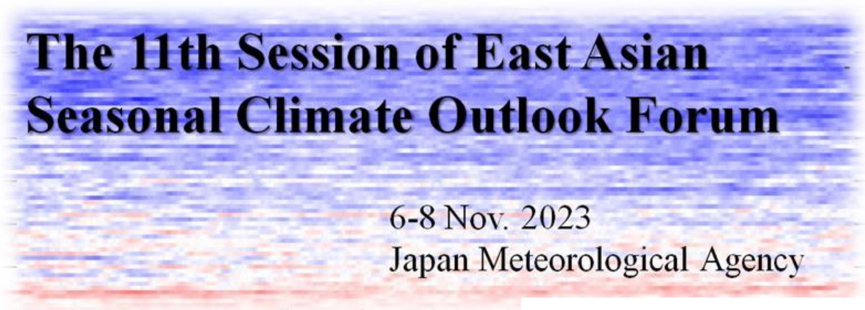
The Eleventh Session of the East Asia winter Climate Outlook Forum

6 – 8 November 2023

Tokyo, Japan



(Climate stripes with JRA-3Q)

Tokyo Climate Center
Japan Meteorological Agency

The Eleventh Session of
the East Asia winter Climate Outlook Forum

6 – 8 November 2023
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The Eleventh Session of the East Asia winter Climate Outlook Forum (EASCOF-11)

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Agenda

<u>Monday, 6 November</u>

Opening session: *(Mr. TAKAHASHI Kiyotoshi, JMA)*
10:00 – 10:30

- Welcome Address (Mr. NOMURA Ryoichi, Director-General for Atmosphere and Ocean Department, JMA)
- Opening Remarks from RAP (Mr. Ben Churchiil: Video)
- Self-Introduction
- Group Photo

10:30 – 10:45 Coffee Break

Session 1: Research and Development of climate variations associated with the East Asian monsoon

(Chair: Dr. WU Jie, CMA)

10:45 – 12:15

- Status and evolution of the World Meteorological Organization's regional climate outlook forums (Dr. Wilfran MOUFOUMA Okia, WMO) 30min
- The influence of snow cover over Eurasia on surface air temperature variability and its impacts on sub-seasonal prediction (Dr. TAKAYA Yuhei, MRI/JMA) 30min
- Establishment and verification of China Multi-Model Ensemble version 2 (CMMEv2.0) (Dr. WU Jie, CMA) 30min

12:15 – 14:20 Lunch

Session 2: Review of recent climatic features in East Asia

(Chair: Dr. MUNKHJARGAL Erdenebadrakh, NAMEM)

14:20 – 15:40

- Climate Events and Impacts over China in 2023 (Dr. MEI Mei, CMA) 20min
- Overview of Summer Climate over South Korea 2023 (Ms. JIIN SEONG, KMA) 20min
- Quasi-biweekly intensification of Pacific-Japan pattern that caused an intense heat over Japan in late July 2023 (Dr. TAKEMURA Kazuto, JMA) 20min
- Review of Summer Climate over Mongolia, 2023 (Dr. MUNKHJARGAL Erdenebadrakh, NAMEM) 20min

15:40 – 16:00 Coffee break

Session 3: Good practices for the engagement between producers and users of climate services

(Chair: Dr.KAYABA Nobuyuki)

16:00 – 18:00

- Our Efforts to Promote the Use of Climate Predictions in JMA (Ms. KATO Nariko, CPD/JMA) 20min
- Dynamical vs statistical seasonal forecasting and their application in agriculture (Dr. MASUTOMI Yuji, NIES) 40min
- Recent advances in agro-meteorological services for climate change adaptation (Dr. MARUYAMA Atsushi, NARO) 40min
- Discussion 20min

18:30 – 20:00 Reception at AL ROYAL GARDEN

<u>Tuesday, 7 November</u>

Session 4: Current Status and Future Plan of Seasonal Forecasting Service

(Chair: Mr. WONSIL HA, KMA)

09:30 – 11:00

- Recent Activities and Future Challenges of JMA's Sub-seasonal to Seasonal Prediction (Mr. HIRAHARA Shoji, JMA) 30min
- Current Status and Future of Seasonal Climate Prediction Services (Dr. JIA Xiaolong, CMA) 30min
- Introduction to WMO LC-LRFMME & KMA's Climate forecasting service (Mr. WONSIL HA, KMA) 30min

11:00 – 11:10 Tour of operation room for weather forecasts

11:10 – 11:30 Coffee break

Session 5: Seasonal outlook for winter 2023/2024

(Chair: Dr. ZHANG Daquan, CMA)

11:30 – 12:30

- Seasonal outlook for winter 2023/2024 over Mongolia (Dr. MUNKHJARGAL Erdenebadrakh, NAMEM) 30min
- Seasonal outlook for winter 2023/2024 over Japan (Mr. UESAWA Daisaku, JMA) 30min

12:30 – 14:30 Lunch

Session 5 (Cont.):

(Chair: Dr. ZHANG Daquan, CMA)

14:30 – 15:30

- Climate outlook in Korea for Winter 2023/24 (Mr. GYOSOON IM, KMA) 30min

- Seasonal climate outlook for winter 2023/2024 over China (Dr. ZHANG Daquan, CMA) 30min

15:30 – 15:50 Coffee break

Session 6: Discussion about objective seasonal forecasts and future perspectives on EASCOF

(Chair: Mr. SATO Hirotaka, JMA)

15:50 – 17:30

- Opening remarks at this session (Mr. SATO Hirotaka, TCC/JMA) 10min
- The implementation of objective seasonal forecasts with country level delivery: Needs and Gaps in Africa, Caribbean and Pacific (Dr. Wilfran MOUFOUMA Okia, WMO) 25min
- Preliminary investigation for Objective seasonal forecast in RAII (Mr. TAKAHASHI Kiyotoshi, TCC/JMA) 20min
- Discussion 45min

<u>Wednesday, 8 November</u>

Session 7: Discussion and summary of the outlook for winter 2023/2024

(Chair: Mr. NATORI Hiroaki, JMA)

09:30 – 10:30

- Summary of consensus outlook
- Discussion

10:30 – 10:50 Coffee break

Closing session:

(Chair: Mr. ITO Akira, JMA)

10:50 – 11:00

※Note: Times are shown in Japan Standard Time (JST).
Each presentation time includes discussion time (5-10min).

Abstracts

Status and evolution of the World Meteorological Organization's regional climate outlook forums

Wilfran MOUFOUMA OKIA

Head of regional climate prediction services division, The World Meteorological Organization

Abstract

Climate change threatens many facets of planetary inhabitability and human well-being. Scientifically credible and accessible climate information, products and services are important elements in the decision-making matrix for effective climate risk management and informing adaptation options, particularly in the context of a changing climate. In recent decades, the World Meteorological Organization(WMO) Regional Climate Outlook Forums (RCOF) emerged as the primary platform that brings together climate experts and sector representatives from countries in a climatologically homogenous region to provide consensus based climate prediction and information, with input from global and regional producing centres and National Meteorological and Hydrological Services (NMHS), with the aim of gaining substantial socio-economic benefits in climate sensitive sectors.

RCOFs strive assess the likely implications of the outlooks on the most pertinent socio-economic sectors in each region and explore the ways in which use can be made of them.

While RCOFs have evolved differently in several regions, based on specific needs and capabilities, and tailored to meet the national conditions, in all cases these forums strive to assess the likely implications of the outlooks on the most pertinent socio-economic sectors. Thus, RCOFs constitute reliable and authentic sources of high-quality climate information, developed through a cooperative endeavour and on a sustainable basis. This presentation outlines some RCOFs practices and recent experiences worldwide, and the ongoing efforts to establish and operationalize Regional Climate Forum (RCF), i.e. an evolution of RCOFs that enhances the portfolio of timescales, products and services, underpinned by mainstreaming of objective subseasonal and seasonal climate forecasting.

The influence of snow cover over Eurasia on surface air temperature variability and its impacts on sub-seasonal prediction

TAKAYA Yuhei
Meteorological Research Institute, Japan Meteorological Agency, Ibaraki, Japan

Abstract

Snow cover (SC) is considered one of important contributors to atmospheric predictability on subseasonal to seasonal time scales. However, the causal relationship in the snow-atmosphere interaction and its impact on sub-seasonal to seasonal (S2S) predictability remains not fully understood. This study evaluates the cause-and-effect relationship between SC and surface air temperature (SAT) at submonthly scales using a novel technique known as Liang-Kleeman information flow analysis. Initially, we focus on the causal relationship over Eurasia, specifically examining the November east-west dipolar SC pattern, a dominant large-scale SC phenomenon. The information flow analysis indicates a one-way causality from SAT to SC around the west pole (Europe) during boreal autumn (November), suggesting that SC has minimal influence on the time evolution of SAT. In contrast, causality from SC to SAT is significant around the east pole (the Mongolian Plateau). An atmospheric model experiment supports the SC-SAT causal relation obtained by the information flow analysis and suggests that the SAT response to SC can persist for up to a month due to snow-albedo feedback, though the response of the upper atmosphere in the model is small.

The study is also extended to investigate the SC-SAT causality in the Northern Hemisphere throughout entire seasons. Using information flow analysis, we identify 'cold spots' where SC conditions actively influence SAT on a sub-monthly timescale. These cold spots are identified by geographical location and season. Furthermore, we assess the SC-SAT causal relationship in operational S2S prediction models. The results indicate that the S2S models underestimate the influence of SC on SAT to varying degrees, suggesting deficiencies in the models. This study underscores the importance of accurately representing the effect of SC on SAT in S2S models for potential enhancements in sub-seasonal prediction skill. The findings contribute to a more fundamental understanding of the snow-atmosphere interaction and sub-seasonal predictability influenced by land snow conditions.

Establishment and verification of China Multi-Model Ensemble version 2 (CMMEv2.0)

Jie WU

Beijing Climate Centre, CMA

Abstract

Based on a combination of 6 Chinese domestic climate models and 3 imported data models from international operation centers, the National Climate Center (NCC) of China Meteorological Administration (CMA) has updated the China multi-model ensemble prediction system to its second version (CMMEv2.0) by including latest models, improving prediction products and enhancing skills verification. Since 2021, CMMEv2.0 has monthly issued the predictions of climate elements and main variability modes for the next 6 months and 4 rolling seasons. This paper gives a comprehensive documentation of the current performance of CMMEv2.0 during its hindcast (1993-2016) and real-time prediction (2021-present) periods. The assessment results demonstrate that CMMEv2.0 truly outperform the individual models, such as capture more realistically structures of the dominant modes of equatorial SST anomalies variability and exhibit better prediction skills of precipitation and 2m temperature anomalies especially over East Asian. The temporal correlation coefficient (TCC) scores for the prediction of Niño3.4 index reach 0.87 at 6-month lead by CMME, and the skills for precipitation and 2m temperature prediction are higher when targeted on boreal winter. ENSO is revealed as the primary sources for seasonal prediction, and the superiority of CMME can be attributed to its better performance on ENSO prediction and representation of ENSO-associated teleconnections. However, CMME, as well as individual models, tend to over-estimate the variabilities and the climate influence of ENSO event. Except that, during boreal summer, the SST variability over north Indian Ocean (NIO) are revealed as a crucial predictability source for the seasonal prediction over East and South Asian. CMMEv2.0 also yielded relatively stable skills for the real-time prediction in recent 2 years, showing by successfully predicted primary rainbelt over northern China for the summer of 2021 and 2022 and the warm condition for winter of 2022-23. Beyond that, the ensemble sampling experiment indicate the MME skills become saturated after the ensemble numbers increased to 5-6 models, and the selection of an optimal subgroup of ensemble models may further improve the prediction skills, especially over extra-tropics, which is deserved for further investigation..

Climate Events and Impacts over China in 2023

MEI Mei

Beijing Climate Centre, CMA

Abstract

North China and Northeast China had encountered intensive rainstorms and floods during this rainy season. An unprecedented rainstorm process hit the Beijing-Tianjin-Hebei region on July 29th to August 1st inducing the strongest basin-wide flood of Hai River since 1963. Besides, a heavy rainfall process on August 2nd to 5th in Northeast China caused flood disasters. In this summer, heatwaves started earliest, accompanied with extreme high temperatures in North China and Huanghuai area. Periodical high temperatures superimposed with meteorological droughts in some areas of North China and Northwest China caused compound disasters. Yunnan experienced sever winter and spring drought, and the drought intensity of January−to−June ranked the first since 1961. A sharp turn from drought to flood occurred in North Chinaduring late July to early August. Continuous droughts existed in Northwest China in mid-summer. From March 24th to mid-August, moderate drought developed in the upper and middle reaches of the Yangtze River Basin, with shorter duration, smaller range and lower impact than those in last year. The number of typhoons was less than normal but their desctructive power was extremely strong. TALIM was the third strongest among all first landing typhoons since 2000. DOKSURI had the second strongest landing intensity in Fujian province since 1949, whose residual circulation as a tropical depression led to serious floods in the Beijing−Tianjin−Hebei region. Besides, SAOLA and HAIKUI successively landed in China in September causing a high-level disaster risk. Due to frequent cold air processes, 15 dust weather processes occurred in the northern China in spring, and the number was the highest since 2011. The convective weather scattered across the country with strong disaster-causing. On September 19th , strong tornados attacked Yancheng and Suqian of Jiangsu province resulting in a few casualties.

Overview of Summer Climate over South Korea 2023

SEONG Ji in, HWANG Ho-seong, PARK Young Joo and KIM Jeong-sik,
Climate Change Monitoring Division, Korea Meteorological Administration, jiin13@korea.kr

Abstract

The mean temperature during the summer of 2023 in South Korea was 24.7℃, which was 1.0℃ above the normal. The precipitation during this summer was recorded at 1018.5 mm, higher than the normal of 622.7-790.5 mm.

The main feature of this summer's temperature was that each monthly temperature in June, July, and August was above the normals. Temperatures remained consistently high during the summer, resulting in the fourth-highest recorded summer mean temperature since 1973.

From late June to early July, hot and humid winds blew along the edge of the North Pacific Subtropical High (NPSH), causing temperatures to rise. In late July, the NPSH temporarily expanded, leading to continued high temperatures.

In early August, when Typhoon Khanun moved northward from the East China Sea, the air rising from the typhoon descended near South Korea, significantly raising the temperature.

From late July, an anticyclonic flow developed near Japan due to the positive Pacific-Japan pattern (P-J pattern), and humid and hot winds blew toward South Korea along the edge of the anticyclone. Meanwhile, this P-J pattern continued until mid-September, and the center of the anticyclone shifted toward Korea. As a result, with strong insolation, the mean temperature in September was 22.6℃, the highest recorded since 1973.

The main feature of this summer's precipitation was that the occurrence of intense and heavy rain in the mid-to-late period of Jangma or the monsoon season, which extended from June 25 to July 26. In particular, stationary fronts oscillated between the north and south for several days in the southern region of South Korea in mid-July, causing intensive and heavy rainfall. Precipitation in Southern parts of South Korea during the Jangma reached 712.3 mm, recording the highest amount since 1973.

During the Jangma season, hot and humid southwesterly winds along the edge of the NPSH often intersected with cold air flowing in from the upper-level trough, and the stationary front was significantly strengthened in mid-July.

- This summer, the sixth Typhoon Khanun was the only one that affected South Korea, bringing heavy rainfall and strong winds from August 9 to 10.

Generally, typhoons move west-northwest along the edge of subtropical anticyclone at low latitudes. and when they meet a trough or westerly belt at mid-latitudes, they tend to turn and move north-northeast.

However, Typhoon Khanun followed an unusual Z-shaped path. While approaching Korea, the steering current created by the surrounding air flow changed frequently. In addition, even after the typhoon made landfall on the Korean Peninsula, it continued on an unusual path, crossing Korea almost in a straight line from south to north, driven by the south wind-based steering current between the Tibetan high and subtropical high.

Quasi-biweekly intensification of Pacific-Japan pattern that caused an intense heat over Japan in late July 2023

Kazuto Takemura
Tokyo Climate Center, Japan Meteorological Agency

Abstract

Japan experienced an intense heat in summer 2023 with the persistent above-normal temperatures. Northern and eastern Japan particularly experienced significantly high temperatures in late July, when the highest temperatures are climatologically observed, with record-setting daily maximum temperatures in many observational stations. Japan Meteorological Agency (JMA)'s Advisory Panel on Extreme Climate Events diagnosed primary factors of the significantly high temperatures in late July through August. This presentation briefly describes features of the anomalous circulation in late July, that triggered the intense heat, and its possible factors to lead more detailed researches of dynamical mechanism and predictability assessment.

In late July, a hemispheric-scale Rossby wave train accompanied by the Silk-Road pattern was dominant in the Northern Hemisphere mid-latitude, causing the poleward-deflected subtropical jet over Japan in the upper troposphere. The Tibetan high was zonally split and remarkably deformed, and the upper-level low potential vorticity (PV) air masses detached from the Tibetan high toward east of Japan. While, the upper-level high PV air masses detached from the intensified mid-Pacific trough and migrated toward south of Japan, contributing to the enhanced convection through the dynamical ascent over the western North Pacific (WNP).

In the lower troposphere, the North Pacific subtropical high (NPSH) was markedly intensified in association with the enhanced convection over the WNP and the consequent cyclonic circulation near the Philippines, corresponding to the intensified Pacific-Japan (PJ) pattern. The PJ pattern was significantly amplified with a quasi-biweek period and temporarily reached the record-breaking amplitude in the end of July. The quasi-biweekly variability of PJ pattern was accompanied by northward-migrating enhanced convection including typhoons from the western equatorial Pacific to near the Philippines. The enhanced convection was likely induced and/or enhanced by the upper-level high PV intrusion and above-normal sea surface temperature over the regions. The latter was in association with remnant impacts of long-lasted La Niña until the preceding winter. Diabatic heating rate in the troposphere was significantly high over the WNP due to anomalously rich moisture despite a developing phase of El Niño, contributing to effective generation of available potential energy that intensified the PJ pattern. Intensified warm air advection toward northern Japan with the periphery of NPSH, adiabatic heating due to anomalous descent and the downward short wave radiation anomalies near the NPSH contributed to the intense heat over Japan.

“Review of Summer Climate over Mongolia, 2023”

E.Munkhjargal, G. Bayasgalan and B. Jargalan
Information and Research Institute of Meteorology, Hydrology and Environment

Abstract

Generally, data from in situ observations in Mongolia have estimated that the mean summer air temperature has increased by 0. 12°C with a deviation of 0.92°C during the last three decades.

But, the average temperature in summer 2023 in Mongolia soared by 1.01°C above the levels of the 1991-2020 period and was recorded as the 5th warmest summer since 1991 for Mongolia. June and August were relatively warm months, while July was around average.

Regionally, warm and dry weather prevailed in the western region throughout the summer, and moreover, daily temperature records were broken several times in this region. But in other regions of Mongolia, it is close to the average.

In terms of precipitation, in the last two months of this summer, except for the western region of Mongolia, the precipitation was near the average, slightly above average. The period of high rainfall began in early July, and daily precipitation records were broken a few times at most of the central stations in Mongolia.

During the period between June and August this summer, extreme conditions directly related to weather such as strong wind and heavy rain caused significant financial losses in Mongolia.

Our Efforts to Promote the Use of Climate Predictions in JMA

KATO Nariko

Tokyo Climate Center, Japan Meteorological Agency

Abstract

The Japan Meteorological Agency provides climate predictions such as two-week temperature forecast, one-month and three-month forecasts. I will make a presentation about our efforts to promote the use of climate predictions collaborated with users.

Global warming and extreme weather conditions have been beginning to affect various industries and our daily lives. In general, adverse effects from such conditions are called climate risks, and climate risk management involves understanding and taking effective actions against them. It is important to adapt climate risks appropriately and JMA has been taking a variety of activities to adapt to climate risks.

In collaborating with agricultural institutes, we found that peach blossom blooming could be predicted more accurately by using two-week temperature forecast rather than the traditional method using long-range average temperature value. Similar methods using two-week temperature forecast have been put into practical use in various places in Japan.

In collaborating with soft drink industries, we confirmed that the sales of cold and hot drinks from vending machines were correlated with temperature, also found that using two-week temperature forecast during cold and hot drinks replacement could reduce sales losses.

In recent years, we have been promoting the use of more long-range forecasts such as one-month and three-month forecasts. The National Agriculture and Food Research Organization (NARO) has been developing models for growth prediction. NARO and JMA are jointly researching best practices to predict earlier climate risks on agriculture using one-month and three-month forecasts.

On the other hand, long-range forecasts are not well-known and not well-used unlike short-range forecasts. Therefore, JMA has conducted three-month forecast briefings monthly for private weather companies to encourage the use of long-range forecasts in a variety of industries.

Dynamical vs statistical seasonal forecasting and their application in agriculture

Yuji Masutomi

Center for Climate Change Adaptation, National Institute for Environmental Studies

Abstract

In this presentation, I would like to discuss two topics. The first topic is the comparison of performance between dynamical and statistical seasonal forecasting, and the second topic is the application of seasonal forecasting in agriculture.

Dynamical and statistical seasonal forecasting each have their strengths and weaknesses. For instance, dynamical forecasting has high costs in terms of development and computation, but it aids in understanding phenomena. On the other hand, statistical forecasting has significantly lower costs, but it is not very useful for understanding phenomena. Despite these distinct characteristics, both types of forecasts serve the same purpose, which is seasonal forecasting. So, which one is better in terms of forecast accuracy? To address this question, I used JMA/MRI-CPS2 as the dynamical forecast and a model utilizing climate indices as the statistical forecast to compare the accuracy of seasonal precipitation forecasts. I will discuss the details of this comparison in the presentation.

The second topic is the application of seasonal forecasting in agriculture. Seasonal forecasts predict climate variables like temperatures and precipitation for the upcoming months, which is valuable information by itself. However, the impact of high temperatures or excessive rainfall on crops varies significantly depending on the timing and location. Therefore, agricultural farmers, officers, and professionals need not only climate information but also agricultural information like crop yield. In other words, it is necessary to translate climate information into agricultural information. This translation is achieved through crop growth models. I have been using these crop growth models to convert seasonal forecasting information into crop yields and have developed a system to display this information online. I would like to provide an overview of this system in the presentation.

Recent Advances in Agro-Meteorological Services for Climate Change Adaptation

Atsushi Maruyama

National Agriculture and Food Research Organization, JAPAN

Abstract

Agriculture is one of the industries most strongly affected by climate change. Climate services to support crop cultivation (agro-meteorological services) would be a key technology for climate change adaptation in agriculture. This report presents recent advances in agro-meteorological services in Japan, including precise meteorological data covering farmland across the country, crop growth and yield prediction models, and a novel thermometer suitable for use on farmland.

The Agro-Meteorological Grid Square Data (AMGSD) was developed covering the entire Japan with a resolution of 1 km. AMGSD seamlessly connects historical data and forecast data to enable crop growth prediction that are governed by long-term weather conditions. Historical data is based on observations at more than 600 weather stations in Japan and their spatial interpolation. Forecast data are based on JMA's Global Spectral Model (GSM) for data from 0 to 1 day, JMA's Meso-Scale Model (MSM) for data from 2 to 9 days, and Model Output Statistic (MOS) Guidance for 1-month by JMA for data from 10 to 26 days. In addition, normal values are used for weather data beyond 26 days. AMGSD provides daily data for a total of 14 factors important to agriculture, including daily mean, maximum, and minimum air temperatures, precipitation, solar radiation, longwave radiation, and snow depth.

Based on AMGSD and crop growth models, decision support systems for farmers have been developed to predict harvest times and weather hazards for several crops, including rice, wheat, and soybeans. The decision support systems also use disease/pest forecasting models to assist in crop disease and insect control, and a microclimate model to support field irrigation. One of the most advanced examples of decision support service is the Climate Smart Irrigation System. The CSIS is based on the Internet of Things (IoT) using recent information and communication technologies, which enables appropriate water management to avoid high and low temperature damage to crops according to predicted weather conditions. Furthermore, CSIS is expected to be applied to water management for water conservation based on rainfall forecasts and for reducing methane production in rice paddies for climate change mitigation.

In farmlands, irrigation and cropping alter surface thermal conditions, so that independent weather observations are essential for accurate crop growth prediction. A novel thermometer with multiple spherical sensors (3-globe thermometer) was developed to accurately measure the air temperature of farmland, which is the most important factor in crop growth prediction. Principle of 3-globe thermometer is based on the energy balance for a spherical surface, and radiation effects are eliminated without using a radiation shield. Therefore, the 3-globe thermometer can measure the air temperature in farmlands without using commercial power for ventilation. The error of the 3-globe thermometer is within 0.2°C, and is expected to be used in future agro-meteorological services.

Recent Activities and Future Challenges of JMA's Sub-seasonal to Seasonal Prediction

HIRAHARA Shoji

Meteorological Research Institute, Japan Meteorological Agency, Ibaraki, Japan

Abstract

This presentation provides a brief summary of recent advancements and future plans for the seasonal forecasting system at the JMA. First, we highlight the implementation of the JMA/MRI-CPS3, the latest version of our system, which was launched in February 2022. Compared with the previous system, CPS3 features a significantly increased model resolution for both atmospheric and ocean models, improved data assimilation systems, and more comprehensive physical processes.

The system has demonstrated improved prediction skills on sub-seasonal to seasonal timescales, including for MJO and ENSO. Ongoing developments include examining the causes of a large positive IOD-type model bias during the boreal summer. Additionally, we are actively developing an eddy-permitting resolution ocean 4DVAR and coupled data assimilation systems to further enhance the ocean forecast skill at early lead times.

Current status and future of climate prediction and services in BCC

Xiaolong JIA

Beijing Climate Centre, CMA

Abstract

Designated as a WMO RCC in RA II (Asia) at EC-LXI in June 2009, BCC undertakes the obligation of delivering climate services to neighboring and surrounding countries in Asia and the international climate community in general. BCC is responsible for global monitoring and prediction of climate and climate change of sub-seasons, months, seasons, years and decades. For the past five years, BCC has accurately predicted the temperature trend of winter in China.

Based on several domestic operationally-run climate models and internationally imported data, Beijing Climate Centre has established the China Multi-model Ensemble Prediction System(CMME). It provides the prediction and verification products of basic climate elements such as temperature and precipitation, as well as the primary climate variability modes.

BCC has established a technical scheme for objective risk assessment of single disaster and comprehensive risks, including establishing key technologies for typhoon disaster risk assessment, and achieve rolling risk pre-assessment of typhoon disasters; and established a preliminary overall technical scheme for Meteorological Disaster Risk Pre-assessment at different time scales (extension and monthly), and achieve risk pre-assessment based on multi-model.

BCC has established the Climate Information Processing and Analysis System (CIPAS) for the past 10 years. CIPAS3.0 is now widely used at both the national and provincial levels.

In the future, BCC’s modern climate operational system will be fully built, and the intelligent transformation of climate monitoring, prediction and projection, risk assessment, and climate services will be realized as a whole.

WMO LC-LRFMME & KMA's Climate forecasting service

HA Wonsil, IM Gyosun, GONG Yeonji, WON Youjin
and CHO Kyungsuk
Climate Prediction Division, Korea Meteorological Administration

Abstract

The Korea Meteorological Administration (KMA) has been operating the World Meteorological Organization (WMO) Leading Center for Long-Term Forecasting (LC-LRFMME) since April 2009, having been recognized by WMO for its multi-model ensemble forecasting technology. This Leading Center collects climate forecast data from 15 organizations*, produce it as multi-model ensemble forecast data** in both image and digital formats, and make it available through its website (www.wmolc.org) around the 15th of every month.

In September 2022, 15 participating organizations agreed to make the Leading Center's data open and accessible. As a result, KMA fully opened the Leading Center's climate prediction data to all users from July 26. As part of this effort, KMA removed the login function from the existing Leading Center website and created downloadable user manuals in both English and Korean versions to assist users in understanding the data, thereby increasing the data accessibility and usability. This release of data is expected to be used not only in academic research and technology development in the field of climate prediction but also in industrial sector that are sensitive to extreme climate.

In addition, the status and future plan of KMA's long-range forecast service will be presented in the forum.

* 15 organizations: Korea, US, UK, Germany, France, Japan, China, Canada, Australia, Italy, Brazil, Russia, South Africa, India Meteorological Administration, and European Center for Medium-Range Weather Forecasts (ECMWF)

** Provided data: Climate prediction models, verification results, and more for a total of 9 types information, including air temperature, precipitation, sea surface temperature, sea level pressure, 850hpa temperature/wind (east-west), 500hPa GPH, and sea ice.

“Seasonal outlook for winter 2023/2024 over Mongolia”

E.Munkhjargal, G. Bayasgalan and B. Jargalan
Information and Research Institute of Meteorology, Hydrology and Environment

Abstract

IRIMHE issued its outlook for the coming winter (DJF) in September 2023 and will be updating it by the end of October.

Overall, we have been using the results of eight kinds of dynamical models such as the Tokyo Climate Center, European Centre for Medium-Range Weather Forecasts so on, and also using outputs of a coupled general circulation model at NAMEM was performed, and statistical analysis.

According to the results of current models and statistical analysis, the air temperature in the eastern part of Mongolia is expected to be warmer than normal, and in other regions, it is expected to be normal. In terms of precipitation for the coming winter, expected to be average conditions across Mongolia.

Overall, more detailed analysis results of numerical and statistical models will be presented.

Seasonal Outlook for winter 2023/2024 over Japan

UESAWA Daisaku

Tokyo Climate Center, Japan Meteorological Agency

Abstract

The Japan Meteorological Agency (JMA) issued its outlook for the coming winter (December 2023 - February 2024) over Japan in September and updated it in October.

The current El Niño conditions are likely to continue through the coming winter. The sea surface temperature (SST) is expected to be continuously above-normal over the central and eastern equatorial Pacific. Besides El Niño, a positive Indian Ocean Dipole (IOD) event appears to be currently occurring, and a positive IOD-like SST pattern (above-normal over the western Indian Ocean and below-normal over the eastern Indian Ocean) is expected to continue until at least early winter. Corresponding to these SST anomalies in the tropics, the convective activities would be enhanced over the western Indian Ocean and the central equatorial Pacific, while suppressed over the eastern Indian Ocean and the Maritime Continent. As a forced response to these anomalous convective activities over the tropical Indian Ocean and the Maritime Continent, stationary Rossby waves propagating along the subtropical jet stream (STJ) would be excited. The propagation of Rossby waves would cause the northward shift of the STJ around Japan. In association with the northward shift of the STJ, the weaker-than-normal winter monsoon is expected around Japan.

Based on these oceanic/atmospheric conditions predicted by JMA's seasonal ensemble prediction system, the JMA's latest outlook for winter over Japan says that seasonal mean temperatures are expected to be above-normal (60% chance) nationwide except for northern Japan. In northern Japan, seasonal mean temperatures are equally expected to be above-normal or near-normal (40% chance). Seasonal snowfall amounts are expected to be below-normal (50% chance) on the Sea of Japan side of eastern and western Japan.

Climate outlook in Korea for Winter 2023/24

IM Gyosun, HA Wonsil, GONG Yeonji, WON Youjin
and CHO Kyungsuk
Climate Prediction Division, Korea Meteorological Administration

Abstract

The seasonal outlook for winter 2023/24 over Korea will be presented based on the KMA's operational climate prediction system, Global Seasonal Forecasting System version 6 (GloSea6) and Multi-Model Ensemble (MME) resulting from the WMO Lead Centre for Long-Range Forecast MME (WMO LC-LRFMME), as well as the impacts of essential climate indices. The preliminary results indicate that temperatures will be above normal in November, December, and February, and near normal in January over Korea. Precipitation will be above normal from November to December and near normal from January to February over Korea. El Niño events are highly likely to continue during the coming winter.

A positive IOD in the fall and an El Niño event in the winter are expected to suppress convective activity in the eastern Indian Ocean and the tropical western Pacific. This is expected to strengthen the anticyclonic circulation over eastern Japan, affecting the Korean Peninsula.

However, if the Barents–Kara Sea ice remains below normal, as expected to persist through the winter, it could lead to Ural blocking and the development of a continental high. Consequently, a cold and dry air flow may enter the Korean Peninsula, potentially causing a decrease in temperatures and precipitation. But, there may be variations in weather patterns throughout the season.

Detailed analysis results from numerical models will be presented.

Seasonal Outlook of the Climate in 2023/2024 Winter over China

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Abstract

El Niño conditions are present in current oceanic and atmospheric observations. The sea surface temperature (SST) of central and eastern Pacific Ocean is warmer than normal, while the SST anomalies of tropical Indian Ocean is positive. The tropical Indian Ocean dipole mode is in its positive phase. The SST over western North Pacific is warmer than normal. The SST anomalies of most North Atlantic Ocean are positive, especially for tropical north Atlantic. Both dynamical and statistical models predict a continuation of El Niño is extremely likely this Fall and Winter. The sea ice concentration in Barents and Kara Sea in early autumn of 2023 is above normal with linear trend subtracted.

According to the seasonal outlook of 2023/2024 winter issued by Beijing Climate Centre (BCC/CMA), the Artic Oscillation (AO) would be in is positive phase and the Siberian high would be weaker than normal, especially in early winter. Under the background of El Niño condition, western North Pacific anticyclone (WNPAC) would develop in the lower troposphere. Meanwhile, the western North Pacific subtropical high (WNPSH) is likely to be stronger than normal and extends westward. The position of WNPSH ridgeline would displaces northward in early winter and southward in late winter. The East Asian trough will be shallower and the intensity of East Asia winter monsoon (EAWM) will be weaker than normal in 2023/2024 winter. Under such atmospheric circulation background, above normal temperatures are likely for most parts of China excludes parts of Northeast China, southern Tibet and Southwest China. The chances of above normal temperature for most parts of China are greater in early winter. The greatest chances of above normal precipitation are indicated for most parts of southern China, northern part of North China and central Tibetan Plateau. The precipitation of northern part of Northeast China and Southwest China are expected to be below normal.

The implementation of objective seasonal forecasts with country level delivery: Needs and Gaps in Africa, Caribbean and Pacific

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Abstract

Climate change threatens many facets of planetary inhabitability and human well-being. The provision scientifically credible and accessible climate services are important elements in the decision-making matrix for effective climate risk management and informing adaptation options. Climate information contained within these services originates from a variety of sources, including observations and monitoring of the climate system, and predictions of climate on subseasonal, seasonal and longer timescales. Ongoing advances in understanding of the climate system, and climate models that are used to make predictions are enabling the continual improvement of climate services to better serve various socio-economic sectors, such as agriculture, health, water resource management, energy, and disaster preparedness. Furthermore, the Climate Services Information System (CSIS) is an integral part of the Global Framework for Climate services (GFCS) and a systematic approach for coordinating the development, archiving, co-production, and use of such climate information by decision makers, with defined roles for federal agencies and non-federal entities such as academic institutions. The WMO global review of Regional Climate outlook Forums (RCOF) conducted in 2017 highlighted the need for RCOF processes to include objective seasonal forecasting techniques and products. The aim is to foster a transition from the currently subjective and consensus-based seasonal outlook generation practices of RCOFs into traceable, reproducible and verifiable objective seasonal predictions, based on multi-model ensembles from dynamical climate models. This presentation highlights ongoing efforts and experiences in the implementation of objective seasonal forecasting to further enhance country-level capacity to produce and deliver tailored products and services in Africa, Asia and South America and address national and sub-regional priority needs.

Preliminary investigation for Objective Seasonal Forecast in RAII

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Abstract

After the Decision 9 (WMO EC-72), an objective seasonal forecast (OSF) process based on the multi-model ensemble (MME) of dynamical models results has been introduced into the process of consensus outlook in some RCOFs. Although there are preceding cases such as SASCOF, notable progress toward utilizing MME is not yet established in other RCOFs in RA II and there are still some challenges in its introduction into the actual RCOF process.

To approach such challenges of implementing OSF into RCOFs, the way of utilizing multi-model ensembles (MME) and calibration to improve the ordinary consensus-based processes are sought.

An investigation to evaluate the forecast performance of this new process in RAII has been conducted. For forecast data, the Copernicus Climate Change Service (C3S) hindcast data for eight models were used including their MME. CRU TS v4.03 data provided by the University of East Anglia were used for observation data of 2m temperature and precipitation. Climate Predictability Tool (CPT) developed by International Research Institute for Climate and Society (IRI) of Columbia University was utilized for calibrating the model output and subsequently generating probabilistic seasonal forecasts. It should be noted that MME data from WMO Lead Centre for Long-Range Forecast Multi-Model Ensemble (LC-LRFMME) were not used due to problem of hindcast data availability when this investigation started in 2022.

Based on CPT using above-mentioned data, the performance of June-July-August forecast initialized in May were evaluated by two metrics for the entire RA II region; Pearson’s correlation coefficients and the area under the ROC (Relative Operating Characteristic) curve.

Preliminary results show followings. Firstly, evaluation scores for MME tend to be better than any single model over the RAII. Secondly, scores for temperature predictions for RA II-average are generally good and the prediction performance tends to be higher in lower latitudes than the mid- and high-latitudes. Scores for precipitation were found to be too low for seasonal forecasts almost entire region of RAII. However further investigation should be needed for more detailed evaluations

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