

Developing an Atmosphere Model for Ultra High Resolution Global Climate Simulation

An effort within the new DOE BER project: “**Ultra High Resolution Global Climate Simulation to Explore and Quantify Predictive Skill for Climate Means, Variability and Extremes**” led by Jim Hack, ORNL, Bill Collins, LBNL, Phil Jones, LANL, and Ken Sperber, LLNL



Presented by Kate Evans, ORNL

Collaborators on atmospheric model development:

ORNL: Dave Bader, Jim Hack, Pat Worley

NCAR: Julie Caron, John Truesdale, Mariana Vertenstein

SNL: Mark Taylor

Many additional collaborators ...

Webpage: <http://users.nccs.gov/~4ue>

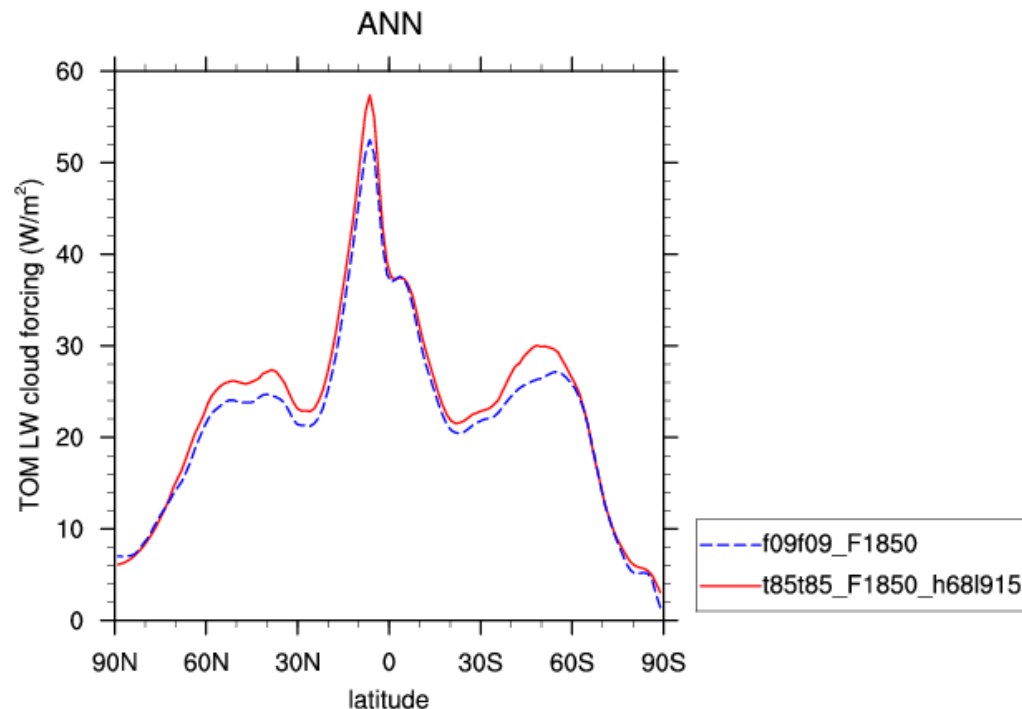


Spectral-Eulerian atmosphere model is being 're-developed' to perform high-resolution simulation with the following attributes:

- **Reasonable throughput**
- **Accurate climate**
 - **Known climate attributes exercised at high-resolution**
 - **Energy balance being tuned for preindustrial conditions**
- **Couples well with rest of CESM - moving target is coming into focus**
- **New Datasets**
 - **Updated high-resolution boundary datasets**
 - **temporally evolving aerosol datasets with monthly fidelity**

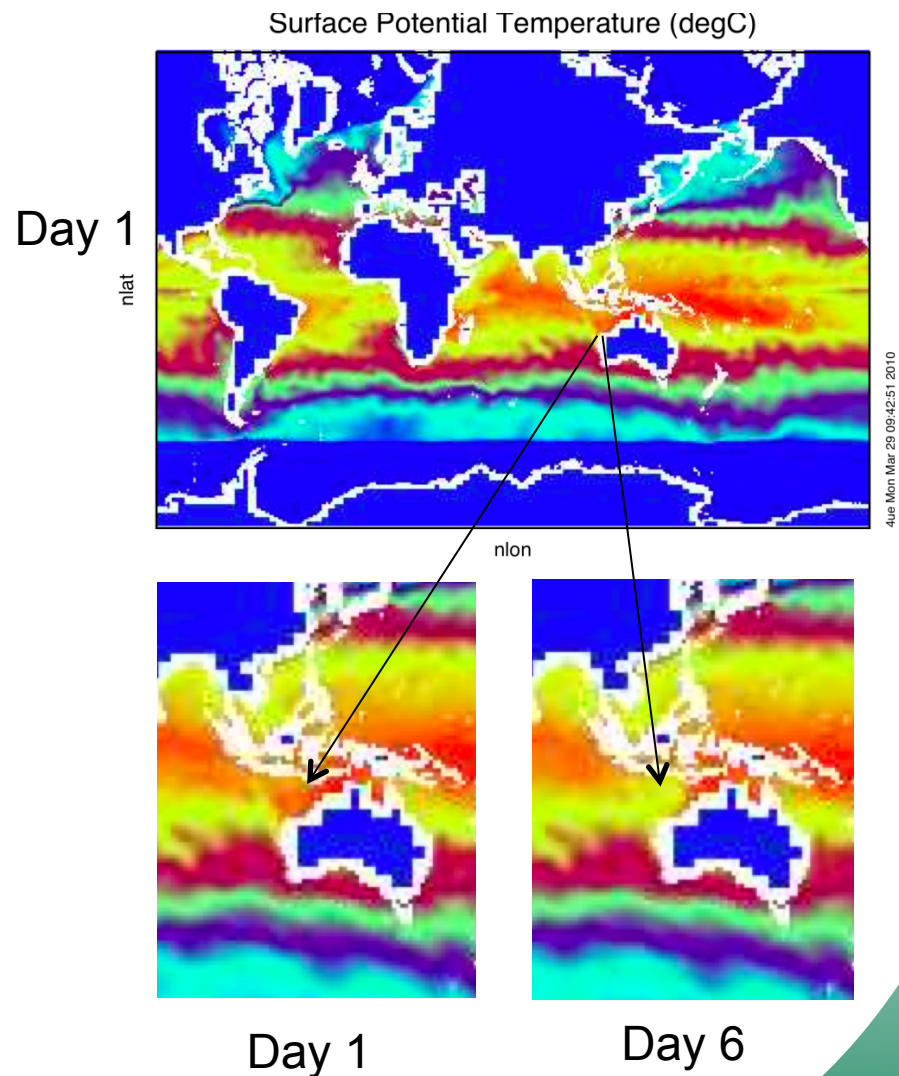
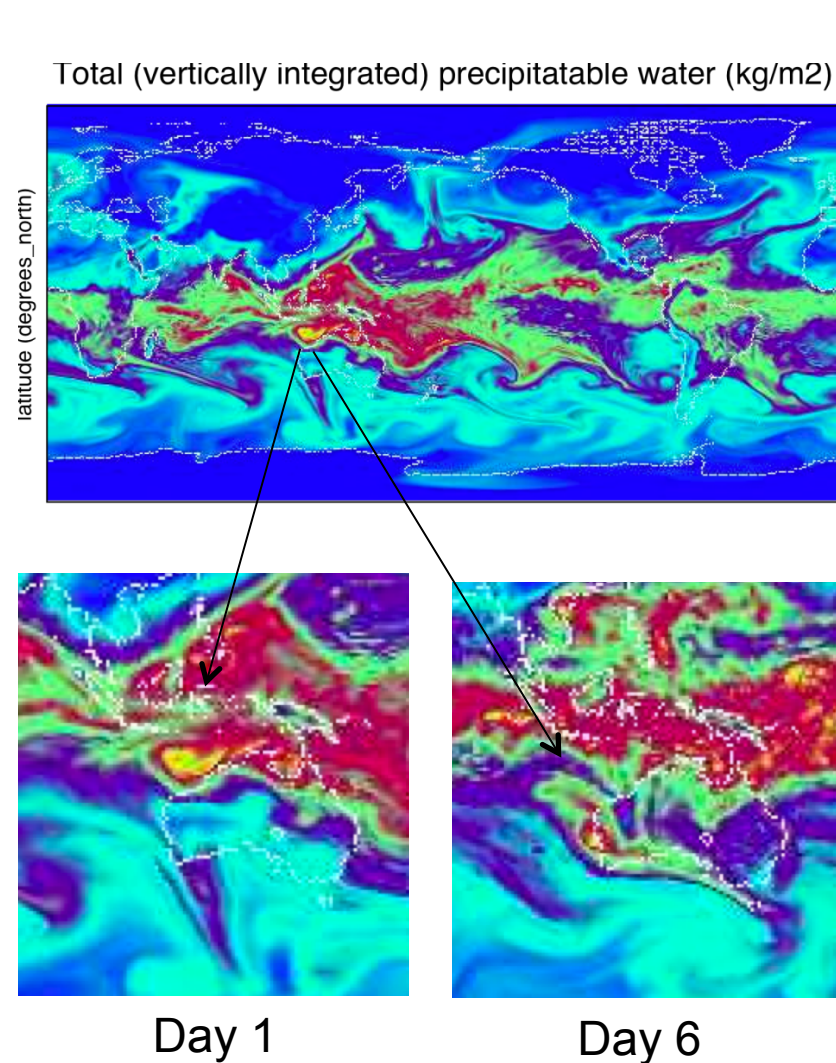
T85 tuning: Comparable to FV.

- Uses new serial monthly SST data 1850-2007
- New monthly serial 1° prescribed aerosols
- Currently retuning with new subcycling option to increase throughput
- Left to do: Need better initial conditions form land and atm

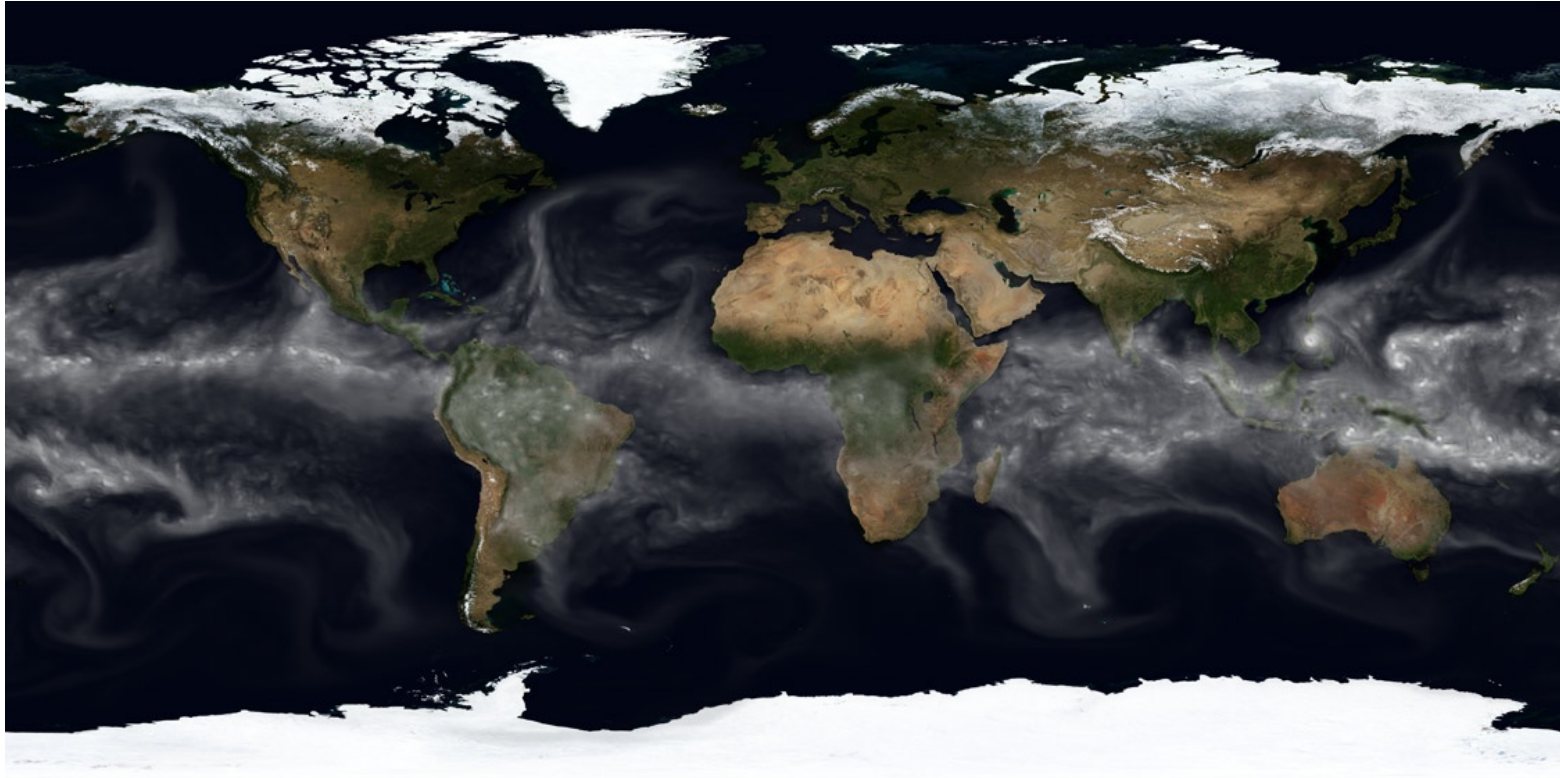


Example of long wave cloud forcing (LWCF) for preindustrial T85 compared to preindustrial 1 degree FV

First days of hi-res coupled model run T341 atm x FV .25° Ind x 0.1° ocn



Next steps: Tuning T341 with new datasets and subcycled dynamics



Instantaneous column integrated water vapor for a preindustrial T341 simulation

Stay tuned . . .

- **FV “trop_bam” chemistry runs to create monthly aerosol datasets have been improved with new emissions datasets**
- **Subcycling option in Spectral-Eulerian implemented and is being tested.**
- **Tuning of HOMME model as a high resolution climate model is underway**
- **HOMME ~0.25 degree resolution is running**
- **Go see SEWG session**