

# Current Status and Future plan of Climate Services in JMA



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# Outline

- Introduction
- TCC/JMA's Improvement and activities of climate services during 2015-2017
- Future plan of TCC/JMA's climate services

# INTRODUCTION

# Organization of JMA

Director-General

Deputy Director-General

## Headquarters

Administration  
Department

Counselors (2)

Forecast Department

Observation Department

Seismology and Volcanology  
Department

Global Environment and  
Marine Department

## Field Offices

Regional Headquarters (6)

Local Meteorological Offices  
(50)

Weather Stations (2)

Aviation Weather Service  
Centers (4)

Aviation Weather  
Stations (6)

## Auxiliary Organs

Meteorological  
Research Institute

Meteorological  
Satellite Center

Aerological Observatory

Magnetic Observatory

Meteorological College

Climate Prediction Division  
/Tokyo Climate Center

Advisory Panel on  
Extreme Climate Events

# Overview of climate services by TCC

- CPD/TCC provides various climate services not only to domestic users in Japan but also NMHSs in the Asia-Pacific region.

Domestic users  
in Japan

NMHSs  
in Asia-Pacific region

Long-range forecasts

Reanalysis data

El Niño Monitoring and Outlook

Climate Monitoring and System Monitoring

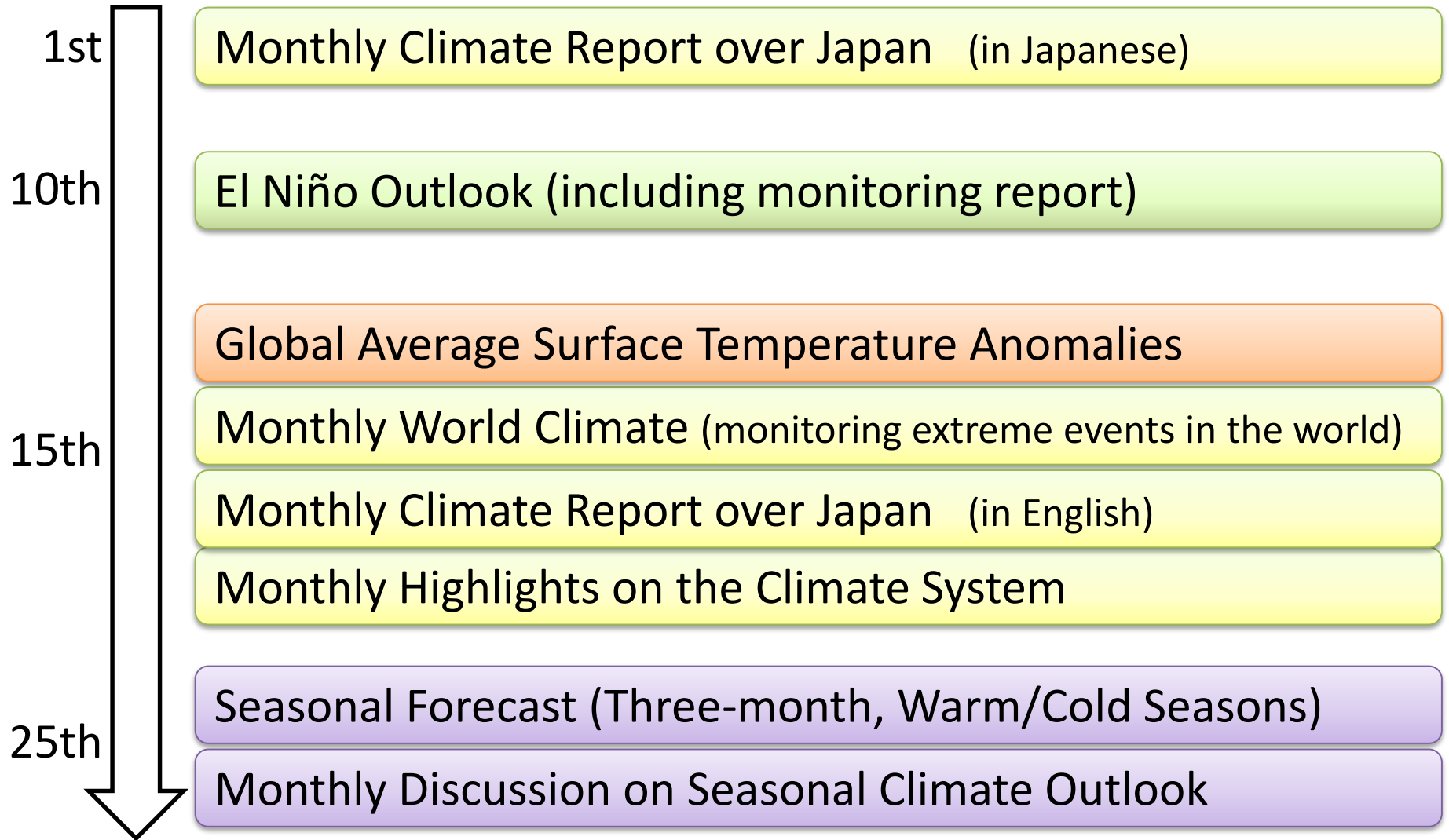
Global Warming Monitoring and Projection

Climate Risk Management

- GPC-LRF Tokyo
- RCC Tokyo (RA II)
- GSN MC
- LC for GCOS
- STRATALERT

**Climate Prediction Division/Tokyo Climate Center**

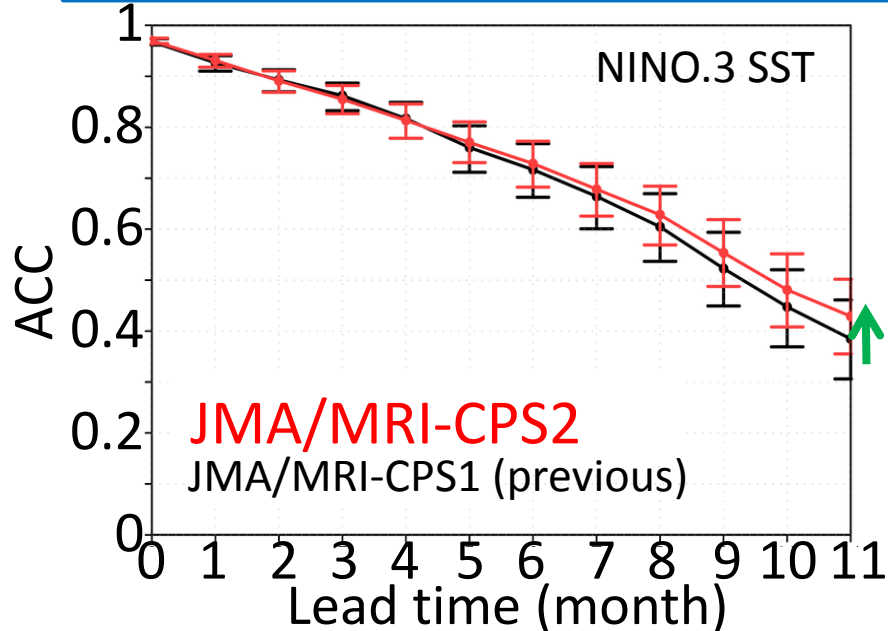
# Provision of climate information ~ Monthly Schedule ~



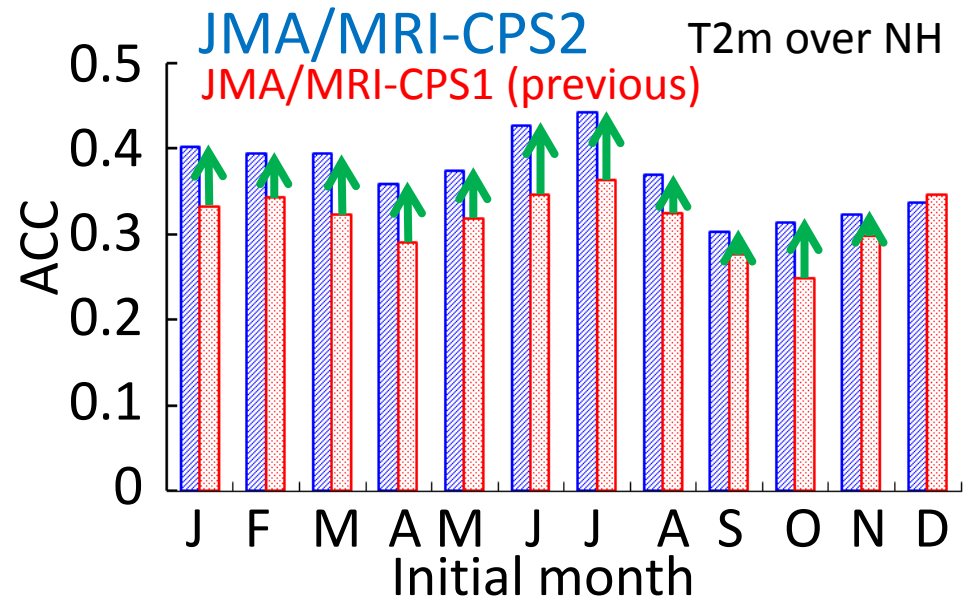
# **TCC/JMA'S IMPROVEMENT & ACTIVITIES OF CLIMATE SERVICES DURING 2015-2017**

# Upgrade of JMA Seasonal EPS (2015)

- JMA/MRI-CPS2 (Takaya et al. 2017)
- Improving resolution and model physics in the model's atmospheric and oceanic components
- Introducing an interactive sea ice model
- Improving ensemble configuration



Anomaly correlation coefficients (ACCs) between observed and predicted NINO.3 SST with respect to forecast lead time



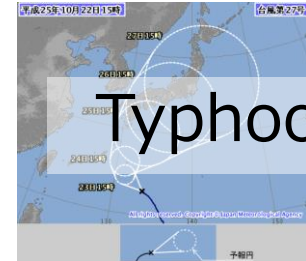
NH average of ACCs between observed and predicted three-month averaged T2m with respect to initial months

<http://ds.data.jma.go.jp/tcc/tcc/products/model/index.html>



# Launch of JMA Global EPS (2017)

- JMA Global EPS is the basis to provide more seamless forecasts to users.
- Dataset of JMA Global EPS is available on the S2S project. (S2S: Subseasonal to seasonal)



Typhoon Info.

Typhoon EPS



Weekly EPS



One-month EPS



**Global EPS**

2月26日5時 東京都の週間天気予報

日付	26金	27土	28日	29月	1火	2水	3木
東京地方	晴時々曇	晴のち曇	曇時々晴	曇時々晴	晴時々曇	曇時々晴	曇
府県天気	晴時々曇	晴のち曇	曇時々晴	曇時々晴	晴時々曇	曇時々晴	曇
降水確率(%)	0	0	0	0	0	0	30
信頼度	/	/	A	A	A	A	A
東京 最高(℃)	10	12	13 (10~16)	12 (10~15)	11 (8~13)	15 (12~17)	18 (15~21)
東京 最低(℃)	/	2	4 (2~6)	4 (2~6)	2 (1~4)	3 (2~5)	6 (4~9)

Weekly Forecast

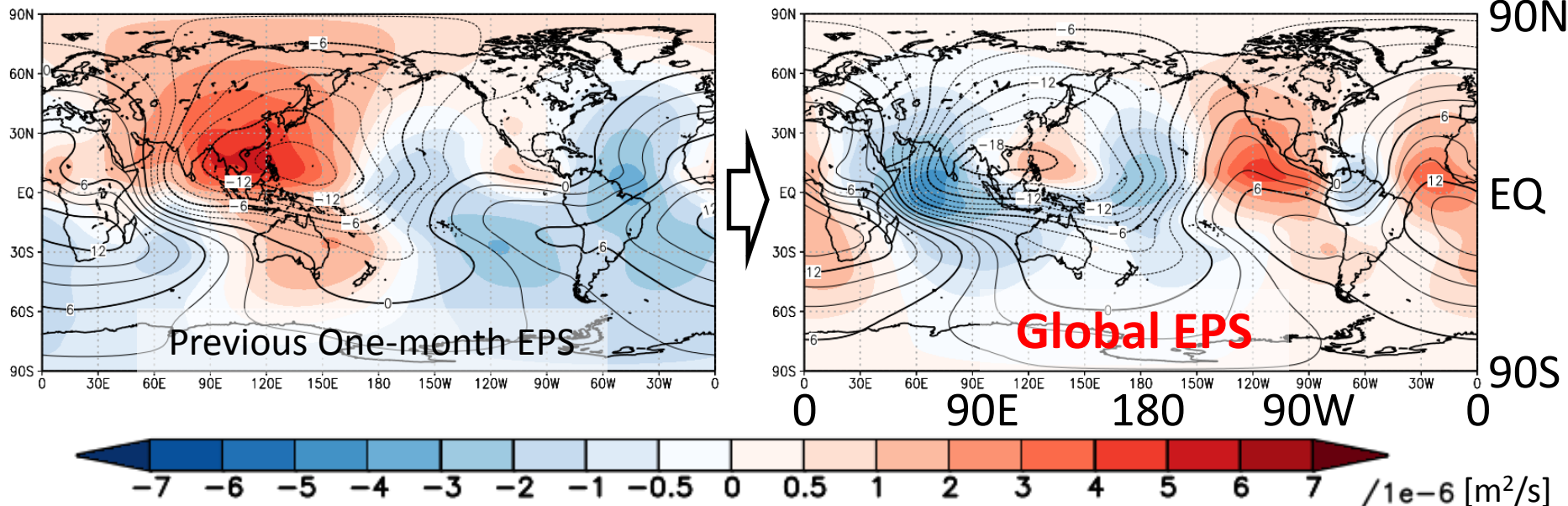
Early Warning Info. on Extreme Weather (~2 weeks)



One-month Forecast

# Launch of JMA Global EPS (2017) (cont.)

- Improving resolution, model physics and ensemble method compared with the previous One-month EPS.
- Improving its skills of prediction, e.g., decreasing mean error of the weak Asian monsoon in summer, increasing anomaly correlation coefficients of Z500 over NH.



Climatological fields of velocity potential at 200 hPa (contours) and related mean error (shading) for summer (JJA) with (a) the previous One-month EPS and (b) the Global EPS . The contour interval is  $2 \times 10^6 \text{ m}^2/\text{s}$ .

<http://ds.data.jma.go.jp/tcc/tcc/products/model/index.html>

# Global model/EPS operated by JMA (As of Nov. 2017)

GSM

- Daily Forecast
- Typhoon Forecast
- One-week Forecast

Horizontal Resolution

20km

Global  
EPS

- Typhoon Forecast
- One-week Forecast
- Early Warning Information on Extreme Weather (~2 weeks)
- One-month Forecast

(~18d)40km  
(18d~)55km

Seasonal  
EPS

- Three-month Forecast
- Warm/Cold Season Forecast
- El Niño Outlook

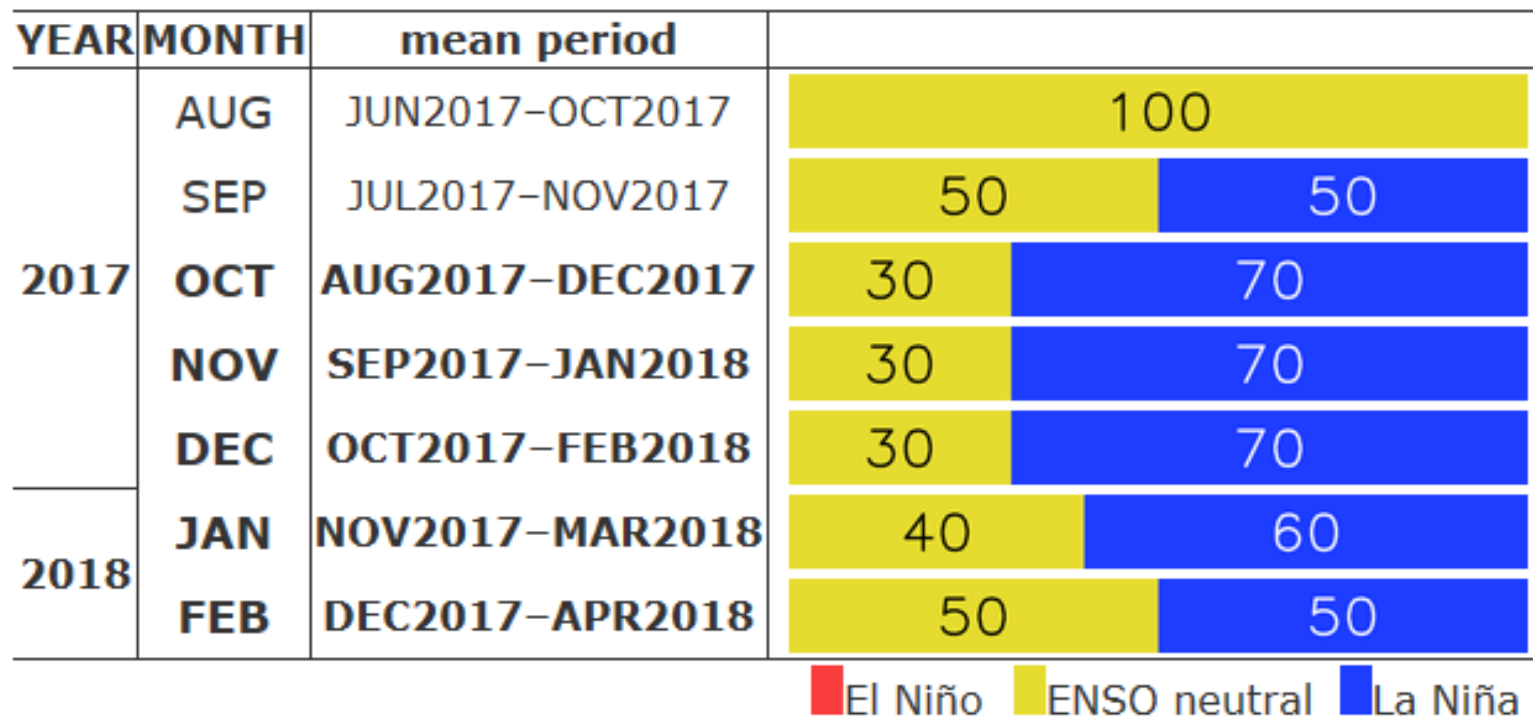
(a)110km  
(o)100km(lon)  
/50km(lat)

(GSM: Global Spectral Model, EPS: Ensemble Prediction System)

# Incorporation of ENSO Forecast Probabilities into the El Niño Outlook (2016)

- Newly adding forecast probabilities for the onset, persistence and end of ENSO events (El Niño, ENSO neutral and La Niña)

ENSO forecast probabilities based on JMA/MRI-CGCM2 issued on 11 Oct. 2017



<http://ds.data.jma.go.jp/tcc/tcc/products/elnino/index.html>

# Version upgrade (ver. 5) of iTacs (2015)

- New datasets: 30-year re-forecast (hindcast) datasets of JMA One-month EPS (currently, Global EPS)
- Production of clear images
- More efficient connections between client PCs and web servers

## iTacs

- iTacs is a web-based application for analyzing and monitoring climate.
- It's available on web browsers, no additional software or plugins are required.

User Information    Logout    Re

User ID: xxx

Analysis Dataset    Forecast Dataset

### Analysis Dataset

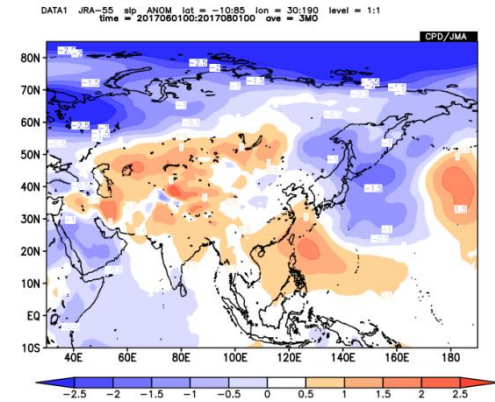
Select parameters    Graphic Options

#### Data1

Dataset	Element	Data type	Area	Level	Time unit	Showing period
JRA-55	Surface SLP (Sea Level Press)	ANOM	ASIA Lat: -10 - 85 Ave <input type="checkbox"/> Lon: 30 - 190 Ave <input type="checkbox"/>	1	MONTHLY <input checked="" type="checkbox"/> Ave <input type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter	RANGE 2017 6 2017 8

Vector     SD  
Derivative:  lon  lat

Analysis method: -Analysis method-



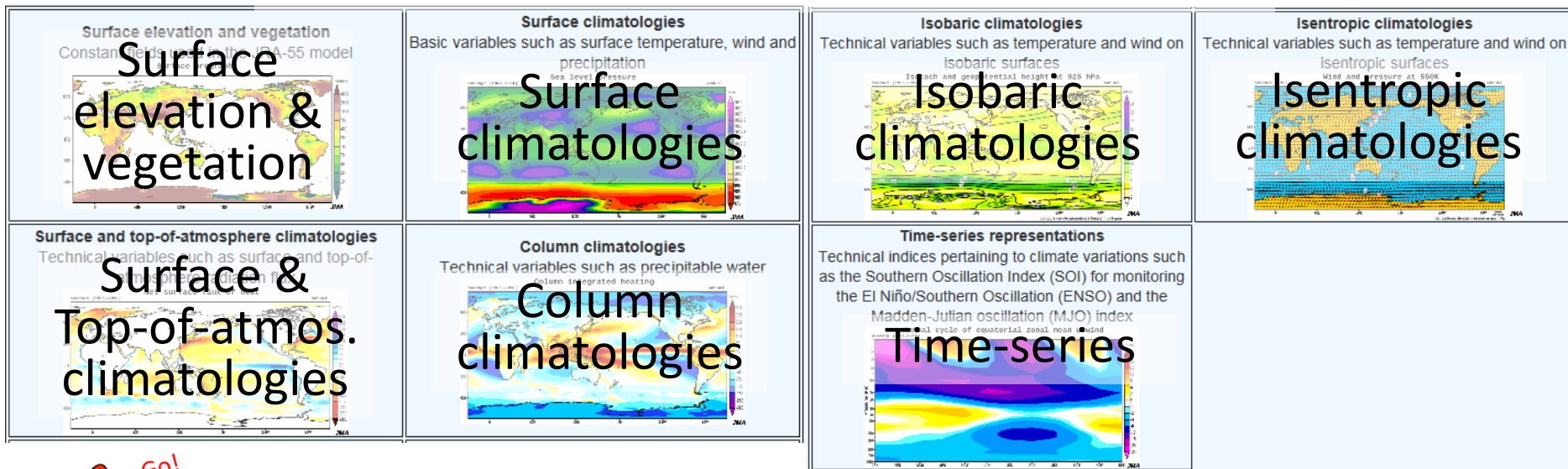
<http://extreme.kishou.go.jp/tool/itacs-tcc2015/>



# Release of JRA-55 Atlas (2016)

- A comprehensive set of global climate maps based on the JRA-55 (Kobayashi et al. 2015) for a variety of meteorological variables ranging from basic metrics such as surface temperature to technical consideration for climate research.

## Category list of JRA-55 Atlas

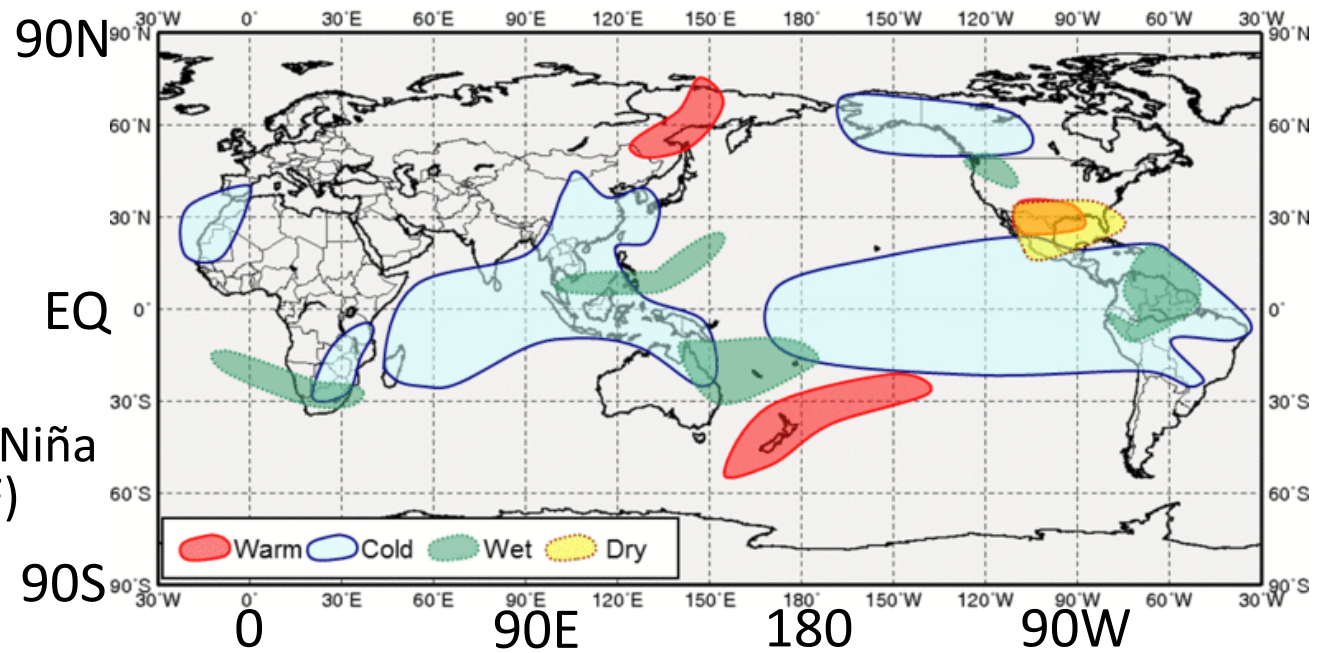


**JRA-55 Atlas: <http://ds.data.jma.go.jp/gmd/jra/atlas/en/index.html>**  
**JRA-55: [http://jra.kishou.go.jp/JRA-55/index\\_en.html](http://jra.kishou.go.jp/JRA-55/index_en.html)**

# Renewed statistical products regarding “Impacts of Tropical SST Variability on the Global Climate” (2016)

- Period for statistics: 55 years (1958-2012)
- Using JRA-55, as well as CLIMAT report and COBE-SST

Schematic chart  
of the Impacts of La Niña  
in Boreal winter (DJF)

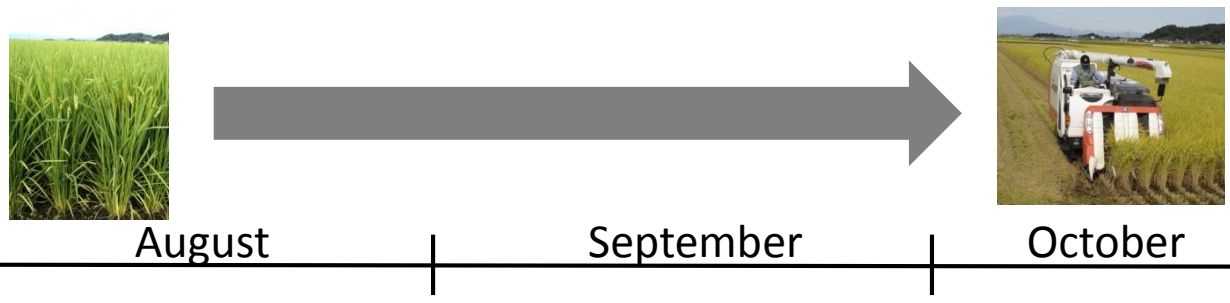


<http://ds.data.jma.go.jp/tcc/tcc/products/climate/ENSO/index.htm>

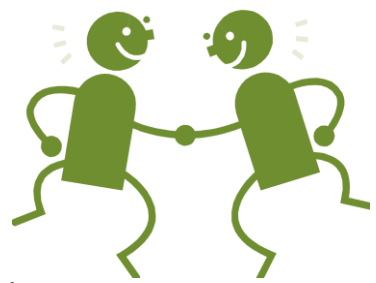
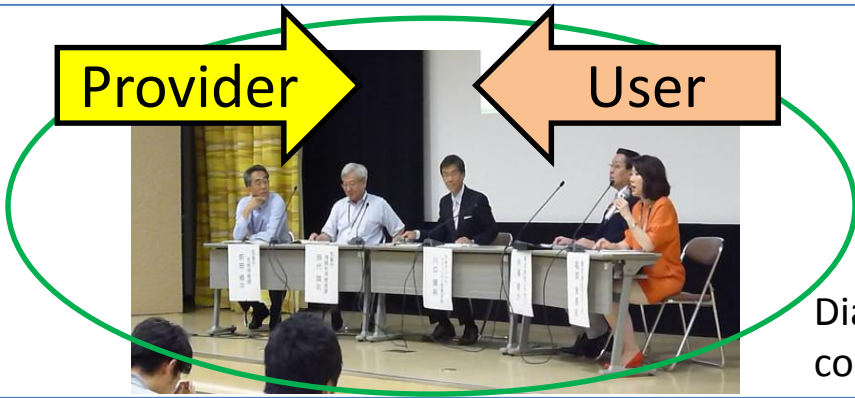
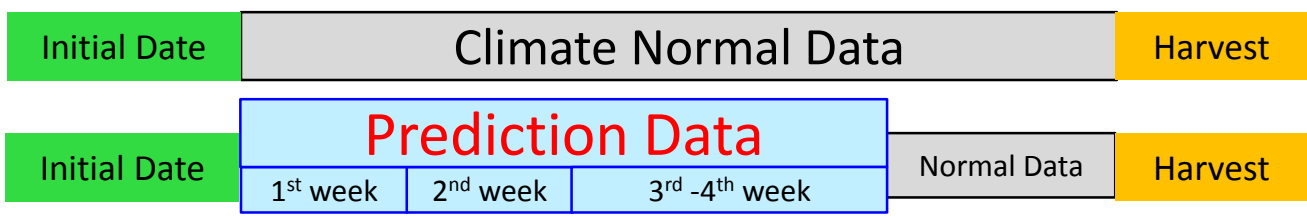
# Building of User Interface Platform (UIP)) in Japan

- In agrometeorological field: Support for use of prediction data instead of climate normal data to decide appropriate time to harvest rice.
- Holding seminars to enhance use of climate information in user sectors.

Use of prediction data to decide appropriate time to harvest rice



Conventional Method  
Developed Technique

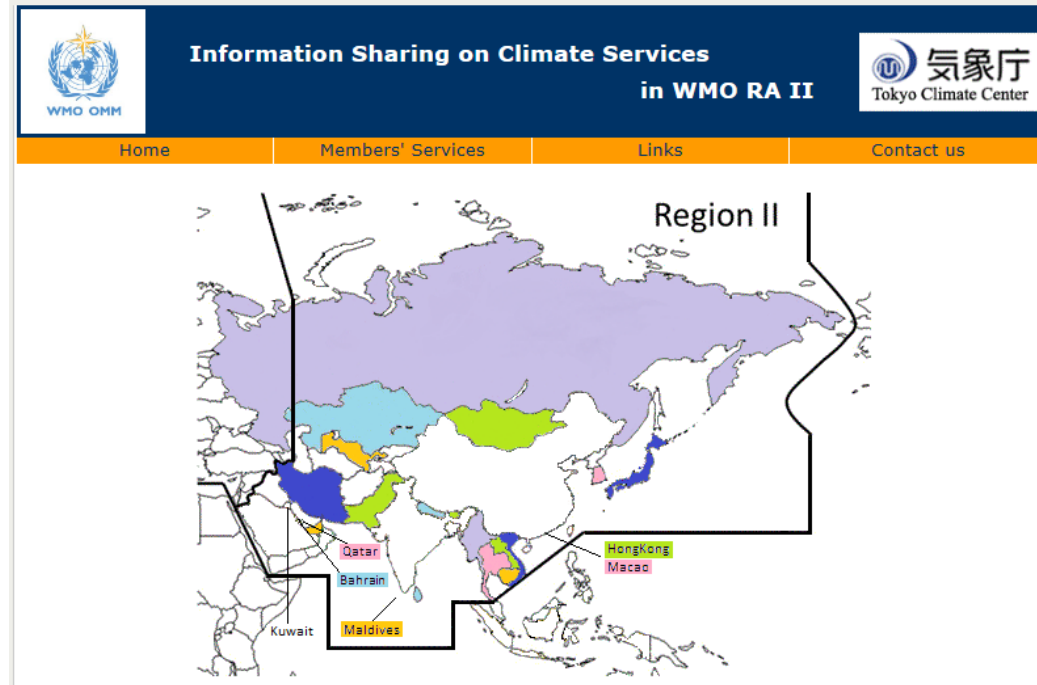


Dialogue, communication, collaboration

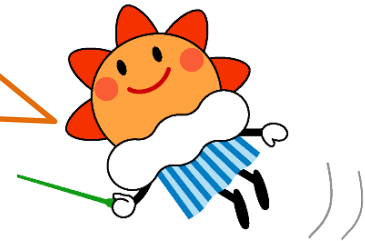


# Renewed “Information Sharing on Climate Services in WMO RA II” website (2017)

- In consideration of the achievements of the four-year RA II pilot project and its important contribution to information sharing, a decision was taken at RA II-16 in 2017 to continue enhancing the sharing of information on climate services in RA II and JMA/TCC was asked to continue maintaining the website for this purpose.



Thank you for  
your cooperation



<http://ds.data.jma.go.jp/tcc/RaiiInfoshare/>

# TCC Annual Training Seminar

One of the GFCS  
Contributing Projects

[FY2017] planned in Jan. 2018

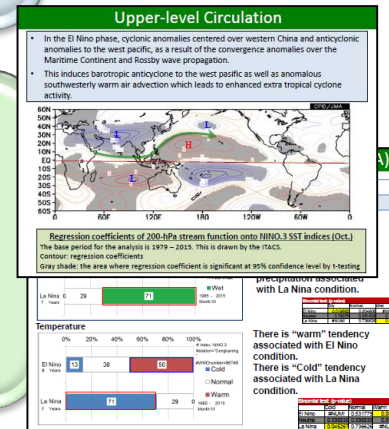
## Seasonal Forecast

- The seminar consists of not only lectures but also exercise and presentation by invited experts.

[FY2016]

## Climate Analysis and Monitoring

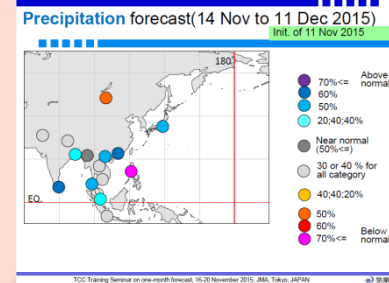
- To understand statistical and dynamical relationship between primary modes of global climate variability (e.g., ENSO) and regional climate.



[FY2015]

## One-month Forecast

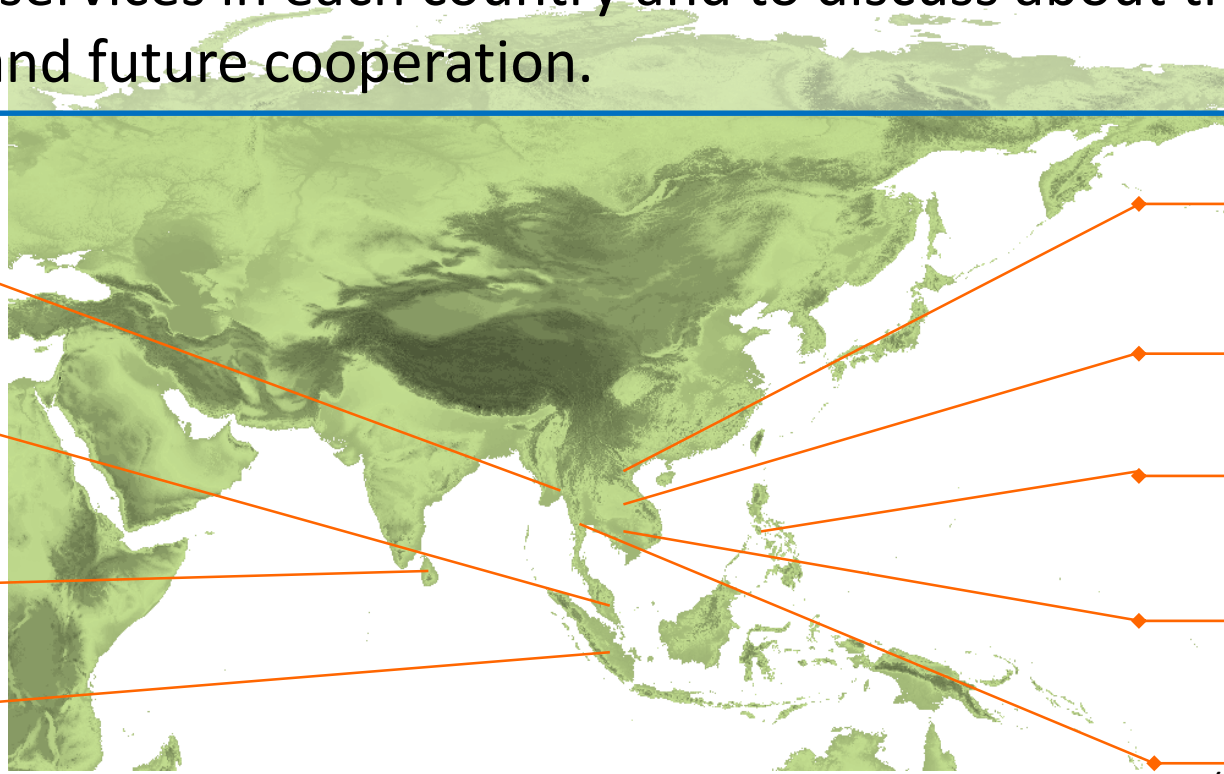
- To understand and improve skills in generating one-month prediction products using statistical downscaling methods



<http://ds.data.jma.go.jp/tcc/tcc/library/index.html>

# TCC expert visit

- TCC has arranged visits by TCC experts to NMHSs in Asia for discussions, technical transfer and training seminars since 2006.
- TCC experts visit also aims to share the current challenge of the climate services in each country and to discuss about the request to TCC and future cooperation.



Myanmar  
(2014)

Malaysia  
(2006, 07, 17)

Sri Lanka  
(2015)

Indonesia  
(2011, 13, 17)

Vietnam  
(2010, 12, 16)

Lao PDR  
(2012)

Philippines  
(2008, 12, 13)

Cambodia  
(2016)

Thailand  
(2006, 07, 08, 15)

# TCC News: the 50<sup>th</sup> issue coming soon!

- The next issue of TCC News is No. 50, the first being published in July 2005.



**Message from Editor**

The Japan Meteorological Agency (JMA) established the Tokyo Climate Center (TCC) in April 2002. TCC has been engaged in climate-related services for the world with the main purpose of assisting the climate change adaptation and prediction services at National Meteorological Services (NMSs) in Asia and Pacific regions. We are grateful to the NMSs in the regions for their cooperation and contribution extended to TCC.

TCC has been operationally providing data and information that are useful for climate monitoring and prediction through the TCC website, and sponsored several international meetings including a training course on climate-related matters. TCC is planning to provide probabilistic forecasts and improve climate monitoring and diagnostics based on the JRA-25 dataset. I expect that the TCC Newsletter will make further contribution to the advancement of climate related activities in the regions.

This TCC Newsletter, newly published and to be issued four times a year, will include articles on significant climate disasters and events, forecaster's commentaries on seasonal outlooks, besides topics on the renewal and the message of TCC products. I hope the newsletter will provide opportunities for timely exchange of views and information among the NMSs on up-to-date climate monitoring and predictions as well as ongoing significant climate events. It will also deal with news and information on international climate activities, such as the IPCC, and the development of climate-related services. I hope the newsletter is of help to activities in climate matters. Further collaboration and advancement of climate services among Asia and Pacific nations.

**No.1 (2005)**

**Shingo Yamada**  
Head of Tokyo Climate Center

**Ongoing Development Activities: COBE-SST**

In March 2006, TCC will put a new historical sea surface temperature (SST) dataset, named COBE-SST, into operation for climate system monitoring, especially for El Niño monitoring. The COBE-SST is a part of the gridded datasets called COBE. COBE consists of the gridded estimates of the variability of SSTs and marine meteorological variables (Ibahi et al., 2005). The COBE consists of global objective analyses from the late 19th century to present, using historical observations from the International Comprehensive Ocean Atmosphere Data Set (ICOADS) and the Kobe Collection datasets. The COBE-SST provides a long-term homogeneous dataset with high spatial resolution (one-degree mesh), which is of great value for monitoring global climate change (see Figure 1).

**References**  
Ibahi, M., A. Shoji, S. Sugimoto and T. Matsumoto, 2005: Objective Analyses of Sea-Surface Temperature and marine meteorological variables for the 20th Century using ICOADS and the Kobe Collection, Int. J. Climatol., 25, 864-879.

**Figure 1 Annual mean SST Anomalies over the Globe from 1891-present, computed as departures from the 1971-2000 mean using COBE-SST**

TCC News No.1 July 2005

Thank you for reading TCC News!



**No. 48**

**Contents**

Launch of JMA's Global El Niño Outlook (April)

JMA's Seasonal Numerical Weather Prediction (NWP) Warm Season Outlook for Summary of the 2016/2017 TCC contributions to Reg TCC Experts Visit Indonesia

**Launch of JMA's CII**

JMA replaced the previous Prediction System) with the GIC 23 March 2017 to produce predictions for one-month prediction GEPS is an integrated solution of typhoon information, one-month forecasts. Major changes from and related performance are as follows:

**Global temperature for**

The annual anomaly of temperature for the year 2016 (near-surface air temperature) is estimated at average, making it the warmest period since 1891 (Figure 1, air temperatures for January and July, and the seasonal boreal winter, spring, and recorded since 1891. W especially seen over wide area the Indian Ocean, and the T longer time scale, the annual pressure has been rising at a rate of 0.009 (0.036 - 0.102) x 10<sup>9</sup> m<sup>2</sup> per decade.

**Figure 1 Seasonal variation of sea ice extent in the North Pole from November 2016 to July 2017. The normal is the 30-year 2009/2010.**

**2. Major updates**  
Major changes in the new GIC one-month EPS are as follows:

- Atmospheric global circulation: A low-resolution version Model (GCM) launched is used with additional processes.
- Horizontal resolution

**No. 49**

**Contents**

Sea Ice in the Sea of Okhotsk (Aerosol dust) Event

TCC Experts Visit Malaysia

**Sea Ice in the Sea of Okhotsk**

The maximum sea ice extent in 2016/2017 was lower than the sea ice extent in the 2016/2017 was around the north February, and then fell below melting (Figure 1). The season's sea ice extent was 5.1 million km<sup>2</sup> below the normal of 1.169 x 10<sup>9</sup> km<sup>2</sup> average from 1980/1981 to 2016/2017. Although values for the interannual variations, there is of 0.069 (0.036 - 0.102) x 10<sup>9</sup> km<sup>2</sup> per decade (square brackets indicate 95% confidence interval), which equates to the total sea area per decade.

*(Ryohki Ohada, Office of Meteorology)*

**Figure 1 Seasonal variation of sea ice extent in the North Pole from November 2016 to July 2017. The normal is the 30-year 2009/2010.**

**No.50 (2017)**

**Figure 1 Seasonal variation of sea ice extent in the North Pole from November 2016 to July 2017. The normal is the 30-year 2009/2010.**

<http://ds.data.jma.go.jp/tcc/tcc/news/index.html>

# **FUTURE PLAN OF TCC/JMA'S CLIMATE SERVICES**

# Development of Reanalysis: JRA-3Q

- JRA-3Q: Japanese Reanalysis for Three Quarters of a Century
  - Period: 1947 to present (1958 to present for JRA-55)
  - Provisional specifications
    - Resolution: 40km, 100 levels (55km, 60 levels for JRA-55)
    - Incorporating many improvements from the operational NWP system in JMA
    - Using improved SSTs and other observations
      - SSTs: COBE-SST2 (1-deg, up to 1985) & MGDSST (0.25 deg, from 1985 onward)
  - Schedule (as of Nov. 2017)
    - Q1 2019: start production
    - Q1 2021: complete production for the 1991 – 2020 normal period
    - Q1 2022: complete production for the whole period

Thank you for your attention.