Current status of operations of Forum on Regional Climate Monitoring, Assessment and Prediction for Regional Association II (FOCRAII)

Zhiqiang GONG
Beijing Climate Center
The GFCS has five main components or pillars whose implementation is critical to ensure that the entire value chain for the production and application of climate services is effectively addressed. Climate prediction is one of the bases of the successful implementation of climate services.
Background

Beijing Climate Center (BCC) was established in 2003, based on the National Climate Center of China Meteorological Administration, to better perform its functions as a WMO Regional Climate Centre (RCC).

BCC was designated as a WMO RCC in RA II (Asia) at EC-LXI in June 2009. BCC has the obligations to deliver climate service for neighboring and surrounding countries in Asia and international climate community, and it has the following capabilities as a RCC.
Platform for products distribution and communication

The Forum on Regional Climate Monitoring-Assessment-Prediction for Regional Association II (RAII)

Since 2005, 13 times of Forum on Regional Climate Monitoring-Assessment-Prediction for Asia have been hosted by BBC, which makes it a very important and effective platform for products distribution and communication of climate prediction.
Coordinating institution: **Beijing Climate Center**

- **Beijing Climate Centre (BCC, 2003)**
- **WMO Regional Climate Centre in RA II (RCC, 2009)**
  - Global Producing Centre for long-range forecast (GPC, 2006)
  - East Asian Monsoon Activity Centre (EAMAC, 2006)
  - Center for Extreme Events Monitoring in Asia (CEEMA, 2010)
Mission of Beijing Climate Center

- To monitor and diagnose global atmospheric and oceanic conditions, as well as extreme climate events, especially in East Asia
- To issue global climate predictions and impact assessments at monthly, seasonal and inter-annual time scales, particularly over East Asia
- To provide climate services to different users
- To do research on climate and climate change issues
FOCRAI I is fully supported by divisions of BCC.
FOCAII frequency: Once a year
Sources of funding: Regular International Cooperation Fund of CMA
Potential applications of seasonal outlooks

**Agriculture and food security**
In many areas, food security remains a major concern. Agriculture is vulnerable not only to market fluctuations but also to climate variability and climate change and

**Disaster risk reduction**
Most natural hazards are caused by weather and climate. This exemplar illustrates how user-friendly climate services can help countries and communities build greater resilience

**Energy**
Energy systems are the engine of economic and social development. Energy generation and planning of operations are markedly affected by meteorological events and energy systems

**Health**
Climate variability and climate change have important repercussions on public health. Temperature and rainfall conditions influence the spread of communicable diseases

**Water**
Water is vital for life, but an over or under supply can threaten life, societies and economies. The amount and availability of water is strongly influenced by climate variability and
Major forcings on the regional climate

- Cold air from mid- and high latitudes
- Forcing of Tibetan Plateau
- Meiyu Front
- Southeast Trade Wind
- Eastward MJO
- Convective Cloud Cluster
- Northwestern Pacific Subtropical High
- Typhoon
- Marskerian High
- Australian High
- Somali Jet
- Monsoon Low
- Monsoon Vortex
- Southwest Vortex
- Subtropical High

Major forcings on the regional climate.
Monitoring of current conditions in the outlook; Climate data is available for the sub-region of interest at extend-range, monthly and seasonal scales.
Prediction resolution has been developed from 160 station to 2332 station;
Prediction temporal scale covers from the extend-range to annual scales, prediction object includes the climate element, climate phenomenon, event, disaster etc. FOCRAII mainly works on the summer prediction in terms of Precipitation and Temperature.
Target element: Climate Prediction

1) ENSO Outlook
2) Indian Ocean SST Outlook
3) EASM Outlook
4) Precipitation and Temperature Outlook
5) Tropical Cyclones Outlook
Probability Outlook

2017 JJA Precipitation Prediction from Dynamical Models

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2017 JJA Temperature Prediction from Dynamical Models
These two figures are synthesized deterministic forecast from the surveys.
Climate Prediction Model System

BCC-CSM

Extended term prediction
Monthly prediction
Seasonal, yearly prediction
Decadal prediction
Climate change projection
Climate assessment

BCC-RegCM
High Resolution Regional Model

Aerosol

Atmosphere

Chemistry

Coupler

Ice

Coupler

Land

Ocean

Improve physical process and model resolution
Multi-Model Downscaling Ensemble System (MODES)

Downscaling

Multi-model and multi-method ensemble

GPCLRF

BCC  ECMWF  NCEP

EC  NCEP  JMA  BCC  BP-CCA  EOF-ITE  OSR  CPPM  EM  MLR

Monthly Prediction

2014-2015 Summer prediction
ENSO Monitoring and Forecast System

Global SST Monitoring

Satellite based SST Mentoring

BCC_CSM based ENSO Forecast System

WMO OMM
Distribution

• Summer outlook is mainly distributed through the Email at the regional level.

• CMA is going to establish the Asia GMAS, which may be another kind platform to share our prediction products.
Capacity Development Activities

• To enhance existing capabilities to provide climate services more effectively by establishing the mechanism and workflow in the areas such as improving the data sharing and collaborative products releasing, deepening the cooperation and exchange between different sectors, strengthening cooperative R&D activities and joint training, and optimizing the operational service system and distribution.

- International Seminar on Climate System and Climate Change (ISCS)
- International Training Seminar on Methods for Short-term Climate Prediction
- International training workshop for climate service
- Training and International Visiting Scholar Program
Since 2015 The FODAS has been introduced to the international students participating the GFCS training course from more than 30 countries, i.e., Thailand, Bhutan, Mongolia, North Korea, Africa etc.

More than 10 countries are studying the use of this tool for their operational work.
The Forecast System on Dynamic Analogue Skills (FODAS)

**Concept note**, Using the historical prediction error to correct the current output, transforming the direct model prediction to the model error estimation.

**Data sets**
- Model data
- Reanalysis data
- Climate Indices

**History forecast error sets**

**The Model Current Prediction**

**Corr. Ana.**
- Main indices sets closely correlated with the forecast error
- Optimal Index Assemble
- Historical Analogue Forecast error
- Regional compose
- Season climate Forecast error
- Processing after forecast

**Core Process**

**Final forecast product**

- BCC_CSM
- ECMWF_SYSTEM4
- NCEP_CFS2
The Forecast System on Dynamic Analogue Skills (FODAS)

Sever: ftp://wlsyzx.yzu.edu.cn/
User name: FODAS, Code: NCC+FODAS

Component Part I

Index of /v2/index/

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Component Part II

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Manual

Simplified FODAS2.0 Operation Manual

Dr. Zhiquing GONG, Zhifan ZHENG, Rong ZHU, Kangpeng XIONG,

Email: gongyj.yuzu.edu.cn

1. Data download

Sever: ftp://wlsyzx.yzu.edu.cn/
User name: FODAS, Code: NCC+FODAS

- Open the folder: v2/index/
- Download the climate index dataset "index_all.txt": put it under the folder FODAS2.0/Data/Indexes/
Engagement, Feedback, monitoring and evaluation are essential for capturing the user’s experience and hence improving the service and its utility.
SWOT analysis

**Strength:**
The platform has been established and operated as a routing work; Contributions from GPCs.

**Weakness:**
Limited prediction accuracy especially in mid-high latitude regions; Lacks of a common platform to distribute the outlook; The outlook is limited at seasonal scale; Lacks of passion to transform climate outlook to climate services.
Way Forward

Issue on climate prediction on Sub-seasonal to Seasonal (S2S) time scale:
● Climate predictability for East Asian monsoon, MJO, extreme climate and precipitation and etc.
● Sharing methods related to climate prediction, such as model initializing, ensemble prediction, ocean data assimilation and etc.

Multi-Model Ensemble prediction and products verification;

More Climate Prediction Model products from GPCs.

Make engagement with users to transform prediction to services.
Thank you
Merci
The Extend-range Forecast System

CFS/DERF Model Data

Downloading Interpolation Initial Process

Ensemble

Prediction Accuracy

Validation Forecast error analysis

Precipitation Process and Cold Air Process modification

Precipitation Process Forecast

Precipitation Process and Cold Air Process Products

Cold Air Process

Validation

Forecast error analysis

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