Convective Processes Working Group

Leaders
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Joint ARM User Facility and ASR PI Meeting
Tysons, VA
Thursday, March 22, 2018

Schedule

- **Introduction – Tony and Adam (5 min)**
- **Breakout Session Overviews (55 min)**
- **Role of CP Translator – Scott Collis (15 min)**
- **Discussion – led by Tony and Adam (45 min)**

Description

This working group seeks to improve the representation of convective cloud processes and properties (e.g., cloud cover, precipitation, life cycle, dynamics, microphysics) in multi-scale models (GCMs, NWP, LAMs, CRMs, LES) with an ultimate goal of reducing associated uncertainties in climate simulations. Research topical areas include: (1) convective vertical velocity, (2) convective system transitions, and (3) cloud-aerosol-precipitation-radiation interactions, involving both direct observations and retrievals of environmental and cloud properties, as well as process parameterization improvement and development.

Mission

The mission of the Convective Processes Working Group is to document from observations and modeling, and thereby develop understanding of, the dynamical, thermodynamical, microphysical, and radiative processes that together determine the evolution of convective cloud systems from formation to dissipation, and to translate this understanding into methods for representing convective cloud processes in numerical weather and climate models.

Objectives

1. Identify guiding science questions regarding convective cloud life cycles that are based on model uncertainties/limitations, that can be addressed using ARM observations, and that support broader programmatic objectives outlined in the ASR Science Plan.

2. Facilitate, organize, and maximize the efforts of individual Principal Investigator projects towards answering these broader scientific questions through the formation and organization of subgroups with similar and complementary research goals.

3. Identify, prioritize, and help implement observational campaigns, measurement strategies, and data products that are needed to understand convective cloud life cycle processes and better represent them in models.

Research Themes

Vertical Velocity

- Sensitivity to Environmental Conditions

- Expanding Observational Retrievals

- Two-way Interactions with Microphysics

Convective System Transitions

- Shallow to Deep (Liquid to Ice, Entrainment)

- Mesoscale Organization (Life Cycle)

- Role of Cold Pools

Parameterization Development

- Convective/Stratiform/Anvil Structural Life Cycle

- System Propagation

- Microphysics

- Turbulence

Breakout Session Summaries

- **End-to-End forward simulators - Mariko Oue**
- **Routine LES: LASSO, and beyond - Andy Vogelmann**
- **CAUSES - Cyril Morcrette**
- **Cold-air outbreaks and the COMBLE field campaign – Bart Geerts**
- **20 Years of CPOL Radar Data – Valentin Louf**
- **Observational requirements for radar insights into convective updraft microphysics and dynamics – Marcus van Lier-Walqui**
- **Aerosol-deep convection cloud interactions – Usama Anber**
- **Model development and evaluation on clouds, convection, and precipitation - Jiwen Fan**
- **GoAmazon2014/5 synergies II – Yolande Serra**
- **CACTI - Adam Varble**
- **Tracking Aerosol Convection interactions ExpeRiment – Mike Jensen**

Discussion

1. Do the breakout sessions and research ongoing in ASR reflect overarching critical needs? Do upcoming field campaigns and IOPs?

2. Are there overlapping research areas that aren't being exploited through collaboration? If so, what is needed to encourage greater collaboration toward achieving long-term objectives?

3. What observations/models are needed to make progress on identified critical questions and objectives? Are these provided by ARM? Are value added products and data finding/downloading adequate?