. The term "anomaly" as used in this report refers to deviation from the normal.

1. Surface climate conditions

Temperatures for December 2018 to February 2019 were generally above normal from the eastern part of East Asia to the southern part of South Asia, and were below normal in and around the northwestern part of East Asia (Figure 15). In particular, seasonal mean temperatures were extremely high from the Okinawa/Amami region of Japan to southern China and from the central part of Southeast Asia to the southern part of South Asia, and were extremely low from western Mongolia to northwestern China. Precipitation amounts during this period were above normal in and around southern and western parts of East Asia and the northwestern part of Southeast Asia, and were below normal in the northeastern part of East Asia (Figure 16). Drier-than-normal conditions in and around the Philippines and warmer-than-normal conditions in and around Southeast Asia, as seen in typical anomaly patterns of past El Niño events, were observed around February.

Figure 17 shows the extreme climate conditions observed between December 2018 and February 2019. In December, extremely high temperatures were seen from the Okinawa region of Japan to Southeast Asia, and extremely low temperatures were seen in the northwestern part of East Asia. Extremely high precipitation amounts were observed from western Japan to eastern China and from Myanmar to northwestern Sumatra. In January, extremely high temperatures were seen from northeastern China to the southern part of Central Siberia and from southern China to the central part of Southeast Asia. Extremely high precipitation amounts were observed from southern China to western Thailand, and extremely low precipitation amounts were observed from northern Japan to the southern Korean Peninsula. In February, extremely high temperatures were seen from the Ogasawara Islands of Japan to southern China and from the central part of Southeast Asia to the southern part of South Asia.



Primary Factors behind the Heavy Rain Event of July 2018 and the Subsequent Heatwave in Japan from Mid-July Onward

22 August 2018

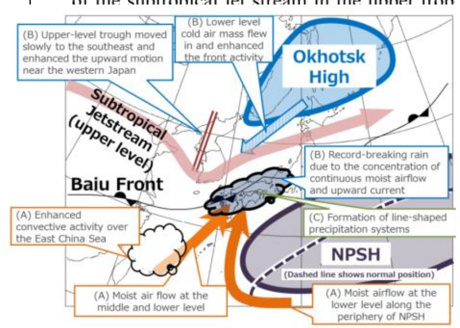
Tokyo Climate Center, Japan Meteorological Agency
https://ds.data.jma.go.jp/tcc/tcc/index.html

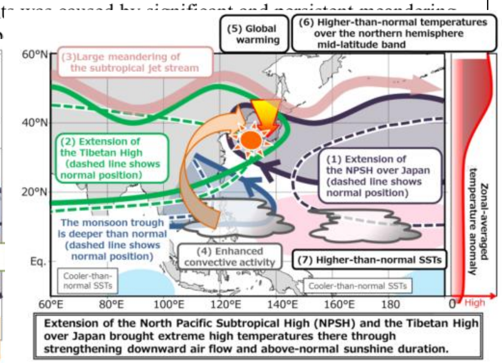
Abstract

Japan experienced significant rainfall particularly from western Japan to the Tokai region mainly in early July (The Heavy Rain Event of July 2018), which caused widespread havoc nationwide. Extremely high temperatures subsequently persisted throughout most of Japan from mid-July onward.

In this context, the Japan Meteorological Agency (with the help of the Tokyo Climate Center Advisory Panel on Extreme Climatic Events) investigates atmospheric and oceanic conditions considered to have contributed to such climate extremes and summarizes related primary factors. Based on this work, the Heavy Rain Event of July 2018 is attributed to an ongoing concentration of two massively moist air streams over western Japan and persistent upward flow associated with the activation of a stationary Baiu front. The related heatwave is attributed to the expansion of a persistent North Pacific Subtropical High and Tibetan High to the Japanese mainland. The serial occurrence of these two extreme climate event[…]

of the subtropical jet stream in the upper trop[…]





https://ds.data.jma.go.jp/tcc/tcc/products/clisys/reports/index.html

Monthly and seasonal highlights on the climate system

JMA monitors the global atmospheric circulation, convection, ocean conditions and snow/ice coverage. 'Monthly (Seasonal) Highlights on the Climate System' is a monthly (seasonal) bulletin focusing on the monthly (seasonal) highlights of the monitoring results.

HOME > Climate System Monitoring > Monthly Highlights on the Climate System

Monthly Highlights on the Climate System

'Monthly Highlights on the Climate System' has been issued in PDF format since March 2007 as a monthly bulletin focusing on the monthly highlights of the monitoring results.

Highlights in September 2019

- Monthly mean temperatures were significantly above normal from northern to we
- Monthly mean temperatures were extremely high from eastern Japan to Mongoli Arabia, from the western part of Western Africa to the western part of Middle Africa from the eastern USA to southern Mexico, and in and around central Brazil.
- In the equatorial Pacific, remarkably positive SST anomalies were observed in the
- Convective activity was enhanced from the southern part of the Middle East to th the western equatorial Indian Ocean, the seas northeast of the Philippines, and the eastern Pacific, and was suppressed from the southeastern tropical Indian Ocean t
- In the 500-hPa height field, positive anomalies were seen over the northern pola Asia, the seas south of Alaska, the eastern USA, and the seas west of Europe, and northeast of the Caspian Sea and over Eastern Siberia.

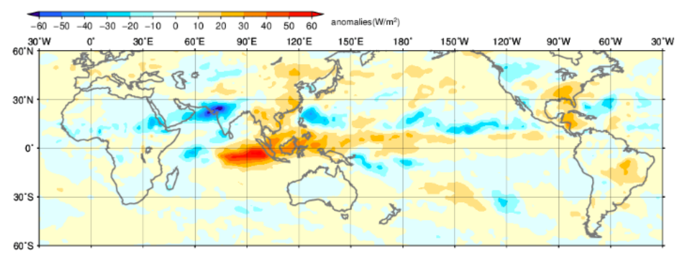


Fig. 6 Monthly mean Outgoing Longwave Radiation (OLR) anomaly (September 2019)

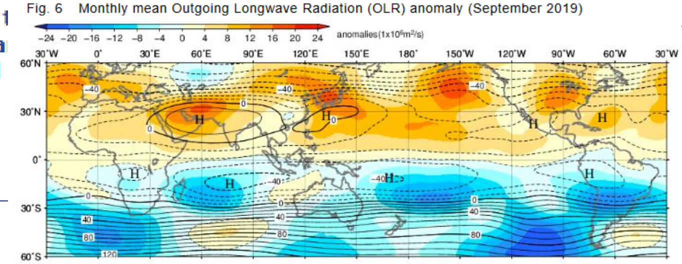


Fig. 8 Monthly mean 200-hPa stream function and anomaly (September 2019)
The contour interval is 10×10^6 m^2/s. The base period for the normal is 1981-2010.

Full version (PDF)

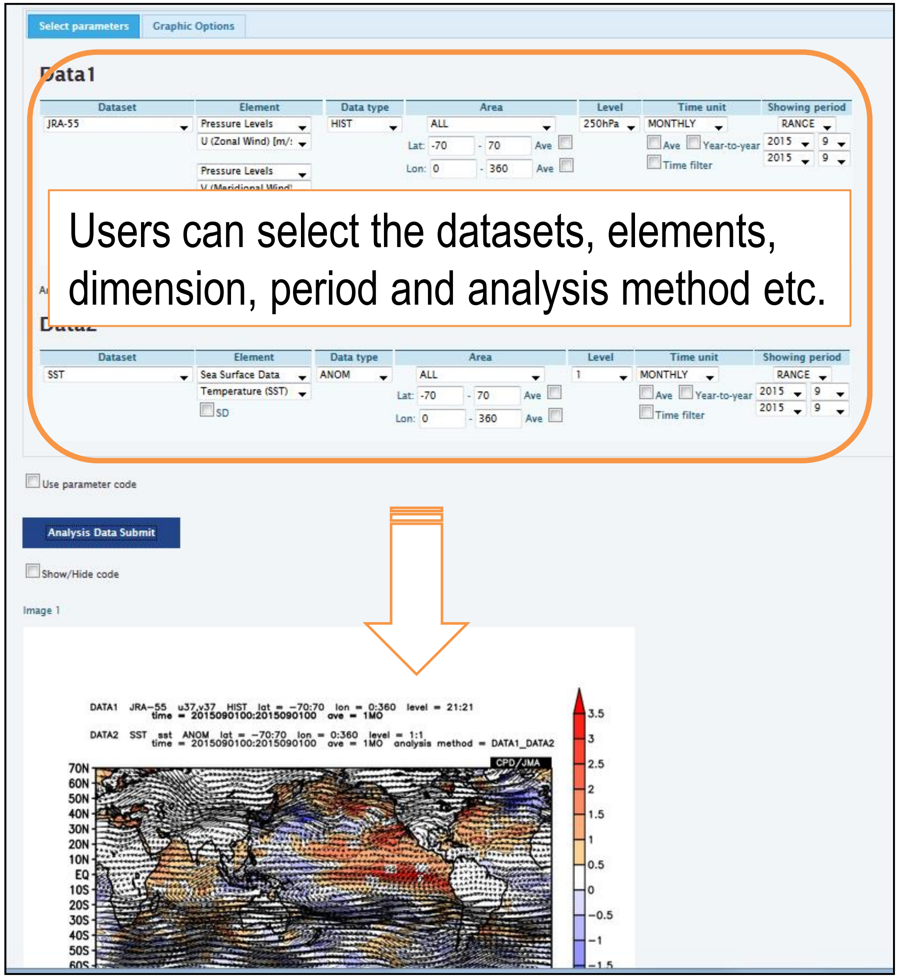
- Monthly Highlights on the Climate System (September 2019)
- Back Number

Back Number (PDF)

Monthly Highlights: https://ds.data.jma.go.jp/tcc/tcc/products/clisys/highlights/index.html
Seasonal Highlights: https://ds.data.jma.go.jp/tcc/tcc/products/clisys/season_highlights/index.html

iTacs: Interactive Tool for Analysis of the Climate System

- The iTacs (Interactive Tool for Analysis of the Climate System) is a web-based application for climatological analysis.
- The output of analysis can be downloaded in the form of gridded data (GrADS format).
- This tool is available for registered NMHS staffs only.
- Applicants are requested to contact TCC via E-mail (tcc@met.kishou.go.jp).



https://extreme.kishou.go.jp/tool/itacs-tcc2015/

3. El Niño Monitoring

El Niño Monitoring

Home | World Climate | Climate System Monitoring | El Niño Monitoring | NWP Model Prediction | Global Warming | Climate in Japan | Training Module | Press release | Links

HOME > El Niño Monitoring

El Niño Monitoring and Outlook

JMA operates the Ocean Data Assimilation System and the El Niño Prediction System (an ocean-atmosphere coupled model) for monitoring and prediction of El Niño-Southern Oscillation (ENSO). Monthly diagnosis reports, ENSO monitoring products, ENSO indices and El Niño outlooks are available on this page.

Main Products

Latest Products last updated : 10 Oct 2019

- El Niño Outlook
- Figures and Tables
- Historical El Niño and La Niña Events
- Download El Niño Monitoring Indices
- Model forecast of SST anomalies for Niño regions

Animations

- SST and Anomaly
- Longitude-Depth Cross Section along the Equator

Gridded Data

- Download SST (COBE-SST from 1891 to the latest month)

ENSO Impacts

- Impacts of Tropical SST Variability on the Global Climate
- Composite analysis of atmospheric circulation (Data and methods)

Latest analysis and outlook

Historical El Niño and La Niña Events

Monthly maps and longitude-depth cross sections

Model Descriptions & Analysis Procedures

- Explanation of El Niño Monitoring Indices
- Description of JMA's Seasonal Ensemble Prediction System (JMA/MRI-CPS2) since June 2015
- Description of Ocean Data Assimilation System (MOVE/MRI.COM-G2) since June 2015
- Description of Daily Sea Surface Temperature Analysis for Climate Monitoring (COBE-SST)
- The Characteristics of the Global Sea Surface Temperature Data (COBE-SST) - Monthly Report on Climate System Separated Volume No.12 -

Decadal Oscillation

- Pacific Decadal Oscillation (15 Feb 2019)
- Explanation

Pacific Decadal Oscillation index

https://ds.data.jma.go.jp/tcc/tcc/products/elnino/index.html

Figures of oceanographic condition

HOME > El Niño Monitoring > Figures of Oceanographic Condition

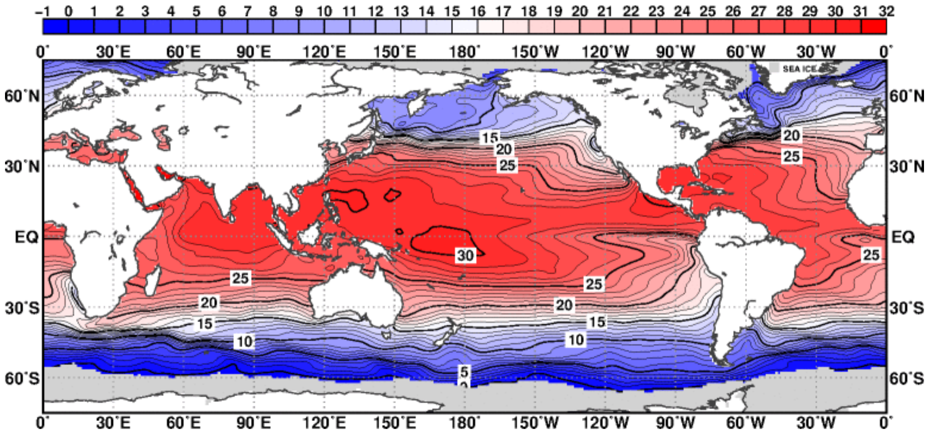
Figures of Oceanographic Condition

Global	Monthly Mean Sea Surface Temperature Monthly Mean Sea Surface Temperature Anomalies 3-Month Mean Sea Surface Temperature 3-Month Mean Sea Surface Temperature Anomalies
The equatorial Pacific	Sea Surface Temperature and Anomalies along the Equator (Time - Longitude) Temperature and Anomalies along the Equator (Depth - Longitude) Sub-surface Temperature along the Equator (Depth - Time) 20°C Depth and Anomalies along the Equator (Time - Longitude) Ocean Heat Content and Anomalies along the Equator (Time - Longitude) Ocean Heat Content and Anomalies along 6°N (Time - Longitude) Ocean Heat Content and Anomalies along 6°S (Time - Longitude) Surface Zonal Wind Stress and Anomalies along the Equator (Time - Longitude)

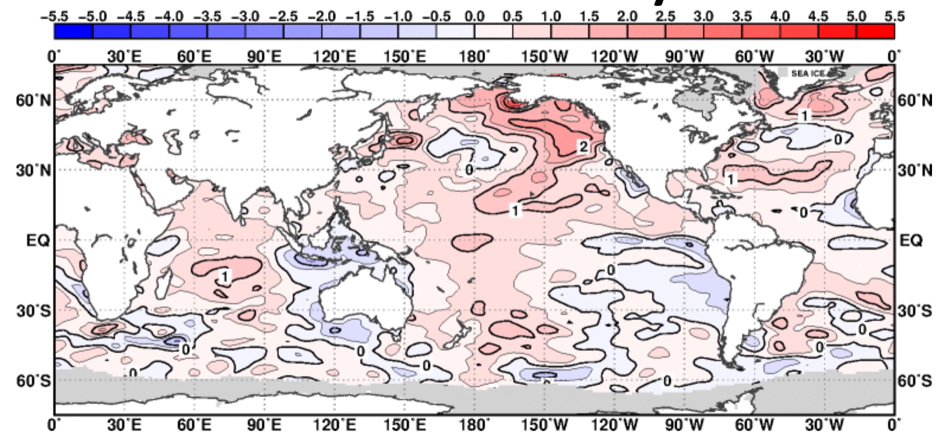
https://ds.data.jma.go.jp/tcc/tcc/products/elnino/ocean/index_tcc.html

SST in JJA 2019

SST



SST anomaly



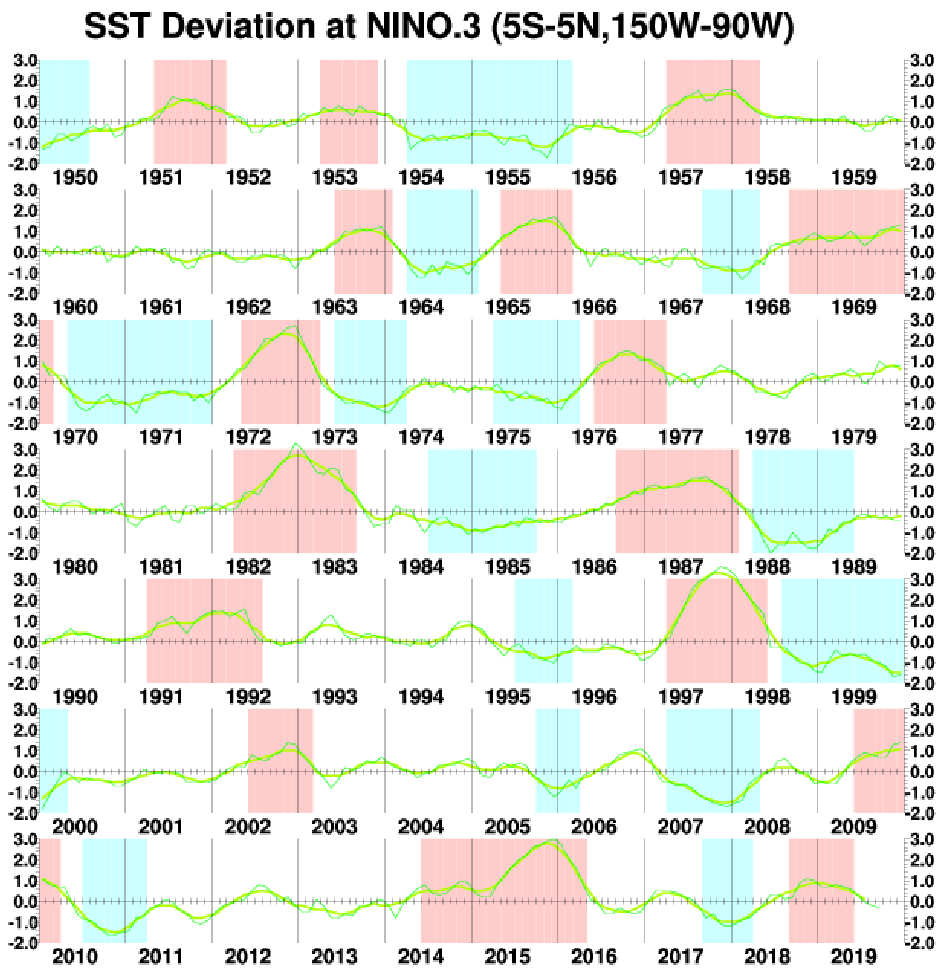
- In the equatorial Pacific, remarkably positive SST anomalies were observed near the date line.
- In the North Pacific, remarkably positive SST anomalies were widely observed.
- In the Indian Ocean, remarkably positive SST anomalies were observed in almost the entire region west of 100°E, and remarkably negative SST anomalies were observed south of Java and in the southwestern coast of Australia.

Historical El Niño and La Niña Events

Historical El Niño and La Niña Events

El Niño	La Niña
	summer 1949 - summer 1950
spring 1951 - winter 1951/52	
spring 1953 - autumn 1953	spring 1954 - winter 1955/56
spring 1957 - spring 1958	
summer 1963 - winter 1963/64	spring 1964 - winter 1964/65
spring 1965 - winter 1965/66	autumn 1967 - spring 1968
autumn 1968 - winter 1969/70	spring 1970 - winter 1971/72
spring 1972 - spring 1973	summer 1973 - spring 1974
	spring 1975 - spring 1976
summer 1976 - spring 1977	
spring 1982 - summer 1983	summer 1984 - autumn 1985
autumn 1986 - winter 1987/88	spring 1988 - spring 1989
spring 1991 - summer 1992	summer 1995 - winter 1995/96
spring 1997 - spring 1998	summer 1998 - spring 2000
summer 2002 - winter 2002/03	autumn 2005 - spring 2006
	spring 2007 - spring 2008
summer 2009 - spring 2010	summer 2010 - spring 2011
summer 2014 - spring 2016	autumn 2017 - spring 2018
autumn 2018 - spring 2019	

Time series of NINO.3 SST deviation



https://ds.data.jma.go.jp/tcc/tcc/products/elnino/ensoevents.html