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The Forum on Regional Climate Monitoring-Assessment-Prediction for Asia (FOCRAII)
7 May 2021, Online

1. The Characteristics of 2020/21 Winter Monsoon and Climate in Japan
&
2. Seasonal Outlook for Summer 2021 over Japan

1. SATO Hirotaka
Scientific Officer
2. HIRAI Masayuki
Senior forecaster

Tokyo Climate Center, Japan Meteorological Agency

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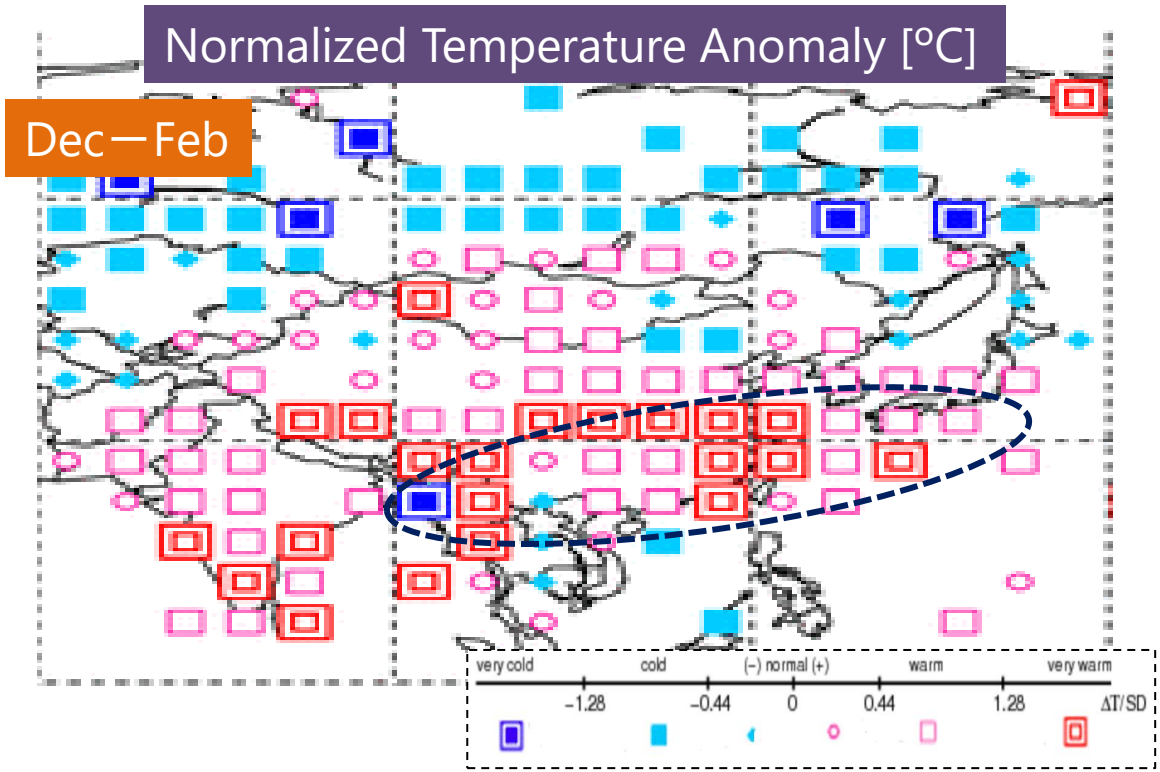
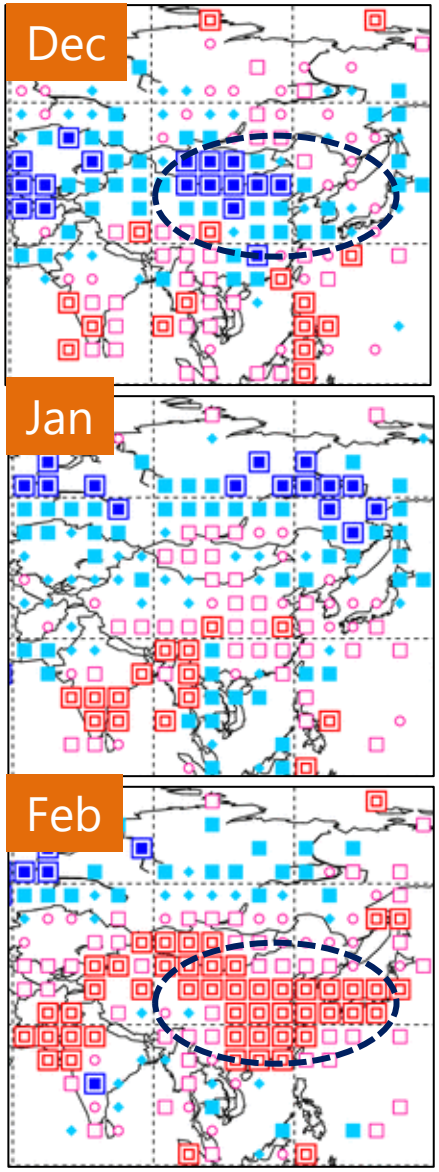
1. The Characteristics of 2020/21 Winter Monsoon and Climate in Japan

Overview of 2020/21 Winter Monsoon





- Seasonal mean temperature
  - **Warm:** eastern Japan to southern China
- Clear contrast in the season
  - **Harsh first half** and **Mild second half**

Based on CLIMAT reports. Reference period for the anomaly is 1981-2020.

Overview of 2020/21 Winter Monsoon

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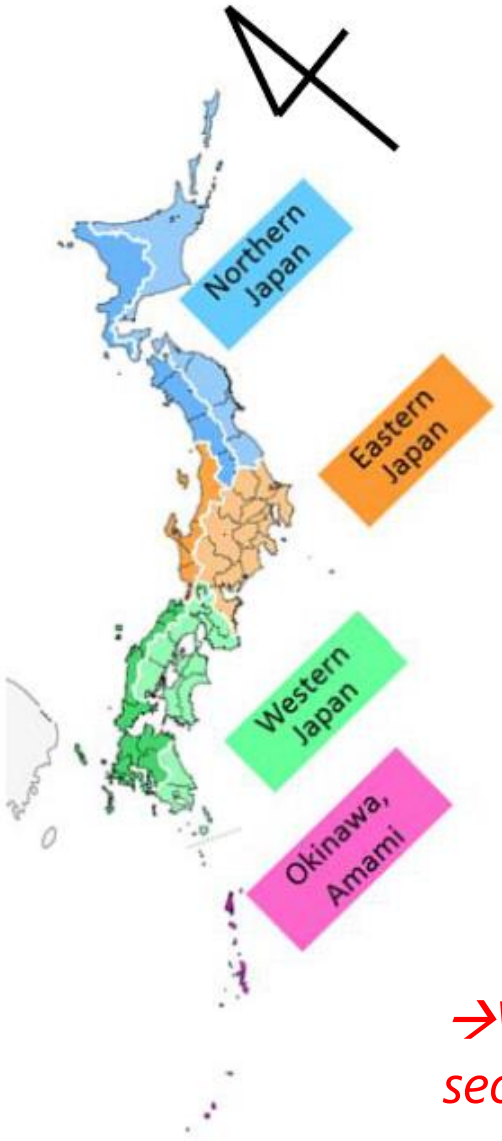


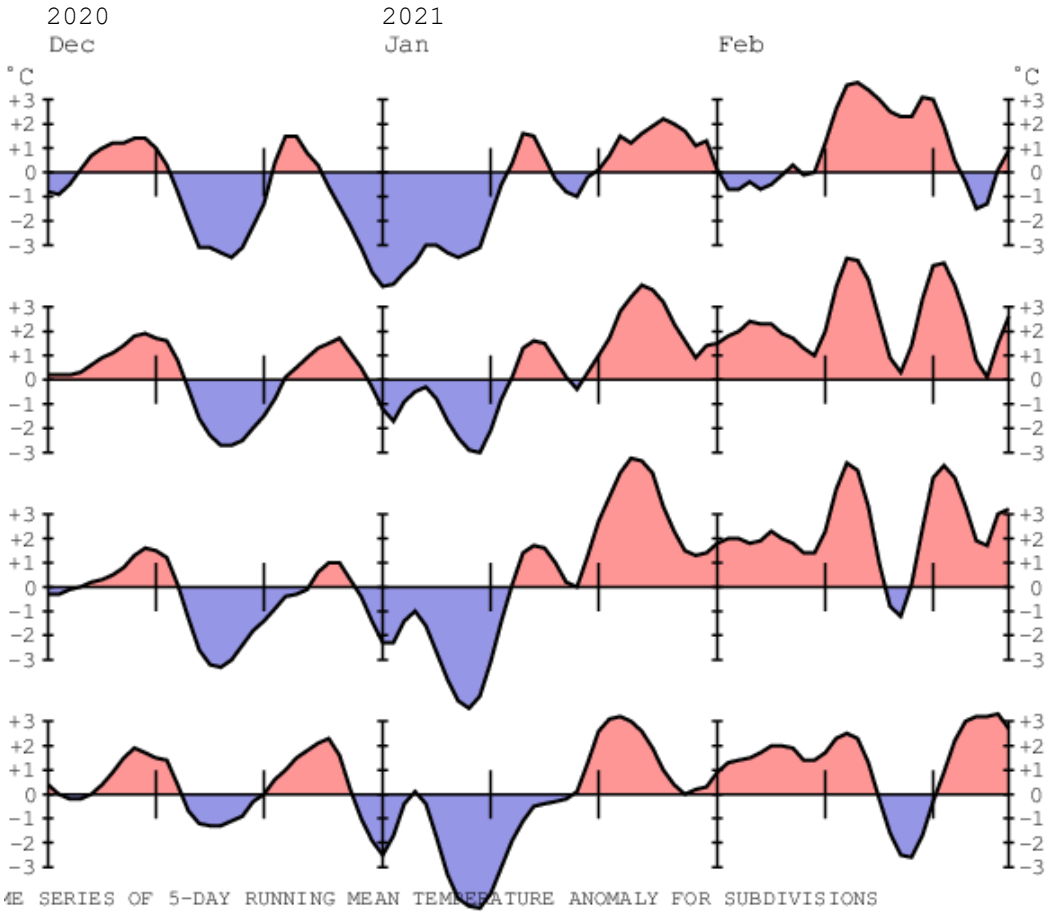
Northern Japan
-0.1 ºC

Eastern Japan
+1.0ºC

Western Japan
+0.8ºC

Okinawa/ Amami
0.4ºC

5-Day running mean temp. anom.



→What conditions of the atmos. circulation in the first and second half?

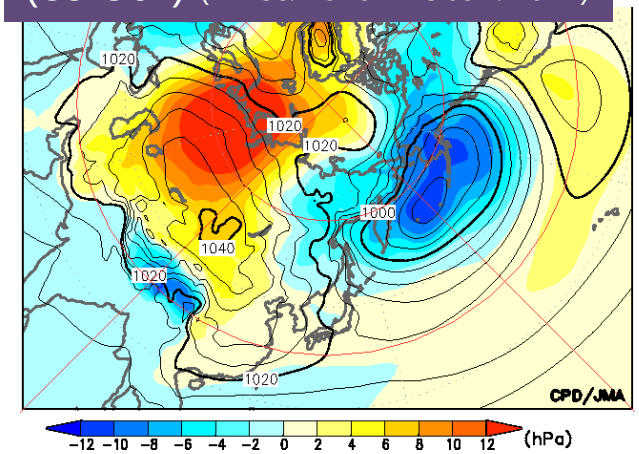
Reference period for the anomaly is 1981-2020.

First half: Wavy Polar Front Jet over Eurasia

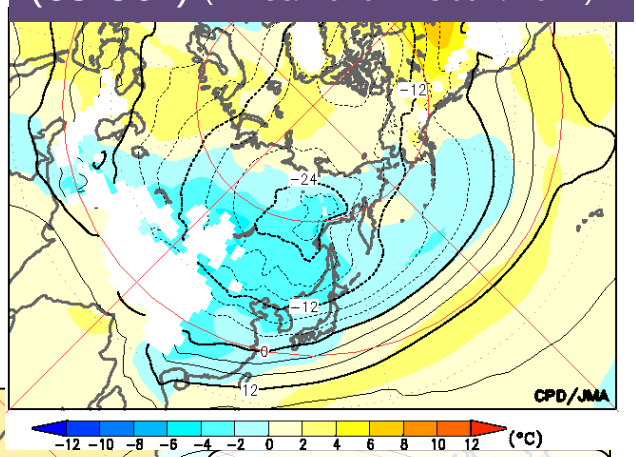
- Intense Siberian High and Aleutian Low

→ *Strong East Asian Winter Monsoon (EAWM)*

SLP (cont.) and its anom. (colour) (1 Dec. 2020 – 15 Jan. 2021)



T850 (cont.) and its anom. (colour) (1 Dec. 2020 – 15 Jan. 2021)



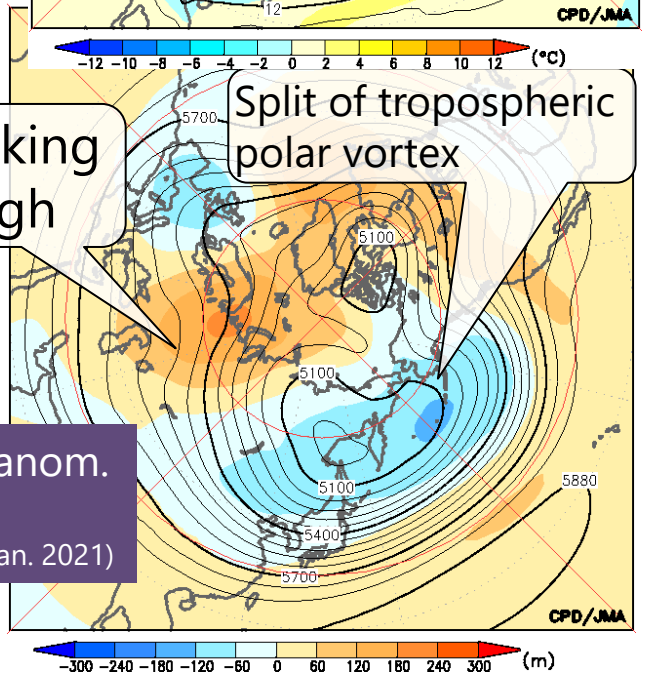
- A wavy z500 anom. pattern from Europe to East Asia
  - A blocking high over western Siberia enhanced the surface Siberian High
  - Similar to the pattern associated with less sea ice extent in the Barents and Kara Seas

→ *Southward polar front jet (PFJ) meandering over East Asia*

Blocking High

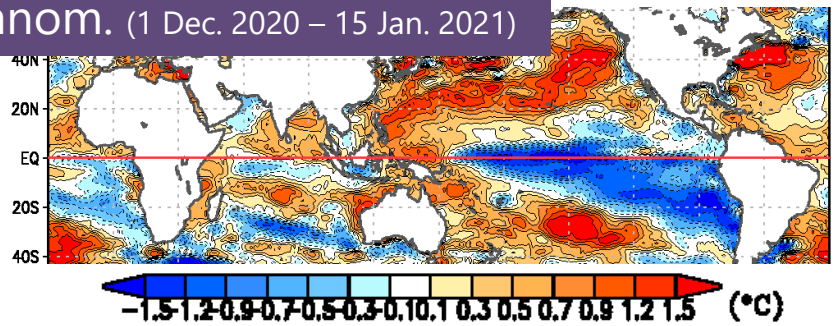
Split of tropospheric polar vortex

z500 and its anom. (colour)
(1 Dec. 2020 – 15 Jan. 2021)



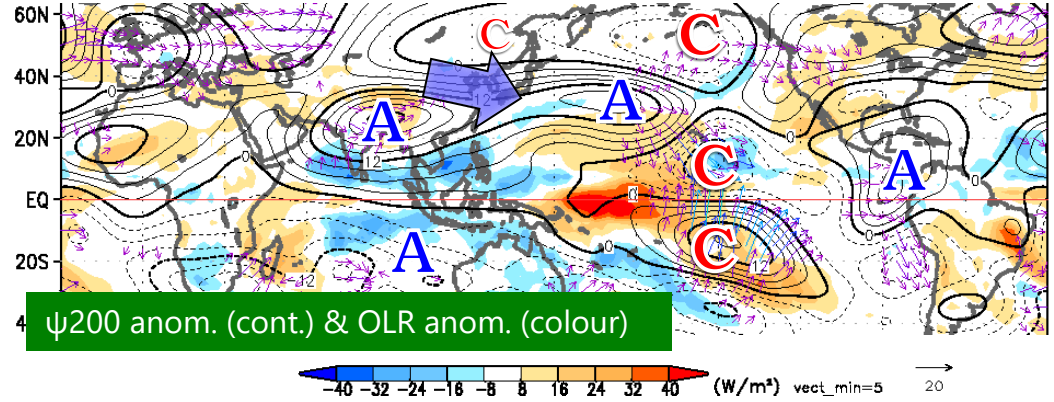
First half: Impacts of the La Niña event

SST anom. (1 Dec. 2020 – 15 Jan. 2021)

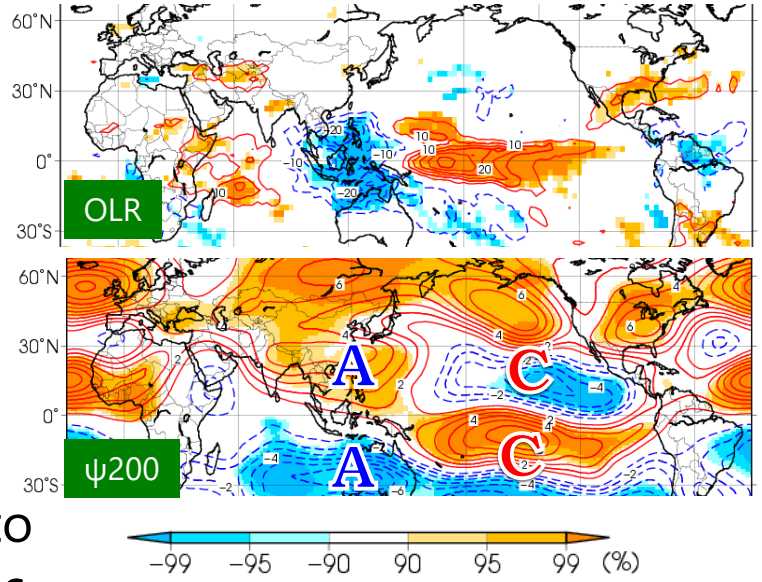


- The La Niña event since 2020 summer persisted through this winter.

First half of this winter (1 Dec. 2020 – 15 Jan. 2021)



La Niña Composites (Dec.)



Period: 1958-2012

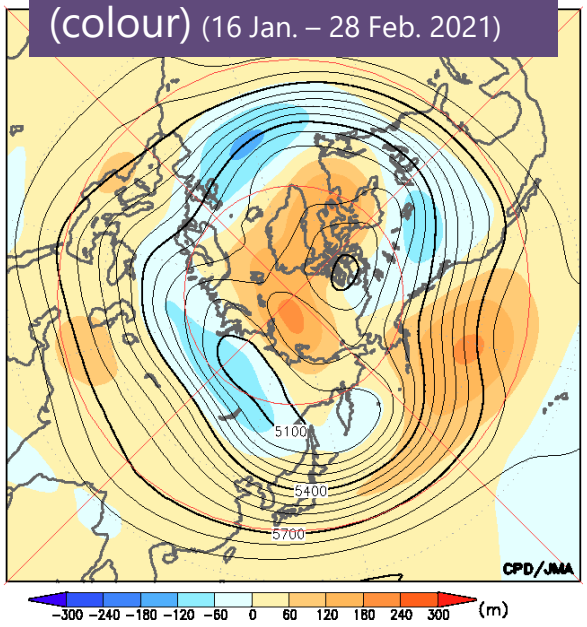
- OLR and ψ200 anoms. from the Indian Ocean to the western Pacific were similar to what was seen in the past La Niña episodes.

→ *Southward subtropical jet (STJ) meandering over East Asia*

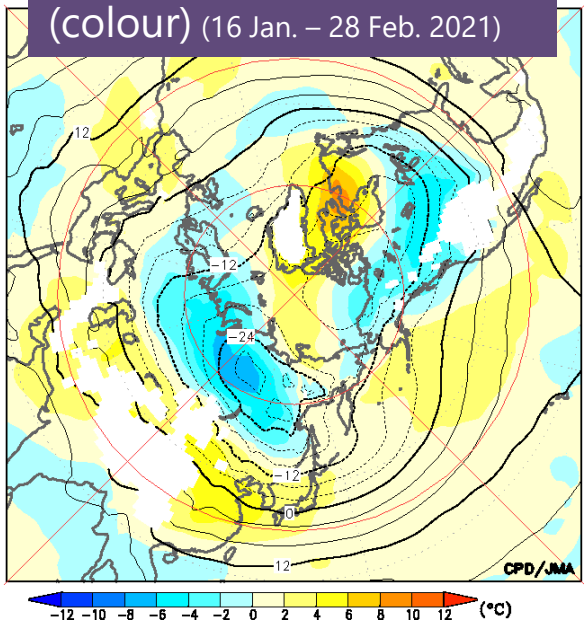
But in the Second Half……

- Zonally-elongated z500 anom. pattern over Eurasia
  - Negative z500 anomalies around 50°–60°N and positive 30°–40°N. → *Not-wavy PFJ over Eurasia*
- Cold air confined within northern Siberia → *Weak EAWM*

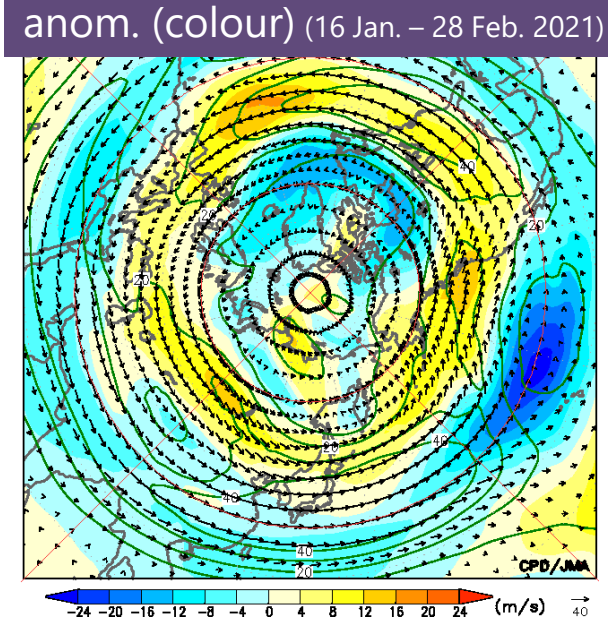
z500 (cont.) and its anom. (colour) (16 Jan. – 28 Feb. 2021)



T850 (cont.) and its anom. (colour) (16 Jan. – 28 Feb. 2021)

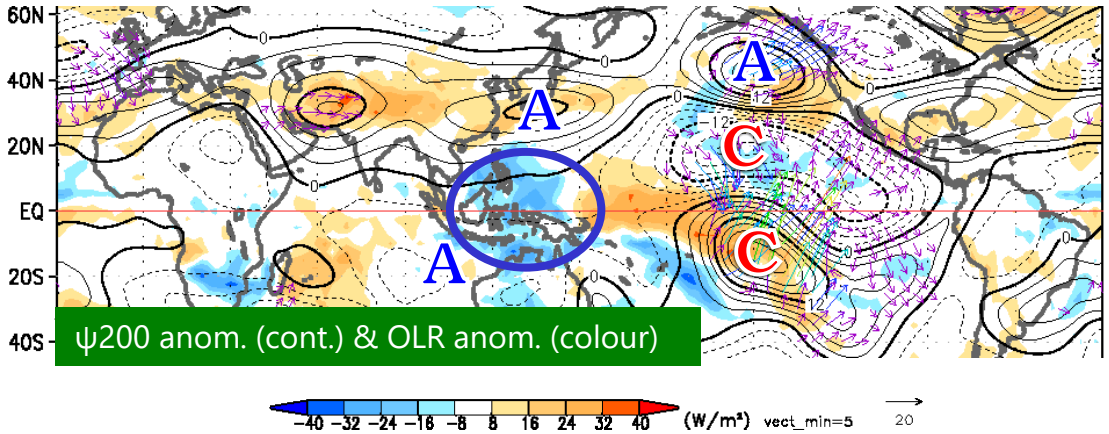


Wind300 (vector.) and U300 anom. (colour) (16 Jan. – 28 Feb. 2021)

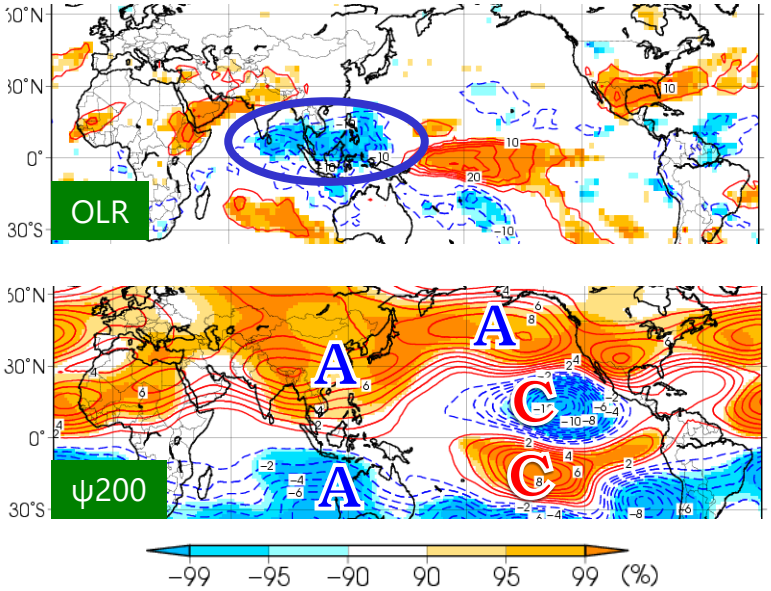


Second half: La Niña-like but Modified Impacts

Second half of this winter (16 Jan. – 28 Feb. 2021)



La Niña Composites (Feb.)



Period: 1958-2012

- OLR and ψ200 anom. were generally similar to what were seen in the past La Niña episodes.
- But, enhanced convection area was limited
  to the east of the Philippines, NOT extended to the Indian Ocean
- The ψ200 anom. centre was
  over Japan, NOT southeastern Eurasia.

→ *Northward STJ meandering over Japan and blocking southward cold air flow*

Summary of 2020/21 EAWM

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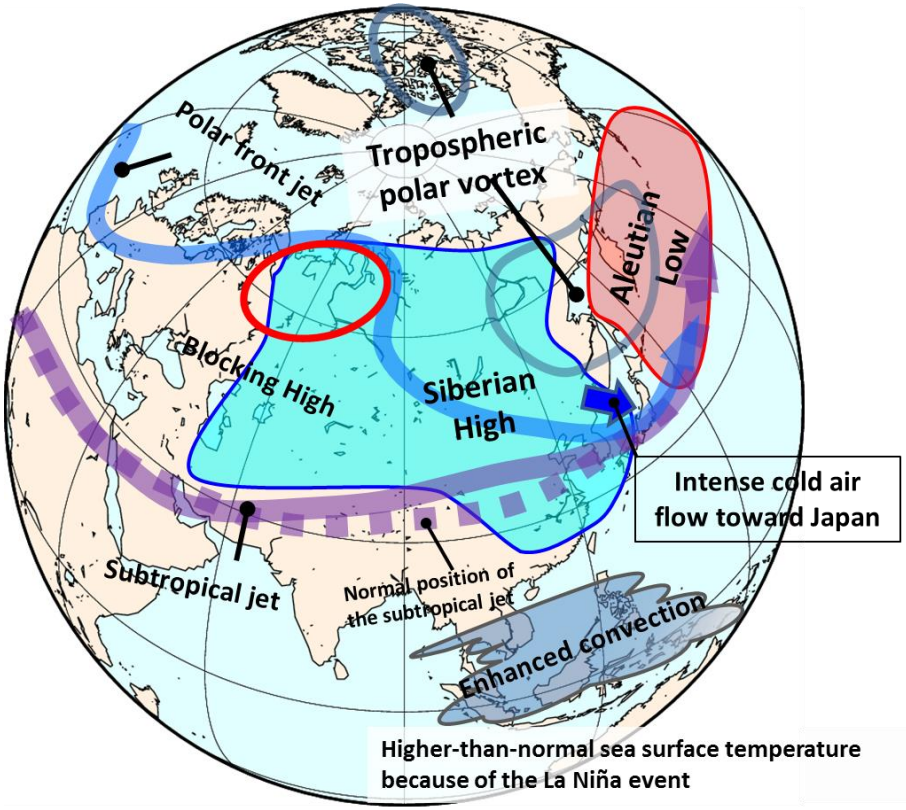
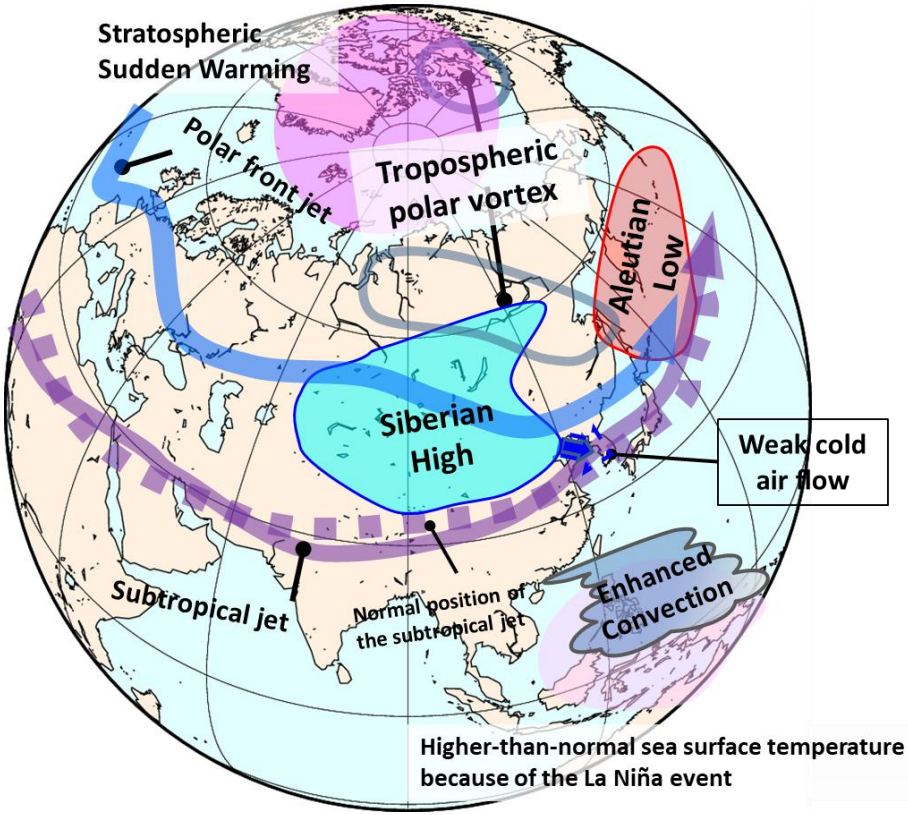
Harsh first half



Mild second half



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2. Seasonal Outlook for Summer 2021 over Japan

<JJA 2021> SST, ENSO outlook

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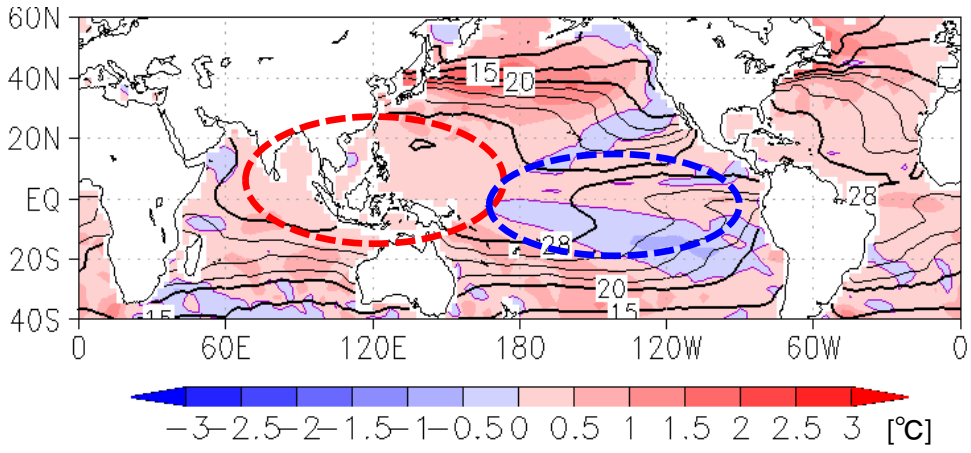
- Initial month is **Apr. 2021**.
- Base period for normal is **1981-2010**.

- ENSO outlook
  - ENSO-neutral conditions are expected during the coming summer.
- Prediction of SSTs over tropics
  - Around the date line, SSTs are predicted to be relatively negative anomalies.
  - In the western tropical Pacific, SSTs are predicted to be positive anomalies.
  - In the tropical Indian Ocean, SSTs are expected to be slightly positive anomalies, but those departures from normal are small.

ENSO forecast probabilities
(El Niño Outlook issued on 9 April 2021)

YEAR	MONTH	mean period	El Niño	ENSO neutral	La Niña
2021	FEB	DEC2020–APR2021		100	
	MAR	JAN2021–MAY2021		50	50
	APR	FEB2021–JUN2021		70	30
	MAY	MAR2021–JUL2021	10	70	20
	JUN	APR2021–AUG2021	20	70	10
	JUL	MAY2021–SEP2021	20	70	10
	AUG	JUN2021–OCT2021	20	70	10

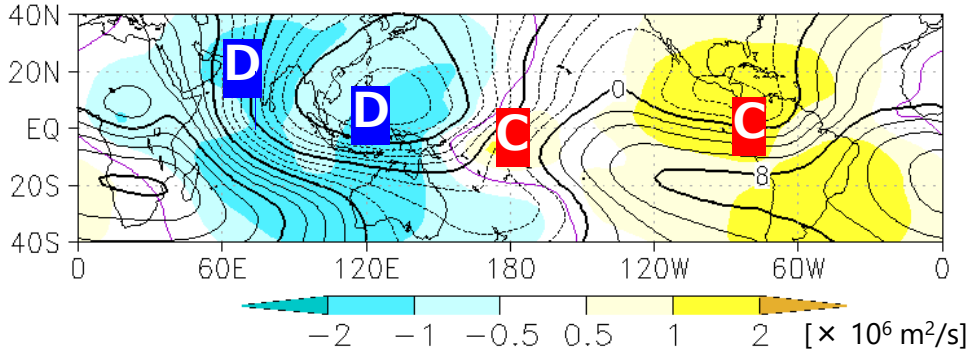
Predicted SSTs (contour)
and its anomalies(shade)



<JJA 2021> Upper circulation fields

- Initial month is **Apr. 2021**.
- Base period for normal is **1981-2010**.

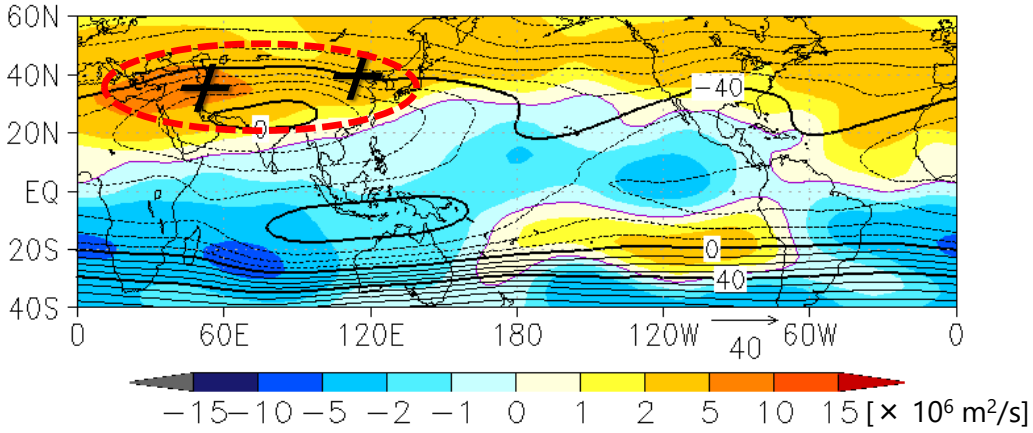
Predicted velocity potential at 200 hPa (contour) and its anomaly(shade)



Large-scale convective activities in the tropics

- More suppressed from the central to the eastern Pacific
- More enhanced around over South Asia and the Maritime Continent

Predicted stream function at 200 hPa (contour) and its anomalies(shade)

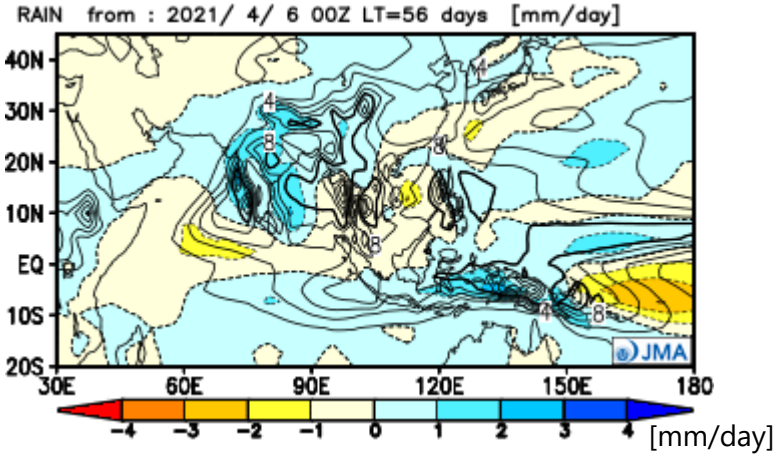


- Tibetan high is predicted to be expanded northward in association with enhanced convections over South Asia and the Maritime Continent.
- Subtropical jet stream is expected to be shifted northward over East Asia.

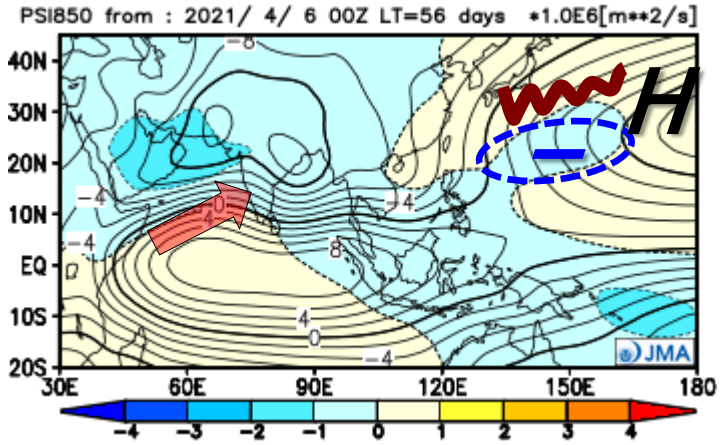
<JJA 2021> Lower circulation fields

- Initial month is **Apr. 2021**.
- Base period for normal is **1981-2010**.

Predicted precipitation (contour) and its anomalies(shade)



Predicted stream function at 850 hPa (contour) and its anomalies(shade)



Large-scale lower circulation and precipitation

- In northern Indian Ocean, southwesterly wind anomalies are predicted, which bring above-normal precipitation anomalies over South Asia.
- In western tropical Pacific, negative (cyclonic) anomalies are predicted in the sea east of the Philippines, suggesting more enhanced convections over the region.
- Western North Pacific subtropical high (WNPSH) is predicted to be expansion westward and northward toward sea south of the main island of Japan.

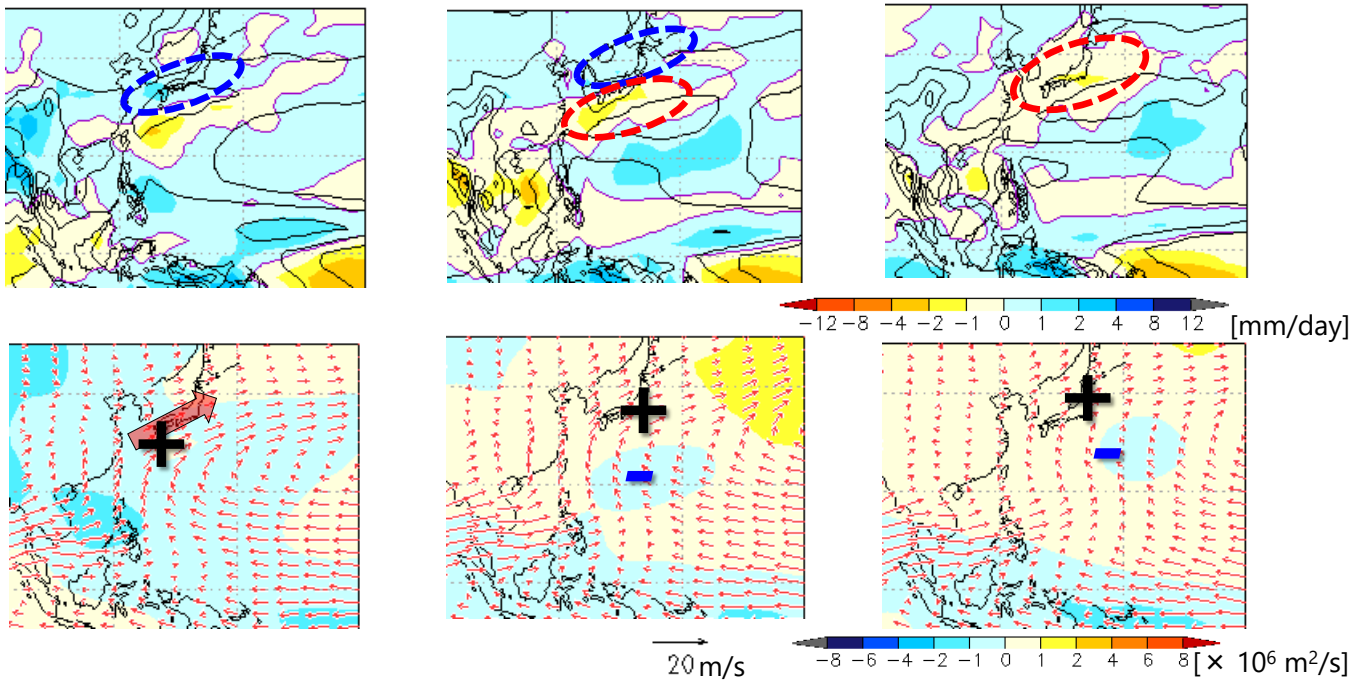
<JJA 2021> Focusing around Japan

- Initial month is **Apr. 2021**.
- Base period for normal is **1981-2010**.

June July August

Precipitation (anomalies)

850 hPa stream function anomalies (shade) and 850 hPa wind (vector)



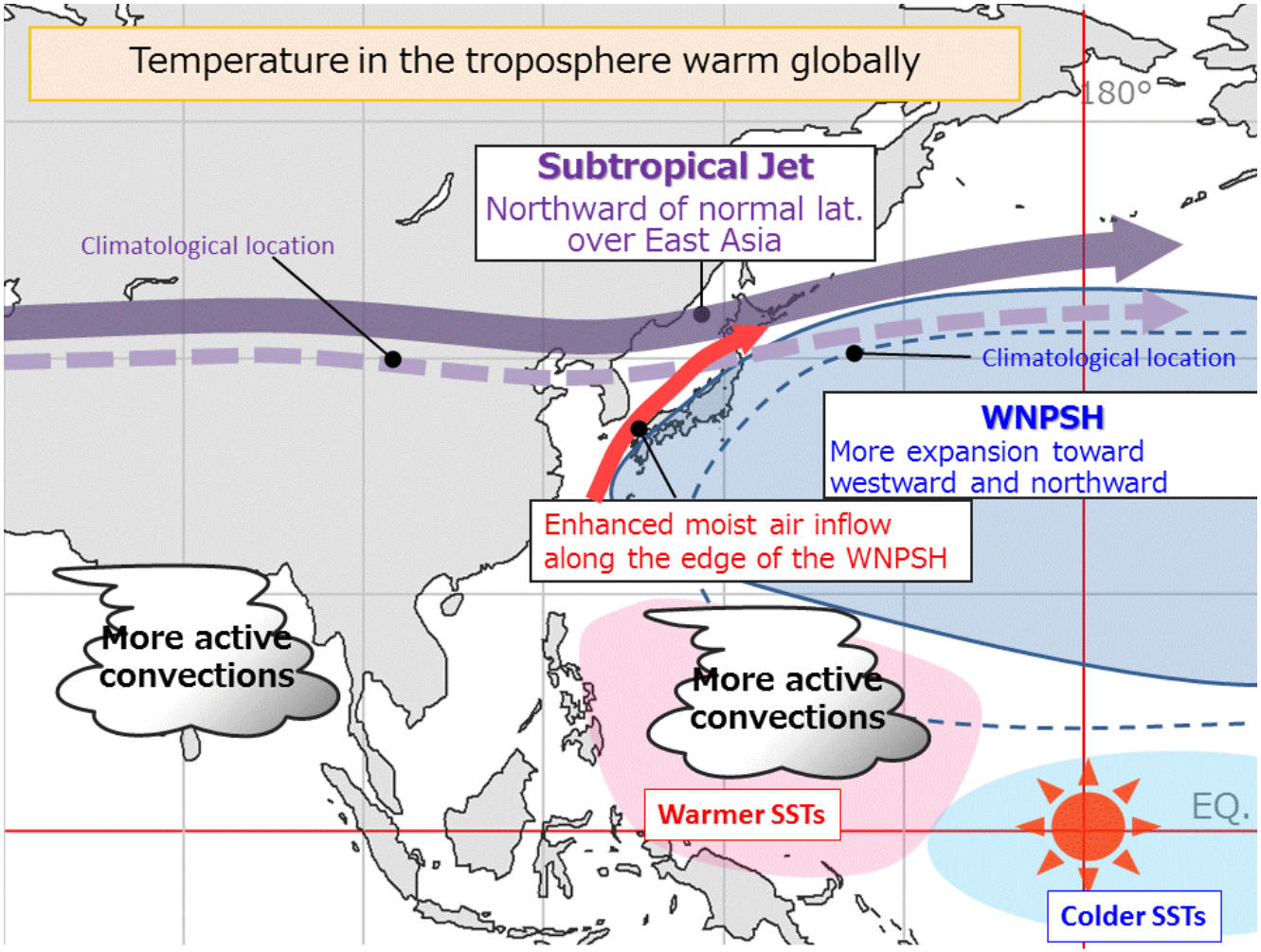
(Pre-midsummer, Baiu season)

- Baiu front is expected to be more active than normal due to moist southwesterly flows along the edge of the WNPSH.

(Mid-summer)

- WNPSH is expected to be expansion toward Japan, which would bring higher temperatures and more sunny days than normal all over Japan.

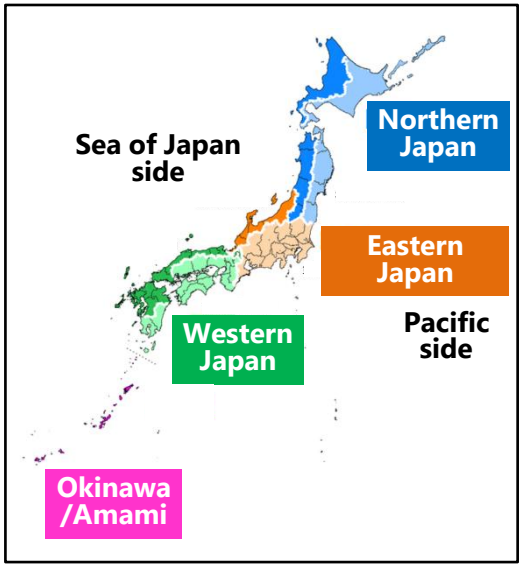
Expected atmospheric circulation and ocean conditions for boreal summer 2021



Conclusion (JMA's warm season outlook)

- Initial month is **Apr. 2021**.
- Base period for normal is **1981-2010**.

		Temperature	Precipitation
Northern Japan	Sea of Japan side	**A/N (40%)**	**A/N (40%)**
	Pacific side		**A/N (40%)**
Eastern Japan	Sea of Japan side	**A/N (40%)**	**A/N (40%)**
	Pacific side		**A/N (40%)**
Western Japan	Sea of Japan side	**A/N (40%)**	**A/N (40%)**
	Pacific side		**A/N (40%)**
Okinawa/Amami		**A (50%)**	**N**



Category **B** : Below-normal, **N** : Near-normal, **A** : Above-normal