

The Performance of CAM5 Physics Modules at High Spatial Resolution

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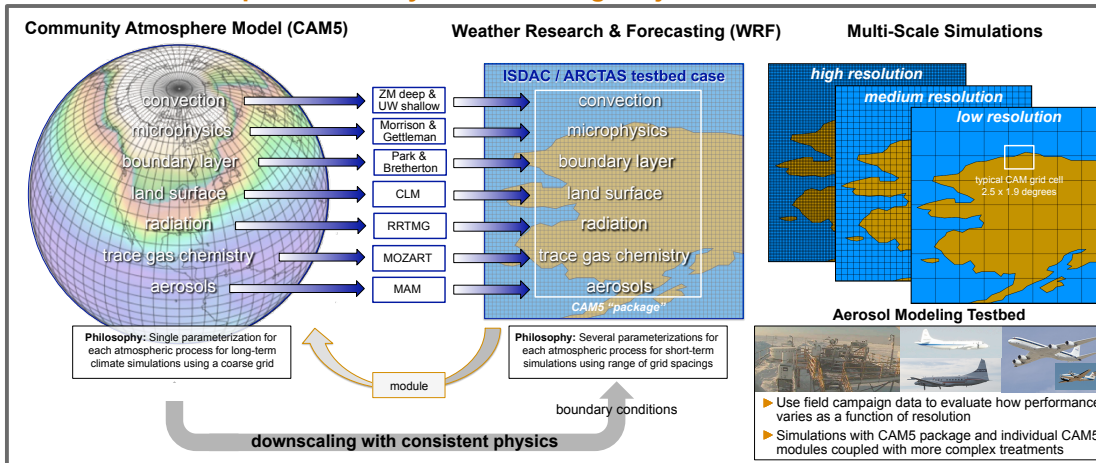
Motivation

- There has been relatively *little interaction* between the cloud-resolving / mesoscale and global modeling communities
- CAM will likely be run at $\Delta x = 10 - 20$ km in the future (5 - 10 years from now), but the *performance of the current suite of physics modules at those scales are not known*
- Rapid development and evaluation of the next generation suite for CAM requires the ability to *isolate processes* as well as the ability to test parameterizations across a range of scales
- Current computing capabilities *do not allow global models to be run routinely at mesoscale resolutions*, anticipated for use 5 - 10 years from now

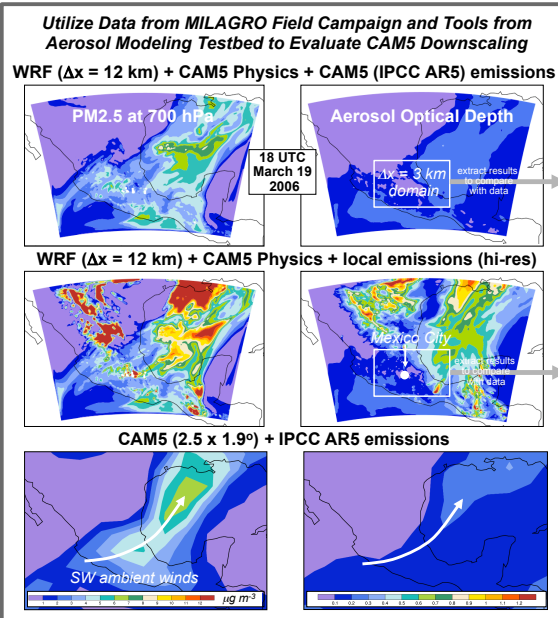
Objectives

- Incorporate the **CAM5 parameterization suite into WRF**
- Use the **Aerosol Modeling Testbed** to evaluate the CAM5 parameterization suite
 - Evaluate CAM5 physics suite at higher spatial resolution more compatible with data
 - Compare CAM5 physics modules against more complex and expensive representations using systematic and consistent methodology
 - Use performance metrics to identify more desirable parameterization choices for both models
- Increase **communication** between cloud-resolving / mesoscale and global scale modeling communities

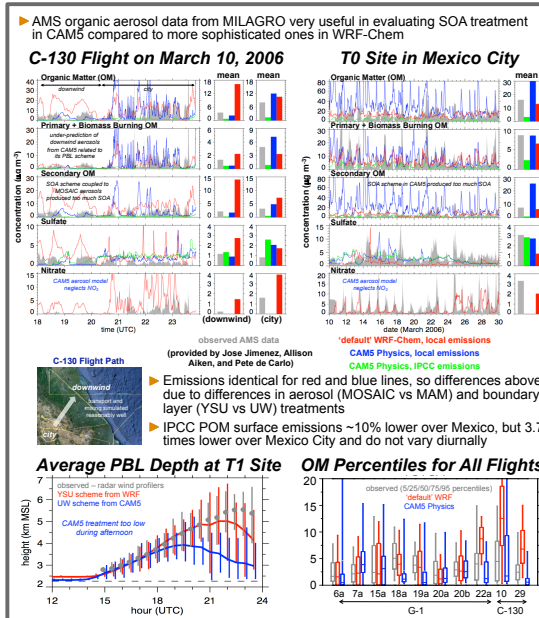
Concept for Earth System Modeling Project on Arctic Processes



Downscaling for MILAGRO Testbed



Comparing Aerosol Predictions



Next Steps

- Run WRF at high resolution, downscaling from CAM5, for the ISDAC / ARCTAS testbed case
 - Compare performance of CAM5 simulations with high-resolution simulations from WRF
- WRF simulations at $\Delta x = 5$ km over Barrow**
- Clouds from ARSCL
- Clouds from Morrison Microphysics Scheme
- Simulated PM2.5, excluding dust
- How well will MAM aerosols (MAM in CAM5, MAM in WRF-Chem, MOSAIC in WRF-Chem) compare with aircraft measurements in the Arctic
 - In contrast to aerosols, the complexity of the Morrison & Gettelman microphysics scheme from CAM5 is comparable to those in WRF. But the performance as scales change needs to be quantified in addition to comparing the performance with other schemes.

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