# Abstacts

# TCC's Recent Development

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The Tokyo Climate Center (TCC) of the Japan Meteorological Agency (JMA), as a WMO Regional Climate Center, assists National Meteorological and Hydrological Services (NMHSs) in the Asia-Pacific region in the implementation of climate services through the provision of climate information, data and products, and capacity-development activities. In the presentation, recent TCC's development will be introduced including the following topics.

1. Pilot Project on Information Sharing on Climate Services

The fifteenth session of WMO Regional Association II (Doha, Qatar, December 2012) decided to establish a pilot project on information sharing on climate services provided by NMHSs as well as activities related to the Global Framework for Climate Services (GFCS). After collecting information on climate services provided by NMHSs as well as details of good practices on the application of climate information in society via a questionnaire survey, TCC developed and launched a dedicated website in March 2014 (http://ds.data.jma.go.jp/tcc/pilot/index.html). The Center will continue to collect pertinent information from NMHSs to be shared with Members.

2. Initiation of the provision of "Monthly Discussion on Seasonal Climate Outlooks"

On 25 March 2014, TCC started providing a new product of "Monthly Discussion on Seasonal Climate Outlooks" on its website (http://ds.data.jma.go.jp/tcc/tcc/products/model/index.html). The Monthly Discussion is intended to assist NMHSs in the Asia-Pacific region in interpreting and assessing GPC Tokyo's products for three-month prediction and warm/cold season prediction and understanding the current conditions of the climate system. The Monthly Discussion consists of chapters on Summary and Discussion, Latest State of the Climate System, Three-month Predictions, Warm/Cold Season Predictions, and Explanatory Note, and it is updated around 25th of every month.

3. New/Upgraded Data and Products

A number of new/upgraded climate monitoring products have been made available including the following products:

- In July 2013, TCC started providing new climate monitoring products called Regional Maps on its website (http://ds.data.jma.go.jp/tcc/tcc/products/climate/rmap/rmap.php). These resources enable users to easily monitor the regional distribution of 10-day and

half-monthly mean temperatures and total precipitation in Africa, Asia, South America, North America, Oceania and Europe.

- The web-based ClimatView interactive climate database has been upgraded (http://ds.data.jma.go.jp/gmd/tcc/tcc/products/climate/climatview/frame.php). The new version is designed to allow browsing without plug-ins using PHP and its graphic library. It enabled viewing with web browsers including Firefox and Google Chrome in addition to Internet Explorer.
- In response to the release of JRA-55 data, all climate products generated using JRA-25 data has been replaced by versions generated using JRA-55 data in March. JRA-55 data has also been made available in Interactive Tool for Analysis of the Climate System (ITACS).

# Crop climatic suitability assessment in China: a case study of winter wheat

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**Abstract**

Analyzing past and current climate conditions, identifying and evaluating its impact on agricultural production, and providing agricultural meteorological report by weekly, monthly, annually report and key farming season can provide useful information for decision making. The temperature, precipitation and sunshine suitability model were established according to crop climatic suitability theory for the winter wheat in main planting area, China. The climatic suitability model was established based on these three climate factors mentioned above, which can reflect the climate impacts on winter wheat comprehensively. According to integration single factor and climatic suitability index of the winter wheat in different growth period derived from the climatic suitability model, the single factor and climate suitability index model were constructed in each selected province. Using the average, maximum and minimum value of climatic suitability index and winter wheat yield statistical data from 1978 to 2011, developed the climatic suitability evaluation index for winter wheat from planting date to a certain growth stage. The results showed that the climatic suitability index and winter wheat yield index had significant relation; climatic suitability evaluation index can be used to indicate the different level (climatic high suitability, medium suitable and low suitability) for the growth of winter wheat. The method and developed index was applied to the winter wheat growth suitability evaluation in 2013 well also.

**Keyword**: winter wheat; climatic suitability index; climate impact assessment

# The Implementation and Development of Climate Services in China

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## Abstract

For the climate service in China, great progress has been made during the last recent years, and its service capability has been improved step by step as well. The service, involving many aspects of the government management, economy and people's lives, has provided a lot of useful information for the decision-making, industrial and agricultural production and people's living, wich includes disaster prevention and mitigation, service for agriculture, climate feasibility demonstration for major construction projects, energy, water resource management, meteorological support for major social activities, human health and other fields. With the development and implementation of CFCS, climate service in China will turn over a new leaf.

Keyword: climate service; development.

# The long-term trend and spatiotemporal variations of haze over China by satellite observations from 1979 to 2013

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## Abstract

With the development of economy in the past thirty years，many large cities in the eastern and southwestern China are experiencing increased haze events and atmospheric pollution，causing significant impacts on the regional environment, human health and even climate. The long-term trend and spatiotemporal variations of haze over China in recent 30 years are investigated using TOMS AAI products. In addition, the heavy haze event occurred in January 2013 over eastern China are explored using AAI products from TOU on board FY3A. Results show that: (1) In China, high AAI values (>1.0) mainly located in desert region in Northwestern China and five areas with intense anthropogenic activity; (2) In China, the AAI follow a clear seasonal pattern. For the eastern and northeastern region, AAI peaks in winter and a secondary peak in spring. A typical summer minimum and autumn to winter increasing pattern is also observed. For the southern region, high AAI peaks in spring and reach to minimum in summer; (3) In eastern China and northeastern China, AAI shows an increasing trend in the recent 30 years and a decreasing trend is found in the southern China in the recent three years; (4) Heavy haze event occurred in January 2013 in eastern China can be clearly seen from the monthly averaged AAI obtained from TOU/FY3A. The daily coverage area with AAI>3.0 peaks at five periods at this time, i.e. Jan.7-8, Jan. 13, Jan18, Jan. 23, and, Jan 28-29, which agrees well with the reported findings by the media and other published literatures. This confirms the ability to monitor the haze with TOU on daily basis of regional scale.

Keyword: Haze; aerosol; remote sensing; AAI; TOU FY3A

# Teleconnetction modes in the Asian monsoon region in summer

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## Abstract

The present paper in cludes 4 parts.
1. Introduction
2. Regional modes of teleconnections in the Asian monsoon region in summer
3. Interaction between the circumglobal teleconnection (CGT) and the Asian summer monsoon
4. Conclusions

# Model Simulation and Projection of East Asian Heat Waves in Present-Day and Future Climates

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## Abstract

The synoptic behavior of present-day heat waves (HW) over East Asia is studied using a global high-resolution atmospheric model (HiRAM) with 50-km grid-spacing. The simulated HW characteristics are compared with those derived from Climate Forecast System Reanalysis products. Additional runs of HiRAM are conducted for the ‘time slice’ of 2086-2095 in the climate scenarios corresponding to Representative Concentration Pathways (RCP) 4.5 and 8.5. By the end of the 21st century, the averaged duration and frequency of HW in selected East Asian sites are projected to increase under the RCP 4.5 scenario by a factor of 1.4-2.1 and 2.0 -2.3, respectively, from the present-day values. These changes can be reproduced by adding the mean shift between the present and future climatological temperatures to the daily fluctuations in the present-day simulation. The output from a continuous integration of a coupled general circulation model through the 1901-2100 period indicates a monotonic increase in severity, duration and HW days during the 21st century.

# Climate Events and Impacts over China in 2013

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## Abstract

In 2013, the mean annual total precipitation in China was 653.5 mm, 4% higher than normal and slightly less than 2012. The seasonal total precipitation was below normal in winter, but above normal in spring, summer, and fall. The annual mean temperature over China was the fourth highest since 1961, it was 0.6℃ above normal while 0.8℃ higher than 2012. Mean temperature were lower than normal in winter, but persistently higher than normal in spring, summer, and fall.

In 2013, the main meteorological disasters in China were rainstorms, typhoons, heat wave with serious local losses. Regional rainstorms were concentrated and there were server floods occurring in Sichuan, Northwest China and Northeast China successively. The number of typhoon was more than normal which brought huge loss to southeast coastal areas. The strongest heat wave since 1951 occurred in the south, which resulted in serious summer drought，The central eastern China suffered much fog and haze, which had great social influence.

In general, 2013 was a year with medium meteorological disasters. The direct economic losses in 2013 were higher than the average of 1990-2012 and the dead or missing persons and affected areas were less than the average of 1990-2012.

# The Recent SST, Sea ice and snow cover monitoring and diagnosis

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## Abstract

Monitoring on recent global oceanic conditions indicated that the development of El Niño condition. Recently (01-14Apr, 2014), the maximum of positive SSTA over 0.5℃ were observed over the central and eastern equatorial Pacific ocean, with bursting of westerly in the equatorial central Pacific, and dominating of anomalously warm subsurface water over the equatorial central-eastern Pacific. On the other hand, the positive North Atlantic tripole also developed in the North Atlantic region.

During the boreal winter, the total area of snow cover was near normal in Eurasia and in the Tibetan Plateau, respectively. During the boreal winter, the Arctic sea ice extent was below the average for 1981-2010 periods, but was near the long-term trend.
As the El Nino condition might occur in the summer, as the research of previous, the strong East Asian summer monsoon would show up in the development phase of El Nino, leading to location of positive precipitation anomalies over the region between Yangtze River and Yellow River basin.

On the other hand, the positive North Atlantic tripole SSTa might force a Rossby wave train extending from Atlantic to East Asia, which might lead an anomalous low in Mongolia and North China at 500 hPa geopotential height field. It was also dynamically consistent with the anomalous cyclone over Mongolia and North China and anomalous anticyclone over South China in the lower troposphere, indicating a strong summer monsoon in the East Asia. This upper- and lower levels coupling pattern in the troposphere favours the negative precipitation anomalies over South China and positive precipitation anomalies over North China.

# The Features of East Asian Winter Monsoon in 2013/14 and Its Possible Impact

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## Abstract

The East Asian winter monsoon (EAWM) was in its strong decadal phase, in boreal winter of 2013/2014, the EAWM index was -0.60, which was weaker than normal, while the standardized seasonal Siberian high intensity index was -0.40, also weaker than normal. During last winter, the center of Arctic polar shifted to the western Hemisphere, the negative height anomalies were visible over the Ural Mountain，while the positive ones dominated the coast area of northeastern East Asian, implying eastward tilt of East Asian trough and inactive of Ural-Mountain blocking high. On the low troposphere (850hPa), the anomalous southerlies covered most of East Asian. Under the aforementioned circumstance, except the 1-6℃ below normal temperatures were observed in northern Siberian plateau and southeastern East Asian, the temperatures were 1-4℃ above normal in most East Asian. Further research indicate that, in DJF 2013/14, the spatial pattern of 1000hPa geopotential height anomaly showed the features of second component of EOF analysis, instead of the loading pattern of the Arctic Oscillation, which has a closely relationship with the general circulation in the low and middle latitudes, are the possible causes of weak EAWM in winter 2013/2014.

# Primary factors of extreme summer conditions in East Asia in 2013

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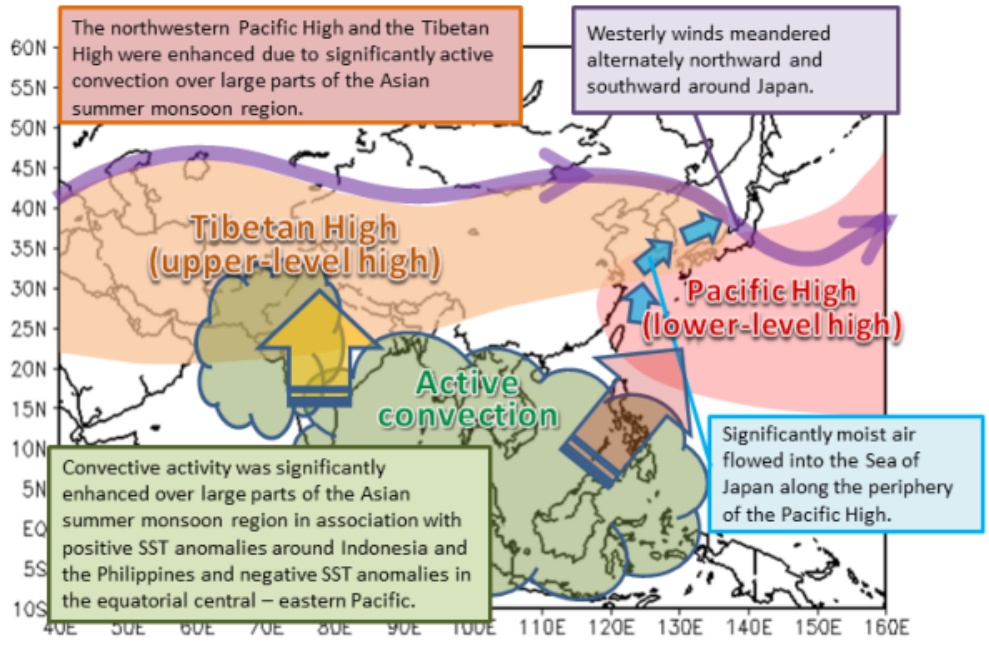
East Asia experienced extreme summer conditions in 2013, with severe heat conditions in southern China, South Korea and Japan, heavy rainfall near the Amur river and in Tohoku region and the Sea of Japan side areas of Japan's main islands, and dry conditions over southern China, South Korea and the Pacific side areas of eastern and western Japan and parts of Okinawa/Amami.

In July and August 2013, the Tibetan High was enhanced and the northwestern Pacific High continued to expand westward. Convective activity was significantly enhanced over large parts of the Asian summer monsoon region in association with SST anomaly patterns in the Pacific (above-normal around Indonesia and the Philippines, and below-normal in the equatorial central-eastern Pacific), and contributed to the enhancement of the Pacific High and the Tibetan High.

The northwestern Pacific High continued to expand westward and predominantly developed over southern China and western Japan, contributing to severe heat and dry conditions. Enhanced warm moist air continued to flow over northeastern China and the Sea of Japan side areas of Japan along the western and northern periphery of the Pacific High, contributing to heavy rain in these countries. Upper cold air occasionally flowed over the areas in association with the southward meandering of the subtropical jet stream, contributing to heavy rain brought by unstable atmospheric conditions.

Possible primary factors contributing to the extreme summer conditions are summarized as shown in the conceptual diagram below.



# October Circulation Precursors of the Wintertime Arctic Oscillation

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## Abstract

The wintertime Arctic Oscillation strongly affects the climate system of the Northern Hemisphere, particularly, North Eurasia. Statistical analysis has revealed highly significant relationships between the wintertime Arctic Oscillation index (AOI) and preceding October circulation. The wintertime AOI strongly covaries with an October circulation anomaly barotropically spanning the depth of the troposphere over the Taymyr Peninsula (Taymyr circulation anomaly, TCA), with the anticyclonic (cyclonic) TCA preceding winters of the negative (positive) AOI polarity. The October TCA affects the wintertime AOI polarity mainly via its impact on air temperature over the Arctic and North-East Asia. Anticyclonic (cyclonic) TCA leads to the positive (negative) temperature anomaly over the Arctic and a corresponding increase (decrease) of geopotential heights, and to the negative (positive) temperature anomaly over North-East Asia and so to enhancement (weakening) of the climatological trough associated with long planetary waves and corresponding enhancement (weakening) of the upward wave activity flux. To characterise temporal variability of the TCA, a Taymyr Circulation index (TCI) is suggested. Correlation coefficient between the (inverted) wintertime AOI and the October TCI is 0.58 for the 1958-2012 period, with correlations being stable in time. The anticyclonic (cyclonic) TCA is associated with smaller (larger) number of cyclones coming to the region of the eastern Barents Sea–Taymyr Peninsula–Laptev Sea. Statistical relationships between the October TCA, wintertime AOI and September/October sea surface temperature in the northern Barents Sea are shown.

# The Japanese 55-year Reanalysis "JRA-55": General Specifications and Basic Characteristics

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The Japan Meteorological Agency (JMA) conducted the second Japanese global atmospheric reanalysis, called the Japanese 55-year Reanalysis or JRA-55. It covers the period starting in 1958, when regular radiosonde observations began on a global basis. JRA-55 is the first comprehensive reanalysis that has covered the last half century since the ERA-40 reanalysis, and is the first one to apply four-dimensional variational analysis (4D-Var) to this period. The main objectives were to address issues found in previous reanalyses and to produce a comprehensive atmospheric dataset suitable for studies of multidecadal variability and climate change.

This presentation is a brief introduction to the observations, the data assimilation and prediction system used in JRA-55 and the basic characteristics of the JRA-55 product.

# The Development of a Statistical Forecast Model for Changma

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## Abstract

Forecasting year-to-year variations in East Asian summer monsoon (EASM) precipitation is one of the most challenging tasks in climate prediction because the predictors are not sufficiently well known and the forecast skill of the numerical models is poor. In this study, a statistical forecast model for changma (the Korean portion of the EASM system) precipitation is proposed that was constructed with three physically based predictors. A forward-stepwise regression was used to select the predictors that included sea surface temperature (SST) anomalies over the North Pacific, the North Atlantic, and the tropical Pacific Ocean. Seasonal predictions with this model showed high forecasting capabilities that had a Gerrity skill score of 0.82. The dynamical processes associated with the predictors were examined prior to their use in the prediction scheme. All predictors tended to induce an anticyclonic anomaly to the east or southeast of Japan, which was responsible for transporting a large amount of moisture to the southern Korean Peninsula. The predictor in the North Pacific formed an SST front to the east of Japan during the summertime, which maintained a lower-tropospheric baroclinicity. The North Atlantic SST anomaly induced downstream wave propagation in the upper troposphere, developing anticyclonic activity east of Japan. Forcing from the tropical Pacific SST anomaly triggered a cyclonic anomaly over the South China Sea, which was maintained by atmosphere–ocean interactions and induced an anticyclonic anomaly via northward Rossby wave propagation. Overall, the model used for forecasting changma precipitation performed well (R = 0.85) and correctly predicted information for 16 out of 19 yr of observational data.

**Key words**: Changma, East Asian summer monsoon, forward-stepwise regression, Gerrity skill score

# On the role of warm pool on the East Asian summer precipitation during recent decades

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## Abstract

The western-Pacific warm pool (hereafter, the warm pool), which is the area where the annual mean sea surface temperature (SST) is persistently higher than 28 C covering the region roughly between 120 E and 170 E and from 10 N to 10 S, is recognized as playing an important role in both the tropical and extratropical climate by modulating the tropical convection that is capable of perturbing the atmospheric teleconnections. Using the available observation datasets, we examine the changes in the relationship between the warm pool SST and the precipitation variability over East Asia since 1979. It is found that a simultaneous relationship of warm pool SST-East Asia summer precipitation has been changed after the anomalous El Nino during the early 1990s occurred. Interestingly, it is also found that the characteristics of air-sea interactions over the warm pool including SST-cloud are also changed after the mid-1990s. We speculate that the changes in the air-sea interactions over the warm pool might be associated with the changes in the relationship of warm pool SST-East Asian precipitation.

Keywords: warm pool, air-sea interactions, teleconnections, precipitation.

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# Outlook of ENSO from spring to summer 2014

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## Abstract

Since the mid of February 2014, sea surface temperature (SST) in large portions of the equatorial eastern Pacific has increased, and then by the mid of March, the positive SST anomalies has covered most of Nino regions except Nino 1+2 and correspondingly the subsurface warm water has dominated the eastern equatorial Pacific. Meanwhile the twice strongly westerly burst events occurred in early the year, which led to weaken the northeasterly trade wind and intensify the convection activities near dateline. In early April 2014, a new westerly anomaly that is beneficial to El Nino event appeared to develop in the western tropical Pacific. In addition, the studies showed that both signal factors of the past winter negative SST anomalies in the northwestern Pacific and the last spring air temperature difference between over the eastern and western tropical Pacific all favor an El Niño event since summer 2014.

Based on the prediction of models and current development trend of the sea and atmospheric status, SST anomalies in Nino regions are expected to stand up at 0.5 degrees Celsius in May or June 2014, and continue to shape into an at least moderate El Niño event through the remainder of the year.

# BCC/LCS ENSO Analysis and Prediction System:

# 2014 Summer ENSO Outlook

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## Abstract

Recently, an ENSO monitoring, analysis and prediction system (EMAPS) has been developing in Laboratory for Climate Studies of Beijing Climate Center (BCC/LCS). In this new system, the two indices for representing the so-called Cold-Tongue (CT) ENSO and Warm-Pool (WP) ENSO have been utilized to monitor the evolutions of the two ENSO types. A group of statistical models have been developed to predict directly the two types of ENSO using the equatorial upper oceanic heat content, western-Pacific zonal wind stress, and Indian Ocean dipole signal as the precursors. Also, the new methodology for predicting ENSO is proposed and an analogue-dynamical ENSO prediction system has been established by introducing a method of analogue-based correction of errors (ACE) into the prediction of the BCC operational climate model. Further, an independent validation indicates the good performance of this new ENSO prediction system. The verification of 2013 autumn ENSO prediction shows that the EMAPS has given a fairly reasonable prediction. With this new system, we at present provide an outlook of ENSO during the following summer that ENSO: the sea surface temperature anomalies in the equatorial Pacific possibly develop into an El Niño event with a moderate intensity in this summer, which has been suggested to be likely dependent upon whether the western-Pacific westerly bursting event will occur in April-May.

# Validation of Bayesian Model Averaging for Seasonal Prediction Based on TRMM Data

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## Abstract

Rainfall variability in Indonesia is very high that makes difficult to predict spatially and temporally. With such difficulty, research about ensemble mean and Bayesian Model Averaging (BMA) method is needed. Some statistical methods to predict rainfall variability are incorporate into one output as an ensemble. Tropical Rainfall Measuring Mission (TRMM) data was used on this research, which is weather radar carried by the satellite. Performance of the model output is then verified using contingency tables. The BMA ensemble method can improve the onset of dry season prediction by 22% and for the onset of rainy season ensemble forecast BMA can improve the prediction by 12%.

# MJO Prediction Experiments Based on Climate System Model of Beijing Climate Center

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## Abstract

Madden-Julian Oscillation (MJO) is a dominant mode in the tropical intra-seasonal variability and has a prominent impact on tropical and extratropical climate. It has been becoming a hot topic to predict the MJO using fully coupled climate models. In this study, we report some results of the MJO prediction experiments based on the climate system model of Beijing Climate Center (BCC). In these experiments, a series of hindcasts are conducted with different initialization schemes, and ensemble perturbations are generated by different methods. The hindcast results have shown that the BCC model is capable of predicting the MJO signals at the leading time of more than 13 days. The performance of MJO prediction is more sensitive to the initialization schemes of the BCC model than the perturbation methods that are used in forming the ensemble prediction. Indeed, problems remain to be addressed in developing this MJO prediction system, particularly based on the model in which the MJO signals may not be excellently simulated and still needs to be further improved.

# An application of hybrid downscaling model to forecast seasonal precipitation at stations in China

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## Abstract

Downscaling techniques can effectively improve the coarse resolution and poor representation of precipitation predicted by general circulation model (GCM). In this study, a statistical downscaling method, based on the singular value decomposition (SVD), is proposed for better representing the coupled variation between predictors and seasonal (i.e. winter and summer) precipitation in China. By comparing current predictors from Climate Forecast System version 2 (CFSv2) of National Centers for Environmental Prediction and previous predictors from observation, the two best appropriate predictors, the winter sea level pressure (SLP) from the CFSv2 and the autumn sea ice concentration (SIC) from observation, are selected to construct the statistical downscaling model for prediction of winter precipitation in China. Three downscaling schemes are developed by involving the SLP, SIC, and both of them (i.e., SLP-scheme, SIC-scheme, and SS-scheme), respectively. Validations for the schemes show a considerable improvement of performance in predicting China winter precipitation, compared with the original CFSv2 output. The temporal and spatial anomaly correlation coefficient (ACC) and root mean square errors (RMSE) were estimated. For the cross validation, the spatial ACC are increased from ~0.01 of the CFSv2 to >0.3 of the downscaling model. For the independent validation, the temporal RMSE from the downscaling schemes are all decreased more than 30%. In particular, the results using the SS-scheme showed relatively smaller root mean square errors than those of either the SLP-scheme or SIC-scheme, and hence can reproduce the precipitation anomaly in 2011 and 2012 winters more accurately.

The downscaling method was also used to predict the summer precipitation anomaly in 2014. The centers of the positive anomalies are located in Southeast China, Huang Huai and Northeast China, while it would experience relatively drought along Yangtze valley.

# The seasonal forecast of the precipitation in China

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## Abstract

The precipitation anomalies in the summer of 2014 in China were estimated by using the 2L AGCM of the Institute of Atmospheric Physics (IAP), CCSM4.0 and statistical models. The AGCM were forced by the sea surface temperature anomalies (SSTAs) predicted by the ENSO Forecast System of IAP. The SSTAs in the tropical Pacific, the snow cover over the Tibetan Plateau and the zonal wind anomalies in the last winter were used in the statistical models.

The prediction showed that El Niño would start evolving in summer of 2014. The Eastern Asian summer monsoon will be stronger than usual. The precipitation in most part of China will be below-normal during the summer of 2014. The precipitation in the Huaihe Valley, the north to the Hetao region, the north and south parts of northeast China, the southeast part of the North China, the Northwest part of the Xinjiang Uygur Autonomous Region and some areas in the southwestern China seemed to be above-normal.

# Seasonal outlook of the East Asian Summer in 2014

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1. Oceanic conditions

Tropical oceanic conditions are the most important signal for the summer outlook in view of its predictability and have effects on variability of Asian summer monsoon which plays a key role in East Asian summer climate.

ENSO neutral conditions have continued during the boreal winter and the first half of spring. However, warm Kelvin waves which were excited by twice strong westerly bursts seen in January and February over the equatorial western Pacific migrated with large amplitude along the equatorial central Pacific in March, and will reach the western coast of South America in the end of April.

The JMA's CGCM predicts that the warm Kelvin waves will continue migrating along the equator and SSTs in the eastern Pacific will increase in the second half of April. It also predicts that the coupling of ocean and atmosphere will start in the first half of the boreal summer. The NINO.3 SST will be near normal during the boreal spring and will transition to above normal in summer. As a result, in summer, although the continuation of ENSO neutral conditions may be possible considering large uncertainties in the model prediction, it is more likely that El Niño conditions will develop.

The area-averaged SST in the tropical western Pacific (NINO.WEST) region was near normal in March. It is likely that the NINO.WEST SST will be near normal or below normal in summer.

2. Outlook for Asian summer monsoon

According to JMA's CGCM forecast, in association with the SST anomaly patterns, convective activity is predicted to be stronger than normal in the equatorial central and eastern Pacific while weaker than normal over the Indian Ocean, the Indian subcontinent and the Maritime continent. These anomaly patterns are consistent with those seen in El Niño conditions and imply that the Asian summer monsoon will be generally weaker than normal. In association with the weak Asian summer monsoon, the Tibetan anti-cyclone will be less developed than normal and the sub-tropical jet stream will shift southward compared to its normal position. These atmospheric conditions suggest cool summer climate in East Asia.

However, it is noteworthy in the result of forecast by JMA's CGCM that convection around the Philippines is predicted to be more enhanced than normal with good prediction skill. The north Pacific High will be dominant over the western Japan and Okinawa by the mechanism of P-J teleconnection pattern. This seems to be a point of discussion for summer

climate in the southern part of East Asia.

3. Summary of the summer outlook for Japan

JMA issued the summer outlook on 25th February. It says that mean temperatures are expected to be near normal or below normal, both with a 40% probability, in northern Japan, and to be near normal or above normal, both with a 40% probability, in western Japan. Total precipitation amounts are expected to be near normal or above normal, both with a 40% probability, in northern Japan, and to be near normal and below normal, both with a 40% probability, in western Japan.

# Summer climate prediction for China in 2014

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## I Precipitation prediction

The predictions of precipitation and temperature are based on consensus on possible influence of external forcing factors and summer monsoon circulation. The precipitation prediction for China JJA 2014 indicates that the precipitation is more than normal lies in southern North China, northern Huaihe river, eastern Northwest China, northern Northeast China, northern Xinjiang province, southern South China and southern Southwest China; While the less-than-normal precipitation lies in the most other areas, especially western Jiangnan area.

## II Temperature prediction

The temperature prediction for China JJA 2014 indicates that most areas of China will have higher-than-normal temperature; while the temperature is lower than normal lies in northern Northeast China, and southern South China.

# Climate review for 2013/2014 Winter and 2014 summer outlook over Mongolia

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**ABSTRACT**

Agricultural and livestock sector that play crucial role in economy and food supply in Mongolia highly depend on weather and climate. Therefore, predicting monthly and seasonal temperature and precipitation is important in our social-economic development. The synoptic, analogy and some statistical methods have been used operational long range weather forecasting. Warm and cold season outlook for monthly mean temperature and precipitation anomalies are been issued twice a year. And monthly forecast for anomaly of temperature and precipitation is given every month.

In long-range weather forecast, several statistical methods and models are used, including Local climate and extreme model, and two more statistical methods based on downscaling. Beside it, prediction maps of Climate center's dynamic models such as of APCC, ECMWF, NCEP, KMA, IRI, NOAA, NECC, BCC and TCC are have been used for monthly and seasonal prediction.

In last winter in 2013-2014, in the most part of our country average temperature was above normal by 0.9oC, and the precipitation was only at 50% of the territories and below normal.

According to the Local Climate Model prediction, temperature would be generally above normal. However, it is predicted to be near normal in the eastern part in July, in the most parts in May, and in the western part, in the western area of the central and southern parts, and in the eastern area of the eastern part of the country in September. Precipitation is predicted to be generally above normal and near normal during the whole country.

Extreme Model is predicted that the temperature would be generally above normal in the whole country. However, it is predicted to be below normal in the whole country in August. Precipitation is predicted to be near normal in May and August. Above normal during June-July and September in the whole country.

Based on these results and outputs, preliminary summer climate outlook from May to September 2014 is concluded. According to it, temperature is expected to be above normal by +1.0~+1.5oC in the most area of the western and central parts during June-July, in the southern part in August and in the eastern area of the central and southern parts, and in the western area of the eastern part in September. Near normal in the most area of the whole country in May, in the most part of the eastern and southern parts in June, in the eastern part in July, in the northern part in August and in the western part, in the western area of the central and southern parts, and in the eastern area of the eastern part in

September. Precipitation is predicted to be generally near normal in the most area of the whole country during May-September. However, it is above normal in the southern area of of the whole country in June, in the south-eastern area of the eastern part in July, in the southern area of the southern part in September. Below normal in the some parts of the country in May, in the western area of the western part in Julne and in the southern area of the southern and eastern parts in August.

# Seasonal Outlook for Summer 2014 by using APCC MME

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ABSTRACT

Since its establishment, APEC Climate Center (APCC) has been issuing operational monthly rolling 3-month forecasts based on a well-validated multi-model ensemble prediction system. Multiple model simulations are provided by 17 prominent climate forecasting centers and institutes in the APEC region. The seasonal prediction information has been productively applied by those in developing countries that are unable to produce their own prediction information due to lack of forecasting techniques and/or infrastructure. Recently, however, the member economies requested to extend the scope of APCC's seasonal climate prediction services in order to better prepare for climate-related hazards in a timely manner. Upon receiving this request and to meet the needs of the APEC community, APCC launched is operational 6-month lead dynamical seasonal prediction service in September 2013.

The seasonal outlook for summer (June through August, JJA) 2014 has been performed with initial condition of March, 2014. The participated models are NCEP-CFS V2 from NCEP in USA, NASA in USA, MSC_CANCM3 and MSC_CANCM4 from MSC in Canada, POAMA from BoM in Australia, and PNU from Pusan National University in Korea.

APCC MME forecast indicates that slightly warme-than-normal sea surface temperature (SST) conditions in the West/central Pacific and southern subtropical Indian Ocean are expected to persist into early boreal summer along with anomalously cool SST in the southeastern subtropical Pacific. Equatorial warming across the Pacific is expected to follow during mid-to late boreal summer, consistent with El Nino development reflected in the Nino3 index. The Indian Ocean Dipole is expected to remain neutral.

Warmer-than-normal conditions are expected in many East Asian regions. Anomalously dry conditions are expected over oceanic regions spanning the North Indian Ocean basin possibly affecting the Indian Subcontinent, as well as across the Maritime Continent and extended northward impacting South China and the extra-tropical West Pacific.

# NEACC's Seasonal Prediction for the Summer 2014

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Seasonal prediction for the summer 2014 is presented. It is developed by the North EurAsia Climate Centre (NEACC) based on the model ensemble forecast of GPC-Moscow. Assessments of the GPC-Moscow historical forecasts are shown. Summer 2013 forecast for East Asia and its skill are also discussed.

# Seasonal Forecast for Rainy Season 2014 for Macao

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## ABSTRACT

Macao is located at the coastal area of southern China, which is often affected by the warm and moist airstream coming from the ocean. In general, the annual total precipitation of Macao most occurring during rainy season (from April to September). The abundant rainfall accompanied with frequent influence of tropical cyclone in summer, producing flooding, landslip and storm surge, could cause a great damage to the general public.

Seasonal forecast have been provided by the Macao Meteorological and Geophysical Bureau since 2011. The seasonal forecast provides information about the likely percentile category of temperature and precipitation in the coming forecast season. The result of the seasonal forecast is based on the consideration of El Niño/La Niña conditions, statistical analysis of the local climate conditions in the past few decades and dynamic model outputs provided by different major climate prediction centers around the world.

In this presentation, the rainy season for Macao will be discussed. The result shows a normal to below normal condition for precipitation from April to June, and near normal condition from July to September; as for temperature, a normal to above normal condition from April to September is expected.

# Seasonal Forecast for Summer 2014 for Hong Kong

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As part of the climate services provided by the Observatory, the seasonal forecasts of temperature and rainfall in Hong Kong in terms of tercile category are disseminated to the public via the Internet. Formulation of the forecast is supported by a combination of dynamical model results and statistical methods. The dynamical model results are acquired from major climate prediction centres around the world as well as generated by a suite of global-regional climate model operated in-house. Also taken into account in the forecast formulation are statistical downscaling results of global climate model data and the impacts of El Niño/La Niña.

Rain could be heavy and persistent during summer (June-August) in Hong Kong, leading to floods and landslips at times. The seasonal forecast for summer is therefore of particular interest to the general public. In this presentation, the seasonal forecast for summer 2013 will be reviewed and a preliminary forecast for this summer including the number of tropical cyclones entering 500 km of Hong Kong will be presented. Besides, the annual outlook for Hong Kong issued in March will also be presented.

# A New method in predicting regional climate reasoning based on mechanisms of ocean-atmosphere interaction

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## Abstract

A new method have being used in regional climate prediction. The method used logical reasoning to future anomalous atmospheric circulation based on the second predictability and mechanisms of ocean-atmosphere interaction. The first step is to make judgment to continued SST anomaly and the local and remote forcing affection from ocean to atmosphere, then to estimating the whole effect from all forcing including seasonal variation before the estimating the location and strength of planet front by comprehensive analysis. The qualitative judgment of regional climate prediction is made after appreciating the anomalous water vapor transportation to specific area caused by anomalous atmospheric circulation. As an example, Asia climate prediction of 2014 have been made by this method.

# Seasonal climate outlook for summer 2014 over DPRK

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## Abstract

SHMA issued a report on the seasonal climate outlook for summer 2014 on 20 Feb. 2014. According to this report, the coming summer is likely to be bellow to near normal for temperature and near to above normal for precipitation over DPRK.

The basis of our outlook is as follows;

1. On the basis of monitoring of SSTA over NINO3.4, SSTA over this region will be expected to be near to above normal in summer 2014.

   Pacific SSTA predicted by similarity in change features of SSTA will be above normal over NINO3.4 area. Even the weekly El Nino event will appear in this area.

   Physical and statistical models forecast that the NINO3.4 index will be kept near to above normal state in the coming summer.

   In similar years, the tendency of summer temperature was bellow or near normal and precipitation was near or above normal over DPRK.

2. SHMA's numerical model predicts that 500hPa height anomalies will be higher than normal in high latitude but lower in middle latitude. This heralds that the meridian circulation will be a little strong over middle latitude of East Asia. And then the forecasting anomaly map shows that western subtropical high will be normal while Tendency of Monsoon will be Normal or stronger in summer.

   With interpreting the model, the temperature will be below to near normal and the precipitation will be near to above normal.

3. Composition years similar to interaction between atmosphere and ocean from summer 2013 to winter 2013/2014 reveal that the temperature is near or above normal and precipitation is near or above normal.

   On the whole, the temperature is expected to be bellow to near normal and precipitation to be near to above normal.