The Fifth Session of the East Asia winter Climate Outlook Forum

8 – 10 November 2017

Tokyo, Japan

Tokyo Climate Center
Japan Meteorological Agency

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Agenda

The Fifth Session of the East Asia winter Climate Outlook Forum (EASCOF-5)

8 – 10 November 2017, Tokyo, Japan

Agenda

Wednesday, 8 November

Opening session:

09:45 – 10:05

- Welcome Address (Mr. Shogo Tanaka, Director-General of Global Environment and Marine Department, JMA)
- Self-Introduction

10:05 – 10:25 Coffee Break

Session 1: Current Status and Future Plan of Seasonal Forecasting Service

(Chair: Dr. Chan Xiao, CMA)

10:25 – 12:05

- Current Status and future plan of climate services in China (Dr. Yuping Yan, CMA) 25min
- Current Status and Future plan of Climate Services in JMA (Mr. Akihiko Shimpo, JMA) 25min
- Status and Plan of Seasonal Forecasting Service in KMA (Dr. Dong-Joon Kim, KMA) 25min
- Current and Future perspective of seasonal prediction of Mongolia (Mr. Davaadorj Amarsaikhan, NAMEM) 25min

12:05 – 13:30 Lunch

Session 2: Climate variations associated with the East Asian monsoon (I)

(Chair: Dr. Soyoung Yim, KMA)

13:30 – 15:00

- The role of Arctic sea-ice decline on cold winters in recent Eurasia (Dr. Masato Mori, University of Tokyo) 30min
- Predictability of the Polar-night Jet Oscillation and Its Impact on the Skill of Tropospheric Forecasts (Dr. Shunsuke Noguchi, Meteorological Research Institute/JMA) 30min
- Predictable seasonal temperature variability in the East Asian winter monsoon (Mr. Yuhei Takaya, Meteorological Research Institute/JMA) 30min

15:00 – 15:20 Coffee break

15:20 – 15:30 Group Photo

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

(Chair: Dr. Tosiyuki Nakaegawa, Meteorological Research Institute/JMA)

15:30 – 17:30

- Forecasting crop yield variability for world food agencies: toward operational services (Dr. Toshichika Iizumi, National Agriculture and Food Research Organization) 30min
- The poor weather early warning system in Tohoku District, Northern Japan; an example of climate data usage for agriculture (Dr. Hiromitsu Kanno, National Agriculture and Food Research Organization) 30min
- Development of Climate Risk Management Techniques for Agriculture at JMA (Mr. Nobuyuki Kayaba, JMA) 15min
- Dzud yearly warning system over Mongolia (Mr. Davaadorj Amarsaikhan, NAMEM) 15min
- KMA Extreme Climate Services and (User-specific) applications (Ms. Sunhee Bae, KMA) 15min
- Discussion 15min

18:30 – 20:00 Reception at the KKR Hotel Tokyo

Thursday, 9 November

Session 4: Climate variations associated with the East Asian monsoon (II)

(Chair: Dr. Hongli Ren, CMA)

09:30 – 10:30

- Influence of enhanced convection over Southeast Asia on blocking ridge and associated surface high over Siberia in winter (Mr. Kazuto Takemura, JMA) 30min
- Detection of Kamchatka blocking and its winter circulation pattern(Dr. Baek-Min Kim, Korea Polar Research Institute) 30min

Session 5: Review of recent climate conditions for East Asia

(Chair: Mr. Davaadorj Amarsaikhan, NAMEM)

10:30 – 11:00

- Characteristics of 2017 summer monsoon in East Asia (Mr. Hiroki Togawa, JMA) 30min

11:00 – 11:20 Coffee break

Session 5: Review of recent climate conditions for East Asia (cont.)

(Chair: Mr. Davaadorj Amarsaikhan, NAMEM)

11:20 – 12:20

- Review of major high impact climate events over China this year (Dr. Chan Xiao, CMA) 30min
- Overview of 2017 Summer Climate over South Korea (Dr. Soyoung Yim, KMA) 30min

12:20 – 13:50 Lunch

Session 6: Development and verification of seasonal prediction system

(Chair: Mr. Yoshiaki Sato, JMA)

13:50 – 15:20

- BCC climate prediction model system: developments and applications (Dr. Qiaoping Li, CMA) 30min
- Performance of JMA's Seasonal Ensemble Prediction System for recent events (Mr. Takashi Yamada, JMA) 30min
- Seasonal forecast skill of East Asian winter monsoon in APCC and CHFP multi-model data (Dr. Jee-Hoon Jeong, Chonnam National University) 30min

15:20 – 15:40 Coffee break

Session 7: Seasonal outlook for winter 2017/18

(Chair: Mr. Hajime Takayama, JMA)

15:40 – 18:00

- ENSO outlook (Mr. Ichiro Ishikawa, JMA) 20min
- BCC predictions of ENSO and primary EAST-Asian circulation patterns in 2017/18 winter (Dr. Hongli Ren, CMA) 20min
- Recent climate feature and seasonal outlook for Winter 2017/2018 over Mongolia (Mr. Davaadorj Amarsaikhan, NAMEM) 20min
- Climate Outlook for Winter 2017/2018 (Ms. Jeongwon Park, KMA) 20min
- Seasonal outlook for winter 2017/18 over Japan (Mr. Hajime Takayama, JMA) 20min
- Seasonal Outlook of the Climate in 2017/2018 Winter over China (Dr. Daquan Zhang, CMA) 20min
- Discussion 20min

Friday, 10 November

Session 8: Discussion and summary of the outlook for winter 2017/18

(Chair: Mr. Akihiko Shimpo, JMA)

09:30 – 10:30 Discussion and summary

Session 9: Discussion on future perspectives for EASCOF

(Chair: Mr. Kiyotoshi Takahashi, JMA)

10:30 – 11:50

- Report of the WMO Workshop on Global Review of Regional Climate Outlook Forums (RCOF) (Mr. Yasushi Mochizuki, JMA) 20min
- RA II Working Group on Climate Services (WGCS) (Mr. Kiyotoshi Takahashi, JMA) 20min
- WCRP Working Group on Subseasonal to Interdecadal Prediction (WGSIP) (Dr. Tamaki Yasuda, Meteorological Research Institute/JMA) 20min
- Discussion on future perspectives for EASCOF 20min

Closing session

11:50 – 12:00

Abstracts

The Fifth Session of the East Asia winter Climate Outlook Forum
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Current status and future plan of climate services in China

Yuping Yan
Division of Operation, Science and Technology, Beijing Climate Center

Abstract

Climate data, climate prediction products and climate knowledge are all climate information, which is refer in particular to providing tailored climate products to end-users and decision makers. BCC dedicates to climate application since it is founded and is building China Framework of Climate Service (CFCS). Last year, a task force was set up in BCC and focused on research and development of climate products oriented to end users. A series of China Climate Risk Indices has been developed, which is including six type of risk index and indices of agriculture output, to name a few: Integrated Risk Index (CRI), Flooding Risk Index (FRI), Drought Risk Index (DRI), Landing Typhoon Risk Index (TRI), Heat Wave Risk Index (HRI) and Frozen Risk Index (FRI). These indices issue every month and predict for the upcoming three months. By high-resolution climate model, national low-speed wind map has been investigated and guided on wind farm siting. The first generation of climate information mobile APP is ready to come into the market. Climate knowledge has already put into practice on city safety keeping, large-scale project construction, environment impact assessment on nuclear plant and evaluation of greenhouse gas emission reduction. In the next five years, BCC will build a combined CLimate Application Panel (CLAP) based on BCC's regional climate model, quantitative evaluation on meteorological disasters and their impacts, as well as various climate data and geographical information. Hopefully, the climate application will be more objective and targeted, and the capability of climate services will be improved effectively.

Current Status and Future plan of Climate Services in JMA

Akihiko Shimpo
Tokyo Climate Center, Japan Meteorological Agency

Abstract

The Japan Meteorological Agency (JMA) provides climate services to domestic users in Japan, such as climate monitoring, seasonal forecasts, El Niño monitoring and outlooks, and climate change monitoring and projections. It is also an important activity for JMA to operate the Tokyo Climate Center (TCC), which is a Regional Climate Center (RCC) in WMO Region II, providing a variety of information and products to assist the climate information services of National Meteorological and Hydrological Services (NMHSs) in the Asia-Pacific region. During the period from 2015 to 2017, TCC has been improving its services as follows:

- Upgrade of JMA Seasonal Ensemble Prediction System (EPS) (JMA/MRI-CPS2; Takaya et al. 2017) (2015), improving resolution and model physics in the model's atmospheric and oceanic components, introducing an interactive sea ice model, and improving the ensemble configurations;
- Upgrade of TCC's Interactive Tool for Analysis of the Climate System (iTacs ver.5) (2015), making new datasets available such as 30-year re-forecast (hindcast) datasets of JMA's one-month ensemble prediction system, allowing the production of clear images with smooth anti-aliased lines, and providing more efficient connections between client PCs and web servers via a revamped web interface;
- The JRA-55 Atlas (2016), consisting of a comprehensive set of global climate maps (1981-2010 average) based on the Japanese 55-year Reanalysis (JRA-55; Kobayashi et al. 2015) for a variety of meteorological variables ranging from basic metrics such as surface temperature to technical considerations for climate research;
- Renewed statistical products regarding the impacts of tropical SST variability on the global climate system (2016), extending period of statistics to 55 years (1958-2012), and using JRA-55 as an additional dataset for investigation;
- Incorporation of ENSO Forecast Probabilities into the El Niño Outlook (2016), adding forecast probabilities for the onset, persistence and end of ENSO events (El Niño, La Niña and ENSO-neutral periods), and including information of probabilities in the lead and main parts of the Outlook;
- Launch of JMA's Global EPS (2017), integrating three EPSs to one EPS to support JMA's issuance of typhoon information, one-week forecasts and one-month forecasts, and improving resolution, model physics and ensemble method compared with the previous One-month EPS.
- Renewed "Information Sharing on Climate Services in WMO RA II" website (2017), updating information of climate services by NMHSs in RA II.

These improvements and other activities regarding capacity development conducted by TCC will be briefly introduced at the session, and also JMA's future plan about improvement of climate services will be shown.

Status and Plan of Seasonal Forecasting Services in KMA

Dong-Joon Kim, Jiseon Bak
Climate Prediction Division, Korea Meteorological Administration

Abstract

Korea Meteorological Administration (KMA) is producing tercile-based probabilistic long-range forecasts – 1-month, 3-month forecasts and further climate outlook – based on KMA's operational seasonal prediction system, GloSea5 (Global Seasonal prediction system ver.5) introduced from UK Met Office as well as various climate monitoring products and prediction results from statistical models.

Currently, normal (Gaussian) distribution is assumed for both temperature and precipitation to determine the tercile values, which sometimes leads to unrealistic normal precipitation range due to non-Gaussian nature of precipitation distribution. So, KMA introduced a quantile-based method in determining terciles for precipitation forecast, and the preliminary result will be presented. Some experiment results of doubling ensemble size using UK Met Office's ensemble members to maximize the benefit of UKMO-KMA joint seasonal prediction system will also be presented.

KMA is developing a next-generation global model, KIM (KMA Integrated Model), through 9-year (2011~2019) project, which will be primarily used for numerical weather prediction as well as long-range forecast in 2020s. Recent major progresses of the development project will be presented along with preliminary verification results.

Current and Future perspective of seasonal prediction of Mongolia

A.Davaadorj, Ch.Sarantuya and L.Oyunjargal
Information and Research Institute of Meteorology, Hydrology and Environment, NAMEM
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Abstract

Since 1987, meteorological service of Mongolia have started to produce the monthly weather forecast. The main method for long range weather prediction was solely synoptic method. As long range weather prediction is challenging issue, we needs to focus on not only seasonal prediction, but also climate analysis.

Since then, our researchers developed some classic statistical methods based on Multiple Linear Regression and Discriminant Analysis. In 2009, we developed two statistic downscaling methods one from APCC MME model output, and second one from TCC model outputs.

However, recent years our statistic methods is not enough for seasonal climate prediction. Therefore, we need new dynamic approach for long range weather prediction. In 2014, we started to run PNU model, but that is very expensive in term of computation and storage. Thus, we have not made it fully operation yet.

In the future, we are planning to run General circulation model. This year we have started to study and test Community atmosphere model.

The role of Arctic sea-ice decline on cold winters in recent Eurasia

Masato Mori[1], Yu Kosaka[1], Masahiro Watanabe[2], Hisashi Nakamura[1] and Masahide Kimoto[2]

[1]Research Center for Advanced Science and Technology, the University of Tokyo

[2]Atmosphere and Ocean Research Institute, the University of Tokyo

Abstract

During the recent decades, severe winters occurred frequently in the mid-latitude central Eurasia, contributing manifestation of cooling trend over there, despite increase in greenhouse gas concentrations. Statistical relationship obtained from observational analyses have indicated that part of this cooling is forced by recent Arctic sea-ice decline. However, conclusions obtained from numerical modeling studies differ depending on the model used and experimental setting, and whether or not the cause is due to sea ice reduction is controversial.

In this research, we successfully detected the signature of Eurasian cold winters excited by Arctic sea-ice decline in the Barents-Kara Sea, by analyzing observation and four kind of historical large ensemble simulations based on atmospheric general circulation model (AGCM) forced by observed sea surface temperature and sea ice (AMIP-type experiments). The sea-ice reduction acts to increase the occurrence frequency of cold winter in the central Eurasia, but the sea-ice forced effect is underestimated in the AGCM compared with observation. We conclude that this model bias can be a major cause that makes diverse conclusions among modelling studies.

Predictability of the Polar-night Jet Oscillation and Its Impact on the Skill of Tropospheric Forecasts

Shunsuke Noguchi, Hitoshi Mukougawa, Yuhji Kuroda and Ryo Mizuta
Climate Research Department, Meteorological Research Institute

Abstract

The predictability of the extratropical stratosphere and its impact on the forecast skill of tropospheric circulation in the Northern Hemisphere are examined in the framework of Polar-night Jet Oscillation (PJO). The PJO is the dominant low-frequency mode in the winter stratosphere characterized by the poleward and downward propagation of the zonal-mean zonal wind anomalies.

By using extended-range ensemble forecast datasets provided by the Japan Meteorological Agency, we have projected statistical properties of forecast results to a phase space spanned by two leading empirical orthogonal functions representing the PJO behavior. As a result, following characteristics of predictability variations during both anomalously weak and strong events of the stratospheric polar vortex (part of such events corresponds to sudden warmings and vortex intensifications) are obtained: (1) During prominent PJO conditions, regardless of weak or strong vortex events, the forecast skill of long-lasting anomalies in the lower stratosphere is significantly enhanced for forecasts starting after the onset of anomalous events. (2) The forecast skill not only in the lower stratosphere but also in the troposphere is improved after the setup of anomalous events. However, the reduction of tropospheric forecast error sometimes becomes obscure due to large internal variabilities, especially after strong vortex events. (3) In contrast to the same positive impact on the forecast skill in the lower atmosphere, the forecast uncertainty of the stratospheric condition shows different feature depending on the strength of the stratospheric polar vortex: During weak vortex events, the temporal evolution of the ensemble spread changes drastically from the exponential growth (saturates at high level) to the linear one (remains small) associated with the breakdown of the polar vortex. On the other hand, during strong vortex events, forecasts show large uncertainty throughout the event, because the westerly wind condition in several members of ensemble forecast permits intermittent upward propagation of planetary waves although the time-averaged flux from the troposphere is anomalously low.

Thus, this study provides comprehensive knowledge for the impact and uncertainty of stratosphere-troposphere coupling in a state-of-the-art ensemble prediction system. Our results and methodologies would also be particularly useful for real-time monitoring of sub-seasonal to seasonal forecasts.

Predictable seasonal temperature variability in the East Asian winter monsoon

Yuhei Takaya
Meteorological Research Institute, Japan Meteorological Agency

Abstract

The East Asian winter monsoon (EAWM) exhibits a pronounced year-to-year variability, which is affected by several factors such as ENSO, MJO, extratropical circulations. This talk gives an instructive overview of the seasonal predictability of the East Asian monsoon. While the EAWM is originally defined as the variability in lower-tropospheric winds by a traditional definition, here we focus on the temperature variability. Sources of the predictability of EAWM are illustrated based on sets of hindcasts using JMA seasonal prediction systems. The EAWM activity is subject to the interannual variability of upper-tropospheric circulations characterized by the Western Pacific pattern, Arctic Oscillation and so forth. The interannual variability in the tropics such as El Nino-Southern Oscillation (ENSO) and associated convective activity over the Indo-Pacific sector has an indirect influence on the upper-tropospheric circulations through teleconnections and serves the primary predictability over East Asia. In addition to the predictable variability, the unpredictable variability is also discussed in this presentation. Better predictive understanding of the EAWM variability is the basis of winter climate prediction in the East Asia.

Forecasting crop yield variability for world food agencies: toward operational services

Toshichika Iizumi
Institute for Agro-Environmental Sciences,
National Agriculture and Food Research Organization

Abstract

Consumers in many countries are increasingly dependent on food imports, and are therefore exposed to variations in production and export prices in major food-producing regions of the world. National governments and commercial entities in import-dependent countries are paying increased attention to crop forecasts of important food-exporting countries as well as to their domestic food production. Given the increased volatility of international food markets and rising incidence of weather extremes under climate change affecting food production, the role of scientifically-sound crop forecasts becomes increasing important for governmental food agencies as an objective outlook of crop yields (production per unit area).

A joint research entitled "Development of seasonal-climate-forecast-based global forecasting system of crop yield variability and crop forecast information services for world food agencies" is launched April 2017. This research is conducted by the Institute for Agro-Environmental Sciences/National Agriculture and Food Research Organization (NIAES), Japan and APEC Climate Center (APCC), Republic of Korea, and aims to assess the prediction skill of statistical crop yield models using APCC's multi-model ensemble (MME) seasonal temperature and precipitation forecast data; and develop a crop forecast information services towards operational use at APCC if yield models show sufficient skill. In this talk, I present an overview of the project and initial results.

In the first year of the project (2017), NIAES assesses the prediction skill of the yield models when using APCC's MME temperature and precipitation hindcast data. The MME data are averaged over 3-month period to cover key growth stages, as in previous work (Iizumi et al., 2013, doi:10.1038/nclimate1945). Although previous work uses soil moisture, this variable is not available in APCC MME data, and therefore precipitation is used instead. In 2018, APCC specifies the format of crop forecast information and develop its user interface if the prediction skill is satisfactory. In 2019 and 2020, APCC conducts test operation of the services with a limited number of users and wider users, respectively. APCC and NIAES also address technical and scientific issues need to be solved for further improvement to the services.

Seasonal crop forecasting offers useful information particularly for national and international food agencies to monitor global crop production and respond better to anticipated shocks due to climate extremes. Importantly, crop forecasts are independent of other two major sources of information at this moment, governmental statistics and satellite remote sensing, and therefore expected to function complementary and further improve the capacity of food agencies to adapt climate extremes under changing climate.

The poor weather early warning system in Tohoku District, Northern Japan; an example of climate data usage for agriculture

Hiromitsu Kanno
National Agriculture and Food Research Organization

Abstract

Tohoku District is located in the northern part of Japan. It lies to the south of Hokkaido and occupies the northern part of Honshu. Its climate zone is classified as temperate rainy climate (Cfa), but in winter there is a lot of snow. Tohoku district has a cool climate, abundant water resources, and has a lot of farming. The major industry in Tohoku is agriculture. The rice productivity is high: 28% of rice production in Japan comes from Tohoku District.

In the agricultural history of Tohoku District, farmers have experienced terrible famines, in particular in the Ten-mei famine in 1783, several hundred thousand people died of hunger. Recently, cool summers have frequently occurred again and rice crops in Tohoku District are indeed sometimes damaged by cool weather. So, we have made the early warning system to reduce the agricultural damage by cool weather.

This system uses two kinds of meteorological data: one is numerical simulated forecast data and the second is meteorological observation data. In regards to the forecast data, daily GSM data is sent from JMA to Japan Weather Association (JWA) and then the first downsizing process is performed using a local numerical simulation model, reducing the data from the 20 km to a 5 km square mesh size. Next, a second downsizing process is performed from the 5 km to a 1 km square mesh size. This process is statistical, as opposed to dynamical, and uses an interpolation formula in proportion to the distance. In regards to the observation data, we are able to use the Japanese meteorological observation network (Automated Meteorological Data Acquisition System: AMeDAS). The AMeDAS data are interpolated using statistical formulae from ca. 20 km to 1 km square mesh size. Through those processes, we have 1 km square mesh data for both forecast and observation. Then these 1 km mesh data are applied in a crop growing model and rice blast forecasting model. The resulting agricultural information data is expressed on the web site, and at the same time send to users by using a mobile phone (http://map2.wat.soft.iwate-pu.ac.jp/narct2016/newaccount/).

Also, we are now developing a new agricultural alert and expert regional assistant system. This system covers all over Japan. Meteorological data used in this system include both forecast and observation, and downscaled to 1 km mesh size. They contain a lot of meteorological elements; temperature, precipitation, sunshine duration, solar radiation, long wave radiation, relative humidity, wind speed, snow depth, etc. These data are available only in the purpose for research (http://adpmit.dc.affrc.go.jp/technical/cont67.html). Agricultural alert and expert regional assistant system informs the alert of extremely high and low temperature damage for rice, and at the same time offers the way to avoid the damages, e.g., to control the fertilizer and to put agricultural water. We are now trying out the system before putting it into practice.

Development of Climate Risk Management Techniques for Agriculture at JMA

Nobuyuki Kayaba
Tokyo Climate Center, Japan Meteorological Agency

Abstract

The Climate Prediction Division of the Japan Meteorological Agency (CPD/JMA) takes activities to develop best practices of the use of subseasonal and seasonal forecasts (especially for temperature) and observed data in collaboration with user-sector organizations in agricultural and various industrial fields in order to promote the utilization of these forecasts and data in their decision making.

JMA and the National Agricultural and Food Research Organization (NARO) conducted a pilot project to develop an early warning system using two-week forecasts during five years from 2011 to 2016. JMA also engaged in dialogue with local agricultural organizations toward the development of the monitoring tools to prevent barrier to growth of wheat brought by extreme high temperature.

In 2016 the final joint report of these activities were published (in Japanese). In this presentation, we introduce the above-mentioned pilot project and products for agriculture and discuss future issues for practical use.

Dzud yearly warning system over Mongolia

A.Davaadorj, B.Erdenetsetseg, N.Elbegjargal and L.Oyunjargal
Information and Research Institute of Meteorology, Hydrology and Environment, NAMEM
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Abstract

Main users' sectors of our long range weather forecast are agriculture and livestock husbandry. Warm seasonal outlook is important for agriculture and cold seasonal outlook –for livestock husbandry. Actually users of these sectors want to know whether there would be drought and Dzud.

Warm seasonal outlook is released first time in late March and updated every month. Cold seasonal outlook is released first time in late August and updated every month. The first issue of the seasonal outlooks are published as a booklet and distributed to our government office. And updates are distributed via web page.

Warm seasonal outlook is introduced in Farmers' Forum in the end of April and they decide what kind of seeds to plan and what kind of technology to use.

Cold season outlook is essential for herders whose livelihood highly depend on upcoming winter condition especially Dzud condition. Dzud is a major natural disaster in Mongolia which can cause serious damage to the livestock sector, community well-being and the national economy.

More than half of Mongolian population still live in nomadic style with their livestock husbandry. Due to frequent Dzud occurrence in recent years, they are migrating to the urban area because of loss their livestock.

Even though, we issue cold season outlook, it is not easy to predict Dzud possibility. However, our met service produce "Dzud risk map" – which is impact based product. One of factors of Dzud risk map is winter climate outlook.

Dzud risk map is produced by end of Nov and presented to the Mongolian Government Meeting, Parliament Standing Committee meeting on Food and Agriculture, and Special Committee meeting on Emergency Management.

This information became the basis of winter preparation works and dzud early warning management measures that have been implemented countrywide.

KMA Extreme Climate Services and User-specific Applications on Energy Sector

Sun Hee Bae, Bo Young Yim and Jong Seo Park
Climate Extremes Analysis and Assessment Team, Korea Meteorological Administration

Abstract

Some of extreme climate/weather has become more frequent and intense in recent decades. Extreme climate/weather conditions give significant social and economic impacts on various sectors, such as energy, agriculture, and human well-being. Thus, it is important to provide reliable information of extremes.

Korea Meteorological Administration (KMA) has improved scientific understanding of extreme climate and developed its early detection and prediction technology in recent years. KMA's new extreme climate services based on probabilistic long-range forecast (1-month & 3-month outlook) will be trial operation in November 2017. Specifically, extreme climate services include both monitoring information of current state of extremes such as very high or low temperatures and forecasting information of their expected probability.

For application of detection and warning information of extreme climate, KMA also developed extreme climate services to help predict energy consumption in energy-related (power, gas) government as a best practice example of user-specific applications. Details of current status and plan of KMA's extreme climate services are introduced including application results on energy sector.

Influence of enhanced convection over Southeast Asia on blocking ridge and associated surface high over Siberia in winter

Kazuto Takemura
Tokyo Climate Center, Japan Meteorological Agency

Abstract

This study analyzes the relationship between enhanced convective activity over Southeast Asia and blocking ridge over the area from Eastern to Central Siberia, and its influence on the development of Siberian high. This line of the approach is important to assess the influence of ENSO on the East Asian winter monsoon.

Composite analysis in La Niña events shows significant characteristics of enhanced convective activities over a wide area of Southeast Asia associated with warmer-than-normal sea surface temperature (SST), wave train from the southeastern part of East Asia to Eastern Siberia, positive height anomalies at 500 hPa from Eastern to Central Siberia and the development of the Siberian high. The results indicate that stronger-than-normal East Asian winter monsoon is statistically seen in La Niña years, corresponding to our common view.

From case studies over the period of winter, there are a number of cases that westward shift of blocking ridge over Siberia precedes the development of the Siberian high, corresponding to "Pacific-origin" type suggested by Takaya and Nakamura (2005). The upper-tropospheric circulation anomalies clearly show wave train over the area from the southeastern part of East Asia to Eastern Siberia in the period when the blocking ridge is developed, with anti-cyclonic circulation anomalies in and around southern China and Eastern Siberia and cyclonic ones over Japan. In the tropics, enhanced convective activity is seen over the area from the Bay of Bengal to the South China Sea, indicating its contribution to the anti-cyclonic circulation anomalies over the southeastern part of East Asia as one of the essential wave sources.

A linear baroclinic model (LBM) experiment shows clear steady responses of anomaly patterns over the area from the southeastern part of East Asia to Eastern Siberia to idealized diabatic heating anomalies over the Indochina Peninsula, well corresponding to those seen in the case studies. The LBM results suggest the contribution of the enhanced convective activity to the anti-cyclonic circulation anomalies over the southeastern part of East Asia and the downstream wave train in the upper troposphere.

These results indicate the existence of the dynamical process from the enhanced convective activity over Southeast Asia to the development of Siberian high.

Detection of Kamchatka blocking and its winter circulation pattern

Baek-Min Kim, Seon-Hwa Kim
Unit of Sea-Ice Prediction, Korea Polar Research Institute

Abstract

Although there have been various blocking studies to date, it is still difficult to define blocking, and it remains a major controversy, even though it is a field with a long history of research. Blocking detection methods based on various definitions showed diverse blocking climate patterns. Moreover, it is very difficult to make fair comparisons among detection methods because they use different criteria for blocking size, area, and duration. Over the Kamchatka region, flow of mobile high pressure, often, was stagnated and, recently, extreme weather events such as heat waves and cold waves over east Asian domain often tend to occur along with the flow stagnation over the Kamchatka region. In this study, we applied common detection criteria to various blocking detection methods to see if there is a technique specialized to capture blocking activity over Kamchatka region. As a result, it is confirmed that Kamchatka blocking is well attained in the zonal wind reversal algorithm. We found that this is due to the better detection of the wave breaking phenomena in this region by the reversal algorithm. It is shown that, during winter season, characteristic surface air temperature pattern in association with the Kamchatka blocking is well known blocking type cold surge pattern revealed by previous study.

Characteristics of 2017 summer monsoon in East Asia

Hiroki Togawa
Tokyo Climate Center, Japan Meteorological Agency

Abstract

Temperatures in the East Asia from June to September 2017 were above normal from eastern China to Okinawa/Amami of southwestern Japan and around Mongolia, and were below normal in western China. Precipitation amounts for the monsoon season were above normal in southeastern China, in western China, on the Sea of Japan side of Japan, Myanmar and northwestern India, and were below normal from Mongolia to northeastern China and around the Korean Peninsula.

SSTs (Sea Surface Temperature) were above normal in the western equatorial Pacific in this summer and below normal in the central and eastern parts after August. Easterly winds in the lower troposphere were stronger than normal over the central equatorial Pacific. The convective activity over the Maritime Continent was enhanced through the summer monsoon season. These characteristics were similar to La Niña event and pre La Niña event composite.

Meanwhile, from early to mid-August, convective activity was particularly inactive over and around the Philippines. During the same period, the Pacific High did not extend to mainland Japan as usual and shifted southward of its normal position, corresponding to the negative PJ (Pacific – Japan) pattern (Nitta 1987; Kosaka and Nakamura 2010). In addition, the Okhotsk High, which brought cool wet northeasterly flows to the Pacific side of northern and eastern Japan, has persisted since the end of July. Both phenomena caused significantly below normal sunshine duration on the Pacific side of northern and eastern Japan.

In Okinawa/Amami of southwestern Japan, monthly mean temperature was the highest on record for August and tied with 2014 as the highest on record of September since 1946. To the south of Japan, the Pacific High was stronger than normal after July. Such extremely high temperature was considered to be caused by warm air advection in the lower troposphere, adiabatic heating by downward flow, and high SST.

References:

Kosaka, Y., and H. Nakamura, 2010: Mechanisms of meridional teleconnection observed between a summer monsoon system and a subtropical anticyclone. Part I: The Pacific-Japan pattern, *J. Climate*, **23**, 5085 – 5108.

Nitta, T., 1987: Convective activities in the tropical western Pacific and their impact on the Northern Hemisphere summer circulation. *J. Meteor. Soc. Japan*, **65**, 373 – 390.

Review of major high impact climate events over China this year

Chan Xiao
Climate service division, Beijing Climate Center

Abstract

In this study, the climate characteristics and major climate events over China this year will be presented.

This year, the most remarkable climate characteristic is warm. Up to now(October 20, 2017), Mean surface air temperature over China is 12.56℃, which is 0.92℃ above normal (10.75, average from 1981-2010). In winter, it was the warmest winter since 1961. Surface air temperature averaged over China in winter was -1.41°C, with 1.94°C above normal (-3.35°C). In spring, the earliest heat wave was happen in north China since 2005. In summer, we had experienced strong heat wave process both the north and south China.

The mean precipitation over China is 613.61mm, which is 4.0% above normal. But frequent rainstorm processes with long duration or local high intensity cause severe flooding this summer.

Eight typhoons landed in China up to now, which is 1 more than normal. Special feature of typhoon activities this year shows in the following aspects, generate time is close, landing position is similar, and the impact is high. The Severe Typhoon Hato was the strongest typhoon landed in Pearl River Delta and cause huge damage in South China, especially in Macao.

Overview of 2017 Summer Climate over South Korea

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Abstract

South Korea experienced above-normal temperature and slightly below-normal rainfall in 2017 summer. The summer-mean temperature over South Korea was 24.5℃, which was +0.9℃ higher than 1981~2010 average. In particular, extreme temperatures were observed during the period from late-June through late-July. During this period, South Korea was strongly influenced by the western North Pacific subtropical High (WNPSH) that extended more to the northwest compared to the normal position and got supplies of hot and moist airs by the southwesterlies along the flank of WNPSH.

The summertime rainfall (609.7mm) ratio to normal (723.2mm) over South Korea was 84%. The June, July, and August rainfall ratios were 38%, 103%, and 88%, respectively. 2017 Changma started on June 24 and ended on July 29 and the Changma rainfall was slightly below normal (291.7mm, normal: 356.1mm). The characteristics of 2017 Changma are as follows: 1) Changma onset and retreat were later than normal. 2) The events of heavy rainfall were concentrated on the central part of South Korea. 3) Large spatial difference of Changma rainfall between southern and central regions of South Korea was observed. The reasons for these characteristic features will be presented.

BCC climate prediction model system: developments and applications

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Abstract

BCC_CSM1.1m is a coupled climate system model with a moderate resolution developed at the Beijing Climate Center (BCC), China Meteorological Administration (CMA). The atmospheric component in BCC_CSM1.1m is the BCC_AGCM2.2 at T106 horizontal resolution and 26 vertical layers, and the land model is BCC_AVIM1.0 with a same horizontal resolution as the atmospheric model. The ocean component and sea ice component are MOM4-L40 and SIS, respectively. Both the ocean and sea ice model use a tripolar grid, in which the latitudinal resolution is 1° longitude and the meridional resolution ranges from 1/3° latitude between 10°S and 10°N to 1° latitude at 30°S/30°N polarward. The different components are fully coupled with an inclusion of global carbon cycle.

BCC_CSM1.1m was applied in seasonal climate prediction. The BCC ensemble system includes 24 ensemble members, of which 9 are from an empirical singular vector scheme and 15 are generated from the lagged average forecasting scheme. In additions, as one of the participants in the sub-seasonal to seasonal (S2S) Prediction Project, BCC has conducted comprehensive S2S reforecast experiments using an improved version of the model (BCC_CSM1.2) since 2014. Based on the retrospective forecasts of the two operational forecast systems, a comprehensive assessment of the prediction skill in global atmospheric circulations, especially the Asian monsoon, ENSO, MJO and some extreme events are discussed.

Performance of JMA's Seasonal Ensemble Prediction Model for Recent Events

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Abstract

JMA upgraded its operational seasonal ensemble prediction system (EPS) in June 2015. Because the new operational seasonal EPS has a new function to consider variabilities of the Arctic sea surface temperatures (SSTs) and sea-ice extents, improvement of the performance especially for winter prediction had been expected.

Verification of the forecast showed the historical highest anomaly correlation to JRA-55 reanalysis for most of elements in winter 2015/2016 with the support of a major El niño event. However, focusing on the East Asian Winter Monsoon (EAWM) prediction, the colder condition over China was not predicted in winter 2015/2016 due to the failure of prediction of positive phase of Eurasian (EU) teleconnection. Meanwhile, anomaly correlation also recorded the higher scores than the past cases in winter 2016/2017. Regarding the EAWM prediction, the warmer conditions over the eastern part of East Asia and the colder conditions over the sea south of Japan were well predicted on November initial. However, negative phase of EU teleconnection was not predicted. Therefore, the cause of good prediction for EAWM in winter 2016/2017 is assumed that the influence on the EAWM from tropics was larger than that from high latitudes.

Although the new operational seasonal EPS became able to predict variabilities of the Arctic sea SSTs and sea-ice extents, how to improve the forecast skill for EU teleconnection still remains a future subject to improve forecast performance for EAWM.

Seasonal forecast skill of East Asian winter monsoon in APCC and CHFP multi-model data

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Abstract

Here we investigated the skill of East Asian Winter Monsoon (EAWM) using dynamical seasonal prediction models – hindcasts and forecasts complied by APEC Climate Center (APCC) and Climatological Historical Forecast Project (CHFP). The models' forecast skill of two EAWM modes, identified as the leading two EOF modes of SAT over East Asia, showed a great difference among models. The models successfully simulate the spatial characteristics of the two EAWM modes, but the skill of their temporal variability is still very low compared to the potential predictability. In general, the forecast skill of the first EAWM mode, which is more related to the high latitude variability - the northern mode, is relatively high. It is found that the Arctic-extratropics interaction has a sensible effect on the forecast skill of the 1st mode and SAT over east Asia. The forecast skill of the second EAWM mode, which is believed to be more related to the tropical Pacific variability, is quite high in several models, but is still very low compared to the potential predictability. We suggested the additional predictability improvement by a multi-model ensemble (MME) method based on the forecasts of EAWM by models.

ENSO outlook

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Abstract

Japan Meteorological Agency makes public ENSO monitoring information and outlook monthly. Following is an excerpt from the October issue. In the talk, latest conditions and outlook will be presented.

In September 2017, the NINO.3 SST was below normal with a deviation of -0.8°C. SSTs in September were above normal in the western equatorial Pacific, and below normal in the central and eastern parts. Subsurface temperatures were below normal in the central and eastern equatorial Pacific. Atmospheric convective activity was below normal near the date line over the equatorial Pacific, and easterly winds in the lower troposphere (trade winds) were stronger than normal over the central equatorial Pacific. These oceanic and atmospheric conditions indicate that common features of past La Niña events were becoming clear in September.

Cold subsurface waters, which were observed in the central and eastern equatorial Pacific, are likely to move eastward and maintain cooler-than-normal SST conditions in the eastern part. JMA's El Niño prediction model suggests that the NINO.3 SST will be below normal during four or five months in the months ahead, and will gradually come close to normal during boreal winter and spring. In conclusion, it is equally likely (50%) that La Niña conditions will develop in boreal autumn or winter, or ENSO-neutral conditions will persist until boreal winter.

BCC predictions of ENSO and primary East-Asian circulation patterns in 2017/18 winter

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Abstract

Based on the BCC_CSM1.1m model, ENSO and some primary East Asian circulation patterns in 2017/18 winter are predicted. Prediction results show that a La Niña event likely occurs during this winter. The AO (Arctic Oscillation) will possibly be in positive phase, while the NAO (North Atlantic Oscillation) and PNA (Pacific-North American pattern) both in negative phase. In the lower troposphere, the Siberia high and India-Burma trough both will be weaker than normal. In the middle troposphere, the East-Asian trough may be weak in this winter. This circulation pattern in mid-low troposphere may possibly lead to a weak EAWM (East Asian Winter Monsoon), which is consistent with the prediction result of EAWM index. The SSTA in central-eastern equatorial Pacific shows that this winter will experience a La Nina event and can at least continue to next spring. In the Indian Ocean, the predictions of IOBM (India Ocean Basin Mode), IOD (India Ocean Dipole), and SIOD (South India Ocean Dipole) indexes respectively show positive, negative and positive in this winter, and are almost at the same magnitude. In the North Atlantic Ocean, the NAST (North Atlantic Sea Triple) presents positive. These predicted information will provide key references for temperature and rainfall forecasting.

Recent climate feature and seasonal outlook for Winter 2017/2018 over Mongolia

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Abstract

Mongolia experienced above normal temperature and normal precipitation in 2017 summer. The summer mean temperature over Mongolia was 19.2^{o}C, which was 1.9^{o}C above normal (1981-2010 average). The June, July and August temperature anomalies were 2.7^{o}C, 2.6^{o}C and 0.3^{o}C, respectively.

Furthermore, the summer total precipitation was 116 mm, which was of near normal. The monthly precipitation ratio were 60%, 57%, and 115% for the June, July and August, respectively.

June and July were the 1st warmest and the 3rd driest months since 1961, respectively. Also, record-breacking heat wave occurred in the late June. Due this dry and hot condition, forest and steppe wildfire frequently occurred during the summer, resulting huge economics loses. Beside, above normal dry condition started to be observed from the beginning of June and intensified up to late July almost all over the country. This caused extreme and moderate dought condition over 70% of the whole country.

Based on statistic models and dynamic model, the seasonal outlook over Mongolia in 2017/2018 winter released. The winter temperature expected to be below normal over Northern part and near normal over southern part of Mongolia. The winter precipitation expected to be above normal over central northern and eastern part and near normal over other part of Mongolia.

Seasonal Outlook for Winter 2017/2018 over Japan

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Abstract

Tropical oceanic conditions are the most important signal for the winter outlook in view of its predictability and effects on the variability of jet streams. JMA's CGCM predicts that the area-averaged SST in the tropical western Pacific (NINO.WEST) will be above normal this winter.

In association with this SST anomaly, the model predicts that convective activity will be stronger than normal in the western tropical Pacific. In the upper circulation fields, anti-cyclonic anomalies from the southeastern part of the Asian Continent to the East China Sea are predicted in association with the active convections. Therefore the subtropical jet stream will meander southward from the Asian Continent to the sea east of Japan, suggesting the stronger-than-normal winter monsoon in eastern, western and southern Japan.

In addition to this, JMA's CGCM predicts the more active convection in the vicinity of the Philippines, the larger influences of the low pressure systems around northern Japan.

Furthermore, the tropospheric temperature is predicted to be above normal mainly due to the recent warming trend, which is likely to decrease probabilities of below normal temperatures.

As a result, in northern Japan, seasonal mean temperatures are expected to be above normal tendencies, seasonal snowfall amounts for the Sea of Japan side are expected to be below normal tendencies and seasonal precipitation amounts for the Pacific side are expected to be above normal tendencies due to large influences by the low pressure systems and small influences of cold air advections from the higher latitudes. In western Japan, seasonal snowfall amounts and seasonal precipitation amounts for the Sea of Japan side are expected to be above normal tendencies due to large influences by the inflow of cold air from the continent.

Climate Outlook for Winter 2017 over Korea

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Abstract

Korea Meteorological Administration (KMA) usually releases official forecast for whole winter on 23 November. The most recent seasonal outlook for winter 2017 over Korea will be presented based on the KMA's operational seasonal prediction system, GloSea5 (Global Seasonal Forecasting System ver.5) and results of the WMO Lead Centre for Long-Range Forecast Multi-Model Ensemble (WMO LC-LRFMME). The GloSea5 results from October initial condition show above-normal temperature and slightly below-normal precipitation over Korea for the coming winter season.

Currently, SST in the Niño3.4 region of the tropical Pacific Ocean is likely to be in La Niña thresholds. However, the La Niña-like pattern in the atmosphere, which has a little stronger-than-normal convection over the tropical western Pacific and sinking motion over the central/eastern Pacific, has become somewhat evident. The majority of international climate outlook models and experts' opinion suggest that weak La Niña may develop with about 50-55% possibility during the remaining period of 2017. In general, Korea has experienced near or below-normal condition for temperature and precipitation during early winter of La Niña developing years. Besides the ENSO, we are monitoring the snow-cover and Arctic sea-ice extent for wintertime forecast. More snow-cover over the Eurasian continent and its fast progress are significantly related to below-normal temperature in Korea during early winter. Severe winters across East Asia are associated with anomalous warmth in the Barents-Kara Sea region. Also, low sea-ice extent over the Laptev Sea during previous October is accompanied by the below-normal temperature during December over Korea.

Seasonal Outlook of the Climate in 2017/2018 Winter over China

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Abstract

Dynamical models and statistical analyses will be discussed focusing on East Asian winter monsoon (EAWM), seasonal temperature and precipitation outlook for 2017/2018 winter over China.

There are several abnormal external forcing factors have to be considered. Firstly, the tropical SST over middle and east Pacific Ocean is colder than normal while the SSTA of tropical Indian Ocean is positive, and most of dynamical and statistical models predict that situation will continue, and a La Niña event is unlikely to be developed this winter. Secondly, the Arctic sea ice cover in early autumn of 2017 is slightly above normal with linear trend subtracted. Besides, it is noted worthy that the SST over north Pacific is much warmer than normal.

Responding to all-around impacts of the abnormal external forcing mentioned above, the Artic Oscillation (AO) index may be negative which is slightly weaker than normal, the Northwestern Pacific subtropical high is likely to be weaker than normal, the Siberian high will be weaker, the East Asian trough will be shallower and the EAWM will be also weaker in 2017/2018 winter. The precipitation of key circulation systems produced by Climate System Model (BCC_CSM1.1m) from Beijing Climate Center show the similar characters. Under such general circulation anomaly distributions, it is predicted that the air temperatures most parts of China will be warmer than normal, excludes parts of Southern and Southwest China. In general, the temperature anomalies in China will be above normal in 2017/18 winter, and such character will be less significant in late winter than in early winter. As for the prediction of precipitations, it will be above-normal in parts of Northeast, North, and eastern part of Northwest China, but in the other regions will be near or below normal, especially in Jiangnan and South China.

Report of the WMO Workshop on Global Review of Regional Climate Outlook Forums (RCOF)

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Abstract

International workshop on global review of Regional Climate Outlook Forum (RCOF), was organized from 5 to 7 September 2017 at Guayaquil, Ecuador under WMO coordination, with the aim to review carefully the processes currently in vogue at various RCOFs in order to determine the gaps and then propose ways to make more effective delivery and communication of climate products and services for decision making in a sustainable manner. More than 40 experts from international organization involved in RCOF process, e.g., Regional Climate Center (RCC), Global Producing Center for Long-Range Forecast (GPC-LRF) and Lead Center for LRF Multi-Model Ensemble (LC-LRFMME), participated in this workshop. I attended to 3-days discussion as an involved person with representative of EASCOF to present current status and future perspective of EASCOF. The material on EASCOF presented in the workshop was prepared in consultation with China Meteorological Administration, Korea Meteorological Administration and National Agency for Meteorology and Environment Monitoring of Mongolia.

On the first day of the workshop, representatives from each of RCOFs introduced a series of their RCOF operations, including the relevant activities like as capacity development, user involvement and National Climate Outlook Forum (NCOF). In the session, I heightened a distinctive characteristic of EASCOF that most of the participating National Meteorological services have sufficient technical capabilities to operate their climate numerical prediction systems and statistical models developed by themselves and thus main aims of EASCOF are to share expertise and recent understanding of phenomena related to seasonal prediction on the East Asian winter monsoon as well as generating consensus seasonal outlook.

In the latter of the workshop, participants in break-out groups discussed the current status and opportunities to introduce innovative approaches and standardized operational practices for generating RCOF outputs including, *inter alia*, the development of objective sub-seasonal and seasonal regional forecasts, tailoring forecast products to specific user-requirements, and mechanisms for the provision of regular sub-seasonal updates between the RCOF sessions.

In this presentation, I will introduce an overview of the workshop, key topics, gaps, and challenges to be addressed in the next decade, and draft recommendations to be proposed as an outcome of this workshop. Taking this opportunity, I would like to encourage all participants to get the gist of this workshop and its outcomes, and to think perspectives of future EASCOF.

RA II Working Group on Climate Services (WGCS)

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Abstract

The WMO Regional association II (RAII) Working Group on Climate Services (WGCS) has been working on climate and agrometeorological issues in close cooperation with WMO's Technical Commissions, in particular, the Commission for Climatology (CCl) and the Commission for Agrometeorology (CAgM).

The sixteenth session of RA II (RA II-16: 2017-2020) just has started in this year with renewal of its structure including subsidiary bodies. Currently, WGCS is composed of two Expert Groups. One is Expert Group on Climate Services (EG-CS) with two coordinators, and the other is Expert Group on Agrometeorology (EG-AgM) with one coordinator. Both groups have five theme leaders under coordinators, respectively. Main themes for EG-CS and EG-AgM are summarized in the following table.

EG-CS	EG-AgM
・Climate risk management and adaptation to climate change ・Regional Climate Center (RCC) and Regional Climate Outlook Forum (RCOF) ・Implementation of Global Framework for Climate Services (GFCS) ・Climate monitoring and climate watch ・Climate data management system, data rescue and homogenization	・Agrometeorological training ・Soil moisture monitoring ・Drought preparedness and management strategies ・Seasonal forecasts application for agriculture ・Socio-economic impact of agrometeorological information

Under the RA II-16 framework, WGCS will address the following challenges in relation to climate services.

・Promotion of RCCs and RCOFs activities and further cooperation among RCCs
・Support and coordination for establishment of new RCCs or RCC-networks
・Support of activities relevant to and implementation of GFCS
・Promotion of application of climate information, especially in climate risk management and adaptation to climate change including agrometeorological perspective.
・Enhancement of capacity building activities

WCRP Working Group on Subseasonal to Interdecadal Prediction (WGSIP)

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Abstract

The World Climate Research Programme's (WCRP) Working Group on Subseasonal to Interdecadal Prediction (WGSIP) aims to develop a program of numerical experimentation for subseasonal-to-interdecadal variability and predictability, with an emphasis on assessing and improving predictions. Research goals are to develop appropriate data assimilation, model initialization and forecasting procedures for subseasonal-to-interdecadal predictions. Links with the operational community such as the WMO Extended Long Range Forecast and RCOF initiatives are also important.

WGSIP currently has a project known as the Climate-system Historical Forecast Project (CHFP) that is a multi-model and multi-institutional experimental framework for sub-seasonal-to-decadal complete physical climate system prediction. The CHFP invites leading centers to contribute their hindcast to a common database. These hindcast are made freely available for non-commercial purposes through a web-portal.

Recently, WGSIP initiated three core projects mainly based on the CHFP dataset.

(1) Long-Range Forecast Transient Intercomparison Project (LRFTIP): The aim of this initiative is to develop an archive of hindcast climatologies and associated diagnostics that can inform investigations into the transient behavior of initialized subseasonal-to-decadal climate predictions, the development of model biases, and the relative merits of different initialization methods.

(2) SNOWGRACE: The aim of this initiative is to evaluate the impact of realistic snow initialization on skill of subseasonal-to-seasonal forecasts by dynamical forecast systems. The modeling strategy follows the one developed during the GLACE2 initiative, which was aimed at assessing the impact of soil moisture on seasonal forecast.

(3) Teleconnections: The aim of this initiative is to evaluate the ability of the dynamical forecasting systems in representing the tropical-extratropical teleconnections. The analysis, based on observational and model data from several seasonal forecast systems, uses a common framework for a straightforward intercomparison.

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The Fifth Session of the East Asia winter Climate Outlook Forum

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