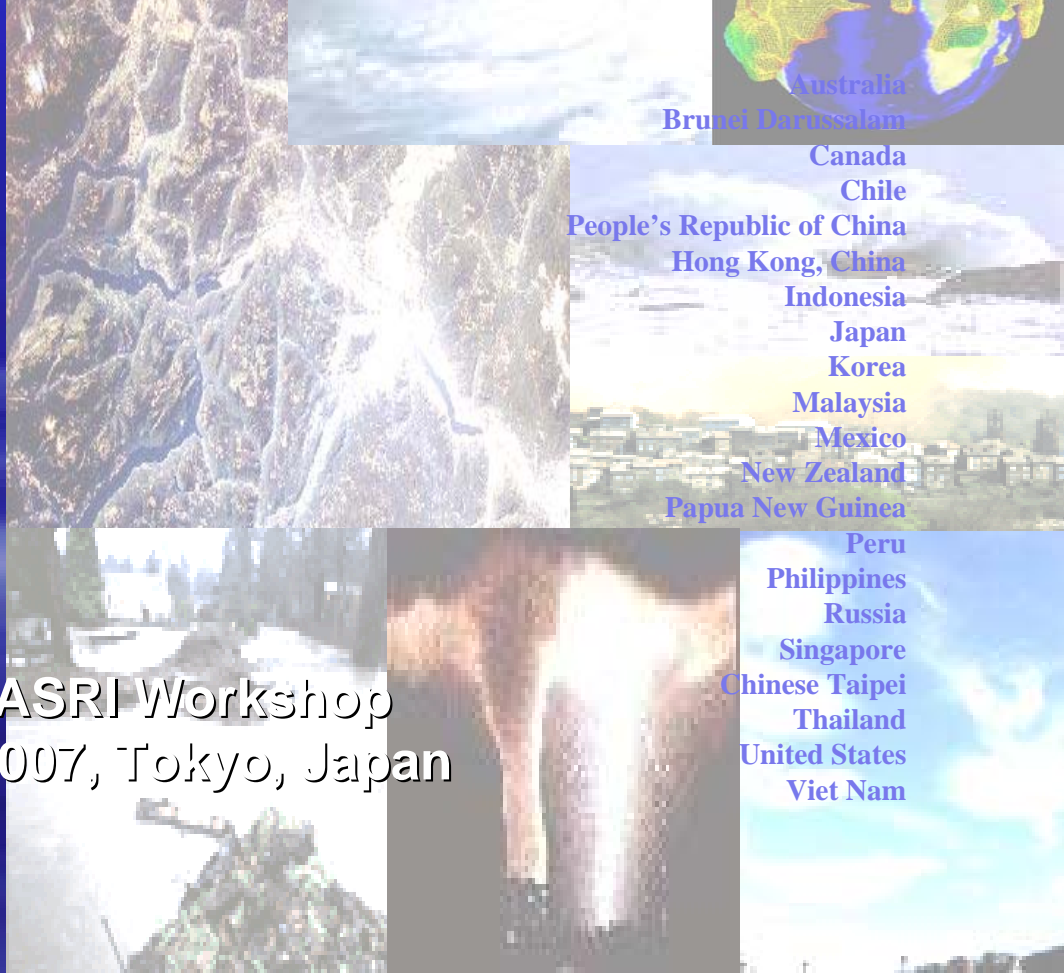


APEC Climate Center (APCC) Climate Information Service

Asia
Pacific
Economic Cooperation
Climate
Center

First AMY/MAHASRI Workshop
8-10th, January, 2007, Tokyo, Japan



Australia
Brunei Darussalam
Canada
Chile
People's Republic of China
Hong Kong, China
Indonesia
Japan
Korea
Malaysia
Mexico
New Zealand
Papua New Guinea
Peru
Philippines
Russia
Singapore
Chinese Taipei
Thailand
United States
Viet Nam

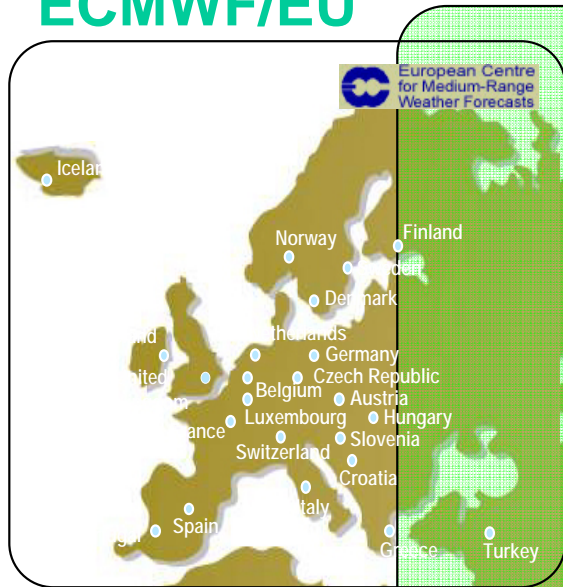


Vision of APCC

- **Realizing the APEC vision of regional prosperity**
 - the enhancement of economic opportunities
 - the reduction of economic loss
 - the protection of life and property

APEC Climate Center (APCC)

ECMWF/EU



1973

APCC/APEC



2005

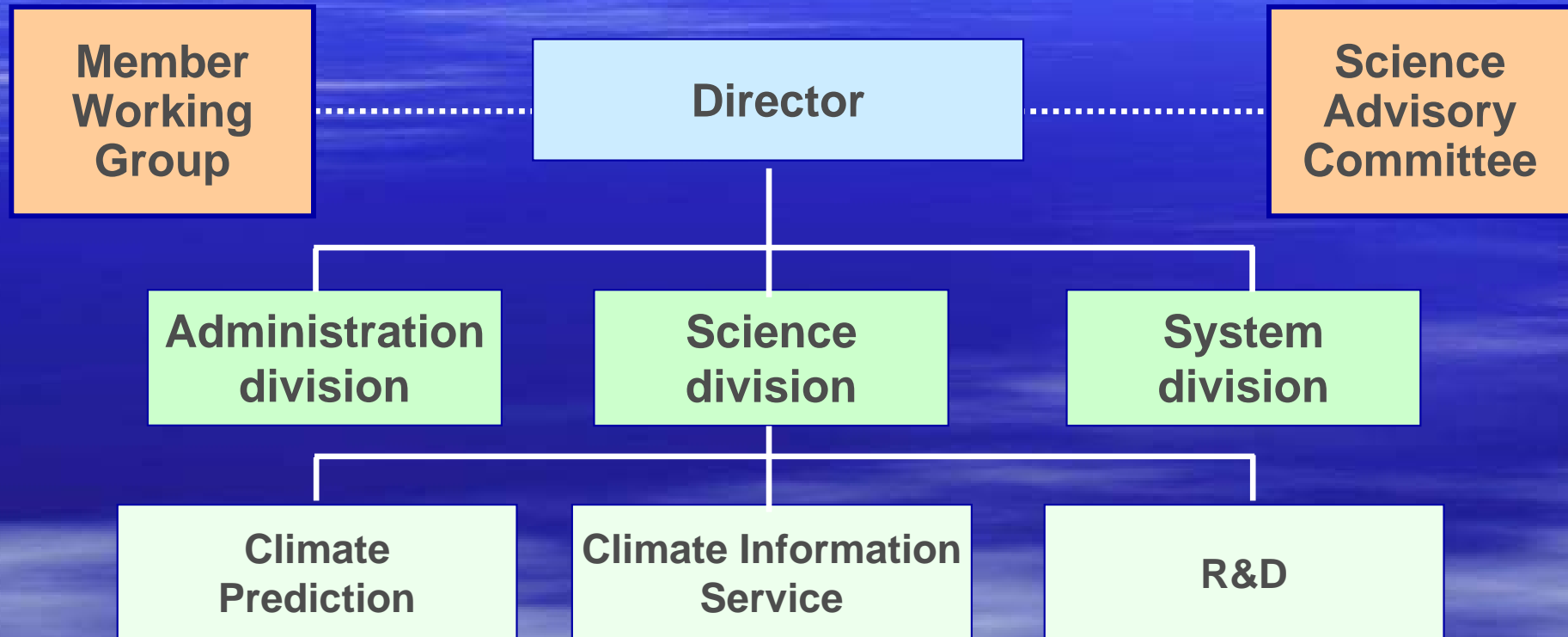
Goals of APCC

- Facilitating the share of high-cost climate data and information
- Capacity building in prediction and sustainable social and economic applications of climate information
- Accelerating and extending socio-economic innovation

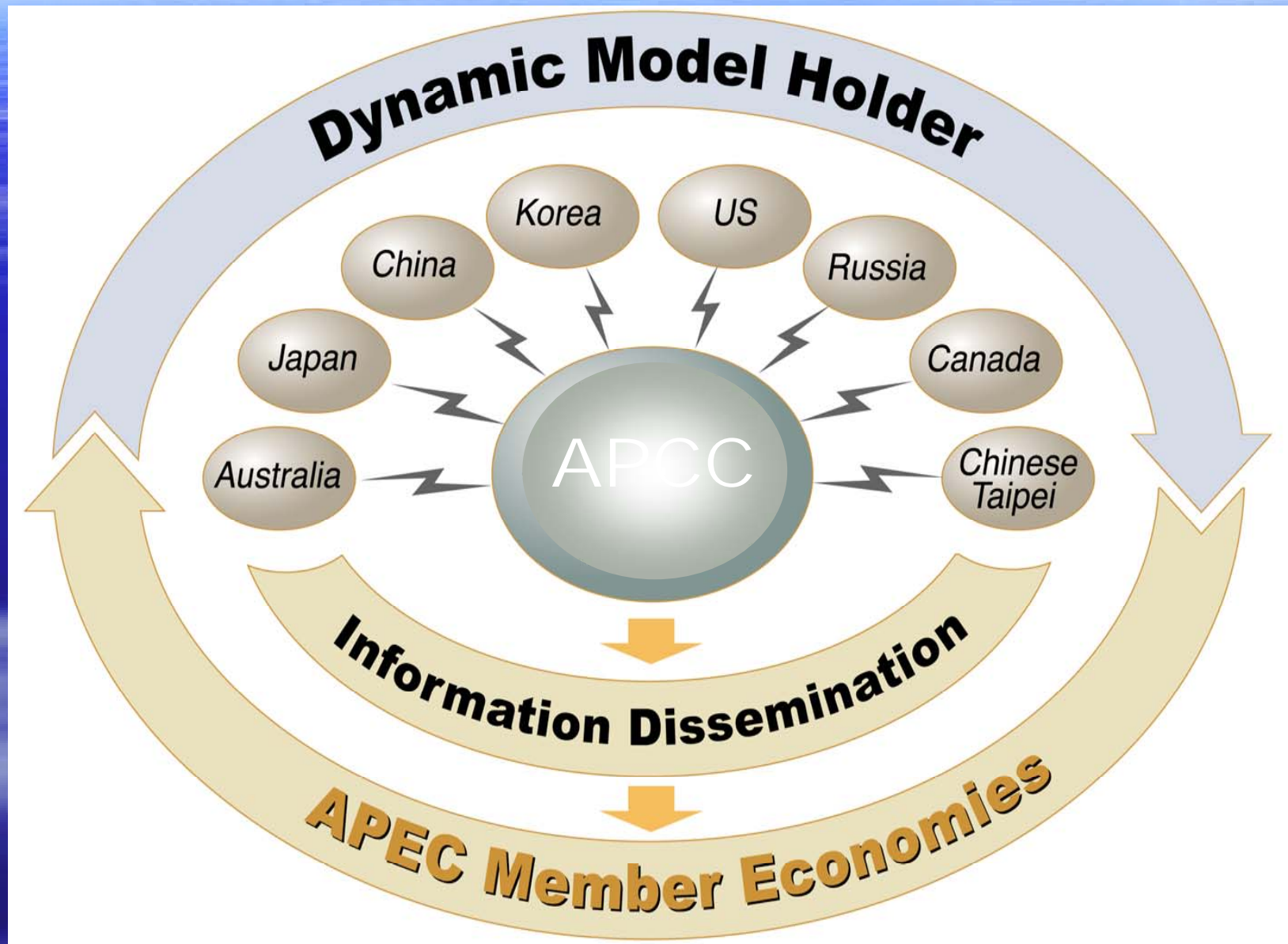
Functions of APCC

- Developing a value-added reliable climate prediction system
- Acting as a center for climate data and related information
- Coordinating research toward the development of an APEC integrated climate- environment-socio-economic system model

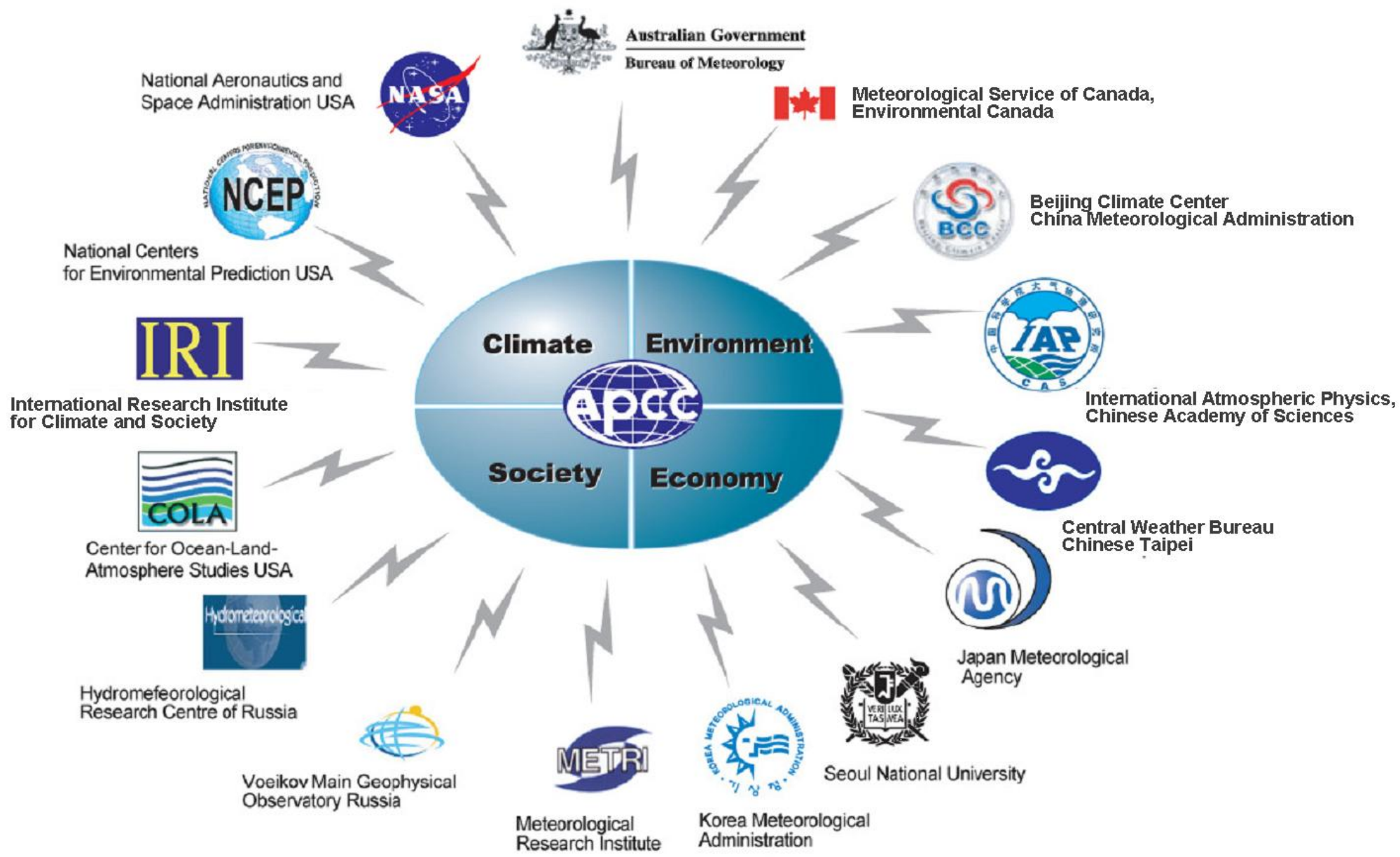
APCC Structure



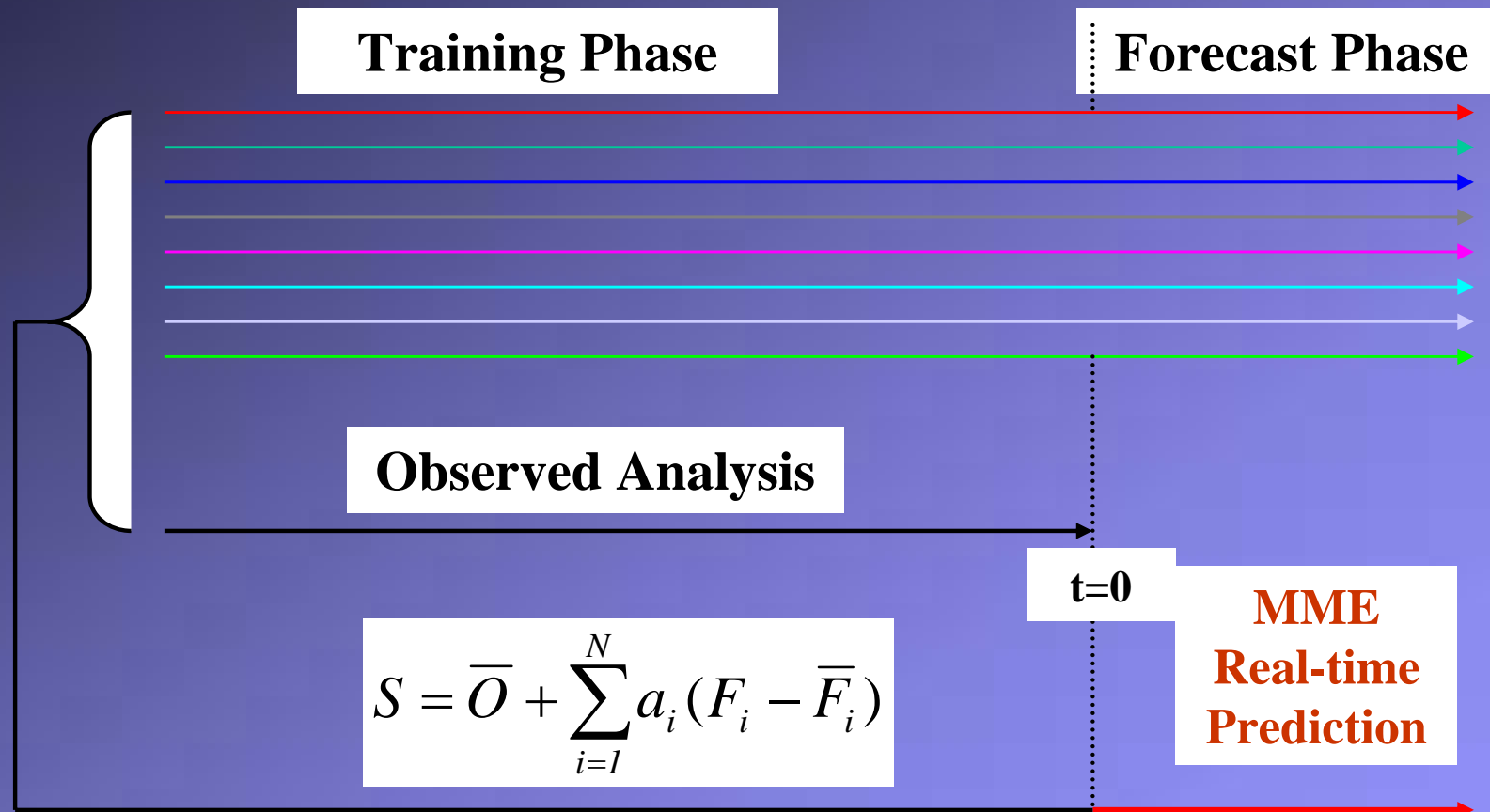
Climate Prediction: APCC Multi-Model Ensemble



Multi-Institutional Cooperation



MME Prediction Method

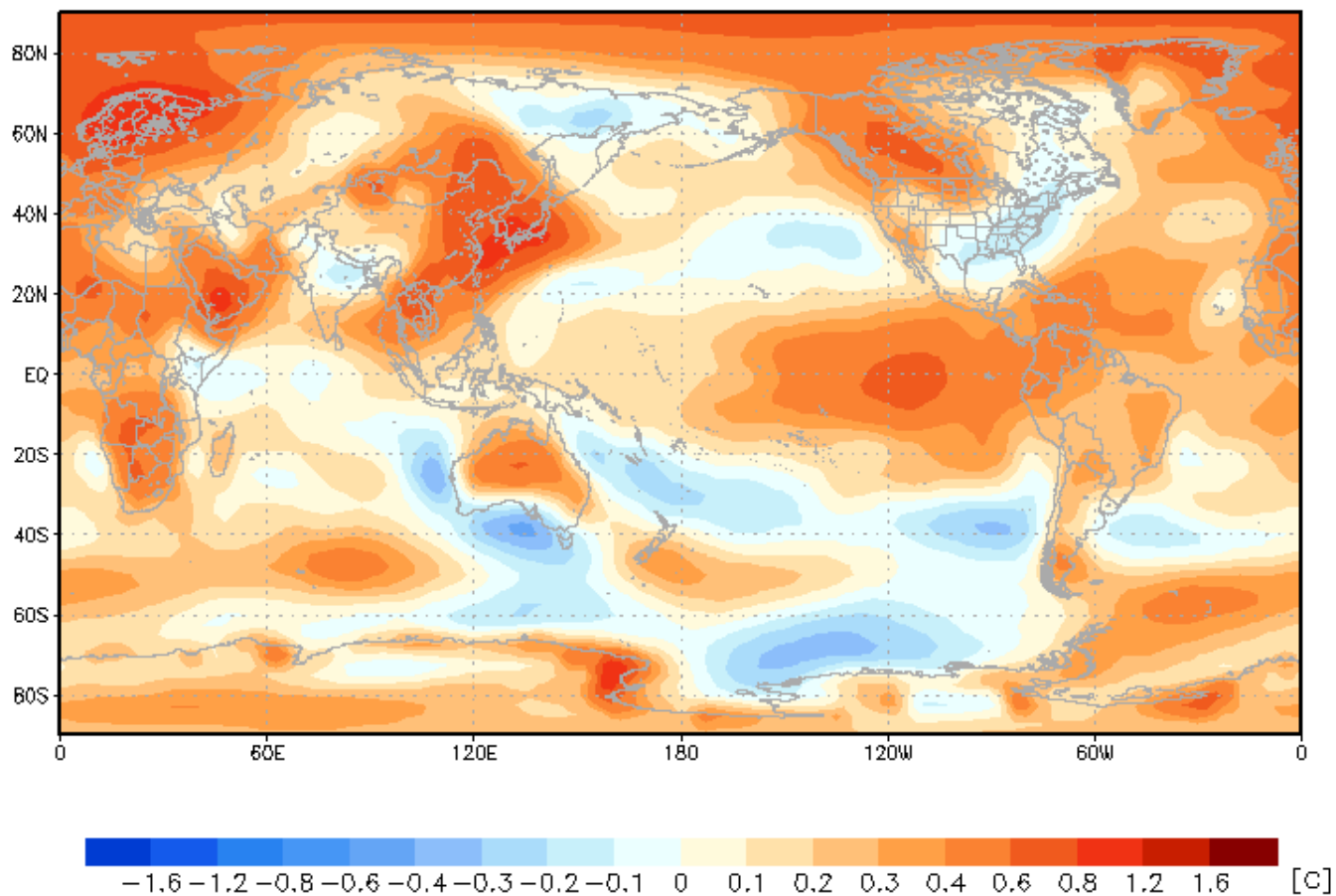


The weights are computed at each grid point by minimizing the function: $G = \sum_{t=0}^{train} (S_t - O_t)^2$

APCC Deterministic MME Forecast

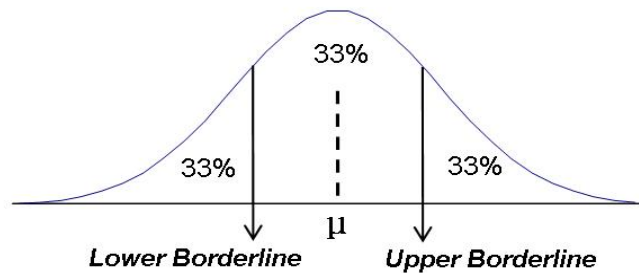
850 hPa Temperature Anomaly

APCC_MME, DJF 2006_07



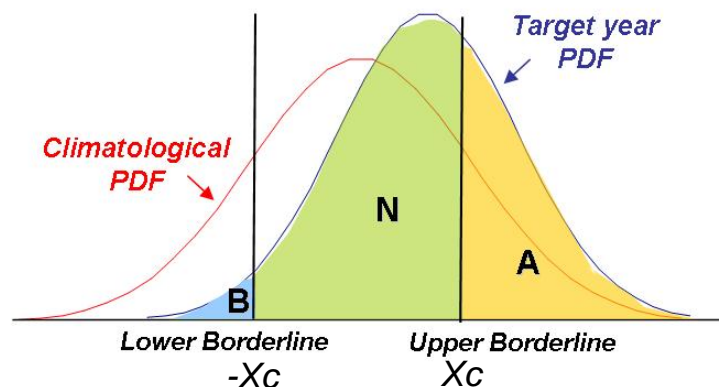
Probabilistic Forecast Method

▪ Defining terciles using Normal Fitting Method



- For the middle/upper tercile boundary :
mean plus 0.43 times the standard deviation
 $\rightarrow \mu + 0.43\sigma$
- For the lower/middle tercile boundary :
mean minus 0.43 times the standard deviation
 $\rightarrow \mu - 0.43\sigma$

▪ Forecast probability



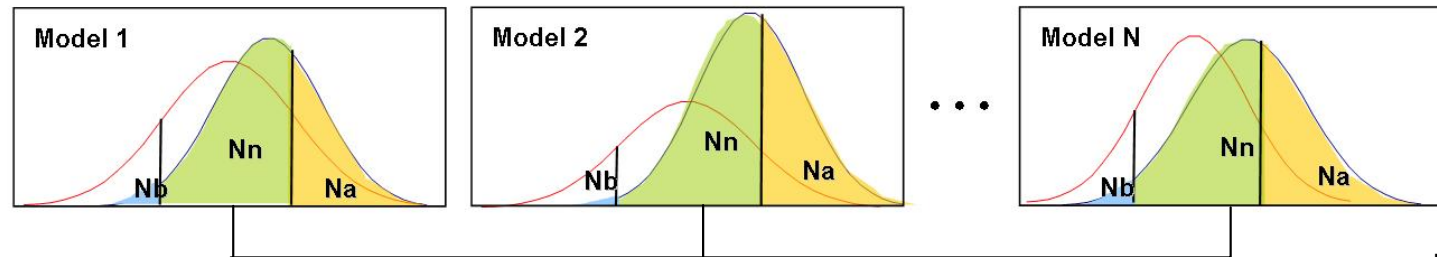
- Above normal case (For example)

$$P_P^A = 1 - \int_{-\infty}^{X_c} N(\mu, \sigma)$$

- A** Probability of Above-normal
- N** Probability of Near-normal
- B** Probability of Below-normal

Probabilistic Forecast Method

Combine different models



Combine : according to each model's square root of ensemble size

Na : num. of above-normal
Nn : num. of near-normal
Nb : num. of below-normal

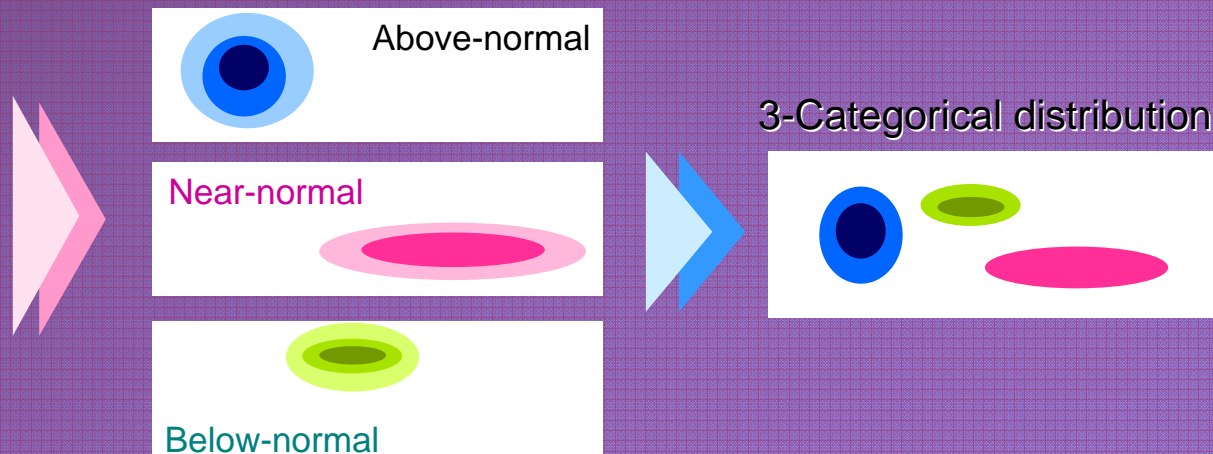
Merged 3-category distribution

χ^2 (Chi-square) TEST

$$\chi^2 = \frac{\sum_{i=1}^k (O_i - E_i)^2}{E_i}$$

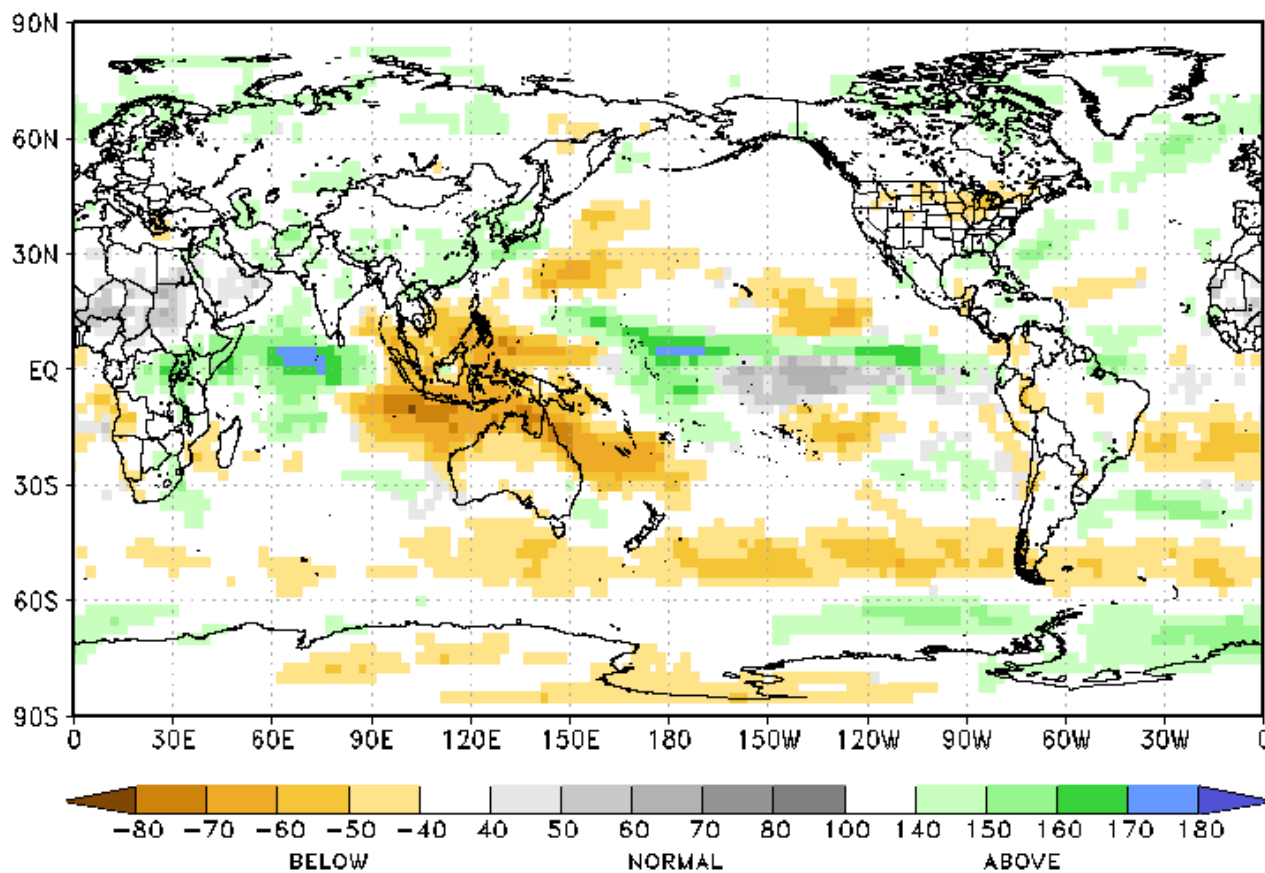
O : Forecast frequencies
E : Hindcast frequencies

Under 0.05% significance level

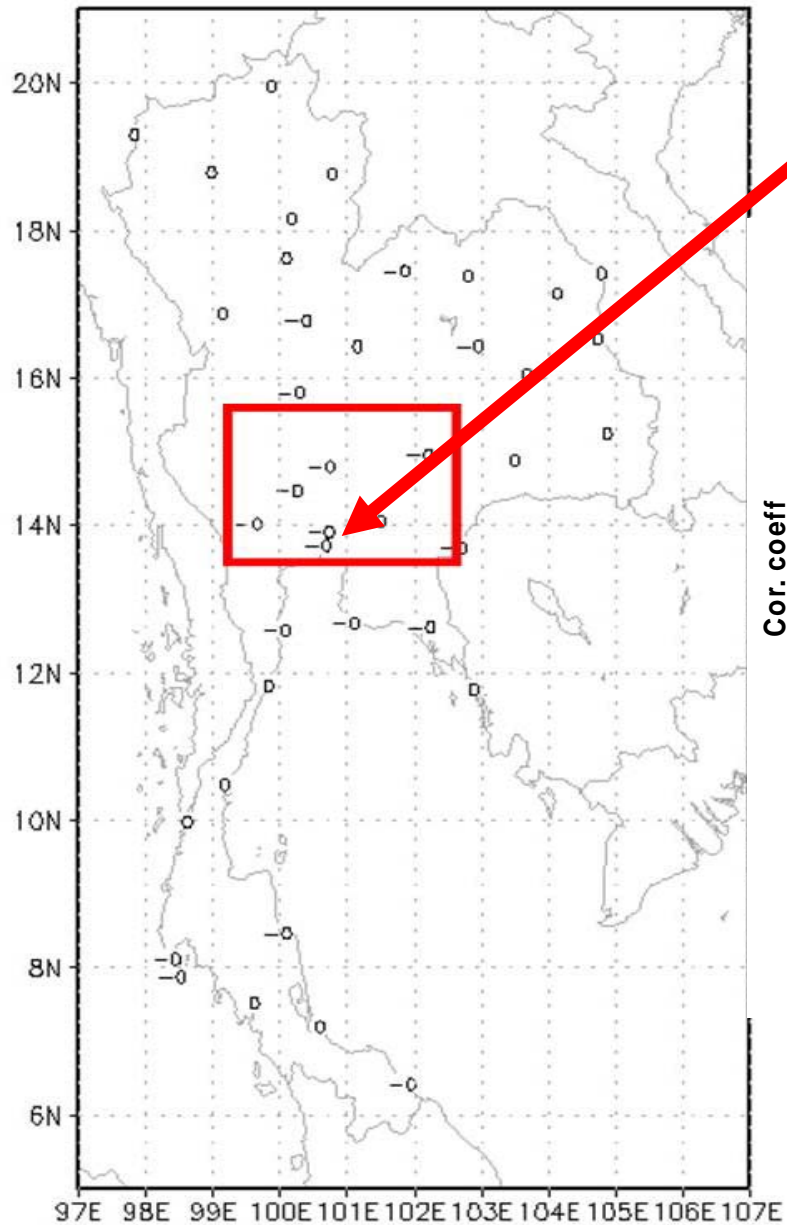


APCC Probabilistic MME Forecast

APCC Multi-Model Probability Forecast
PREC for DJF2006-2007 (%)

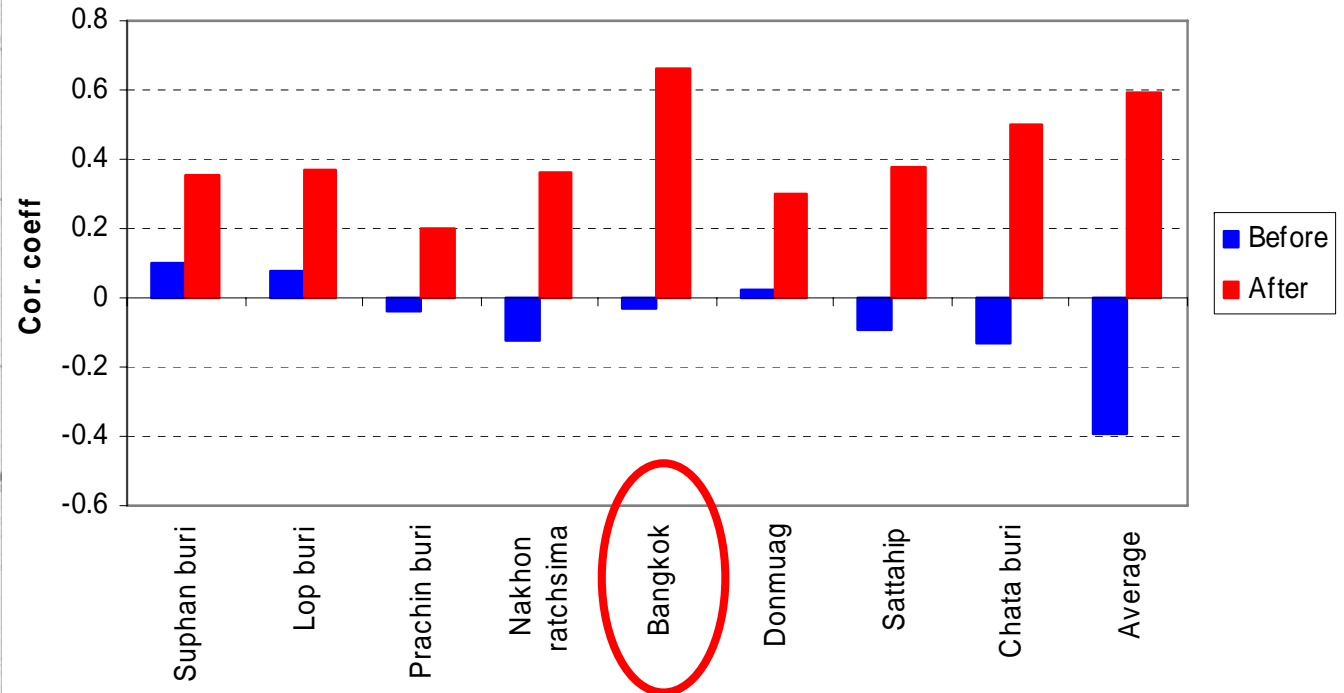


MME-based statistical downscaling: precipitation in Thailand



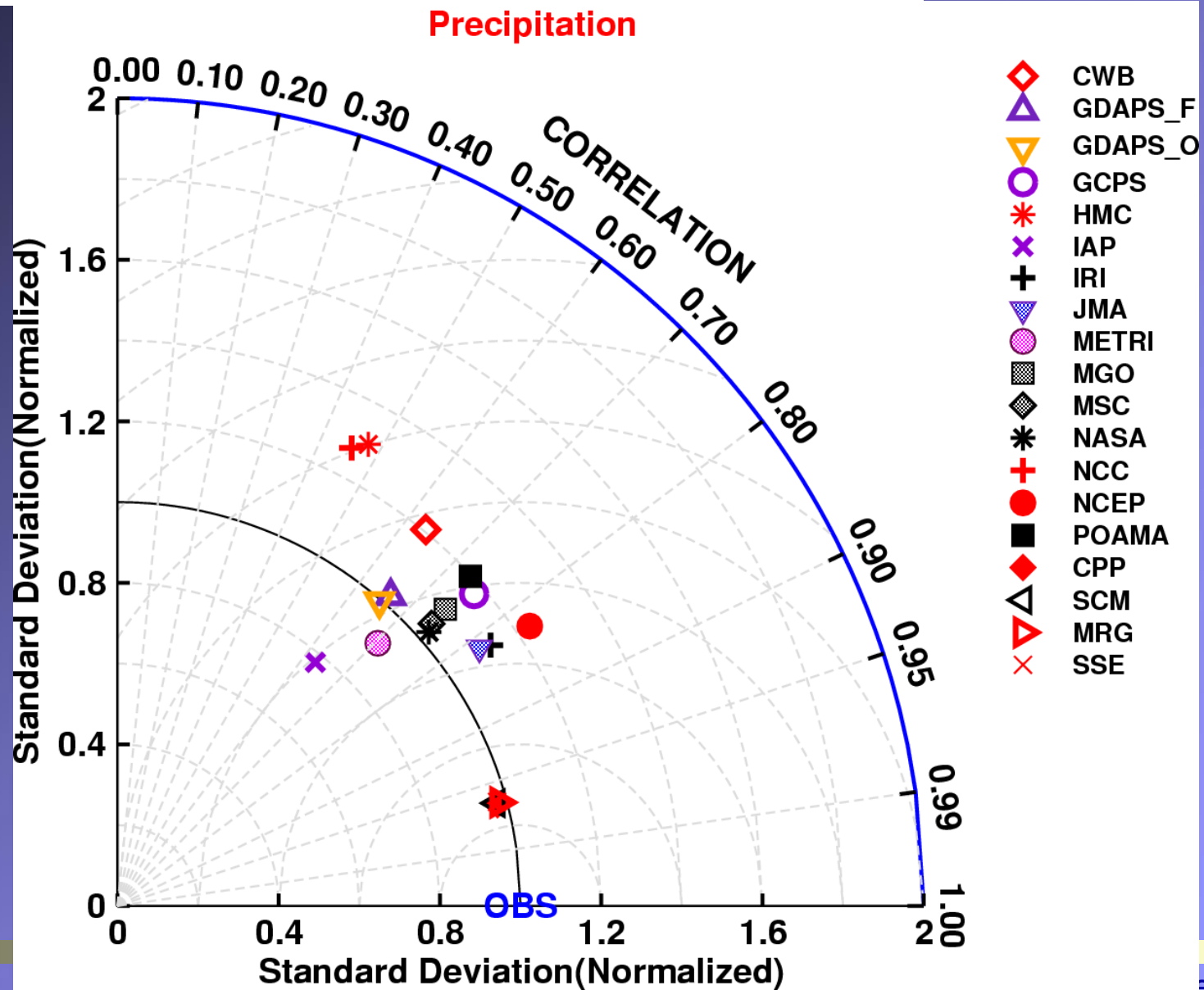
Bangkok

Correlation coefficient before and after downscaling in each station



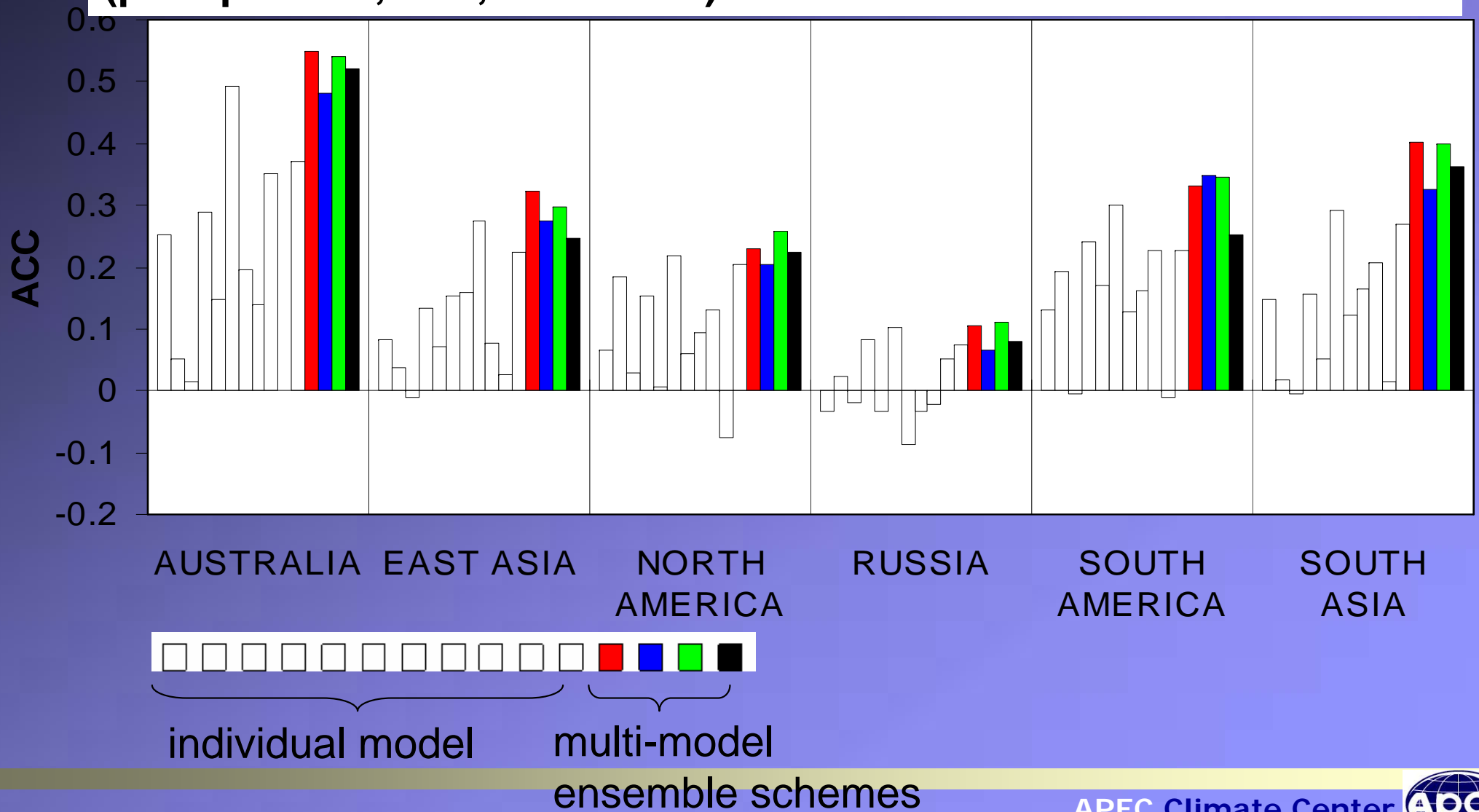
Forecast Verification: Deterministic MME

Taylor Diagram : 1983~2003, JJA Hindcast



Forecast Verification: Deterministic MME

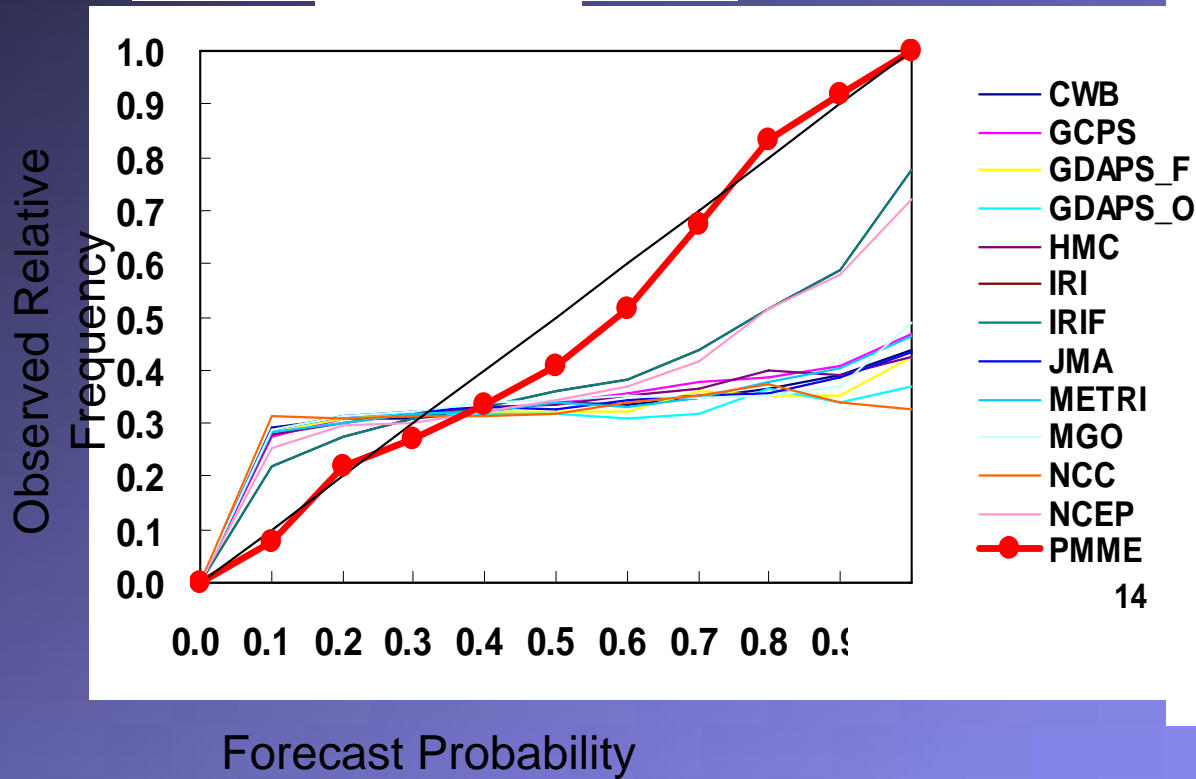
Anomaly Correlation Coefficient for hindcast in each region
(precipitation, JJA, 1983-2003)



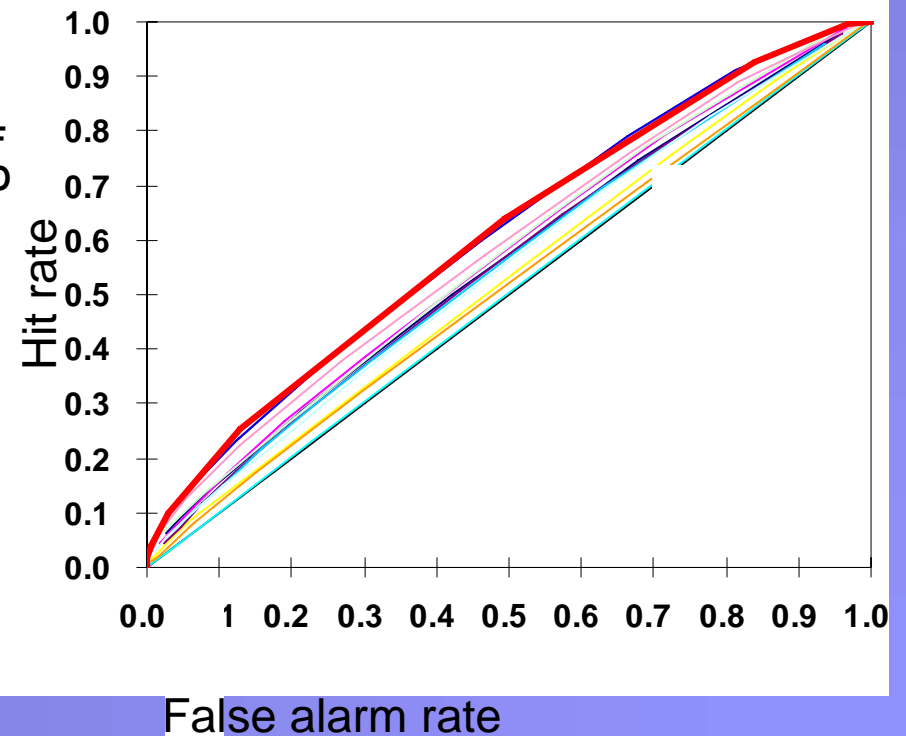
Forecast Verification: Probabilistic MME

Globe, Above-Normal, Precipitation

Reliability Diagram



ROC Curve



14

Climate Information Service

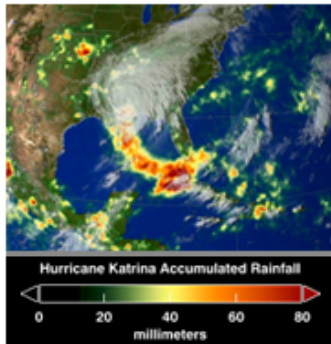
2006. 12. 12 [Tue]

Welcome, APCC

| Logout



APEC Climate Center
Asia Pacific Economic Cooperation Climate Center



▶ Prediction

▶ Verificat

▶ Monitoring

▶ Documentation

Climate Monitoring > Prediction

The aim of Climate Monitoring is to offer regularly updated and comprehensive information on the state of the climate. We provide information in a variety of complementary ways, each focusing on a specific aspect of the state of the climate. Currently we have four monitoring products:



Outlook

Neutral ENSO. Normal and slightly above normal precipitation over the globe with exception of western and equatorial eastern pacific.

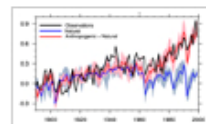


Forecast Maps

Neutral ENSO. Normal and slightly above normal precipitation over the globe with exception

Deterministic

Probabilistic



Index forecast

Neutral ENSO. Normal and slightly above normal precipitation over the globe with exception

Deterministic

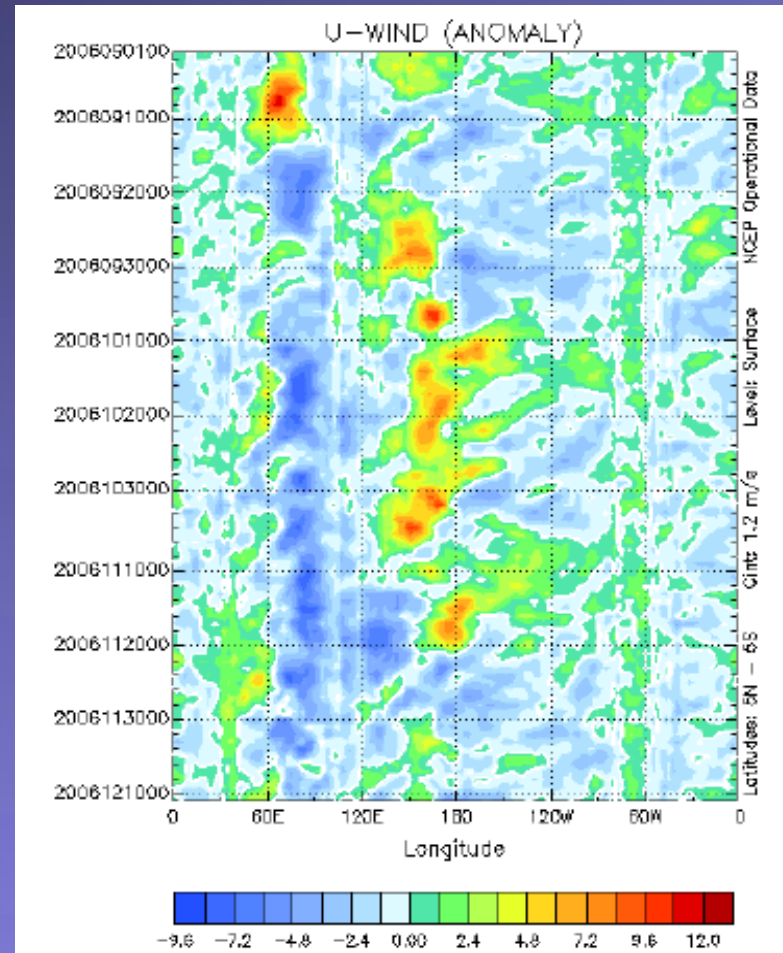
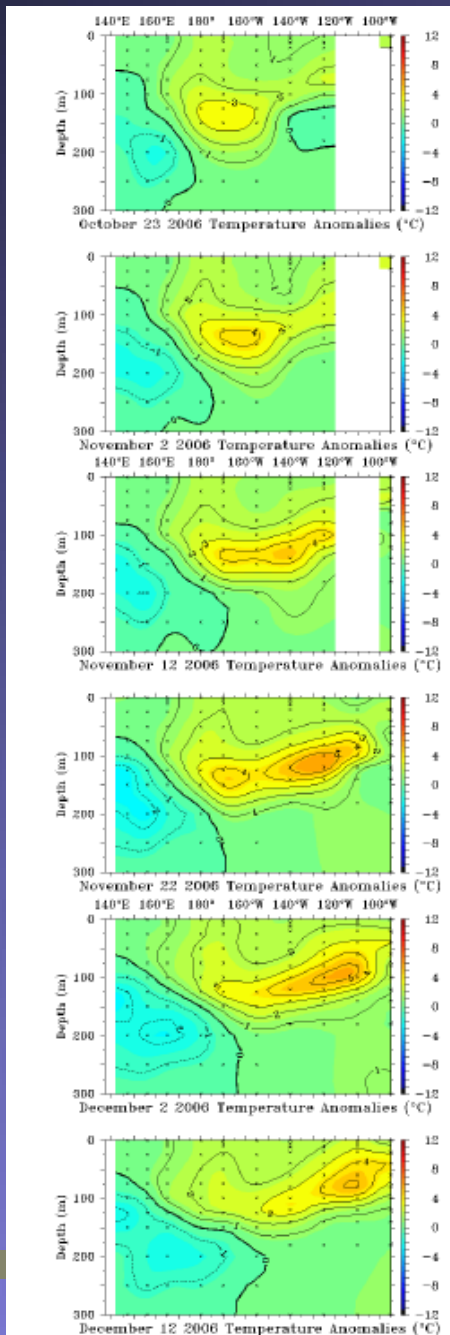
Probabilistic



Archive

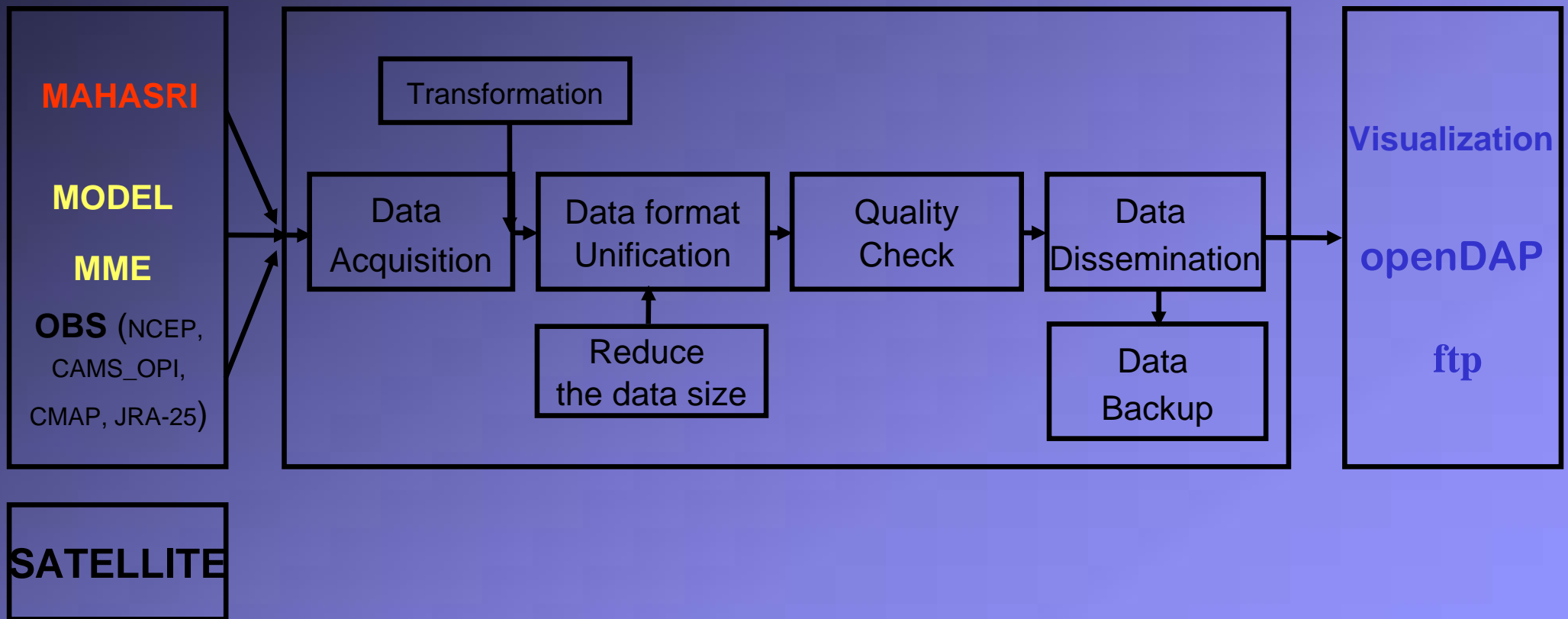
Neutral ENSO. Normal and slightly above normal precipitation over the globe with exception

Real-time Climate Monitoring



El Nino Monitoring

Data Service System



Data Service System

기상청
장기예보지원

➤ 2D 그래픽 표출 시스템 구축 및 시험 운영

GDS 기반의 원격 기후 자료 표출 시스템 시범 운영

<http://gds.apcc21.net:9090/dods> (외부접속)

<http://testbed.apcc21.net:9090/dods> (내부접속)

웹에서 제공되는
엔트리 정보를 이용한
기후자료 표출

APCC GDS TEST SERVER - directory for / : 8 entries

- 1: APCC_MME_DATA_EXPLAIN/: [dir](#)
- 2: TOTAL/: [dir](#)
- 3: COMP: MME Composite Winter Anomaly [info](#) [dds](#) [das](#)
- 4: MME1: 1979-1995 Hindcast diagnostic [info](#) [dds](#) [das](#)
- 5: MME2: 1979-1995 Hindcast diagnostic [info](#) [dds](#) [das](#)
- 6: MME3: 1979-1995 Hindcast diagnostic [info](#) [dds](#) [das](#)
- 7: MME4: 1979-1995 Hindcast diagnostic [info](#) [dds](#) [das](#)
- 8: testdata: test data from hadsst anomalies, generated by joe's eof program [info](#) [dds](#) [das](#)

[back to parent directory](#)

GrADS Data Server 1.3 ([help using this server](#)) . This page last updated 07Z 21 Nov 2006.

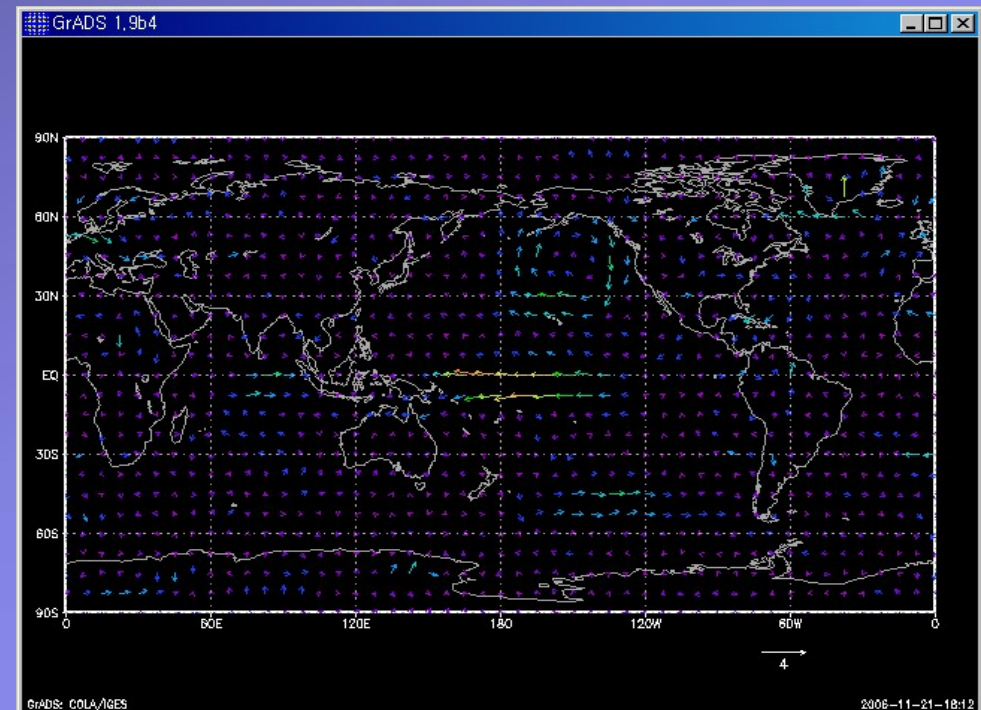
```
xterm
[hsyi@cnode01 ~]$ gradsdds -lc
-c option was specified, but no command was provided

Grid Analysis and Display System (GrADS) Version 1.9b4
Copyright (c) 1988-2005 by Brian Doty and IGES
Center for Ocean-Land-Atmosphere Studies (COLA)
Institute for Global Environment and Society (IGES)
GrADS comes with ABSOLUTELY NO WARRANTY
See file COPYRIGHT for more information

Config: v1.9b4 32-bit little-endian readline sdf/xdmf netcdf dods dods-stn lats p
rintin

Issue 'q config' command for more information.

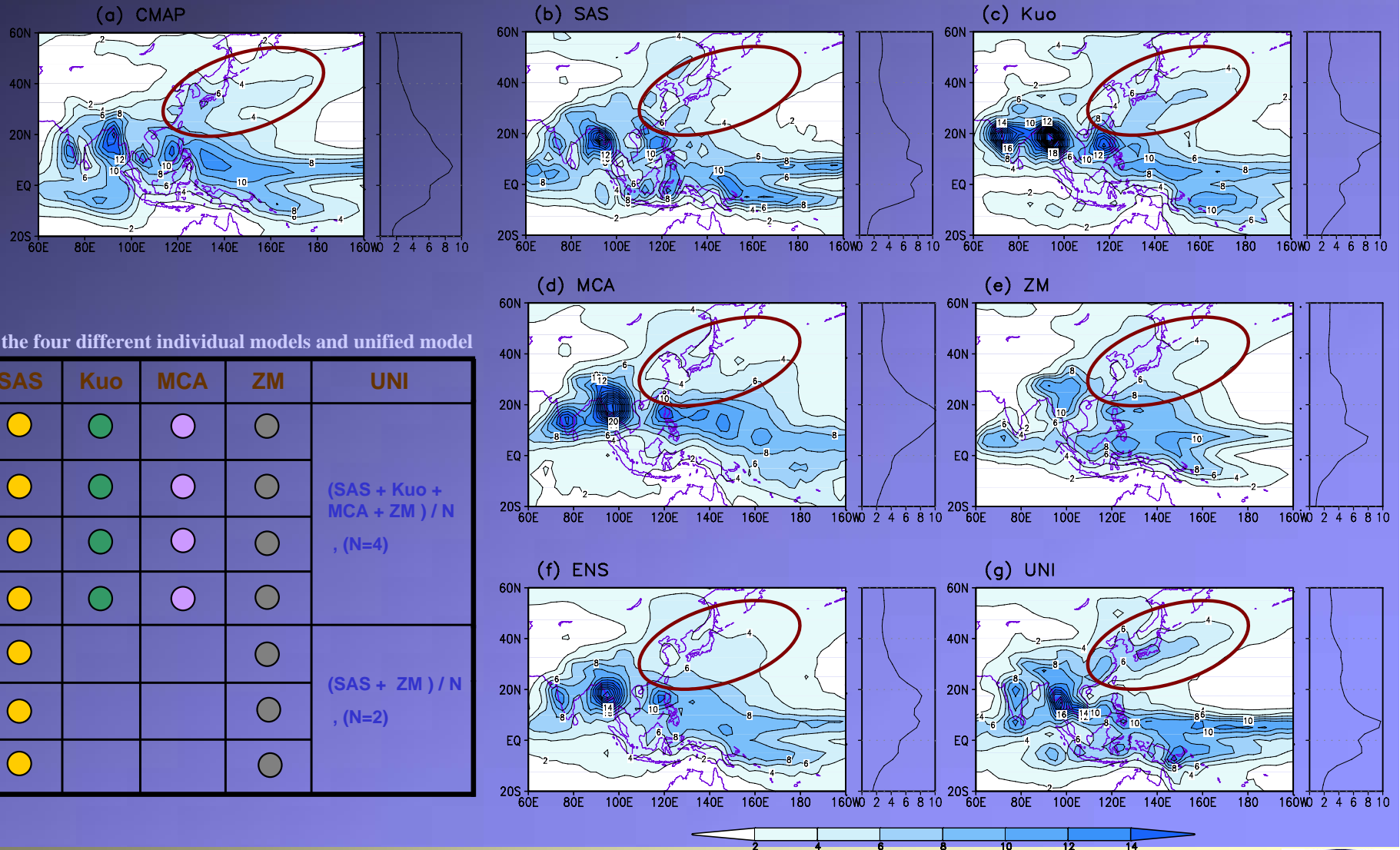
GX Package Initialization: Size = 11 8,5
ga-> sdfopen http://190.1.1.60:9090/dods/COMP
Scanning self-describing file: http://190.1.1.60:9090/dods/COMP
SDF file http://190.1.1.60:9090/dods/COMP is open as file 1
LON set to 0 360
LAT set to -90 90
LEV set to 1 1
Time values set: 2005:12:1:0 2005:12:1:0
ga->
```



Research & Development

Multi-Cumulus convection scheme Ensembles

Climatology and zonal mean of precipitation during the boreal summer (JJA)

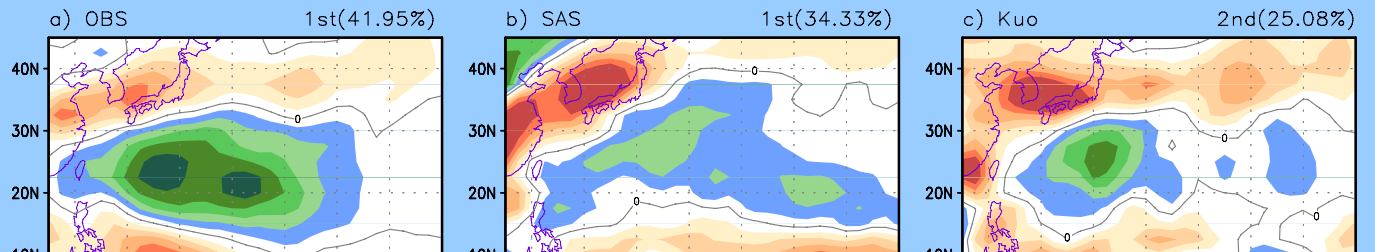


● Convection scheme of the four different individual models and unified model

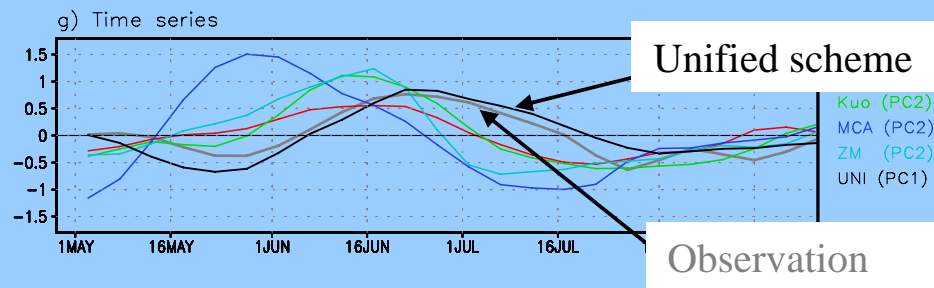
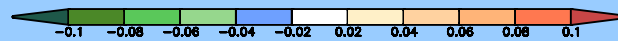
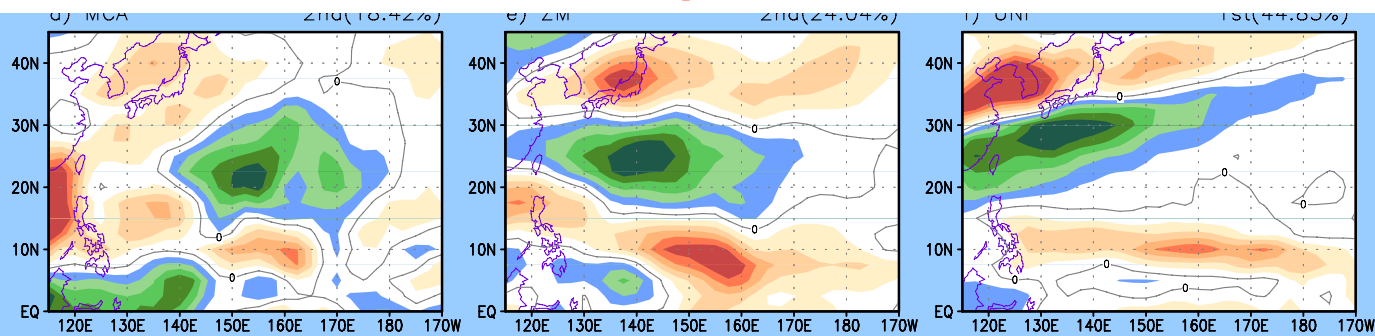
	SAS	Kuo	MCA	ZM	UNI
Heating rate	●	●	●	●	$(SAS + Kuo + MCA + ZM) / N$, (N=4)
Change rate of moisture	●	●	●	●	
Rain fall	●	●	●	●	
Snow fall	●	●	●	●	
Cloud water in cumulus	●			●	$(SAS + ZM) / N$, (N=2)
Areal rate of cumulus	●			●	
Cloud mass flux	●			●	

Multi-Cumulus convection scheme Ensembles

EOF of CISO for Precipitation



Unified Scheme best captures the CISO evolution



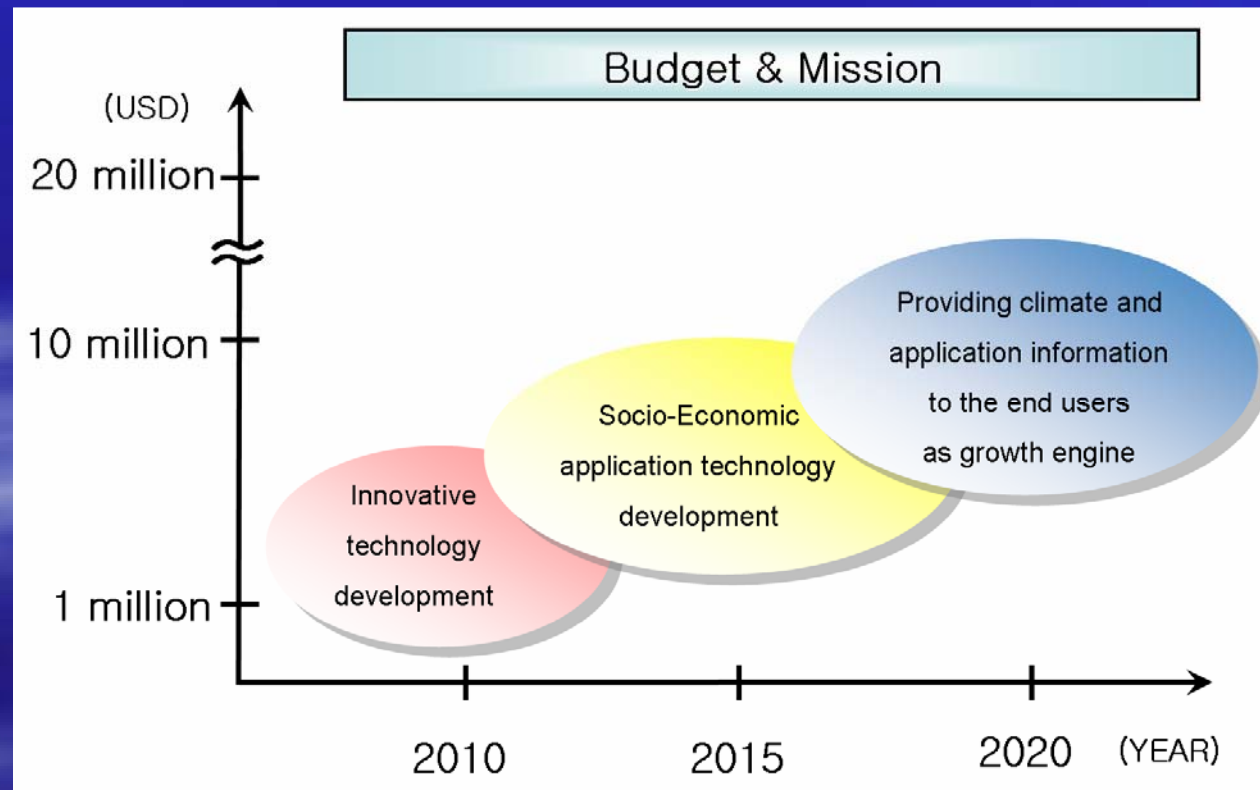
Future Plan

Improving Quality of Service

1st phase : Innovative technology development (~2010)

2nd phase : Socio-economic application technology development (2011~2015)

3rd phase : Providing climate and application information to the end users as growth engine (2016~2020)



Collaboration with MAHASRI

Development of RCM schemes and application models:

- APCC will provide **hindcast datasets** from participating models and from the CLiPAS project, as well as **MME seasonal prediction** data for dynamical downscaling efforts of MAHASRI, in order to better understand the predictability of the Monsoon systems and for the development of application models.

Data service and management:

- APCC will serve as one of the **data centers** for the intensive observational data during the AMY-2008
- Datasets will be made **available to model providers** for verification and ultimately model improvement

Collaboration with AMY/MAHASRI

Expects high resolution (spatial and temporal) station data, LS data, for

- **high-res model** verification
- **Statistical/RCM downscaling development**
- **application model** development
- **Climate monitoring (intraseasonal, drought, flood, TC, other extreme events)**

Focal points/members in MAHASRI WG:

- Prediction & application: C.K. Park/Nohara
- RCM downscaling: Tam/Song
- Data Management: Tam/Lee

Thank you