

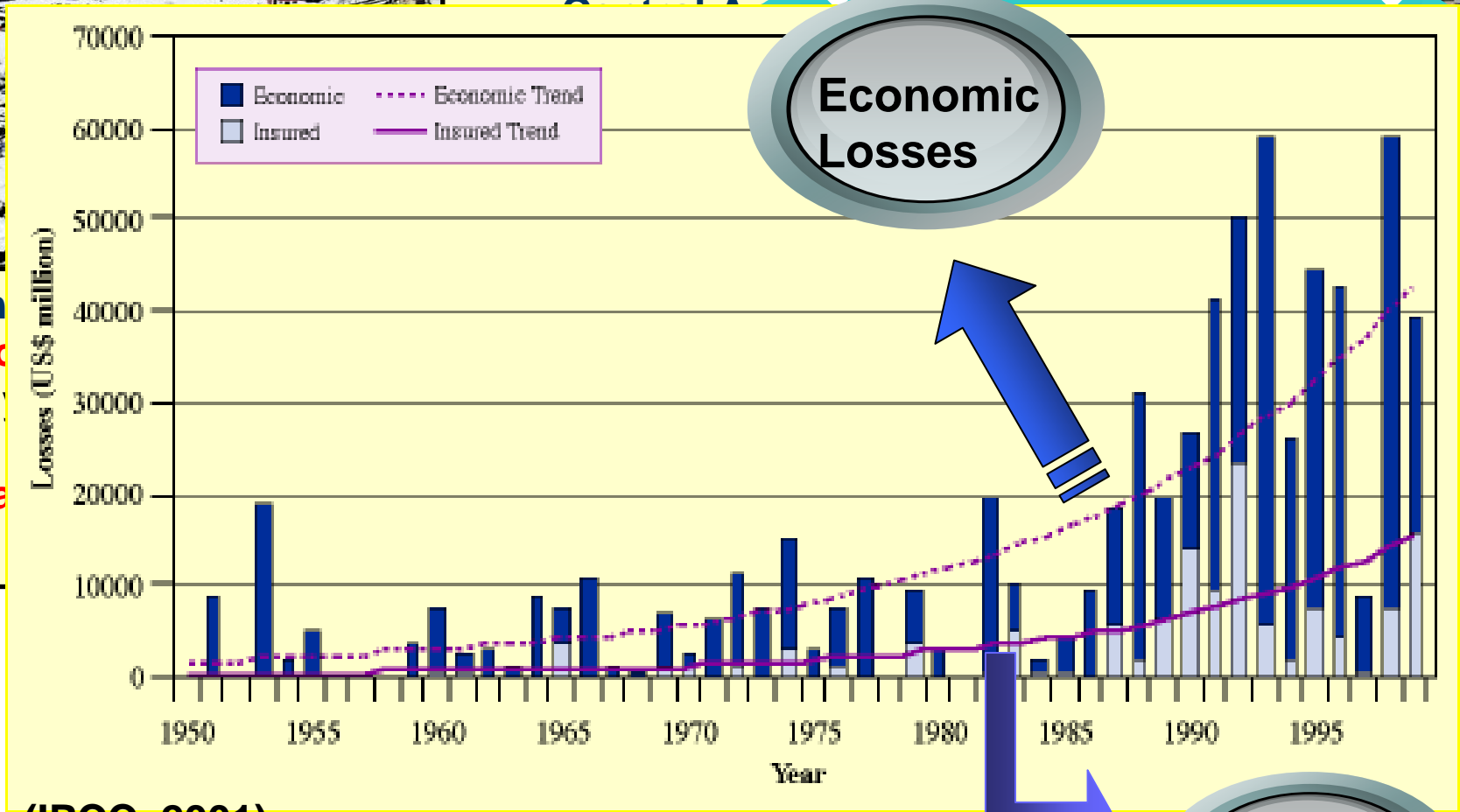
Challenges toward a Global Center

In-Sik Kang
Seoul National University



APEC Participating Members Economic Specific Rim

Economic losses related to weather and climate over the globe)



Economic Losses

Insured

(IPCC, 2001)

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**Weather
Prediction**

**Seasonal
Prediction**

**Climate
Change**

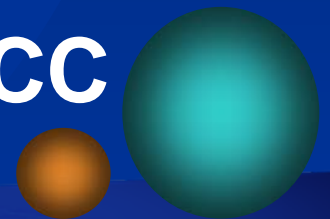
**Operational
Center**

**Science
Community**

ECMWF

IRI

IPCC



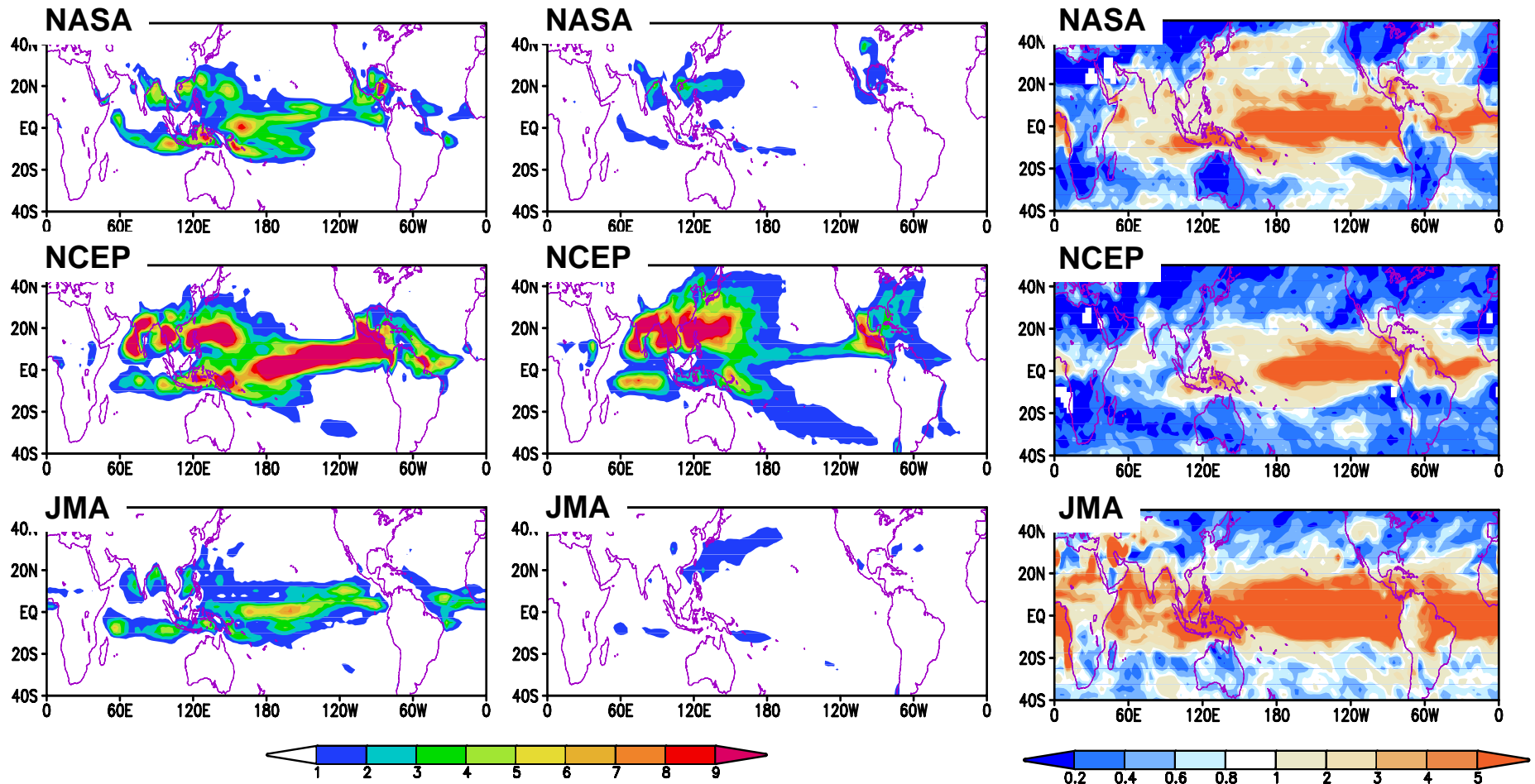
Current Status of Seasonal Prediction

Limitation of seasonal climate prediction : Low Potential Predictability

Forced Variance

Free Variance

Signal to Noise



Limitation of Seasonal Prediction Skill

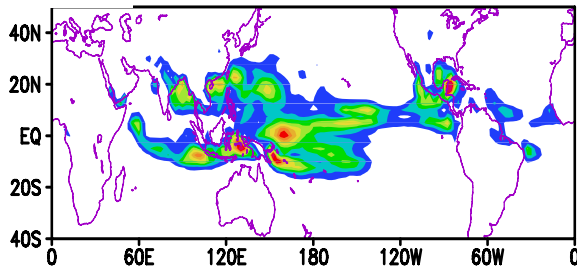
Large Model Errors :

Forced Variance

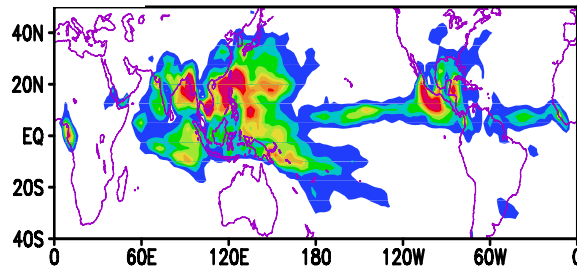
Error Variance

Forced/Error Variance

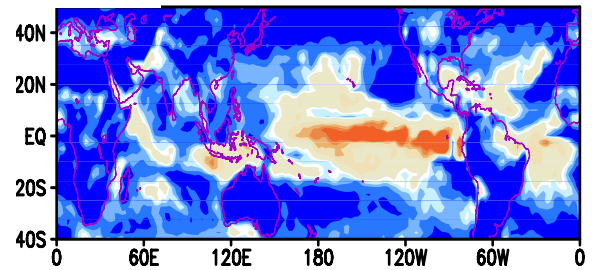
NASA



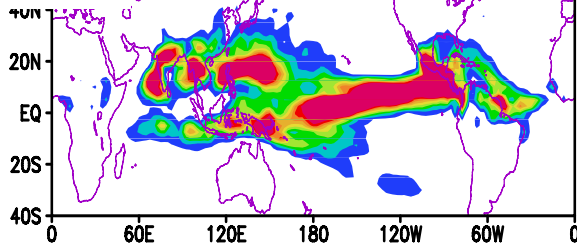
NASA



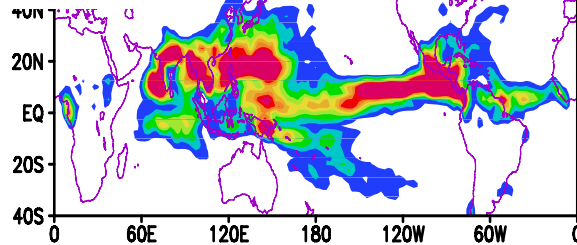
NASA



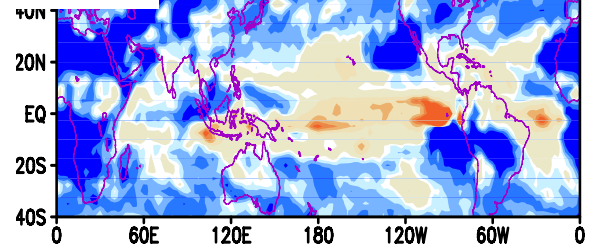
NCEP



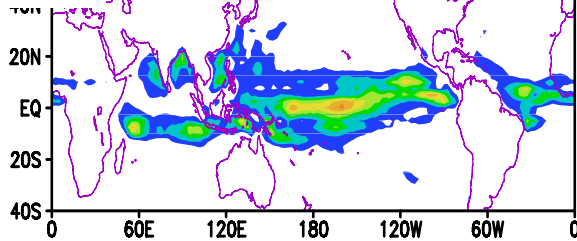
NCEP



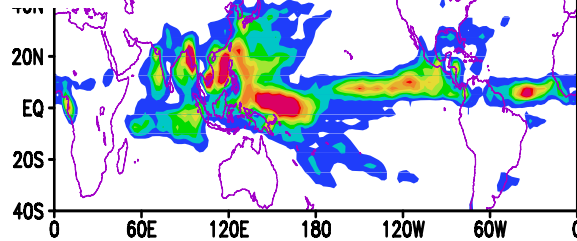
NCEP



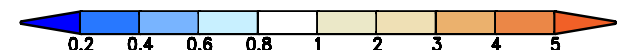
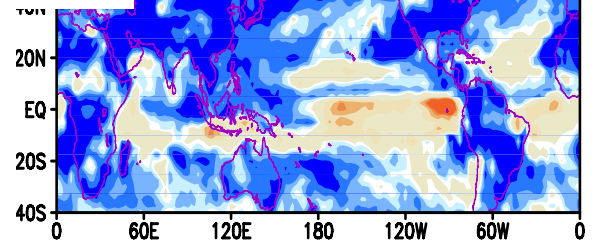
JMA



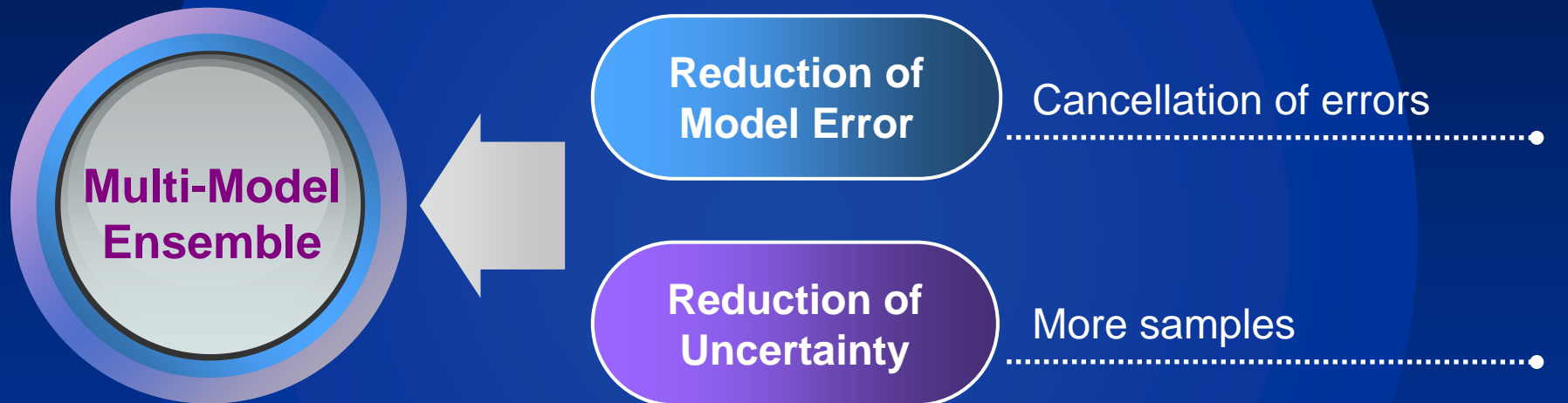
JMA



JMA

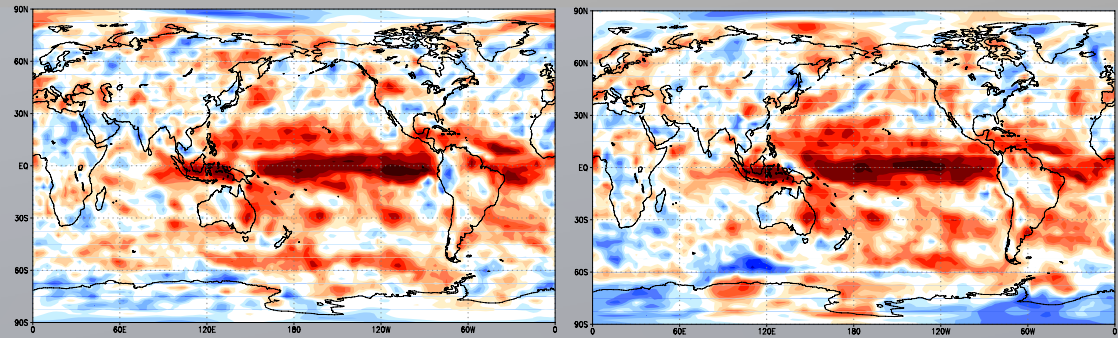


Possible Improvement of Seasonal Prediction Skill

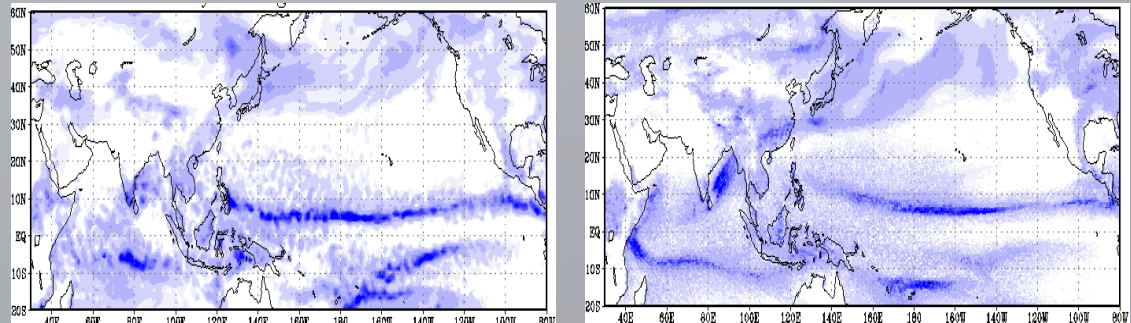


Important works for better seasonal Prediction

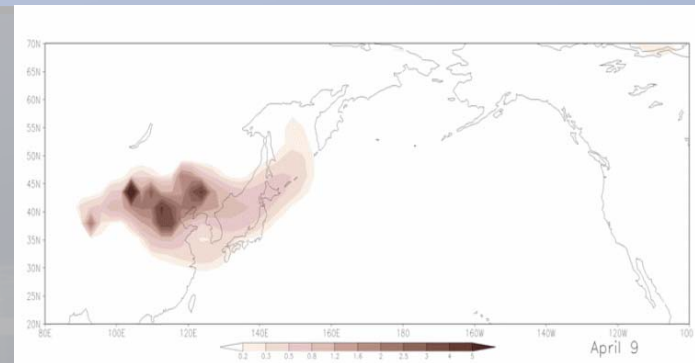
Multi-Model
Ensemble System



Reliable Climate
Prediction Model
(very high-resolution
global model)



Climate-Environment
Modeling
(Aerosol, Yellow
sand,...)



Requirements

The Leading Institute



Strong Research Component

Best Infrastructure

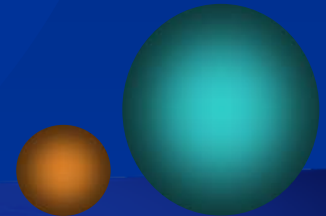


Resources (Budget, Funding)
→ APCC, GEF, World Bank, Industries

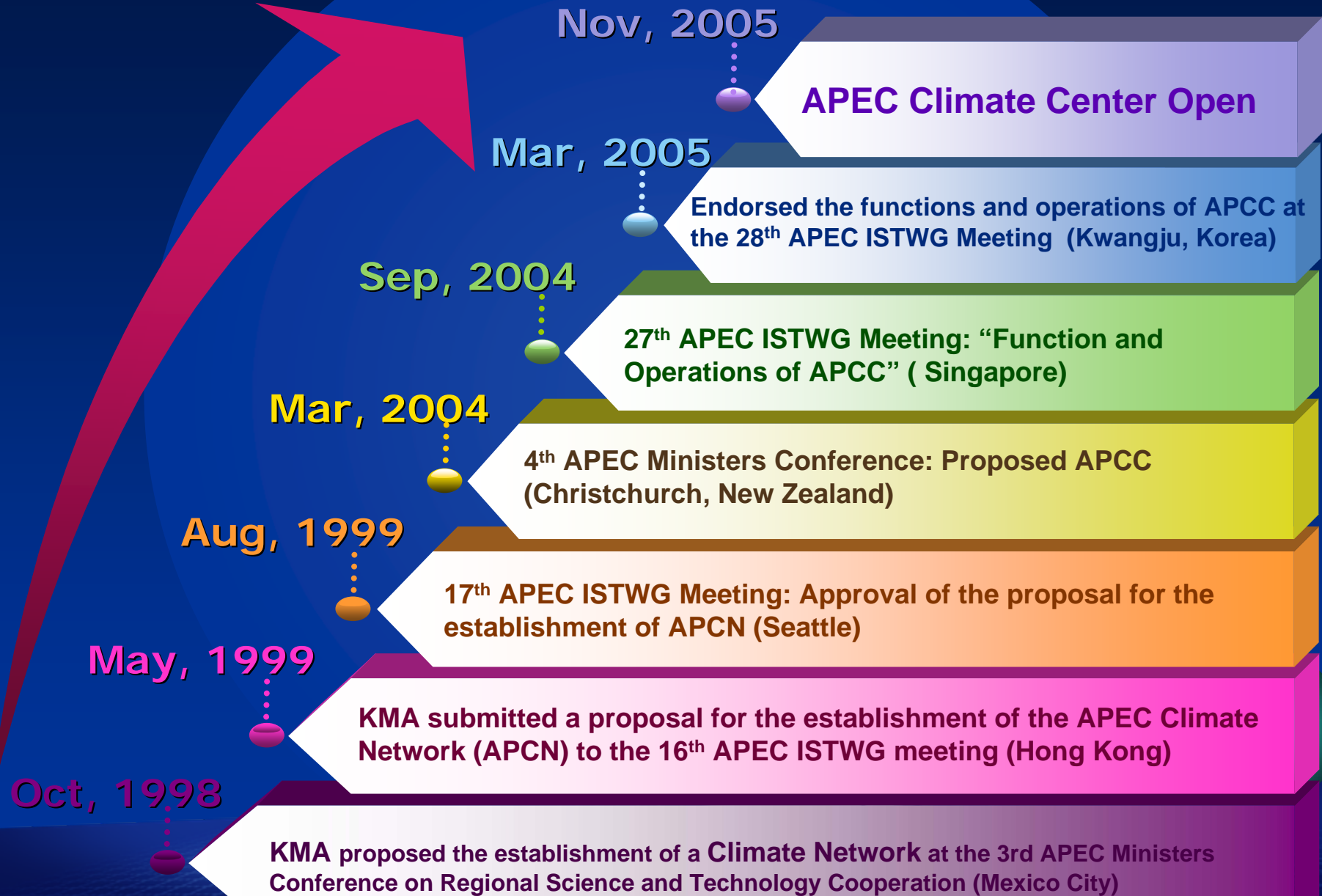
Internationalization



APEC



APCC History



International Centers

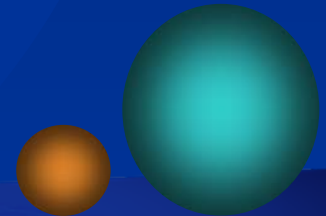
ECMWF

Asia Pacific Economies Cooperation

APCC

Operational Centers
BOM, CMA, JMA,
KMA, MSC, NCEP,
.....

Research Institutions
CES, COLA, IAP
FRCGC, GFDL, ICCS,
NASA,



Global Cooperation

Utilization of APEC Framework



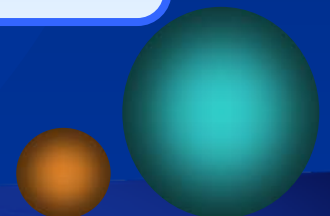
A Global Center

APCC

A purely international institute and to serve as a hub of regional climate research and prediction

To accomplish the WCRP/COPES vision

To provide core facilities and man powers to accomplish the vision



Utilization of
APCC Framework

APCC

Thank You !

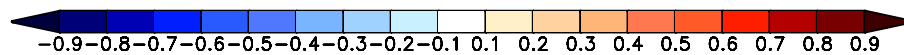
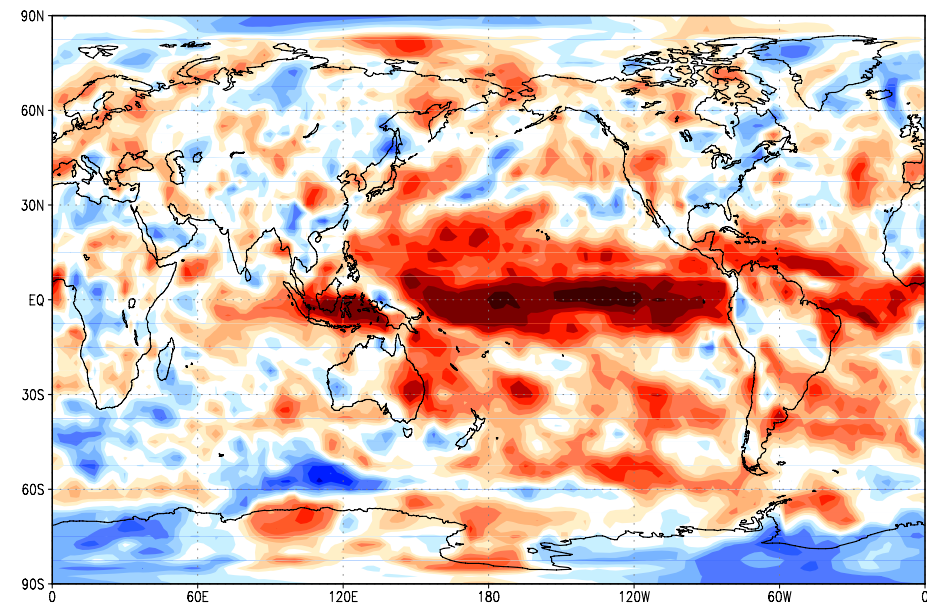
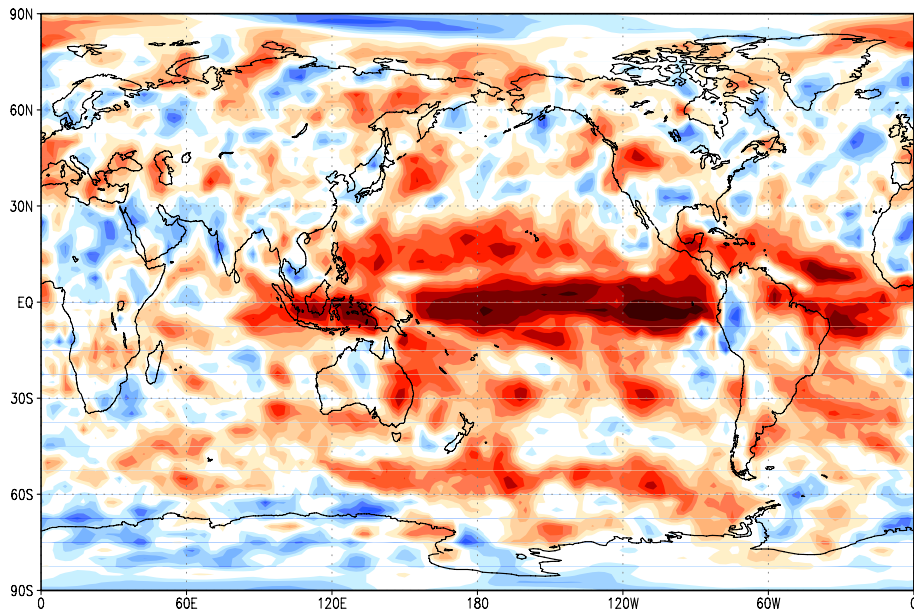
kang@climate.snu.ac.kr



Multi-Model Ensemble System

APCC MME

DEMETER MME

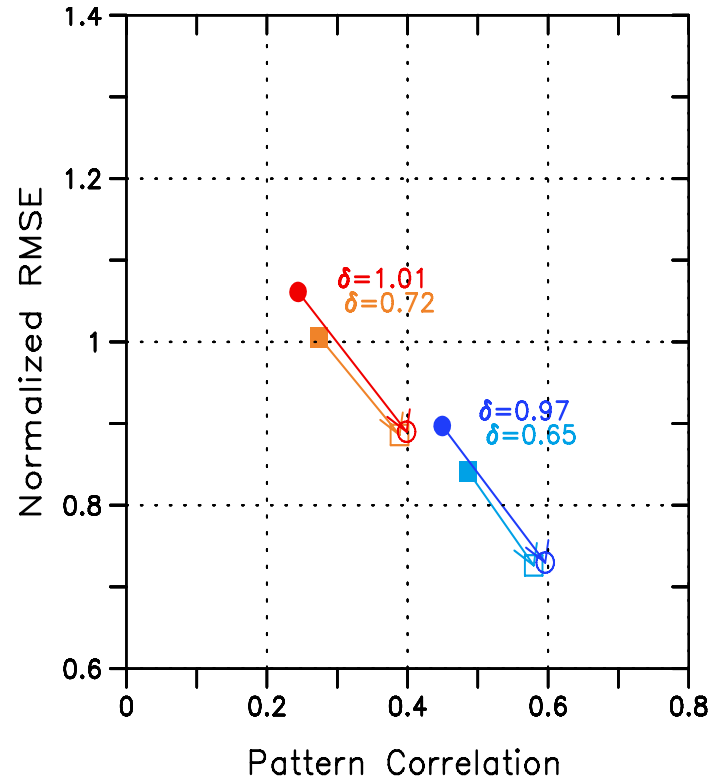
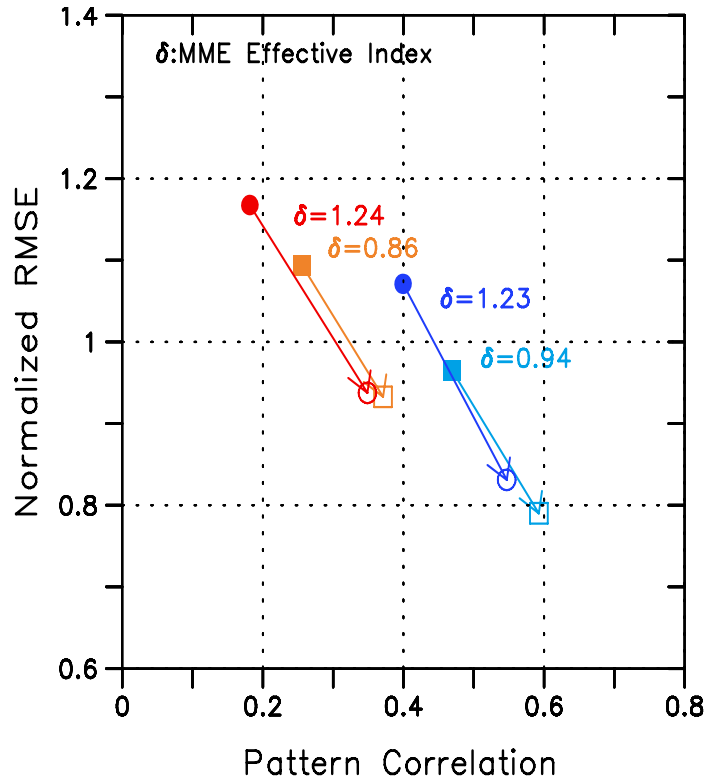


BACK

Multi-Model Ensemble System

JJA

DJF



	Monsoon Region		ENSO Region	
	APCC	DEMETER	APCC	DEMETER
Averaged Skill of Models	●	■	●	■
MME Skill	○	□	○	□



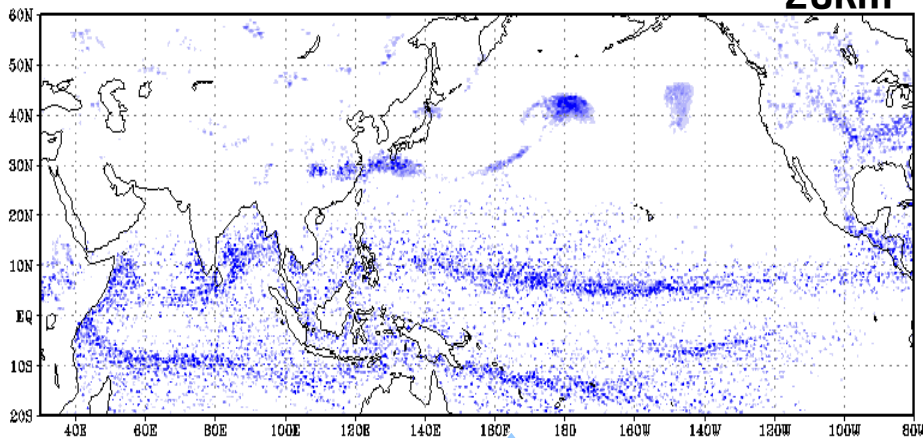
Very high-Resolution Global Model

CES AGCM

T512

prep97hour T512

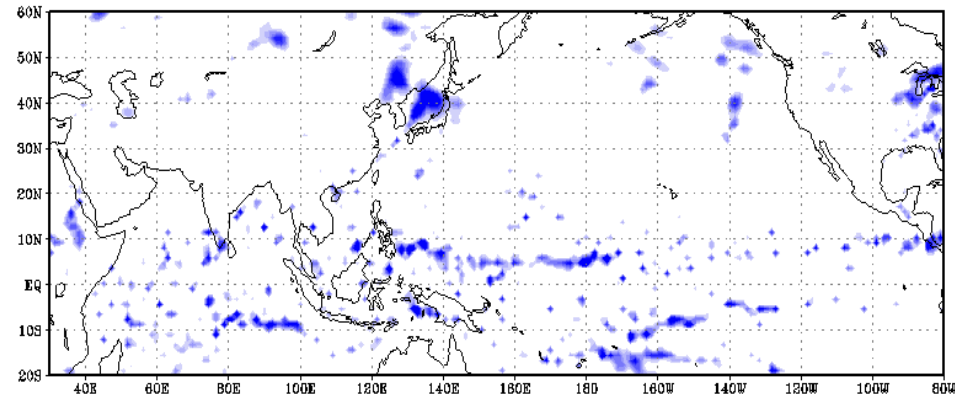
~20km



Very expensive!
It takes 4 hours to integrate
1day using 60 CPUs of
CRAYX1E

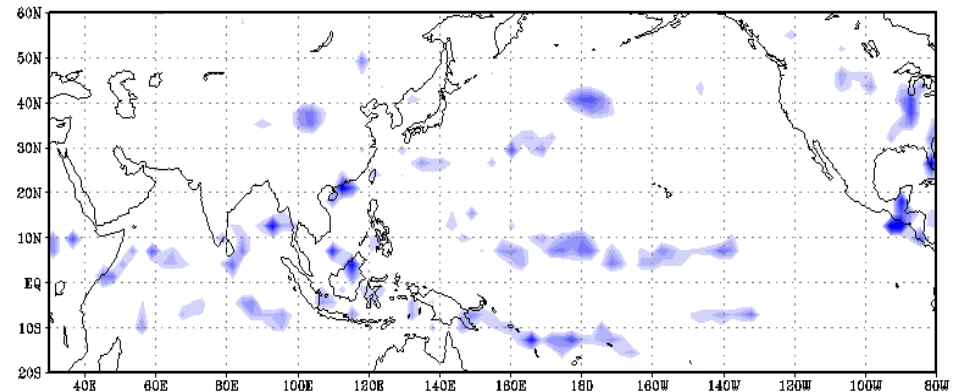
T106

prep97hour T106

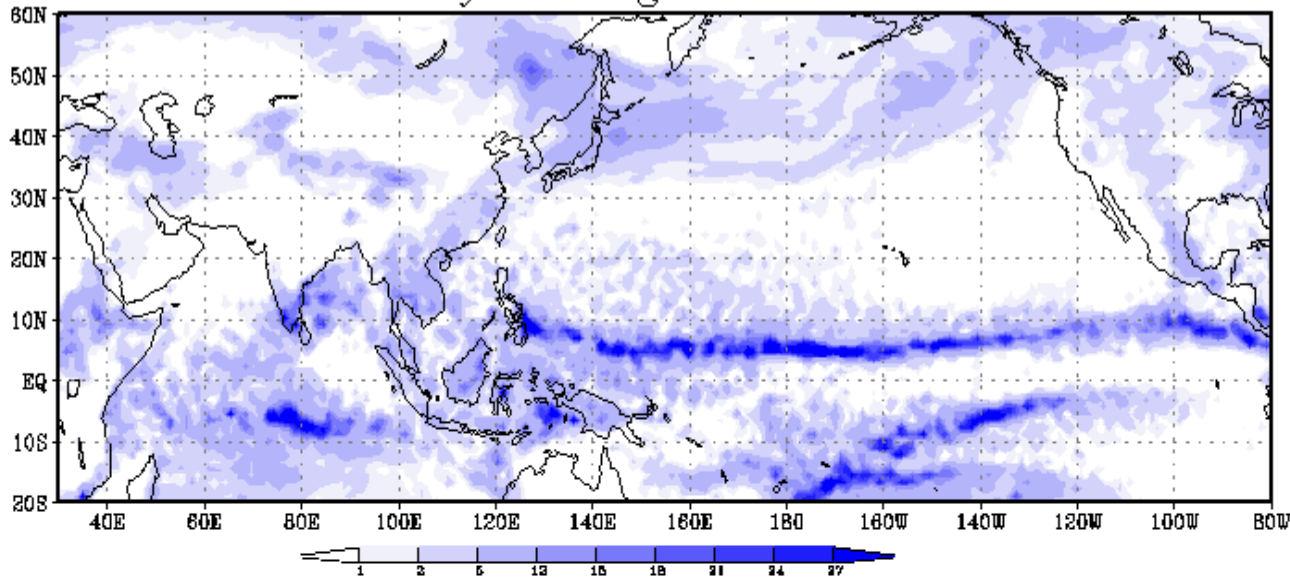


T42

prep97hour T42



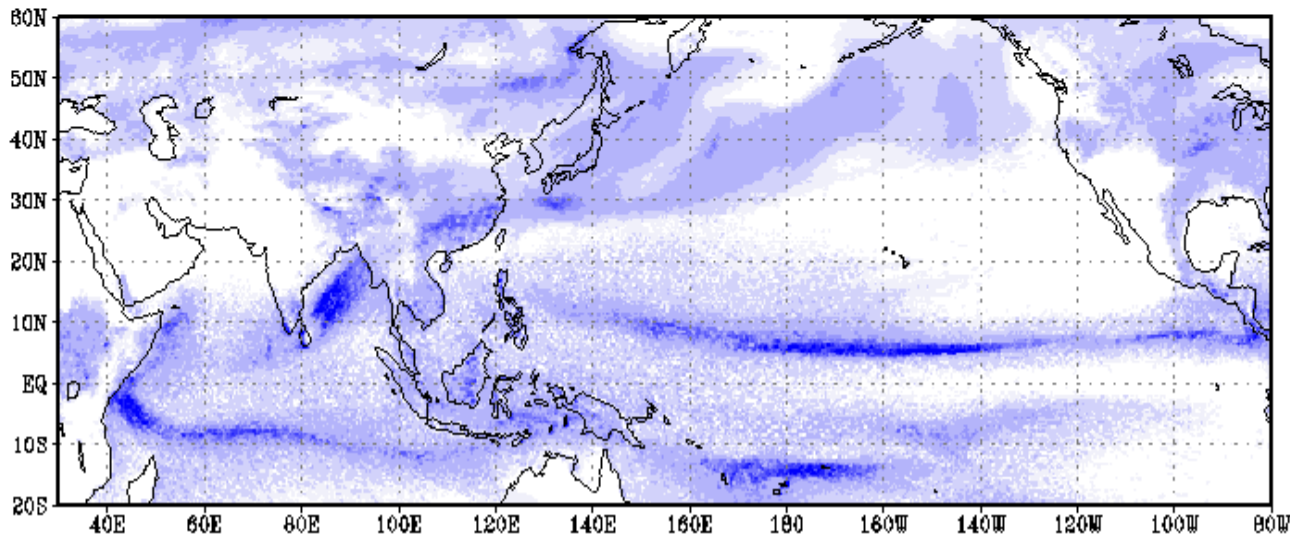
Very high-Resolution Global Model



T106

Area average

: 2.95mm/day



T512

Area average

: 2.99mm/day

Very high-Resolution Global Model

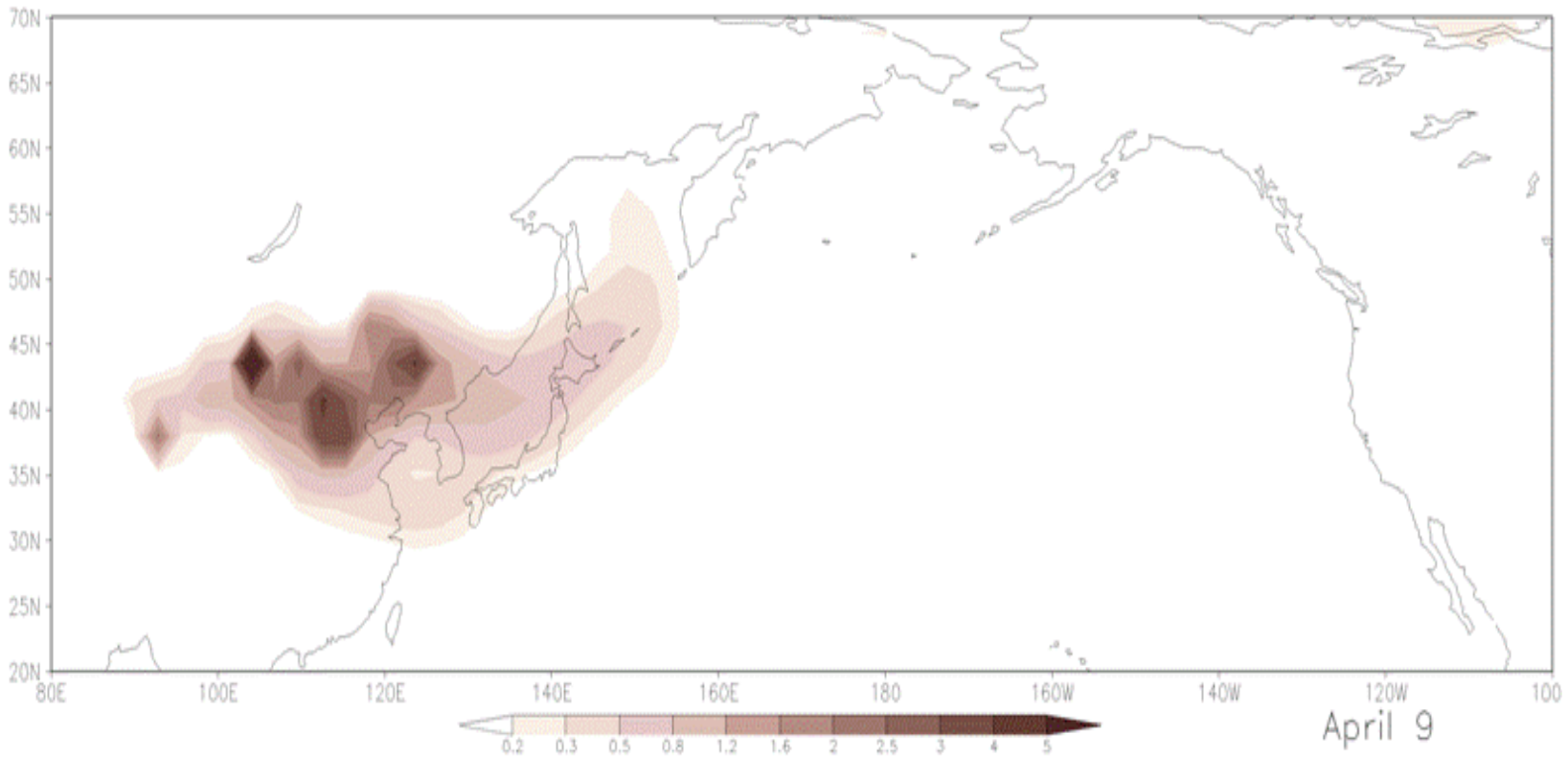
mm/month	T512	T42	T512(%)	T42(%)
0-20	220785834	1534541	97.48045	97.56349
20-40	3651216	30170	1.61207	1.91816
40-60	1250180	6546	0.55197	0.41618
60-80	504608	1331	0.22279	0.08462
80-100	198067	233	0.08745	0.01481
100-120	70141	43	0.03097	0.00273
120-140	22427	0	0.00990	0.00000
140-160	6754	0	0.00298	0.00000
160-180	1827	0	0.00081	0.00000
180-200	628	0	0.00028	0.00000
200-	734	0	0.00032	0.00000
	226492416	1572864		



Climate Environment Modeling

CES AGCM

Daily Evolution of Yellow Sand



BACK