



# Focus on deep and shallow convection, and turbulence

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Steve Krueger and Chin-Hoh Moeng

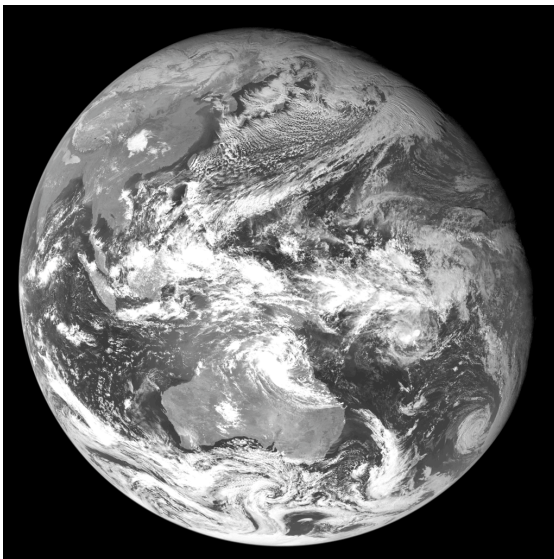
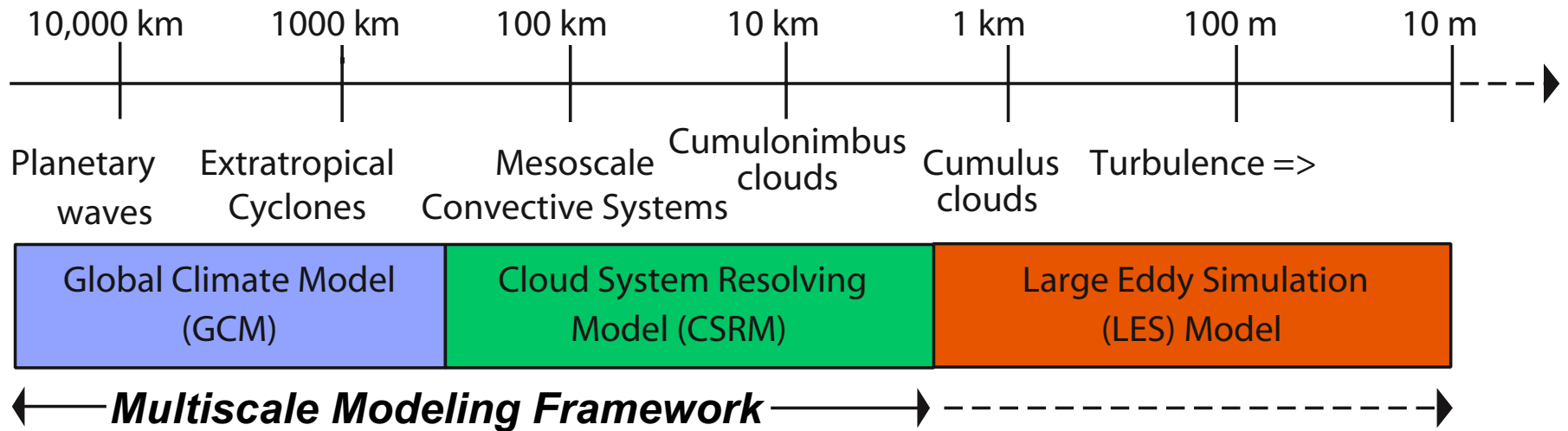
Fort Collins, CO  
August 2007

# Agenda

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- Review of breakout session at Feb 2007 meeting
- Status of action items from Feb 2007 meeting
- Short reports
- Discussion
- Formulate action items for Jan 2008 meeting

# Scales of Atmospheric Motion



# Boundary layer clouds in cloud-system-resolving models (CSRMs)

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- CSRMs may have horizontal grid sizes of 4 km or more.
- Such CSRMs are used in MMF, GCRMs (global CSRMs), and tropical cyclone models.
- In MMF and GCRMs, CSRMs are expected to represent all types of cloud systems.
- However, many cloud-scale circulations are not resolved by CSRMs.
- Representations of SGS circulations currently used in CSRMs can be improved.



# Strategy

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- **Objectives:**

Improve the representation of SGS convection, turbulence, and microphysics in CSRMs used in MMFs, GCRMs, and NWP.

- **Proposed parameterizations**

- *PDF/HOC*: Cheng & Xu, Lappen & Randall
- *Two-scale MMF*: CSRM plus boundary-layer-eddy-resolving model (ERM)

- **Additional physics to be included**

- **SGS microphysics**
- Effects of *surface inhomogeneity* (elevation, land surface properties): both resolved by the CSRM and SGS

# Strategy

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- **Proposed evaluation methods**

- Analysis of and comparison to existing and new *benchmark simulations*
- Comparison to *observational datasets*

# Focus group action items for Aug 2007

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- **Identify or execute useful benchmark LES simulations:**
  - *Identify existing small-domain:* GCSS cases (all)
  - *Identify existing large-domain:* LBA, RICO, etc (all)
  - *Obtain forcing datasets from MMF and execute LES:* (Tao)
  - *Execute new idealized large-domain:* (Moeng)
  - *Update and test LES models with improved microphysics* (Krueger, Blossey, others)
- **Test and evaluate CRM/NWP/GCM parameterizations against benchmark simulations and/or observations**
  - *In SCMs and CRMs* (Cheng, Krueger, Lappen, Grabowski )

# Focus group action items for Aug 2007

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- **Analyze benchmark simulations**
  - *With goal to improve CSRM simulations (Moeng, others)*
  - *With goal to improve conventional GCM parameterizations (Krueger)*
- **Process relevant observational datasets**
  - *New products (Krueger, others)*
- **Collaborate with Low Cloud Feedbacks and MJO focus groups**  
(Bjorn, Marat, Mitch, Steve)



## Additional action items for next 2-3 years

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- **Test and evaluate CRM/NWP/GCM parameterizations against benchmark simulations and/or observations**
  - In MMF
  - In NWP models
- **Optimize MMF CRM configuration**

# Plans for next 6 months

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- UCLA
- UW
- Utah
- NCAR
- Langley
- GSFC

## Model Reformulation (from Low Cloud Feedbacks)

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- Can we use the MMF as a means to embed LES in the GCM? Develop framework for allowing CRM to be delocalized from grid of CAM, thus allowing for the use of embedded LES and or the use of the CRM at only select latitudes. (UCLA: Bjorn Stevens)
- *Develop SAM test bed for this using SamSimilarity* (or big Brother SAM). Here we will use SAM as both the large-scale and CRM to address vertical resolution issues. (This framework is computationally more convenient at the moment for vertical resolution sensitivity studies). Beta-plane aqua-SAM as a testbed for delocalization strategies (i.e., running baby SAM on a different grid). (UW: Peter Blossey?)

# Utah

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- **Develop observational datasets for evaluation of MMF:** Use mesonet and soundings to characterize boundary layer interactions with deep convection (e.g., convection initiation, cold pools).
- Consider using EDMF for shallow cumulus parameterization in MMF.
- Consider SGS microphysics parameterization in shallow cumulus.