CMMAP WG session on

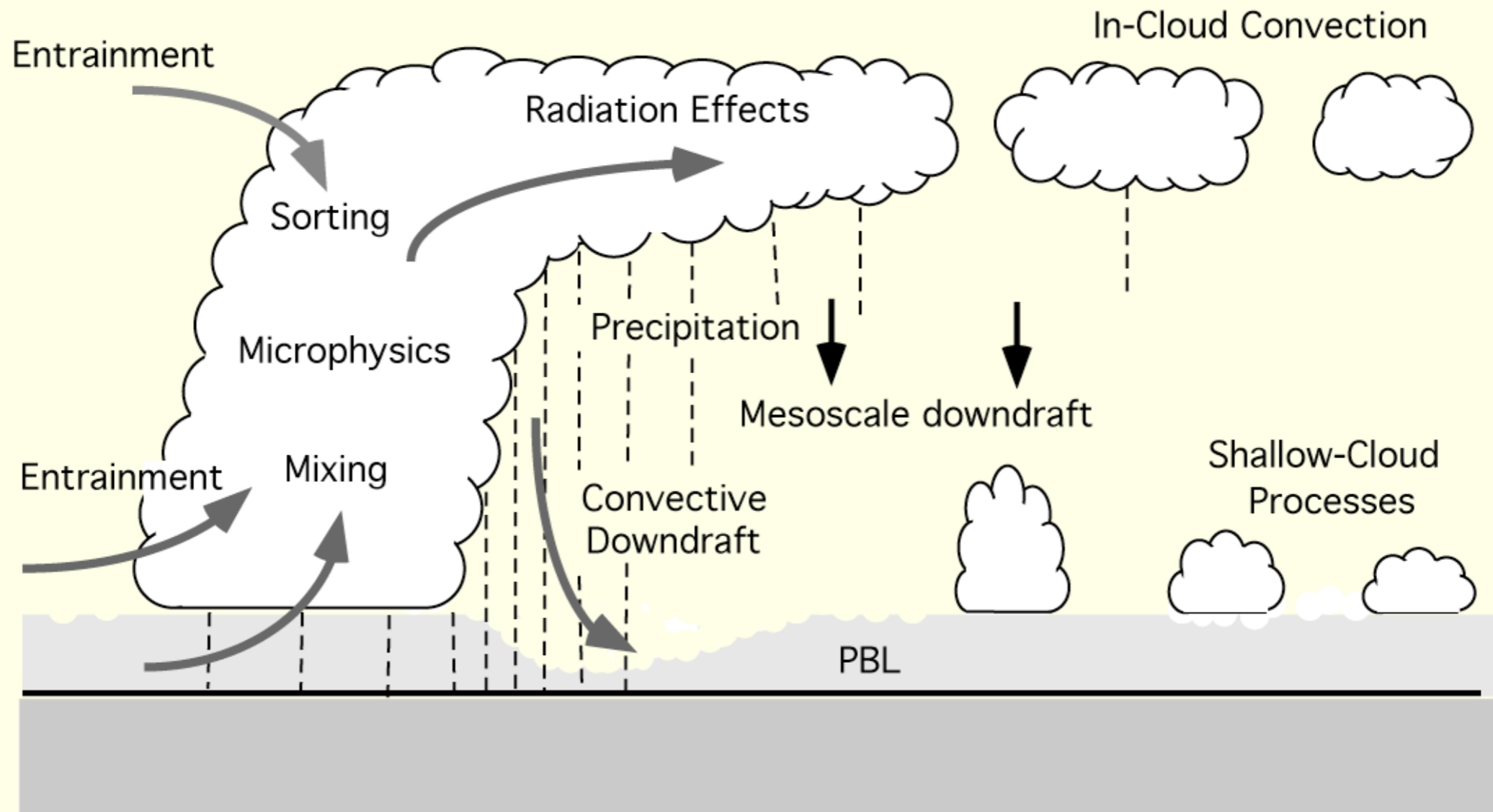# Development and testing of improved parameterizations of microphysics and radiation for use in CSRMS, MMFs, and GCRMs

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Microphysics and Radiation in MMF

UNCERTAINTIES IN FORMULATING CLOUD AND ASSOCIATED POCESSES

Entrainment

Radiation Effects

In-Cloud Convection

Sorting

Microphysics

Precipitation

Entrainment   Mixing

Mesoscale downdraft

Shallow-Cloud Processes

Convective Downdraft

PBL

from Arakawa and Jung (2003)

Radiation WG

Objective:
- Test sensitivity of CSRMs to more detailed radiation calculations

Actions required:
- Develop new radiation parameterization and test in CSRM (Year 3)
- Test new parameterization in MMF and GCRM (Year 4)

Radiation in MMF

To a great extent, there is not much about radiation that is pressing. The benefits are already being realized via use of the ICA which alleviates much uncertainty regarding setting of unresolved cloud structure (which currently plagues conventional GCMs).

Action items: Radiation WG

- Update radiative transfer code in SAM (RRTM, BUGSRad, Li & Barker): *Pincus, Collins, Barker*

- Implement multi-dimensional RT code in a CRM: *Barker*

- Build, assess, and speed-up instrument simulators for inline use in SAM/MMF: *Kummerow* (TRMM), *Ackerman & Marchand* (CloudSat, MISR)

Microphysics WG

Objective:
- Develop and test improved microphysics parameterizations for CSRMs

Actions required:
- Develop new microphysics parameterization and test in CSRM (Year 3)
- Test new parameterization in MMF and GCRM (Year 4)

Action items: Microphysics WG

- Test double-moment (for cloud water, cloud ice, rain) microphysics code in SAM : *Bretherton, Morrison*

- Develop limited (cloud water, cloud ice) double-moment code for SAM: *Ghan*

- Test double-moment (RAMS) microphysics in GSFC GCE/MMF: *Tao*

- Modify SAM to allow different microphysics codes to be plugged in: *Marat*

- Make MMF CSRM output available for analysis: *Marat*

- Make existing GCE microphysics codes available to CMMAP: *Tao*

- Extend pdf-based boundary-layer cloud model to predict droplet number: *Xu*

- Investigate resolution dependence of double-moment microphysics code: *Krueger*

- Investigate geographic dependence of microphysics parameters with GSFC MMF: *Tao*

- Improve ice nucleation parameterization: *DeMott*

- Improve representation of aerosol-CCN linkages: *Kreidenweis* (> 6 months)