



Seasonal Outlook for Summer 2019 over Japan



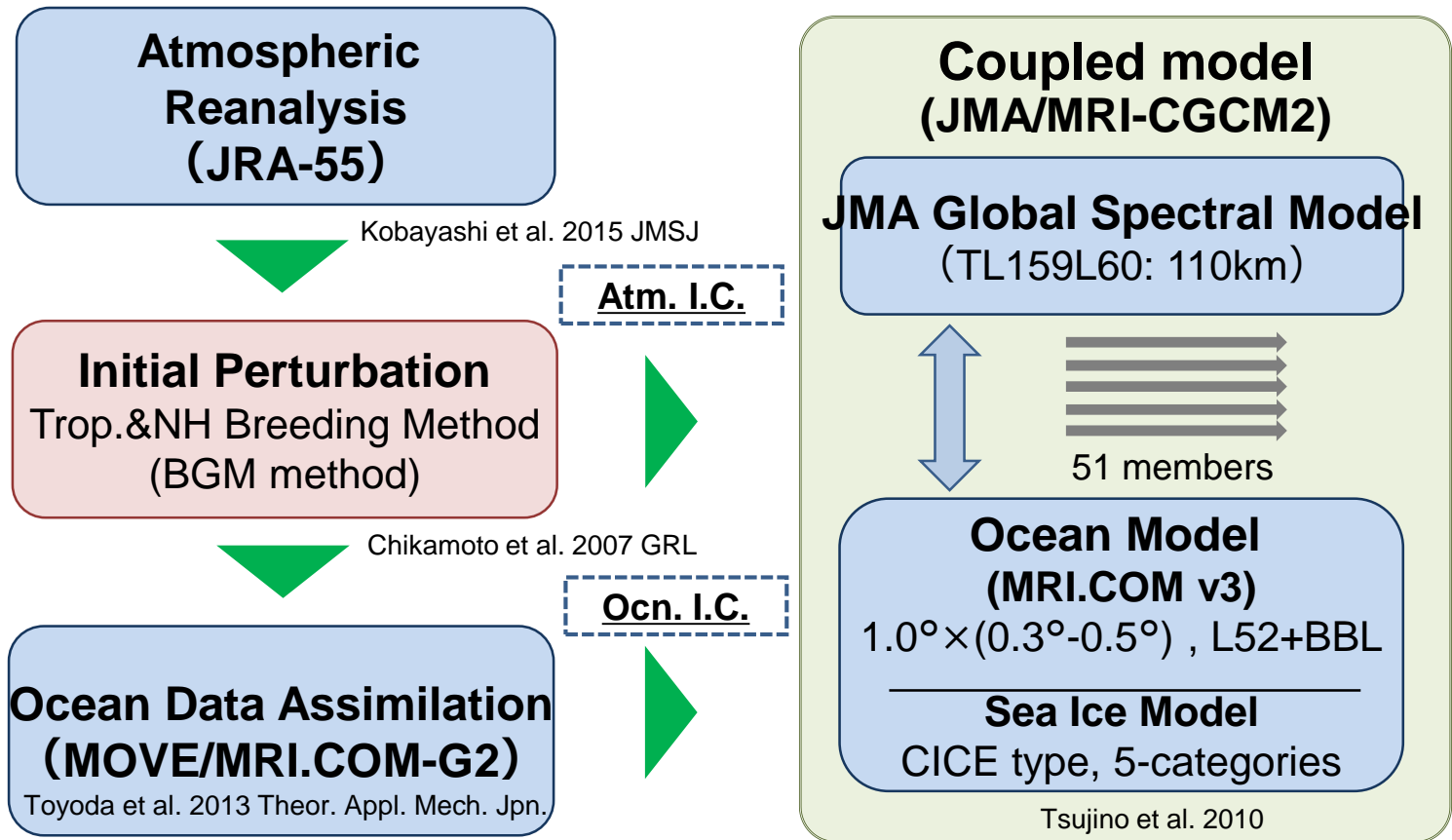
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Climate Prediction Division of
Japan Meteorological Agency (JMA)*

System components of JMA/MRI-CPS2

JMA/MRI-CPS2 (Coupled Prediction System 2)

Takaya et al. 2018

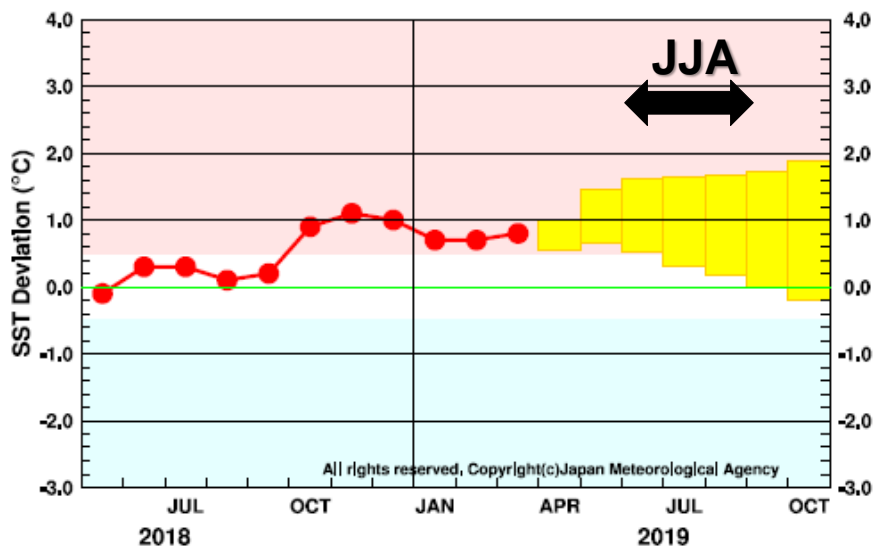


This system consists of three parts: an atmosphere-ocean coupled general circulation model named JMA/MRI-CGCM2, atmospheric and oceanic data assimilation systems, and ensemble generation systems of the atmospheric and oceanic initial conditions. 51-member ensemble integrations are carried out.

El Niño Outlook (Last updated: 10 April 2019)

<http://ds.data.jma.go.jp/gmd/tcc/tcc/products/elniño/outlook.html>

NINO.3 SST index



YEAR	MONTH	mean period	Probability (%)	
2019	FEB	DEC2018-APR2019	100	0
	MAR	JAN2019-MAY2019	100	0
	APR	FEB2019-JUN2019	90	10
	MAY	MAR2019-JUL2019	90	10
	JUN	APR2019-AUG2019	80	20
	JUL	MAY2019-SEP2019	80	20
	AUG	JUN2019-OCT2019	70	30
				El Niño

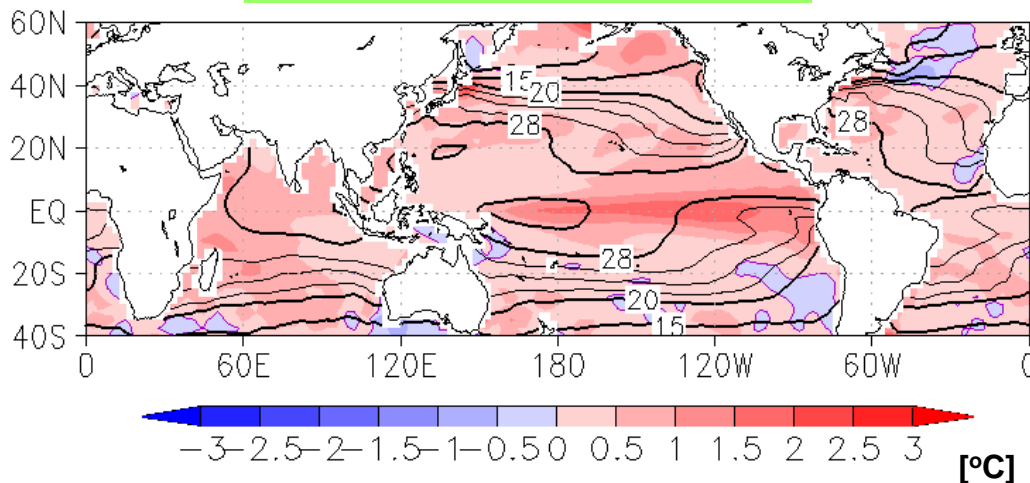
According to the El Niño Outlook issued on 10th April 2019,

- El Niño conditions are considered to have persisted in the equatorial Pacific.
- They are likely to continue until boreal summer (80%).

Sea Surface Temperature for JJA 2019

Ensemble mean

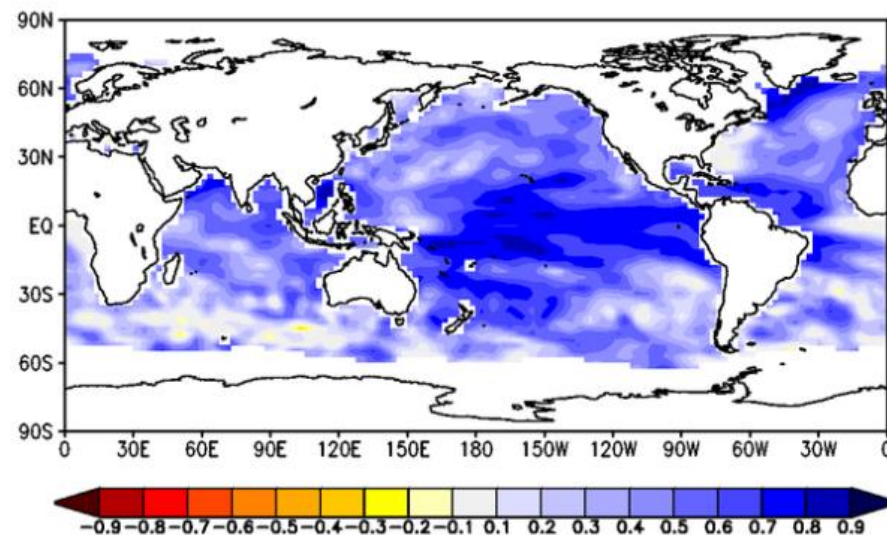
SST (shading: anomaly)



Anomaly correlation coefficient (ACC) for SST (JJA; initial: March)
Blue: positive correlation

Based on 10-member hindcast for 1981-2010

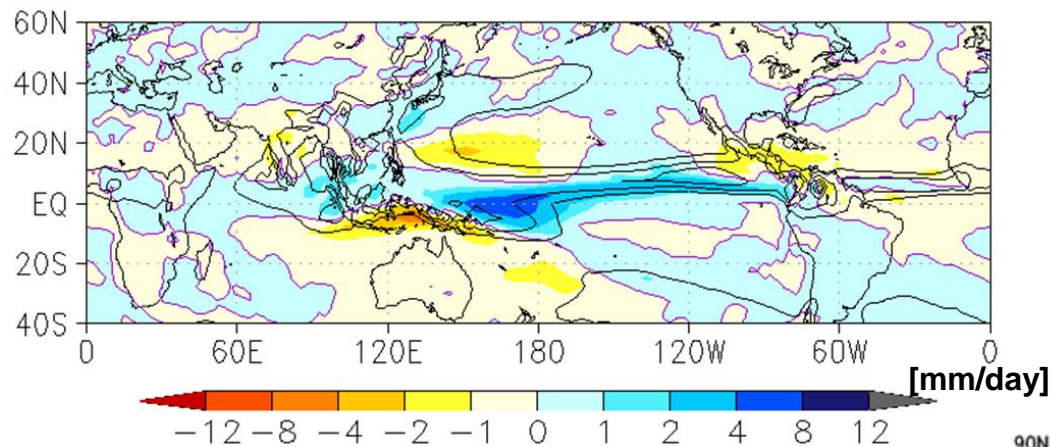
- SST are expected to be above-normal over the whole tropical region, especially over the central and eastern Pacific.



Precipitation for JJA 2019

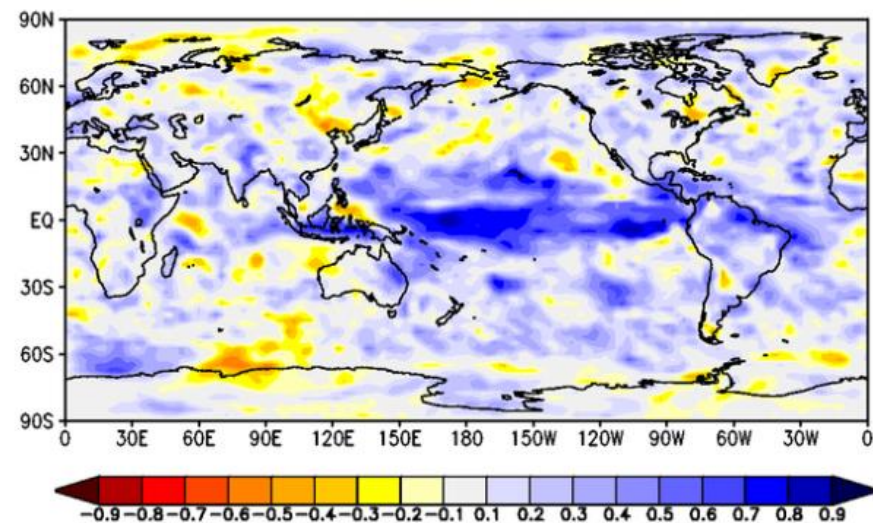
Precipitation

Blue: wet, red: dry anomalies



ACC for precip. (JJA; initial: Mar.)

Blue: positive correlation



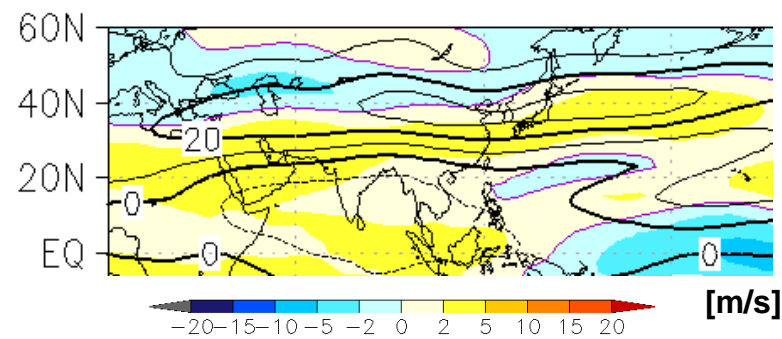
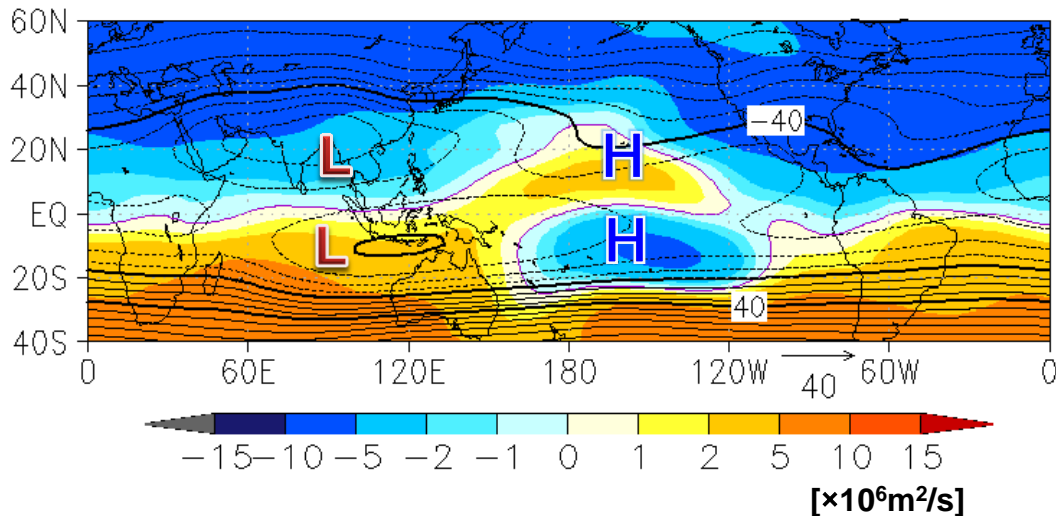
- The convection will be enhanced over the equatorial central Pacific and suppressed around the east of the Philippines.
- The activity of WNPM* could be less than normal.

*Western North Pacific Monsoon

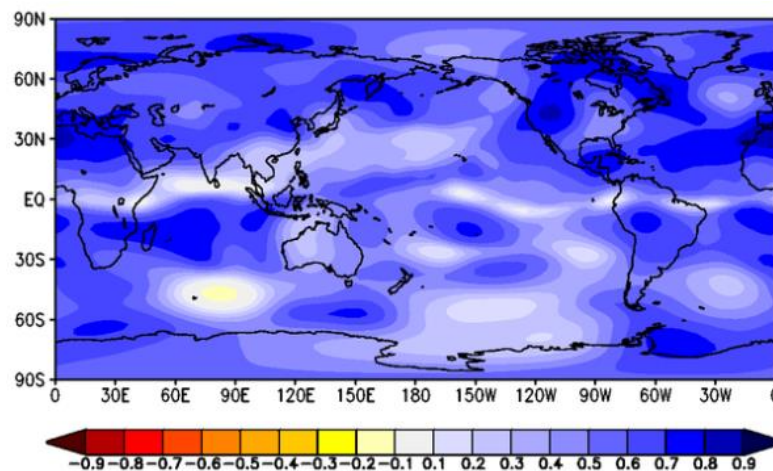
Upper Troposphere for JJA 2019

Stream function at 200hPa (PSI200)
(shading: anomaly)

Zonal wind at 200hPa
(shading: anomaly)



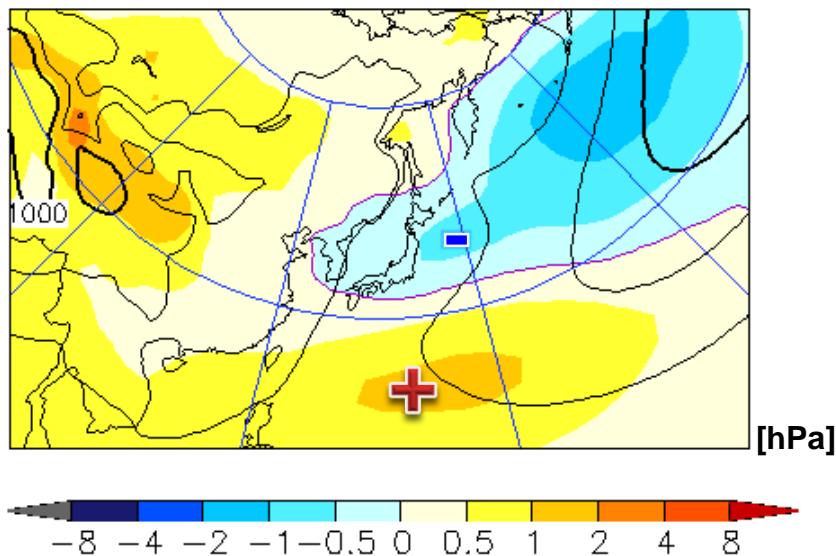
ACC for PSI200 (JJA; initial: Mar.)
Blue: positive correlation



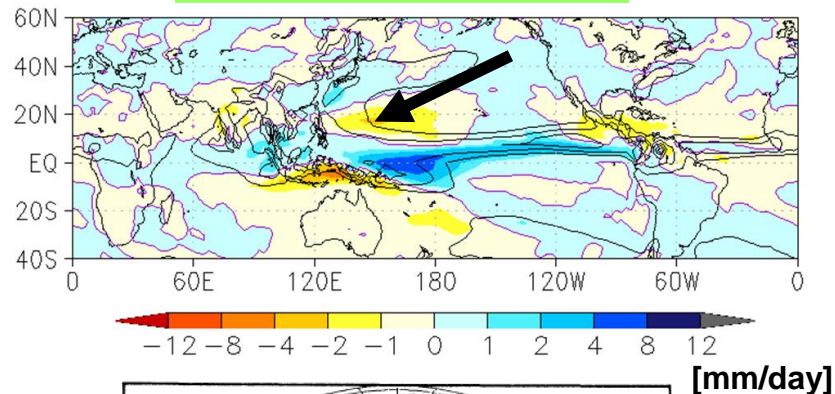
- The Tibetan High is weaker than normal.
- The Asian jet stream shifts southward.

Lower Troposphere for JJA 2019

Sea level pressure
(shading: anomaly)

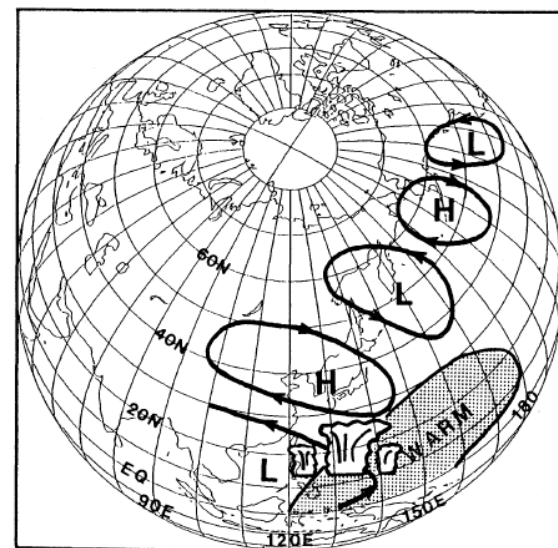


Precipitation
(shading: anomaly)



-12 -8 -4 -2 -1 0 1 2 4 8 12

[mm/day]



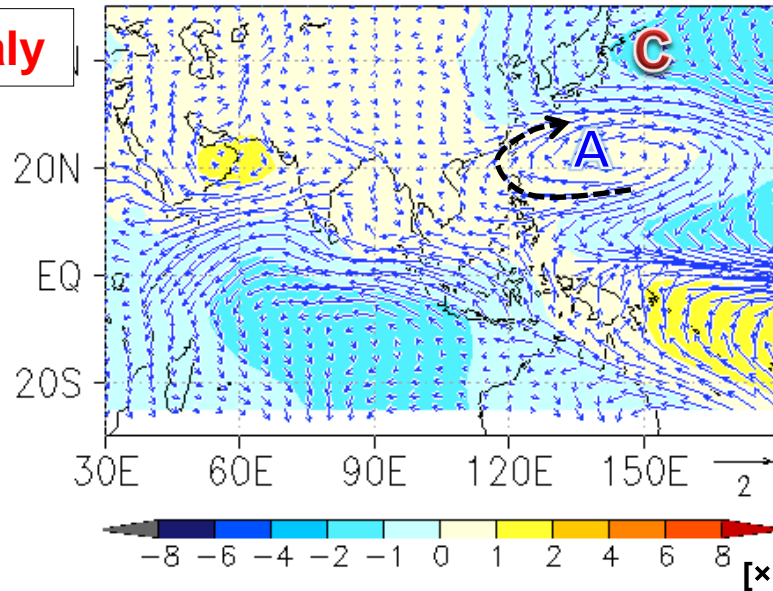
Pacific-Japan pattern (Nitta 1987)

- **PJ pattern** with **positive** and **negative** anomalies to the east of the Philippines and over Japan, as a response to the suppressed convection around the east of the Philippines.
- **The Pacific High** extends westward.

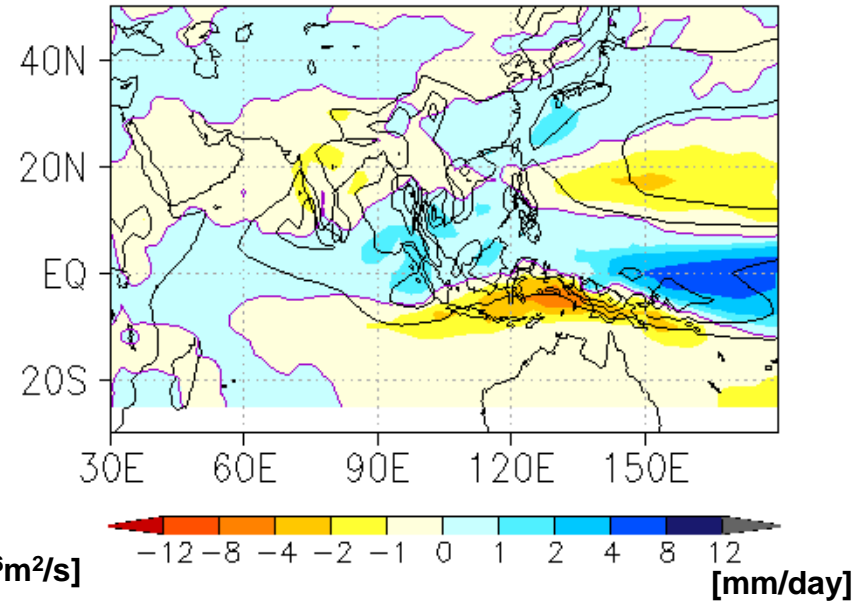
Climate in Japan for JJA 2019

850hPa wind / PSI850

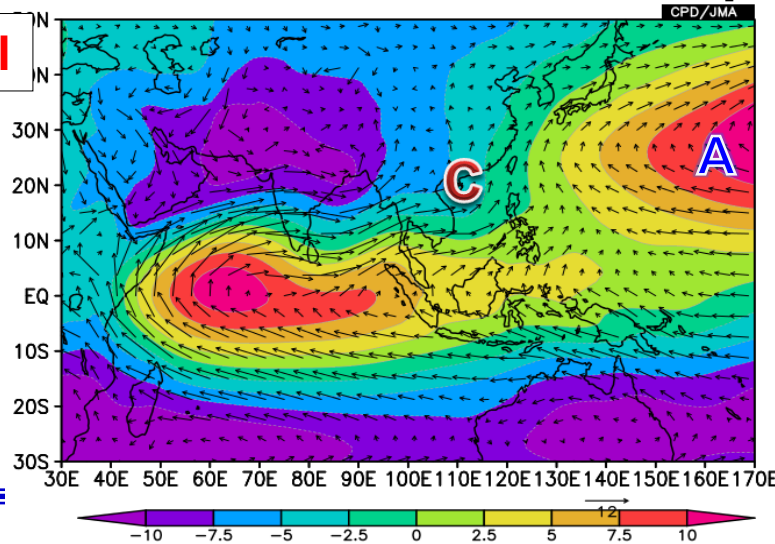
Anomaly



Precipitation (shading: anomaly)



Normal

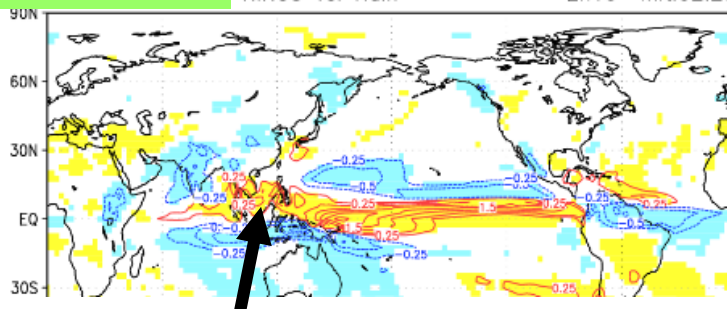


- Moist air could flow over mainland Japan along the edge of the High.
- This tendency can **bring wetter conditions** during this summer over mainland Japan.

Precipitation Bias around Southeast Asia

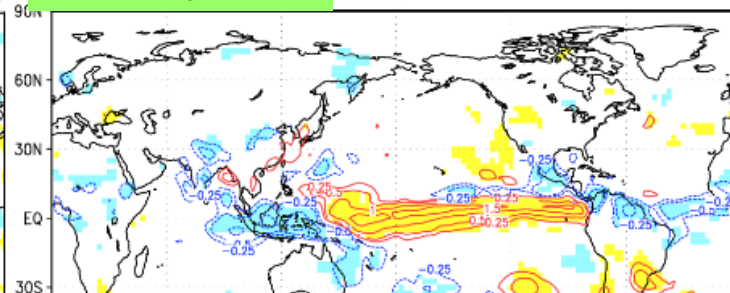
JMA/MRI-CPS2

NINO3 vs. Rain JUN-AUG 1981-2010 En10 init:02.25



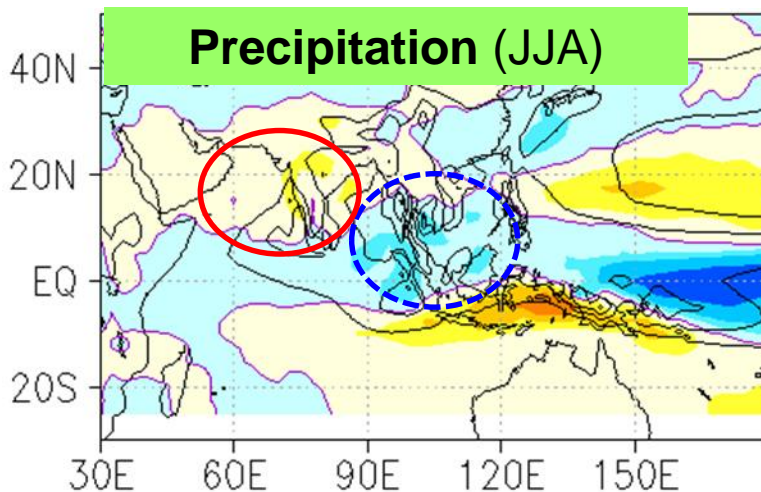
Analysis

s. Rain JUN-AUG 1981-2010



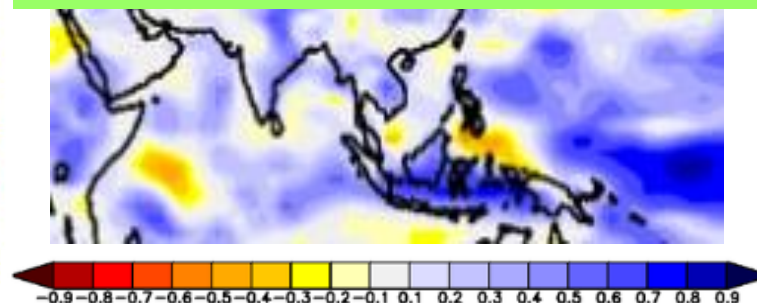
red: positive
Blue: negative

Precipitation (JJA)



ACC for precip. (JJA; initial: Mar.)

Blue: positive correlation

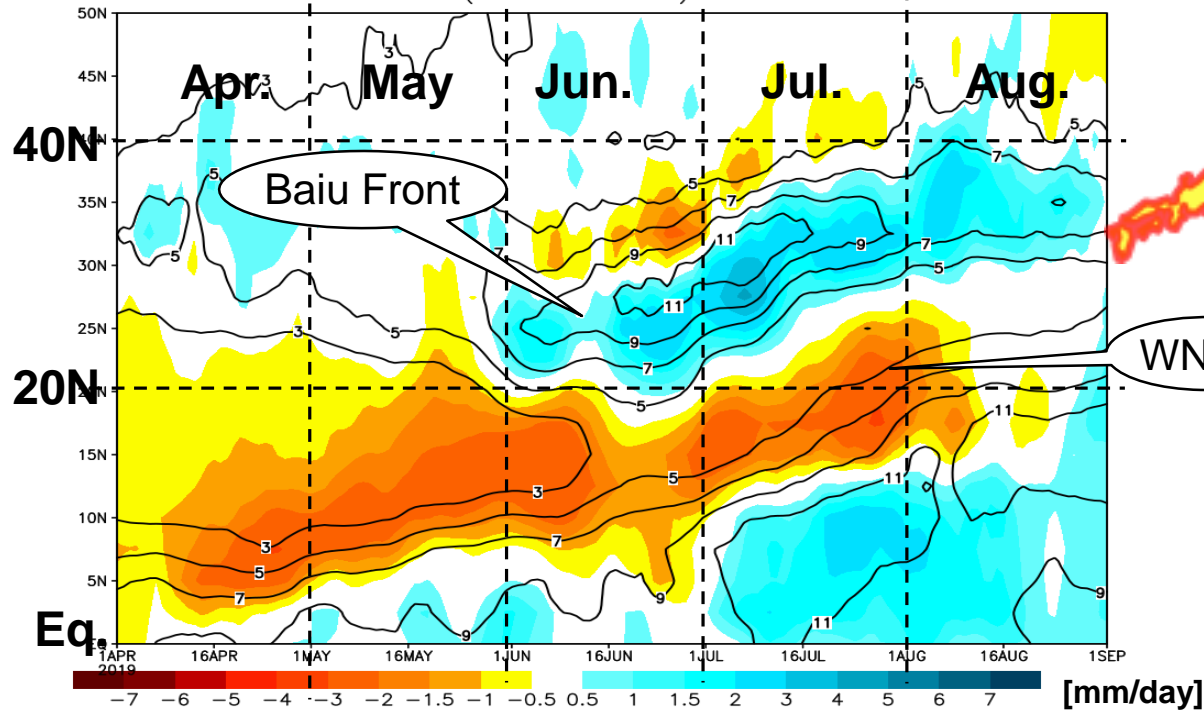


- JMA CPS2 has a positive relationship of precipitation between around the date line and Southeast Asia. However, there are a negative relationship in analysis fields.
- The positive anomalies of precipitation around Southeast Asia **will be neglected.**

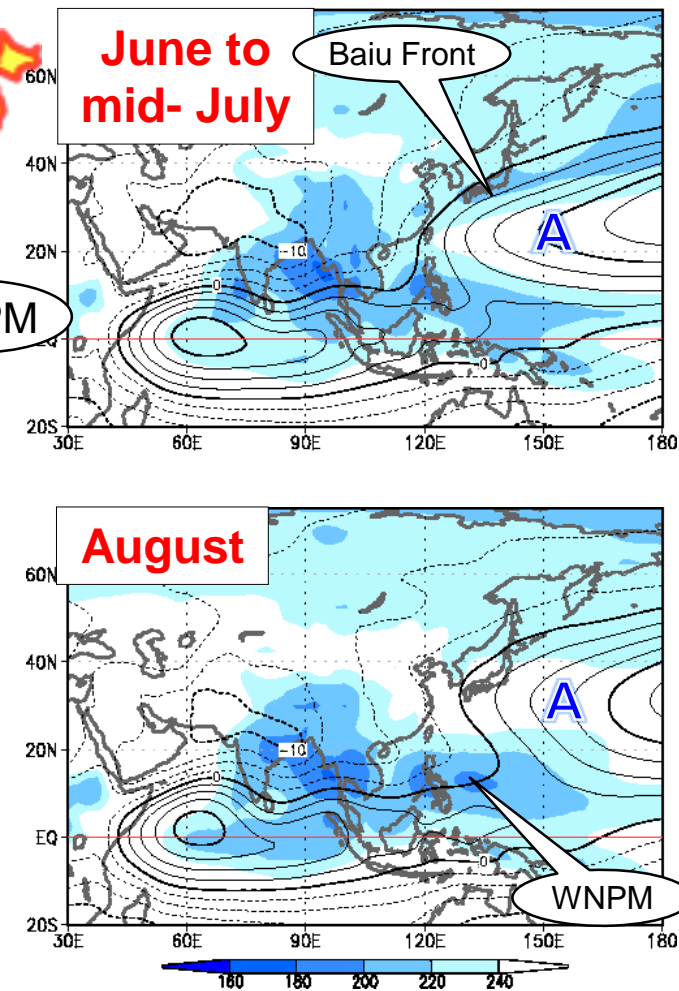
Seasonal Progress of the East Asian Monsoon

Precipitation for 125-145E

Rain anomalies (125E-145E) CPS2 20190307init



PSI850 / OLR Normal



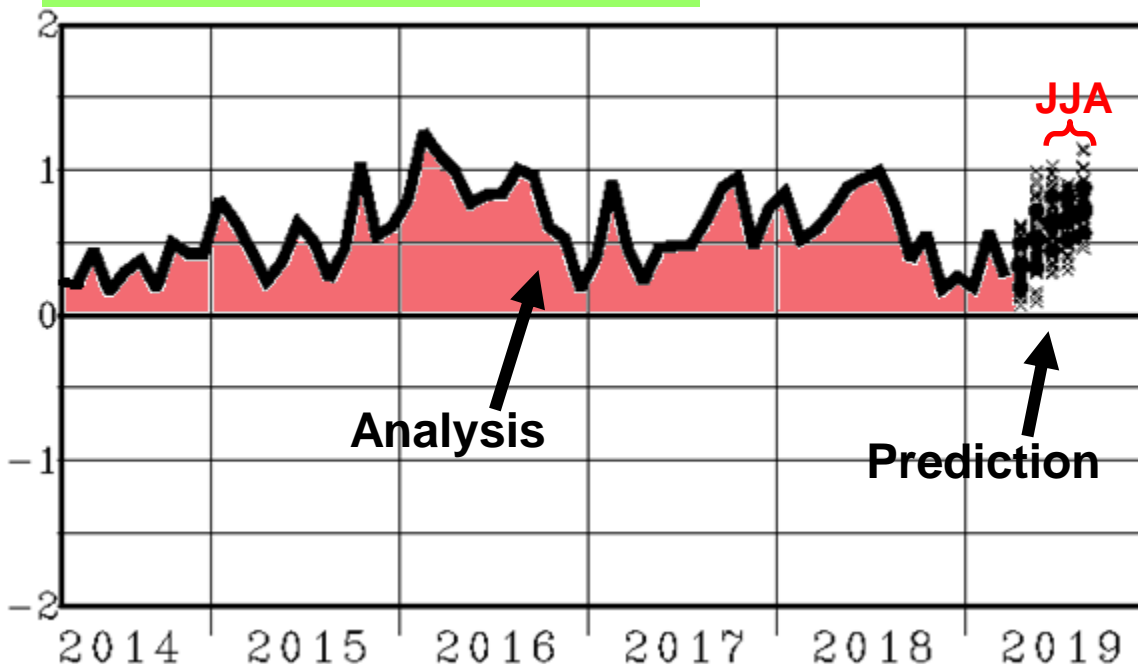
- Seasonal progress of Baiu-front is expected to be later than normal during the rainy season in Japan (June to mid-July).
- In August, wetter conditions are expected around 30N-40N.

Tropospheric Temperature for JJA 2019

Tropospheric temperature

300-850 hPa, 30-90N

30N-90N



- Overall temperatures in the troposphere are higher than normal (about +0.6 deg.) in association with the prevailing long-term increasing trend.
- It is likely to increase the chance of above-normal temperatures.

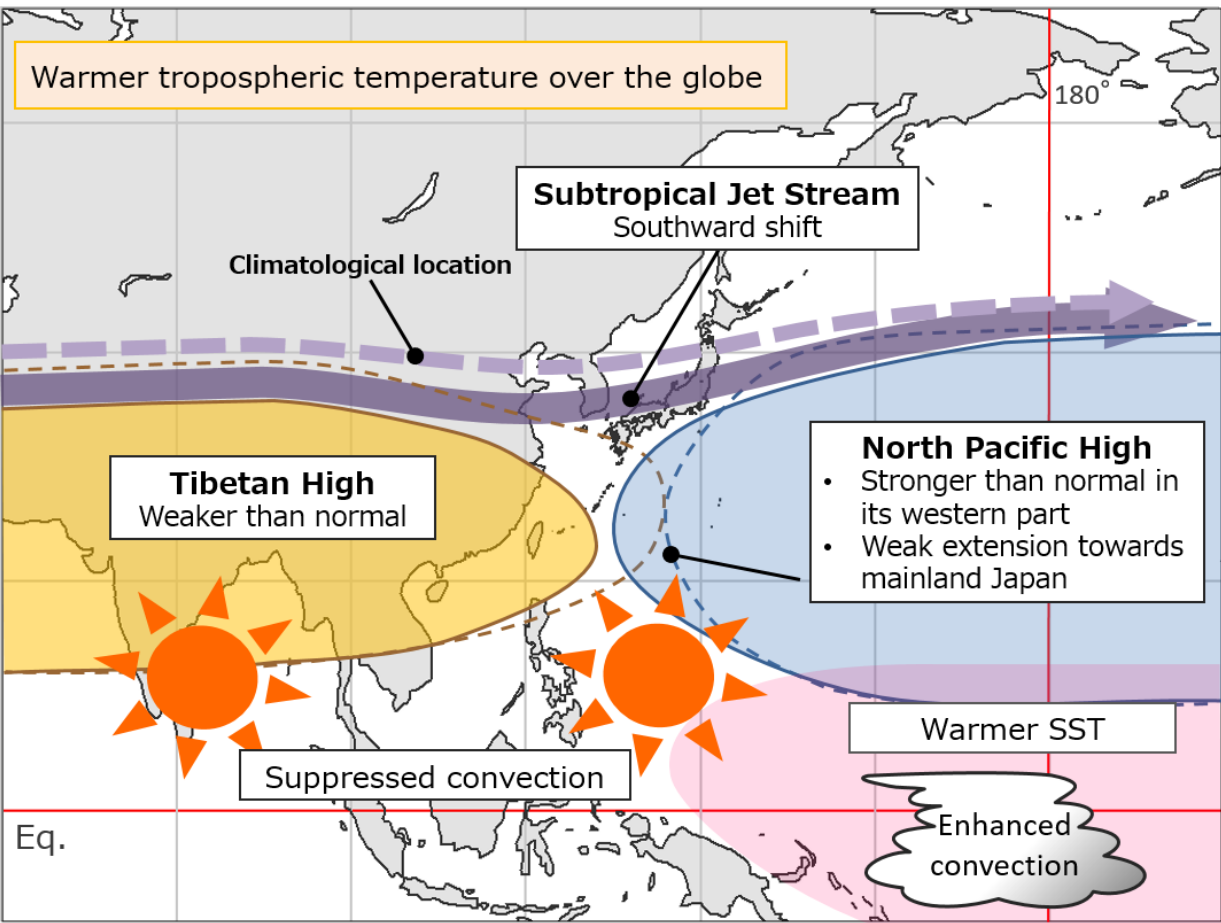
Black line : observed anomalies

Black dots(center) : predictions (ensemble mean)

x : predictions (51 ensemble member)

**ACC for 3-month mean
(JJA; initial: Mar.): +0.63**

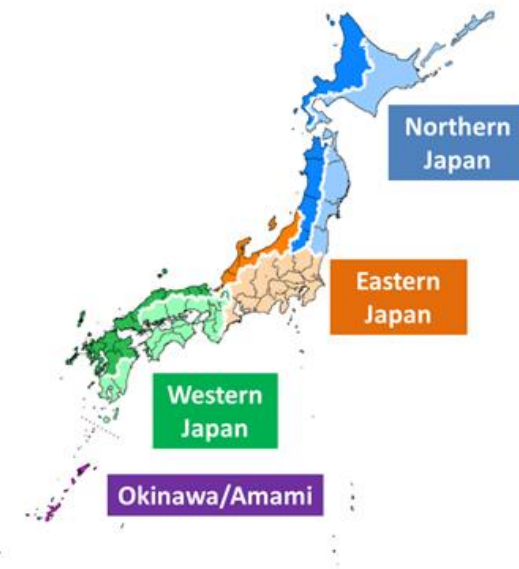
Summary: East Asian Circulation for JJA 2019



- Prevailing warming trend
- Warm SST over the central equatorial Pacific
- Suppressed convection over the Asian monsoon region
- The weak Tibetan High
- Negative phase of PJ pattern, and the weak extension of the North Pacific High towards mainland Japan

Outlook for JJA 2019 over Japan

Category	Temperature			Precipitation		
	-	0	+	-	0	+
Northern Japan	40%	30%	30%	20	40	40
Eastern Japan	30	40	30	20	40	40
Western Japan	30	40	30	20	40	40
Okinawa/Amami	20	40	40	30	30	40



Category –: Below Normal, **0**: Near Normal, +: Above Normal

- **Temperatures** are expected to be near-normal over mainland Japan.
- **Precipitations** are expected to be above normal tendencies over mainland Japan.
- Precipitation during rainy season (June to mid-July) is expected to be near normal, but the seasonal progress of Baiu front may be later than normal. As a result, cloudy/wetter weathers during mid-summer season are expected in northern/eastern/western Japan.



Thank you

