

19th session of the Forum on Regional Climate Monitoring-
Assessment-Prediction for Asia (FOCRAII-19)
8-10 May 2023 in Nanning, China

Seasonal outlook for summer 2023 over Japan

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<JJA 2023> JMA's outlook

- The outlook is mainly based on the JMA's seasonal Ensemble Prediction System.
- The description is updated (the initial condition is Apr. 2023) from the description in my abstract on the prediction with its initial of Mar. 2023.
- The latest JJA 2023 outlook by JMA changed its prediction of the position of the subtropical jet stream (shift northward → near normal)
 - So that, outlook on western Northern Pacific subtropical high differs.

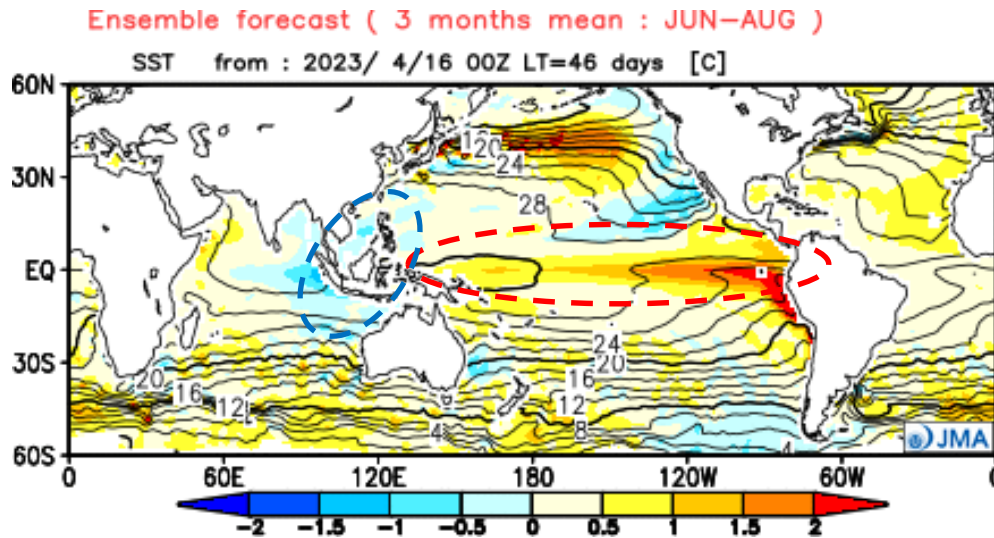
<JJA 2023> SST and ENSO outlook

- It is more likely that **El Niño** conditions will develop by boreal summer (60%) than ENSO-neutral conditions will persist (40%).

Initial is Apr. 2023

Sea Surface Temperature (SST) (contour, °C) and its anomalies (shading)

ENSO forecast probabilities (NINO.3)



YEAR	MONTH	mean period	El Niño	ENSO neutral	La Niña
2023	FEB	DEC2022–APR2023	0	100	0
	MAR	JAN2023–MAY2023	0	100	0
	APR	FEB2023–JUN2023	30	70	0
	MAY	MAR2023–JUL2023	40	60	0
	JUN	APR2023–AUG2023	60	40	0
	JUL	MAY2023–SEP2023	60	40	0
	AUG	JUN2023–OCT2023	60	40	0

■ El Niño
 ■ ENSO neutral
 ■ La Niña

Note: Although the seasonal Ensemble Prediction System (JMA/MRI-CPS3) predicts more possibility for the occurrence of El Niño event and positive phase of Indian Ocean Dipole (IOD), the prediction reliability of these events from spring initial time is limited. Besides, the prediction of the IOD events by the CPS3 tends excess intensity, and the prediction of the El Niño events by the CPS3 might be affected by the prediction of IOD.

<JJA 2023> Global Circulation

Initial is Apr. 2023

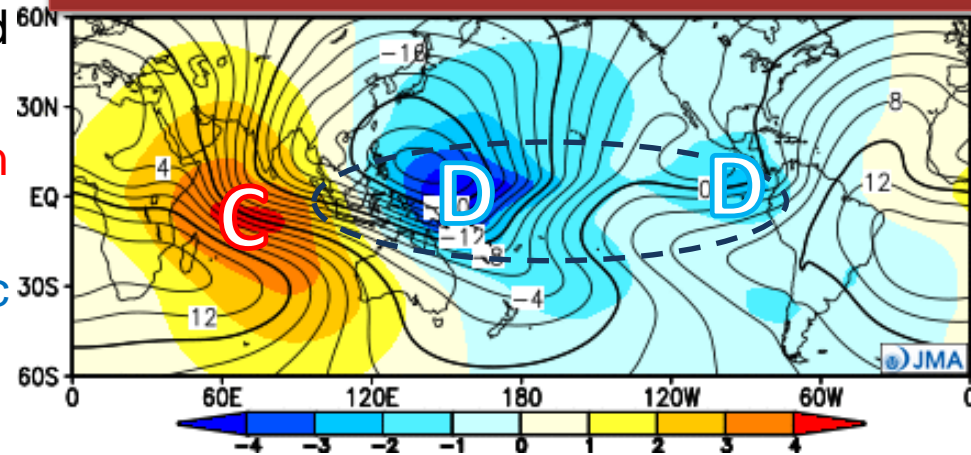
Large scale convective activities predicted in tropics are

- More suppressed over the Indian Ocean (more in southern hemisphere)
- More enhanced over the western Pacific Ocean

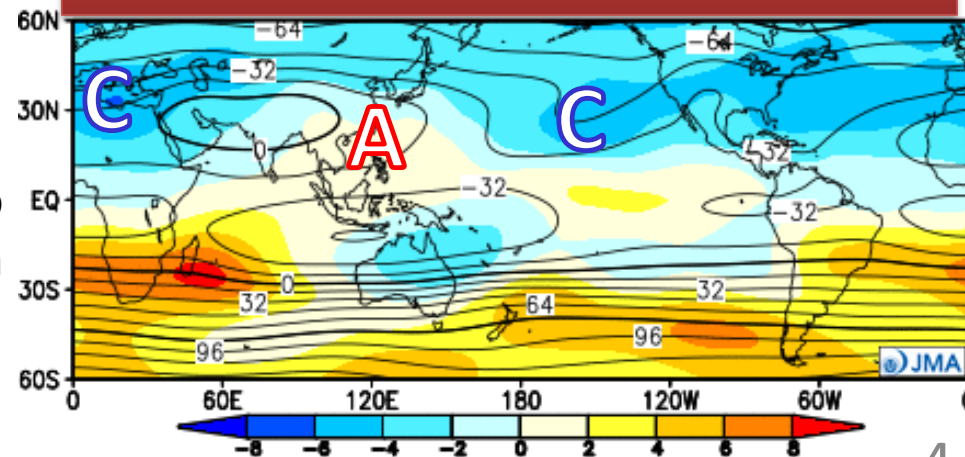
The predicted upper-level stream function suggests that

- The Tibetan high is to be
 - Weaker in its northwestern part
 - Stronger in its eastern part
- The subtropical jet stream is not to be so much shifted from normal position around Japan.

200 hPa velocity potential (contour, $10^6\text{m}^2/\text{s}$) and its anomalies (shading, $10^6\text{m}^2/\text{s}$)



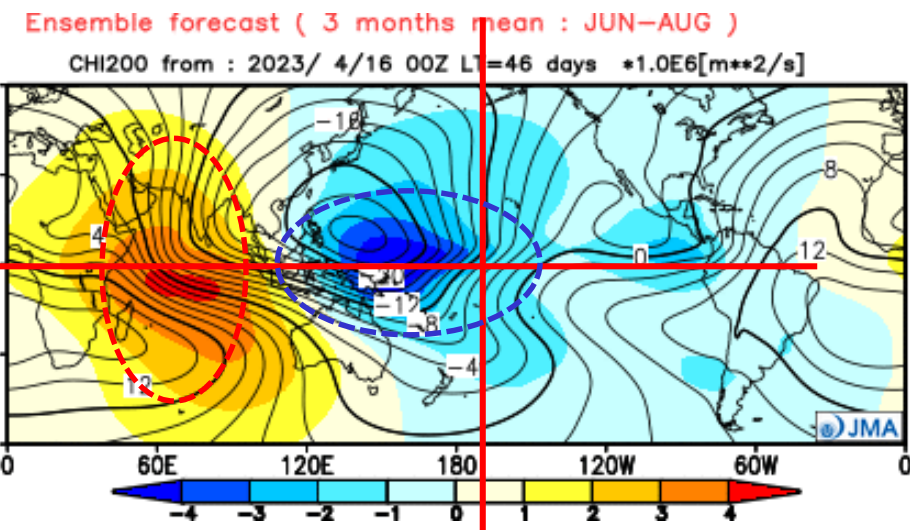
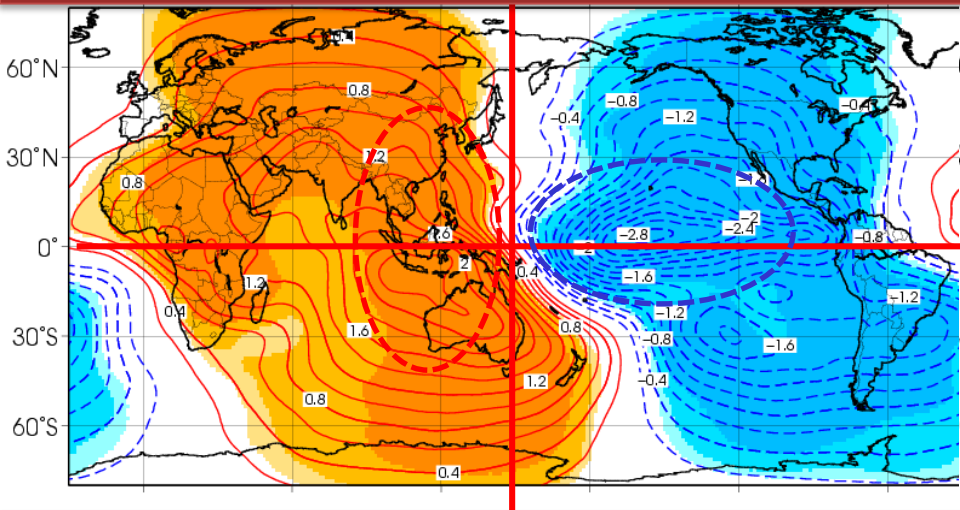
200 hPa stream function (contour, $10^6\text{m}^2/\text{s}$) and its anomalies (shading, $10^6\text{m}^2/\text{s}$)



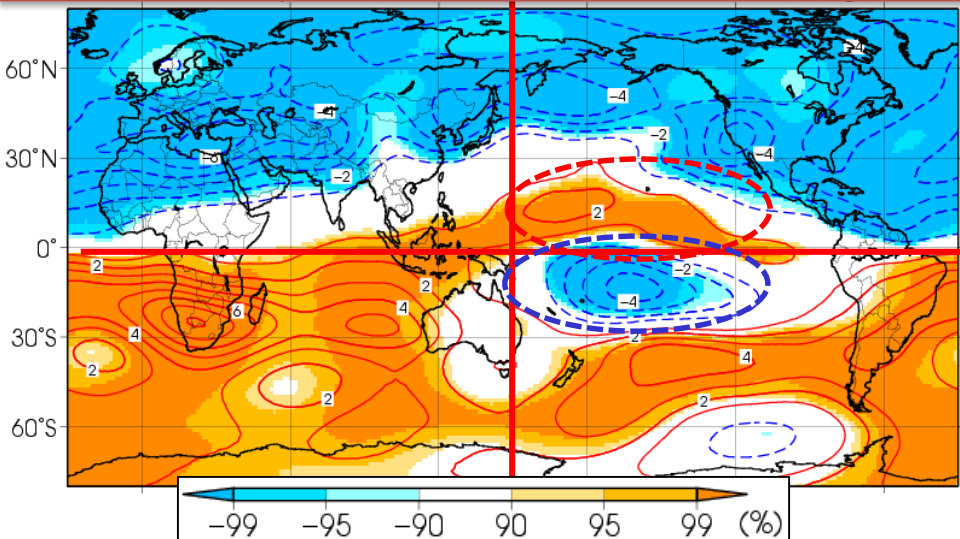
<JJA 2023> Composite map for El Nino events

Initial is Apr. 2023

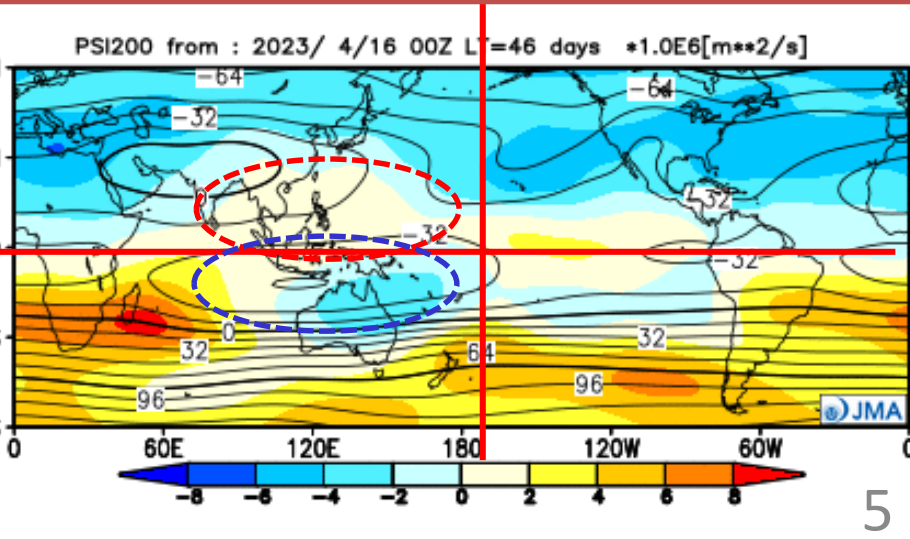
200 hPa velocity potential anomalies (contour, $0.2 \times 10^6 \text{m}^2/\text{s}$) and its confidence level (shading)



200 hPa stream function anomalies (contour, $10^6 \text{m}^2/\text{s}$) and its confidence level (shading)



Global circulation patterns are shifted westward compared to El Nino years

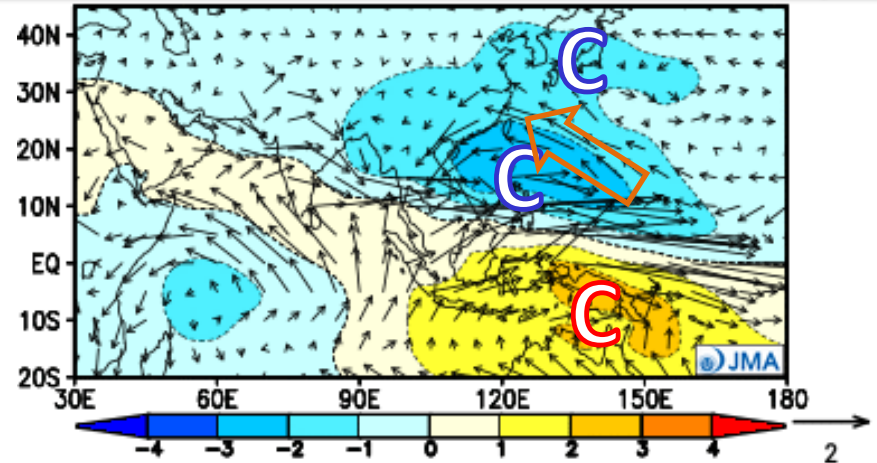


<JJA 2023> Asian Circulation

Initial is Apr. 2023

850 hPa stream function anomalies (Contour & Shading, $10^6 \text{ m}^2/\text{s}$) and wind vector anomalies (m/s)

- Near the Maritime Continent, Cyclonic circulation anomalies at 850 hPa straddling the equator are predicted.
- These seem to be related to the expansion of the western North Pacific subtropical high (WNPSH) which is predicted weaker in its western part.
- Another cyclonic circulation anomalies expected around Japan suggests spells of active rainy season.
- The predicted precipitation shows active convections from Philippine Sea to western part of tropical Pacific Ocean.



Precipitation (contour, mm/day) and its anomalies (shading, mm/day)

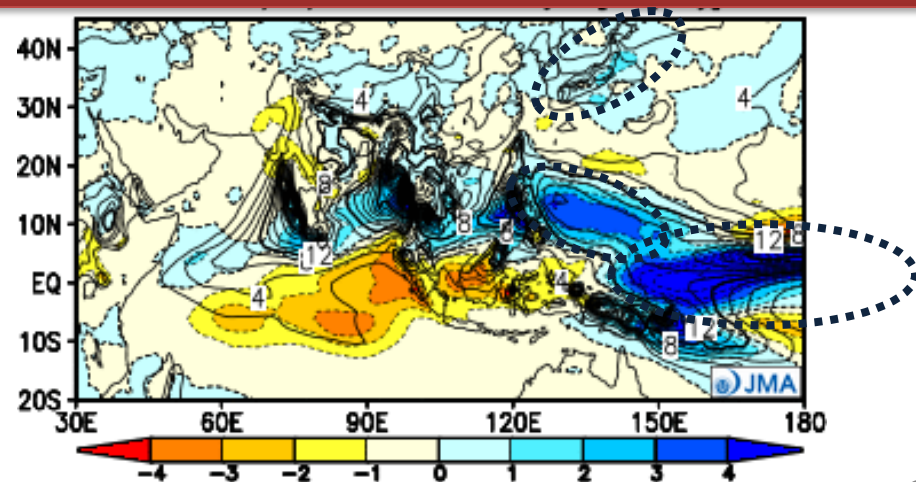


Illustration for MJJ, Initial is Apr. 2023

Warmer tropospheric temperature over the globe

Subtropical Jet Stream

Predicted not so Shifted in latitude

Broken line shows
Climatological location

Tibetan High

Stronger than normal
in its eastern part

Climatological location

Spells of wet air inflow
in early summer

WNPSH

The westward expansion is
predicted not so strong as
normal

Climatological location

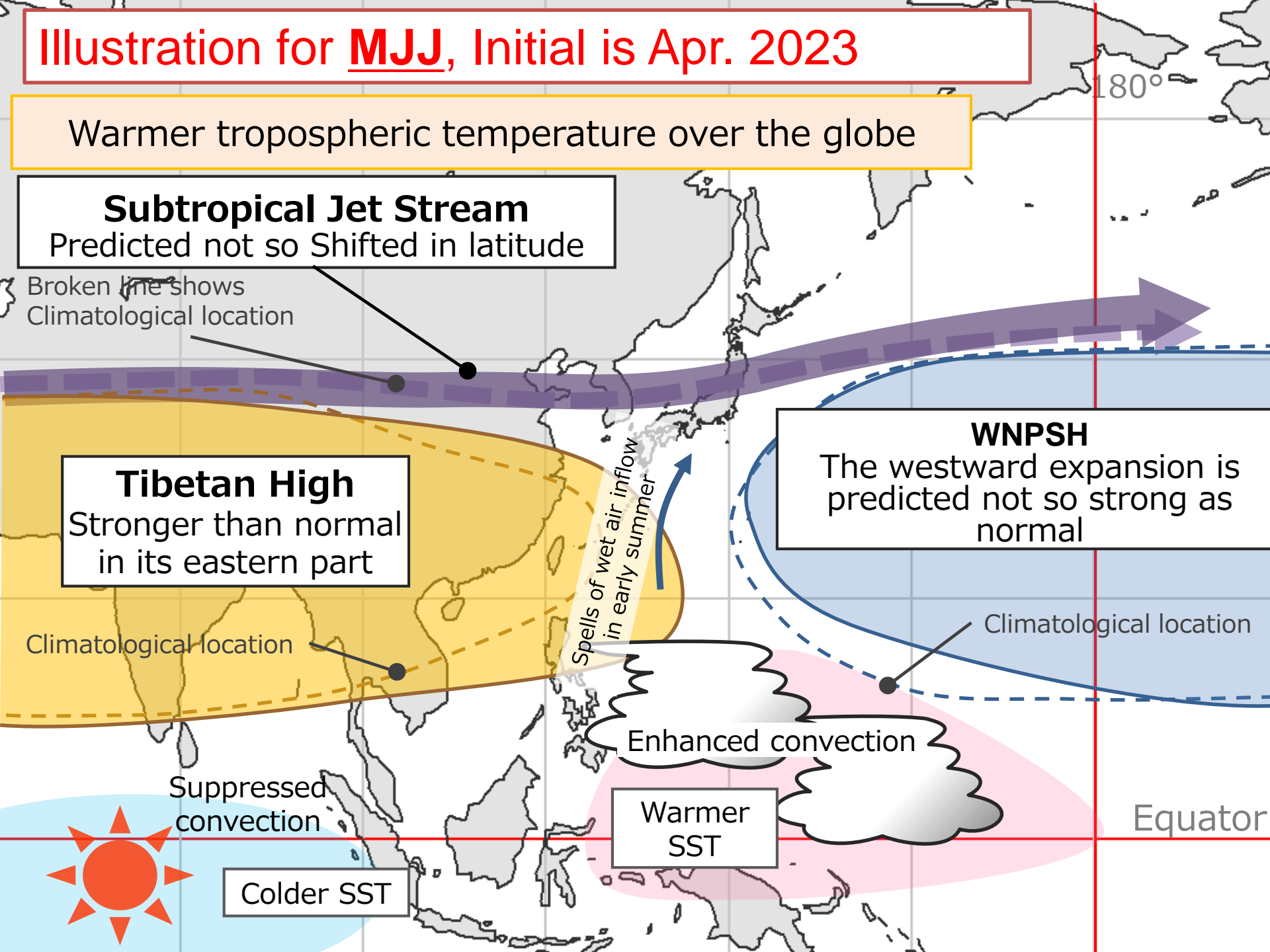
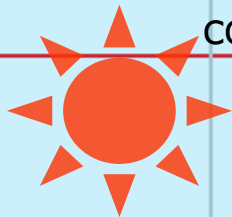
Enhanced convection

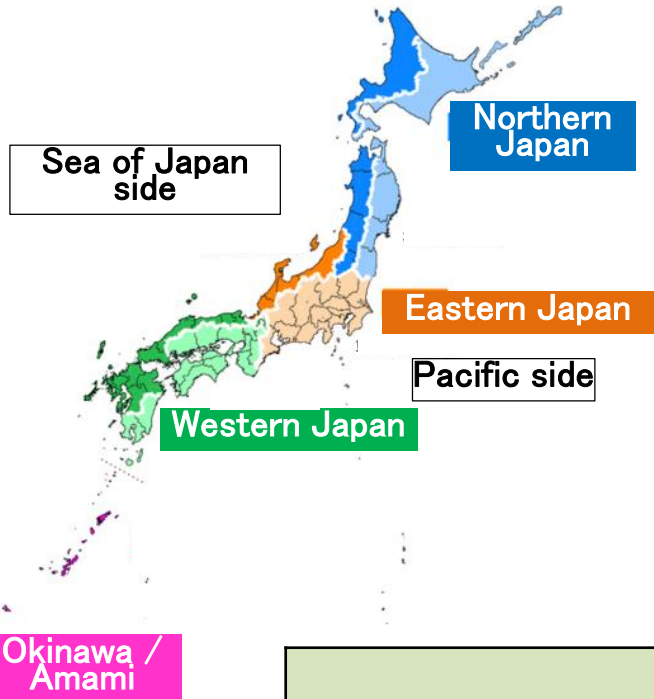
Warmer
SST

Suppressed
convection

Colder SST

Equator





- According to the possibility of the El Niño like global circulation, precipitation outlook may be change upward in the next forecast or so.

Category		Temperature			Precipitation		
		-	0	+	-	0	+
Northern Japan	Sea of Japan side	20	40	40	30	40	30
	Pacific side				30	40	30
Eastern Japan	Sea of Japan side	20	40	40	30	40	30
	Pacific side				30	40	30
Western Japan	Sea of Japan side	20	40	40	30	40	30
	Pacific side				30	40	30
Okinawa/Amami		30	30	40	30	40	30

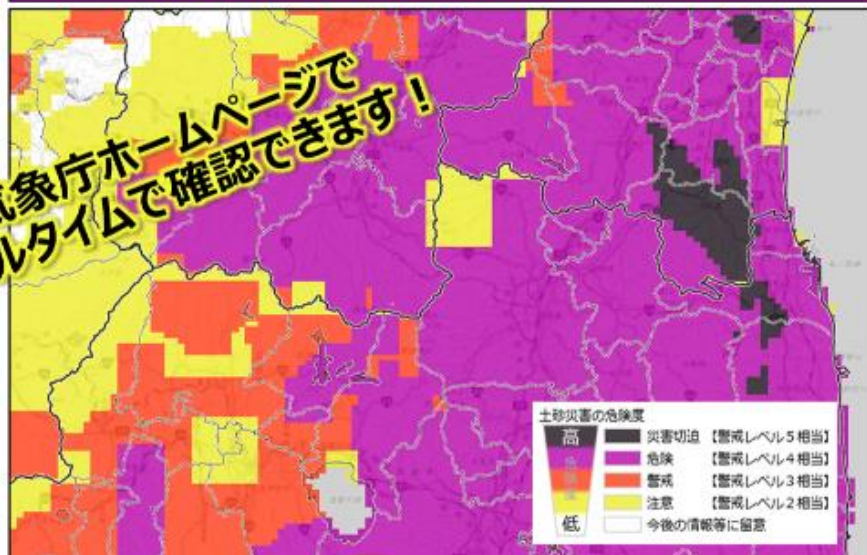
(Category - : Below normal, 0 : Near normal, + : above normal)

During the coming summer, it is expected that

- **The SSTs over the equator of the Pacific Ocean is warming.** But the global patterns of circulation are widely shifted westward from typical one for El Nino year.
- In accordance with these,
 - Compared to normal situation, the monsoon trough is predicted more clearly and WNPSH is predicted weaker in its western part.
 - The weaker western expansion of the WNPSH may allow more southerly wet air inflow compared to normal in the rainy season in Eastern and Western Japan.
 - JMA increased outlook for precipitation in Northern/Eastern/Western Japan in July(rainy season) slightly from no signal on 23 April
 - As the enhanced convection over the tropics in Western Pacific is predicted to heat the upper-level air, the Tibetan high is predicted to be strengthened in its eastern part. This **warm upper-level high expansion is expected to brings warmer conditions around Japan.**

土砂キキクル（大雨警報（土砂災害）の危険度分布）

気象庁ホームページで
リアルタイムで確認できます！



気象庁HP「土砂キキクル（大雨警報（土砂災害）の危険度分布）」
<https://www.jma.go.jp/bosai/risk/#elements:land/>



In Japan, landslide disasters which occur in every rainy season are ones of the most considerable risk...

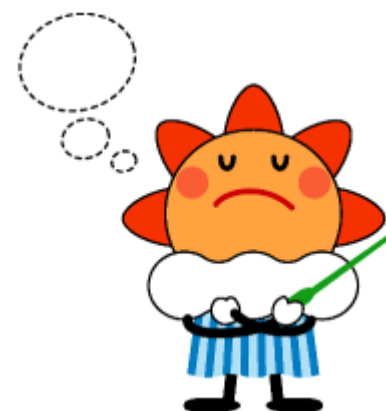
← from landslide risk map (shortrange forecasting product) leaflet by JMA.



写真：広島市で発生した土砂災害
(平成26年(2014年)8月20日気象庁撮影)



写真：新潟県芦北町で発生した土砂災害
(令和2年(2020年)7月13日気象庁撮影)



Appendix