

# 4<sup>th</sup> Pan-GCSS meeting: Advances in Modeling and Observing Clouds and Convection

- ▶ Global Energy and Water Cycle Experiment (GEWEX) Cloud System Study (GCSS)
- ▶ Working groups on cloud types
  - boundary layer
  - Cirrus
  - extra-tropical
  - deep convective
  - polar
- ▶ Cross-cutting working groups
  - GEWEX Pacific Cross Section Intercomparison (GPCI)
  - Cloud and Radiation Metrics
  - Cloud Climate Feedback Intercomparison Project (CFMIP)
  - Cloud Microphysics

# Links to ARM

- ▶ Primarily a modeling group, but
  - Need participation of observationalists people for evaluating models, setting up case studies, devising metrics
- ▶ ARM data used heavily
  - Deep convective group: TWP-ICE intercomparison
  - Cirrus group: March 2000 SGP intercomparison
  - Polar group: MPACE intercomparison
- ▶ New ARM datasets of interest
  - Kollias: vertical velocity from radar data
  - Crewell: COPS dataset (including AMF)

# Science Highlights of Meeting

## ▶ Cloud Climate Feedback

- M. Webb: Regime analysis of models
- S. Sherwood: models do not correctly simulate PWV, UTH, cloud forcing relationships
- M. Zhang: CAM with constant forcing locks into phase; interactions between parameterizations leads to quasi-periodic cloud amount

## ▶ Tropical Convection

- J. Slingo: why is there not a theory for tropical weather like there is for mid-latitude weather? papers by Yang et al. on organized tropical convection; coupled models underestimate strength of air-sea coupling
- Mapes: convection is multi-scale, must understand interaction between scales
- R. Neale: most convective schemes have no memory; adding memory and dilution improves convection; model has continuous relationship between rainfall and precipitable water – observations show two regimes (unorganized and organized convection)

# Metrics & Model Evaluation

## ▶ Climate Model Metrics

- What metrics are best to evaluate clouds/radiation in GCMs?
- NWP-type metrics: skill scores, RMS, bias, anomaly for cloud fraction, surface precip, cloud radiative forcing

## ▶ Improving evaluation of climate models (panel discussion)

- Remove gap between clouds/precip in models and observations
- Make evaluation tools publicly available
- Establish consistent set of metrics so models can be evaluated and users can know performance of models – concentrate model development effort on ‘good’ models
- Metrics need to be useful, not just easy to define
- Examine relationships between variables rather than individual variables; relationships more important to climate feedback question