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Targeted Training Activity: Seasonal Predictability in Tropical Regions to be followed by Workshop on Multi-scale Predictions of the Asian and African Summer Monsoon

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Modelling issues.

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After Bias Correction



Predictability over equatorial region is not improved much

Is post-processing a fundamental solution?

Forecast error comes from

f model imperfectness for poor initial conditions

Model improvement Good initialization process

is essential to achieve to predictability limit

ISSUES IN CLIMATE MODELING (Toward a new Integrated Climate Prediction System)

Climate Dynamics Laboratory

Seoul National University

Sung-Bin Park Yoo-Geun Ham Dong min Lee Daehyun Kim Yong-Min Yang Ildae Choi Won-Woo Choi

MJO prediction

ECMWF forecast (VP200, Adrian Tompkins)







Basic Flow of model development



Problem : cloud top sensitivity to environmental moisture

Prescribed profile

* temperature and specific humidity are nudged with 1 hour time scale



Problem : cloud top sensitivity to environmental moisture

Single column model (Parameterization)



Effect of turbulence on convection



Delaying effect

1. Heat transport by turbulence

Accumulation of MSE above turbulence \rightarrow raising instability (t = t₁) Convection initiated (t = t₂)

→ Convection and boundary layer turbulence coupling

t = t_o

\boldsymbol{q}_{v} 2. Interactions between hydrometeors \dot{q}_{l} Heat exchange between hydrometeors (t = t_3) \rightarrow deep convection → Microphysical cloud model g_r q_g Moistening Interaction Latent/ Convection **Transport by** between sensible heat turbulence initiation hydrometeors time

t = t,

t = t₂

t = t₃

Future Plans II Cloud microphysics

Sec. Barriel



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Future Plans II Improvement of Land Surface process











Time: 06Z JUN 12 1999





The Goddard Cumulus Ensemble (GCE) model was created at 1993 by Wei-Kuo Tao.

1. Non-hydrostatic

Explicit interaction between boundary layer turbulence and convection

2. Sophisticated representation of microphysical processes

Physically based representation of precipitation process

Description of CRM

GCE-Goddard Cumulus Ensemble





• Attempt to parameterization flux of prognostic quantities due to unresolved eddies (1.5 order scheme)





Global cloud resolving model can be the best tool to simulate the nature.





Thank you