The Sixth Session of the East Asia winter Climate Outlook Forum (EASCOF-6)

7-9 November 2018

Seoul, Republic of Korea

Korea Meteorological Administration

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Agenda

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Agenda

<u>Wednesday, 7 November</u>

Registration: 09:30 – 10: 00

Opening session:

10:00 – 10:30

- Welcome Address (KIM Se-Won, Director of Climate Science Bureau, KMA)
- Self-Introduction
- Group Photo

10:30 – 10:40 Coffee Break

Session 1: Overview of the recent Climate and Extremes

(Chair: WANG Lihua, CMA)

10:40 – 11:40

- Overview of 2018 Summer Climate over South Korea (LIM Juyoun, KMA) 20min
- Review of major high impact climate events over China this year (LI Ying, CMA) 20min
- 2018 Summer in East Asia: Rapid transition from extreme flood to extreme heat wave (YOON Jin-Ho, Gwangju Institute of Science and Technology(GIST)/Korea) 20min

11:40 – 13:40 Lunch

13:40 – 14:40

- Characteristics and Factors about the Heavy Rain Event of July 2018 and the Subsequent Heatwave in Japan in boreal summer 2018 (Minako SHIOTA, JMA) 20min
- The possible climatic causes of 2018 extreme heat event in South Korea (MOON Ja-Yeon, APEC Climate Center) 20min
- Climate Change and extreme heat wave events in Korea, 2018 (YEH Sang-Wook, Hanyang University, Korea) 20min

14:40 – 15:00 Coffee Break

Session 2: Services and Assessments (Verification) of Long-range Forecasts

(Chair: Akira ITO, JMA)

15:00 – 15:50

- NIMS/KMA Seasonal Forecasting System and Predictability (LEE Sang-Min, National Institute of Meteorological Sciences, KMA) 25min
- Using climate indices calculated from GloSea5 for subseasonal prediction (PARK Byoung-Kwon, KMA) 25min

15:50 – 16:10 Coffee Break

16:10 – 17:00

- The dominant modes of the winter multi-month temperature in China (LIU Changzheng, CMA) 25min
- Characteristic and Prediction Evaluation of the 2017/2018 Asian winter monsoon (Akira ITO, JMA) 25min

17:00 – 17:30 Discussion

17:30 – 20:00 Reception at the KENSINGTON Hotel

Thursday, 8 November

Session 3: Research and Development of Climate variations related to the East Asia Winter Monsoon

(Chair: Gerelchuluun Bayasgalan, NAMEM)

10:00 – 10:40

- Wintertime Surface Air Temperature Modes (PARK Hae-Li, Pusan National University, Korea) 20min
- Statistical model for seasonal prediction of boreal wintertime temperature over South Korea (WOO Sungho, Chonnam National University, korea) 20min

10:40 – 10:50 Coffee Break

10:50 – 11:30

- Impact of Quasi-Biennial Oscillation on Subseasonal Variability over East Asia LIM Yuna, Seoul National University/Korea) 20min
- What controls ENSO teleconnection to East Asia? (KUG Jong-Seong, POSTECH/Korea) 20min

11:30 – 13:30 Lunch

Session 4: Discussion on the ENSO Activity and Outlook

(Chair: KUG Jong-Seong, POSTECH)

13:30 – 14:10

- El Niño Outlook (October 2018 - April 2019) (Minako SHIOTA, JMA) 20min
- Monthly climate variation over Korea in relation to the two types of ENSO evolution (YEO Sae-Rim, APEC Climate Center) 20min

14:10 – 14:30 Coffee Break

Session 5: Seasonal Climate Outlook for winter 2018/2019

(Chair: LIM Juyoun, KMA)

14:30 – 15:30

- Seasonal Climate Outlook for Winter 2018/2019 over China (ZHI Rong, CMA) 20min
- Cold Season Outlook for winter 2018/2019 over Japan (Akira ITO, JMA) 20min
- Seasonal Climate Outlook for coming winter of 2018/2019 over Mongolia using dynamical model and statistical downscaling (Gerelchuluun Bayasgalan, NAMEN) 20min

15:30 – 15:40 Coffee Break

15:40 – 16:40

- The Seasonal outlook for East Asian winter 2018-2019 by APCC MME (KIM Yoojin, APEC Climate Center) 20min
- Climate Outlook for Winter 2018 over Korea (SEO Tae Gun, KMA) 20min
- 2-Way Nesting Ultra-High Resolution Prediction for Temp. & Prec.(Application to Seasonal prediction for a Limited Area) (OH Jaiho, Pukyong National University/Korea) 20min

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Friday, 9 November

Session 6: Discussion and summary of the outlook for winter 2018/2019

(Chair: KIM Dong-Joon, KMA)

09:00 – 11:00 Discussion and Summary

11:00 – 11:20 Coffee Break

11:20 – 11:50 Discussion about the next meeting, etc.

11:50 – 12:00 Closing remarks

Abstract

Session 1

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Overview of 2018 Summer Climate over South Korea

Juyoun Lim, JeongHee Choi, SeongEun Lee, SuJeong Kim, and Dong-Joon Kim
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Abstract

South Korea experienced historically hot summer and short Changma period and many records were broken. The summer-mean temperature over South Korea was 25.4℃, which was +1.8℃ higher than climatology (1981~2010) and ranked first among mean temperature since 1973 (the year when KMA started statistical processing of nation-wide observation data). In particular, the highest minimum temperature in Seoul was 30.3℃, which was the highest one since 1907 when modern meteorological observation was introduced in Seoul. During this summer, South Korea was strongly influenced by the western North Pacific subtropical High (WNPSH) and Tibetan High that extended more to the northwest and eastward compared to the normal position respectively.

The precipitation during this summer was below-normal as the amount was 586.5mm (normal: 723.2mm) and the percentile was 17.2%ile over South Korea. The June, July, and August rainfall percentile were 33.1%, 3.4%, and 56.5%ile, respectively. 2018 Changma started on June 26 and ended on July 11 and the Changma rainfall was below-normal as 283.0mm (normal: 356.1mm). 2018 Changma onset date was within near-normal range but retreat was earlier than normal. The Changma period was 11~15 days, recording second shortest since 1973. After Changma, clear sky continued and sunshine duration was increased than normal, which contributed to this hot summer.

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Review of major high impact climate events over China this year

Li Ying
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Abstract

This year, we started with a warm and dry winter. The anomaly of temperature over China was 0.2℃ in winter of 2017/18 and the precipitation was 17.7% less than normal which was the least since 2009. In 2018, we experienced the hottest summer since 1961. The temperature was 1.0℃ higher than normal and the precipitation was 9.6% more than normal which was the most since 2000. In 2018, the first rainy season in South China begins later than normal. The rainy season in Southwest China starts near normal. The Meiyu starts later than normal with less precipitation during the rainy period. The timing of autumnal rainy season in Huaxi (Western China) starts later than normal. In 2018, the meteorological disasters caused by rainstorms and floods in China were prominent and brought serious losses. The rainstorms attacked extremely with high frequencies and overlaps. There were 10 typhoons (above normal of 7.2) landing China and the related loss is serious. The typhoon “RUMBIA” has caused direct economic losses of more than 15 billion yuan. The days of high temperature were above normal significantly in summer, which ranked the third highest since 1961. Heat wave attacked both in northern China and southern China.

2018 Summer in East Asia: Rapid transition from extreme flood to extreme heat wave

Jin-Ho Yoon
Gwangju Institute of Science and Technology (GIST), Gwangju South Korea
Simon S.-Y. Wang, Utah State University, Logan, UT, USA
Hyungjun Kim, The University of Tokyo, Tokyo, Japan
Lin Zhao, CCCAR, Chinese Academy of Sciences, Lanzhou, China

Abstract

2018 Summer in East Asia started with relatively wet June and extreme flood over Japan in early July. However, this rather wet status changed suddenly to extreme heat wave that continued for more than a month with record breaking intensity. Flood and heat wave could number of human casualties and economic loss. Here, we are attempting to perform a first-cut analysis how this rapid transition occurred. Our preliminary analysis indicated (1) strong tropical – midlatitude interaction, and (2) upper-tropospheric wave intensification contributed to this rapid transition.

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Characteristics and Factors about the Heavy Rain Event of July 2018 and the Subsequent Heatwave in Japan in boreal summer 2018

Minako SHIOTA
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Abstract

Japan experienced significant rainfall particularly western Japan mainly in early July (The Heavy Rain Event of July 2018), which caused widespread havoc nationwide. Extremely high temperatures subsequently persisted throughout most of Japan in boreal summer 2018. The characteristics and factors for these two phenomena will be given in this presentation.

Overall nationwide precipitation in the Heavy Rain Event of July 2018 was significantly high among any past events since 1982. This event is attributed to a continuing concentration of two massively moist air streams over western Japan and persistent upward flow associated with the activation of the stationary Baiu front. From a viewpoint of large-scale atmospheric circulation, the Baiu front over western Japan was another primary factor behind the Heavy Rain Event, and was stagnant between the highly developed Okhotsk High and the North Pacific Subtropical High expanding to the seas southeast of Japan. The enhancement of these two high-pressure systems was primarily due to Rossby wave propagations along the subtropical jet stream and the polar front jet stream. The increase in the amount of water vapor accompanying global warming is also presumable to be one of the factors on the heavy rain.

Due to the persistent extremely high temperatures, the monthly mean temperature anomaly for July 2018 in eastern Japan was the highest on record for July since 1946. On 23rd July, a new national record for maximum temperatures of 41.1ºC was recorded. The related heatwave is attributed to the expansion of the persistent North Pacific Subtropical High and the Tibetan High to the Japanese mainland. These factors were caused by Rossby wave propagation along the subtropical jet stream and enhanced convective activity over and around the Philippines. Global warming and ongoing higher-than-normal zonally averaged tropospheric air temperatures in the mid-latitudes of the Northern hemisphere are also considered responsible for the extreme heatwave.

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The possible climatic causes of 2018 extreme heat event in South Korea

Ja-Yeon Moon, Yun-Young Lee, Ji-Hyun Oh, Soo-Jin Sohn, Sang Myong Oh, and Yoojin Kim

APEC Climate Center, Busan, Korea

Abstract

Heat waves pose widespread risks as they not only affect public health and ecosystems directly but also damage infrastructure and other societal services (Hsu et al., 2017). A series of unusually hot days is referred to as an extreme heat wave event. Several extreme heat wave events have occurred in various parts of the globe in recent years. In 2018 summer, South Korea has experienced successive above normal (extreme hot) days from mid-July through mid-August which recorded as the top hottest August and the second hottest July mean temperature in the last 46 years (1973~2018).

In this talk, several climatic causes of the 2018 extreme heat in South Korea will be shown. The climatological condition and the similar cases (years) such as 1994 or 2013 hot summer will be compared with the 2018 extreme heat event. The major climate sources that can influence the extreme heat over South Korea will be considered as El Nino, Boreal Summer IntraSeasonal Oscillation, Arctic Oscillation, and the CircumGlobal Teleconnection.

To investigate the relationships between the extreme heat over South Korea and the teleconnections, 92 station temperature data in South Korea and the atmospheric variables from the NCEP/NCAR Reanalysis during 1979~2018 will be used for the analysis.

Climate Change and extreme heat wave events in Korea 2018

Sang-Wook Yeh
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Abstract

Extreme heatwave event, which occurred at 2018 during the late summer (July-August), caused huge socioeconomic impacts in South Korea. Several mechanisms, which include enhanced convections in the western tropical Pacific, a strengthening of subtropical high pressure and a weakening of jet stream in mid-latitudes, have been suggested to explain 2018 Extreme heatwave event. In addition to these mechanisms, this study examines how large scale environmental conditions, which might be associated with climate change, influence 2018 extreme heat wave. It is found that an eddy kinetic energy in mid-latitudes gradually decrease since 1979, which is mainly due to a weakening of meridional temperature gradient. Furthermore, the spatial structure of a liner trend of 500hPa geopotential height in mid-latitudes provides favorable condition which can cause an extreme weather event around Korean Peninsular. We also found that the atmosphere-ocean interactions in the western-to-central subtropical Pacific have been changed, which may lead to a direct influence of SST forcing into the mid-latitudes including South Korea through atmospheric teleconnections.

Session 2

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NIMS/KMA Seasonal Forecasting System and Predictability

Sang-Min Lee
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Abstract

National Institute of Meteorological Sciences/Korea Meteorological Administration has been operating Global Seasonal forecasting system version 5 (GloSea5) since 2014 for seasonal forecasting. GloSea5 uses coupled atmosphere, ocean, sea-ice and land surface model components. GloSea5 uses the lagged-start ensemble generation technique, produces probability forecast using 28 ensemble members in every week.

GloSea5 shows improved year-to-year predictions of the major modes of variability. In the tropics, predictions of the El Niño-Southern Oscillation are improved with higher values of anomaly correlation coefficient than GloSea4. GloSea5 shows unprecedented levels of forecast skill for the North Atlantic Oscillation. It also found useful levels of skill for the Madden Julian Oscillation. And forecast skills in arctic sea-ice extents and eastern Asian summer monsoon precipitation are verified using the subseasonal to seasonal databases.

Keywords: Seasonal forecasting system, GloSea5, Predictability

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Using climate indices calculated from GloSea5 for subseasonal prediction

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Abstract

Korea Meteorological Administration (KMA) has issued probabilistic long-range forecasts including 1-month, 3-month forecasts and further climate outlook since 2014. These forecasts are 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.

The teleconnection is a term used to describe the tendency for atmospheric circulation patterns to be related, either directly or indirectly, over large and spatially non-contiguous areas. Glantz (2001) defines them succinctly as linkages between climate anomalies at some distance from each other. Teleconnections play an integral part in the study of air–sea interactions and global climate processes. They often provide the missing piece in the understanding of climate patterns, both spatial and temporal, that occur across the world. The identification of connections suggested by teleconnections has become so important that the study forms a subfield of the atmospheric sciences.

To understand and use the teleconnections which affect climate features over East Asia including Korea, China and Japan, several climate indices including East Asian summer monsoon(EASM), Arctic Oscillation(AO), Western North Pacific Subtropical High(WNPSH) and Nino3.4 has provide from GloSea5. The temporal/spatial performance and prediction potential of these indices were analyzed for the 1991-2010 period.

The dominant modes of the winter multi-month temperature in China

Liu Changzheng

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Abstract

The research and prediction of winter temperature is one of hot topics of short-term climate. However, lots of relevant studies have been carried out focusing on the timescale of seasonal mean while few of them on the inter-seasonal timescale. Here my study on the multi-month temperature in China is introduced. The leading modes of the combination of December-January-February temperature are investigated with observational data and reanalysis dataset. The simulation ability of the dominant modes is explored with operational climate model outputs, respectively.

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Characteristic and Prediction Evaluation of the 2017/2018 Asian winter monsoon

Akira ITO
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Abstract

A series of extreme cold spells hit Japan and its surrounding areas in winter 2017/18, and cold air consequently prevailed nationwide. The seasonal mean temperature anomaly in Western Japan was -1.2°C, which was the lowest for 32 years since winter 1985/86.

In this talk, the combined primary two factors contributing the cold climate conditions and its prediction evaluation will be discussed. One is that the enhanced convective activity in the tropical western Pacific region in association with the La Niña event strengthened the northwestward expansion of an upper-level high around Southern China, which in turn excited a Rossby wave, causing southward meandering of the subtropical jet stream around Japan. The JMA Coupled Atmosphere-ocean General Circulation Model (CGCM) relatively predicted it well. However, above-normal precipitation was predicted over the latitudinal band of 5N – 15N in the North Pacific in association with cold tongue bias. Consequently, it was likely that the zonal mean response to mid-latitude circulation of the CGCM was stronger than that of observation.

The other is that the tropospheric polar vortex split in association with significant meandering of the polar-front jet stream over Northern Eurasia caused by a blocking high over Western Siberia and other influences. One of the polar vortex sections shifted southward over Eastern Siberia, which caused southward meandering of the polar-front jet stream over the eastern part of East Asia. However, it was not predicted well by JMA CGCM and the other numerical models presented in EASCOF-5. Although the JMA CGCM introduced in June 2015 became able to predict variabilities of the Arctic sea SSTs and sea-ice extents, how to improve the forecast skill for such Eurasian teleconnection still remains a future subject.

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Wintertime Surface Air Temperature Modes

Hae-Li Park[1], Kyong-Hwan Seo[1], and Jin-Yong Kim[1]
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Abstract

Global surface temperatures are expected to warm due to anthropogenic global warming. Actually, surface temperatures have undergone significant warming trend but when it is examined seasonally, boreal winter shows different trend since the 1980s and it is often referred to as “Warm Arctic, Cold Continents” trend pattern. Preliminary studies have shown that this so-called “Warm Arctic, Cold Continents” pattern in boreal winter is related to sea ice loss through ice-albedo feedbacks but it still remains controversial since dynamical models fail to capture this pattern and the observed continental cooling trend in boreal winter is highly uncertain due to large inter-annual variability.

In this study, the dominant pattern of wintertime Northern Hemisphere surface temperature variability is examined by the three leading Empirical Orthogonal Function modes of the northern extra-tropical 2m temperature anomalies which secular trend is removed to eliminate the global warming trend. When the trend is removed, the cold continent pattern is more clearly represented. The first leading mode is characterized by warm anomalies over northeastern Canada, and around davis strait, as well as warm anomalies over North Eurasia and the south-eastern parts of North America. The second leading mode shows warm anomalies over the North Pacific expecially around Bering Strait and cold anomalies over most of Canada and the central-eastern parts of North America. The last mode represents warm anomalies over Barents-Kara Sea region, and cold anomalies over East Asia and central Asia. To understand the regional temperature anomalies over the two continents, the atmospheric tele-connection patterns related to each mode are examined.

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Statistical model for seasonal prediction of boreal wintertime temperature over South Korea

Sungho Woo* and Jee-Hoon Jeong
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Abstract

The predictability of seasonal prediction for surface air temperature (SAT) in present is not competent over the mid-latitude, especially over East Asia including the Korean Peninsula. One of the reasons for the low predictability of seasonal prediction is closely associated with the unreliable predictability of the operational dynamic models with 3～4 weeks lead time over the East Asia region. Moreover it is unfeasible that the performance of the dynamic model will be improved within the short-term.

In this study, the statistical prediction model to support the operational prediction of the SAT over the Korean Peninsula in individual months of the winter season is developed based on simple multiple regression analysis based on the training period of 1973-2015. For the stable predictability of the model, we tried to discover the climate predictors that are linked physically and dynamically to the SAT in the Korean Peninsula.

For predicting the SAT in December, three predictors such as the sea ice concentration (SIC) over the Kara-Laptev sea, the tendency of ENSO-related sea surface temperature (SST) over the eastern Pacific and Eurasian snow cover information are used. The relationship between the predictors and the SAT in December is stable during the training period. The model shows the high correlation skill between the prediction and observational SAT (correlation coefficient : 0.75). The SAT predicted in cross validated hindcast is also highly correlated with the observational SAT (correlation coefficient : 0.71).

The models for the SAT in January and February are also constructed using predictors linked dynamically to the SAT in the Korean Peninsula such as the SIC over the upstream region, the SST variability in the tropical Pacific, the SST variability over the North Atlantic, and circulation in upstream of East Asia. Even though the correlation skills of the models for the SAT in January and February are somewhat less than the model for the SAT in December, the models also show useful skill in the correlation between predicted SAT and observation (correlation coefficients : both 0.66 in January and February).

Impact of Quasi-Biennial Oscillation on Subseasonal Variability over East Asia

Yuna Lim[1], Seok-Woo Son[1]

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Abstract

The zonal winds in the tropical lower stratosphere regularly alternate between easterlies and westerlies with a period of ~28 months, which are called Quasi-Biennial Oscillation (QBO). Recent studies have shown that the QBO influences the tropospheric Madden-Julian Oscillation (MJO) and stratospheric sudden warming (SSW), which are known as the influential intraseasonal variabilities. In general, boreal-winter MJOs become stronger during the easterly phase of the QBO (EQBO) than during the westerly phase (WQBO). Through the strong tropical-extratropical teleconnection with the enhanced MJOs, the precipitation over East Asia is largely varied during EQBO winters. Also, the SSW is more frequently occurred during EQBO winters by affecting the vertically propagating planetary waves. It is known that the surface air temperature anomalies over East Asia become cold in the extreme SSW events. Based on its regularity and impacts, the EQBO in 2018/19 winter is anticipated and therefore the intraseasonal variability of the surface climate over East Asia will be intensified.

What controls ENSO teleconnection to East Asia?

Jong-Seong Kug and Sunyong Kim
Division of Environmental Science and Engineering, Pohang University of Science and Technology (POSTECH)

Abstract

There are distinct impacts of anomalous tropical forcings associated with the El Niño-Southern Oscillation (ENSO) on the climate in East Asia via an atmospheric teleconnection. In this study, the intra-winter changes in the atmospheric teleconnection and its regional impacts associated with ENSO are investigated using data from 386 weather stations throughout Korea, China and Japan. It has recently been shown that the relative roles of western North Pacific (WNP) and equatorial central Pacific (CP) precipitation anomalies play an important role in determining the ENSO teleconnection in the North Pacific. Here, we show that the ENSO impacts over East Asia can also be largely explained by a combination of WNP and equatorial CP forcing. Further, the diverse regional impacts among different ENSO events can be explained to a large extent by the relative roles of the WNP and equatorial CP precipitation. Analyses from state-of-the-art coupled model simulations from the Coupled Model Intercomparison Project Phase 5 (CMIP5) archive support these observational arguments.

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El Niño Outlook (October 2018 - April 2019)

Minako SHIOTA and Takafumi UMEDA

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Abstract

In September 2018, the NINO.3 SST was near normal with a deviation of +0.2℃. SSTs in September were above normal in the western equatorial Pacific and around normal from the central to eastern parts (Figure 1). Subsurface temperatures were above normal from the western to the central equatorial Pacific and around normal in the eastern part (Figure 2). Atmospheric convective activity was near normal near the date line over the equatorial Pacific, and easterly winds in the lower troposphere (trade winds) were also near normal over the central equatorial Pacific. Although these oceanic and atmospheric conditions indicate that ENSO-neutral conditions persisted in September, the Warm Water Volume (defined as the depth averaged temperature over the upper 300 m from 5°S to 5°N, 120°E to 80°W) was as large as those observed before the onset of El Niño events in the past (Figure 3). In addition, easterly winds in the lower troposphere have been gradually weakening over the equatorial Pacific since the middle of September (Figure 4).

The easterly winds are expected to be below normal over the equatorial Pacific, and the subsurface warm waters are expected to migrate eastward and increase SST anomalies in the eastern equatorial Pacific. JMA's El Niño prediction model suggests that the NINO.3 SST will be above normal from boreal autumn to spring (Figure 5). In conclusion, it is likely that El Niño will occur in boreal autumn and persist until boreal spring (70%).

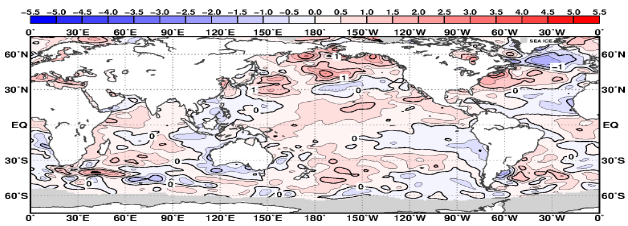
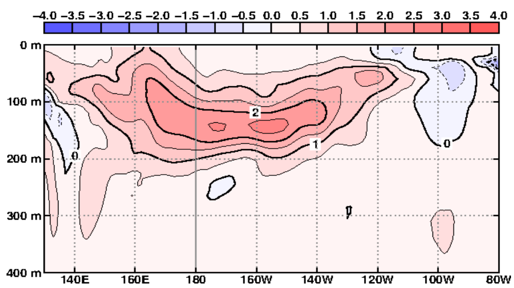


Figure.1 Monthly mean SST anomalies for September 2018. Base period for



Figur.2 Depth-longitude cross section of temperature anomalies along the equator in the Pacific Ocean for September 2018. Base period for normal is 1981-2010.

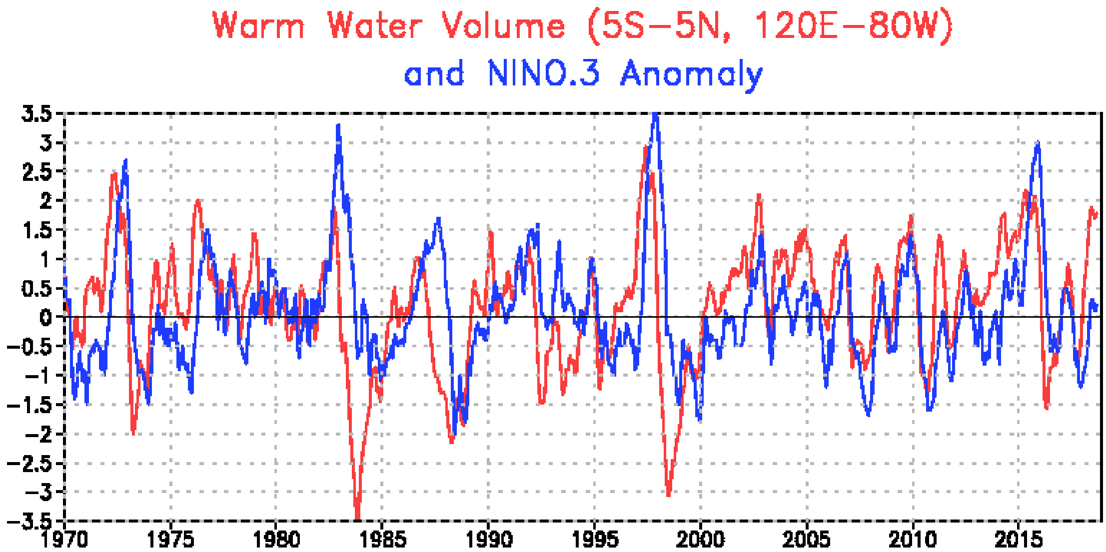


Figure.3 Time series of Warm Water Volume (defined as the depth averaged temperature over the upper 300 m from 5°S to 5°N, 120°E to 80°W) anomaly (°C, value multiplied by 1/3, red line) and NINO.3 SST anomaly (°C, blue line). Base period for normal is 1981-2010.

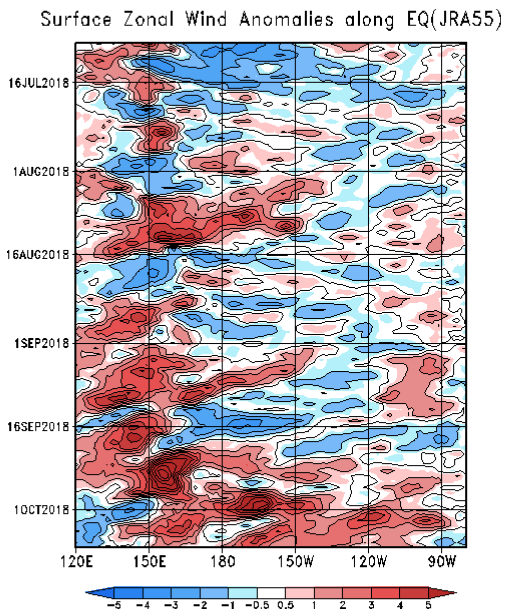


Figure.4 Time-longitude cross section of surface zonal wind anomalies (m/s) along the equator. Base period for normal is 1981-2010.

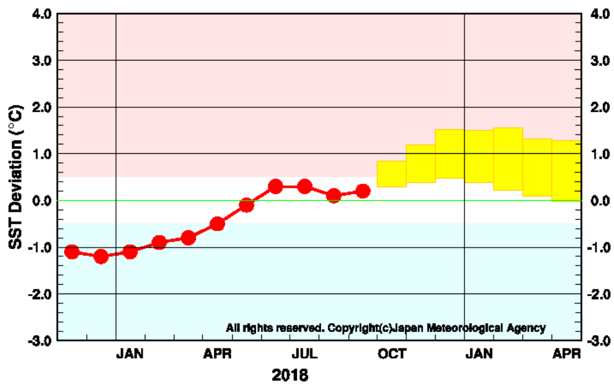


Figure.5 Outlook of the SST deviation for NINO.3 by the El Niño prediction model. Each box denotes the range where the value will be included with the probability of 70%.

Monthly climate variation over Korea in relation to the two types of ENSO evolution

Sae-Rim Yeo

APEC Climate Center, Busan, Korea

Abstract

This study documents monthly temperature and precipitation anomalies over Korea during the different phases of El Niño-Southern Oscillation (ENSO) for the two types of ENSO evolution. The evolution process of ENSO can be classified into two groups based on whether El Niño turns into La Niña in the subsequent year. The first group involves the transition process from El Niño to La Niña, while the second group shows the prolonged El Niño or neutral conditions after the mature phase of El Niño. Since the mid-latitude atmospheric responses as well as the equatorial heating anomalies for the two groups of ENSO are different each other, the ENSO-related climate variation over Korea are investigated separately for the two ENSO evolution groups. In particular, this study focuses on the entire monthly evolution of the temperature and precipitation over Korea during the different phases of ENSO. The statistically robust signals can be found in several particular months, which provides statistical basis for predicting monthly climate over Korea.

Session 5

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Seasonal Climate Outlook for Winter 2018/2019 over China

ZHI Rong, GAO Hui
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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 2018/2019 winter over China.

Based on dynamical models and statistical analyses, we predict a weak EAWM in the coming winter. Air temperatures will be warmer than normal in most China. Winter precipitation will be below normal over most northern parts of China. However, more precipitation tends to occur over southern parts of China, especially the middle and lower reaches of the Yangtze River valley.

Sea surface temperature anomaly over the tropical eastern Pacific is one of the most important external-forcing factors for the climate prediction in this winter. Most of dynamical and statistical models predict that an El Nino event is likely to be developed in the coming winter and will induce a weak winter monsoon, a shallower East Asian trough, an anomalous low-level anticyclone around the Philippines, as well as an intensified northwestern Pacific subtropical high with its high ridge extending more westward and southward. Another important factor is the Sea Ice concentration (SIC) over the Arctic in September. After removing the linear trend of the SIC, the slightly less SIC over the Barents-Kara Sea would result in a weak Siberia High in winter.

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Cold Season Outlook for winter 2018/2019 over Japan

Akira ITO

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Abstract

The Japan Meteorological Agency (JMA) issued its outlook for the coming winter (December 2018 – February 2019) over Japan in September 2018 and updated it in this October. In this talk, the latest outlook will be presented.

It is likely that El Niño conditions will develop in this autumn and continue by the coming winter. The Sea surface temperature (SST) are expected to be above-normal in the equatorial Pacific. Corresponding to the expected SST anomalies in the tropics, the convection will be enhanced over the equatorial Pacific and suppressed around the eastern part of the Indian Ocean.

In upper circulation fields, the subtropical jet stream is expected to shift southward over the Eurasian continent and to meander northward around Japan. On the other hand, equatorial symmetric anticyclonic anomalies are predicted around the central tropical Pacific as a response from active convection. Furthermore, a cyclonic anomaly over the northern part of the North Pacific and an anticyclonic anomaly over the western part of North America are predicted respectively. This pattern is similar to the Pacific North American (PNA) teleconnection pattern often observed in El Niño winters. However, the expected pattern in this winter seems be westward shift compared to the typical PNA pattern.

The Aleutian Low is predicted moderately strong corresponding to the southward shift of subtropical jet stream in the north Pacific region. Then, the extent of winter monsoon is expected to be near-normal around Northern Japan. On the other hand, the relatively weak winter monsoon is predicted around Eastern and Western Japan. Furthermore, the mid-latitude tropospheric zonal mean temperature is predicted to be above-normal mainly due to the recent warming trend, which is likely to decrease probabilities of below-normal temperatures.

Seasonal Climate Outlook for coming winter of 2018/2019 over Mongolia using dynamical model and statistical downscaling

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Abstract

The hindcast data of a CGCM and August-October sea-surface temperature and Sea ice extent in the northern Kara Sea (*BKI*) and Chukchi Sea (*ESI*) are used for predicting 20x20km-resolution anomalous surface air temperature at 2 meter (aT2m) over Mongolia for boreal winter. For this purpose, area-averaged surface air temperature (*TI*) and sea-level pressure (*SHI*) are defined. Then four large-scale indices, TI_{mdl} and SHI_{mdl} obtained from CGCM, and TI_{MLR} and SHI_{MLR} obtained from multiple linear regressions on *BKI* and *ESI*, are ingested using the artificial neural network (ANN) method for the prediction and statistical downscaling to obtain the monthly and seasonal 20x20km-resolution aT2m over Mongolia in winter.

An additional statistical method, which uses *BKI* and *ESI* as predictors of *TI* and *SHI* together with dynamic prediction by the CGCM, is used because of the relatively low skill of seasonal predictions by most of the state-of-the-art models and the multimodel ensembles systems over the high-latitude landlocked Eurasian regions such as Mongolia.

The Seasonal outlook for East Asian winter 2018-2019 by APCC MME

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Abstract

APEC Climate Center (APCC) has provided 3-month-leading monthly forecast information operated by APCC Multi Model Ensemble (MME) since 2008. Further, APCC has generated 6-month-leading monthly forecast data since September, 2013. APCC provides deterministic and probabilistic MME data via the website (http://www.apcc21.org). Currently, 17 climate forecasting centers and research institute from 11 countries participate in the APCC MME. A diverse and massive model set is the advantage of the APCC MME. The seasonal forecast data for winter 2018-2019 is generated with initial condition of October, 2018.

APCC MME predicts positive ENSO upcoming winter, the SST would be around +1℃ anomaly in NINO3 region. The APCC MME predicts marginal El Niño and the atmospheric response would be like the Central Pacific type. Dry condition in tropical/sub-tropical western Pacific and wet/normal condition in tropical central Pacific are predicted.

In East Asia, the surface temperature would be positive or normal. Many models predict above normal temperature over China, Mongolia, Korea, and Japan. But models predict Equal Chance of temperature in some part of south western China and South Korea, south Japan.

Many models predict Equal Chance of precipitation over East Asian region, but some parts of North Korea, west China are predicted to be wet. Most significant signal in precipitation prediction fields is a dry condition in the sub-tropical western Pacific region due to the tropical El Niño.

The Sixth Session of the East Asia winter Climate Outlook Forum
7–9 November 2018, Seoul, Republic of Korea

Climate Outlook for Winter 2018 over Korea

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Abstract

Korea Meteorological Administration (KMA) officially releases seasonal outlook for the coming winter season on 23rd November. The seasonal outlook for winter 2018 over Korea will be presented based on the KMA's operational climate prediction system, GloSea5 (Global Seasonal Forecasting System ver.5) and MME results from the WMO Lead Centre for Long-Range Forecast Multi-Model Ensemble (WMO LC-LRFMME), as well as impacts of essential climate elements/indices. The preliminary results of GloSea5 using October initial condition show above-normal temperature and slightly above-normal precipitation over Korea for the coming winter season.

Currently, the SST anomalies in Niño3.4 region is 0.5℃ higher than normal and it is expected that El Niño will be developed during this winter. There is still some uncertainty in the possible impact of El Niño on the temperature and precipitation over Korea. The Arctic sea ice over Barents-Kara Sea and Laptev Sea is less than normal, and the recent snow cover over Eurasia gradually expands compare to September but keeps near normal. Possible impact of various climate variables such as SST, continental snow cover, and Arctic sea ice on the winter climate of Korean peninsula will be considered along with statistical analysis results to produce final seasonal outlook for the winter. Overall, detailed analysis results of numerical and statistical models will be presented.

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2-Way Nesting Ultra-High Resolution Prediction for Temp. & Prec.
- Application to Seasonal prediction for a Limited Area -

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Abstract

A wide range of future weather and climate information is necessary to operate World Agrometeorological Information Service (WAMIS, http://www.wamis.org) system, for example, it has been required a daily temperature and precipitation intensity information for the next 30 days at least to plant scientists to operate plant disease models to produce an information on a smart chemical use. Also it is requested a daily max., min. and average temperature, and precipitation data for a growing season to crop scientists to prospect the crop production and daily temperature and precipitation data for the 21st century to assess the food security. The common requirement of these weather and climate information is high resolution in time and space.

The East Asia including the Korean Peninsula comes with much difficulty in predicting weather and climate of the East Asia due to the complicated. Therefore, the high resolution-numerical models to simulate detailed atmospheric phenomena and climate are necessary. Recently, it is possible to simulate more in detail by raising the horizontal and vertical resolution of the global climate model with the enhanced computational resources. However, it stills highly demands plenty of computing resources and computing time in simulating global and regional climate model. Meantime, it could be noticed that regional climate model nested in the global climate model can possibly simulate the weather and climate change of even more detailed area.

The high resolution General Circulation Model (GCM) has simulated to estimate the future climate and variability, which has been evaluated to be excellent in simulating a large scaled atmosphere circulation. However, it is not enough to get detail weather and climate information in detail. To resolve this kind of request the regional climate model, such as WRF, is necessary. However, the regional climate model is not free from the laterals as well as the surface of model domain. The simulated climate by the regional climate model varies with the influence of boundary condition from the size and location of selected domain. (Wanly et al., 2004).

To overcome the limitation caused by laterals as well as the surface of model domain the 2-way nesting system has been selected to generate an ultra-high resolution weather and climate information for the East Asia region. A high-resolution ICON atmospheric general circulation model (GCM) have been used for future weather and seasonal prediction with 40 km mesh in globe, 20 km mesh for Asia and 10 km mesh for Korean Peninsula. In this study the seasonal both anomaly and provability prediction for temperature as well as precipitation has been introduced together with dairy information for the selected sites.

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