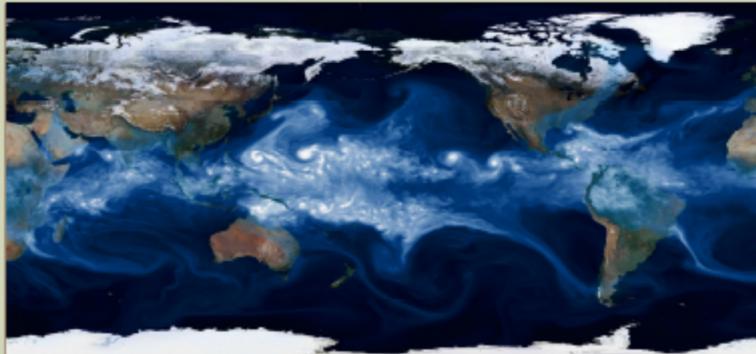


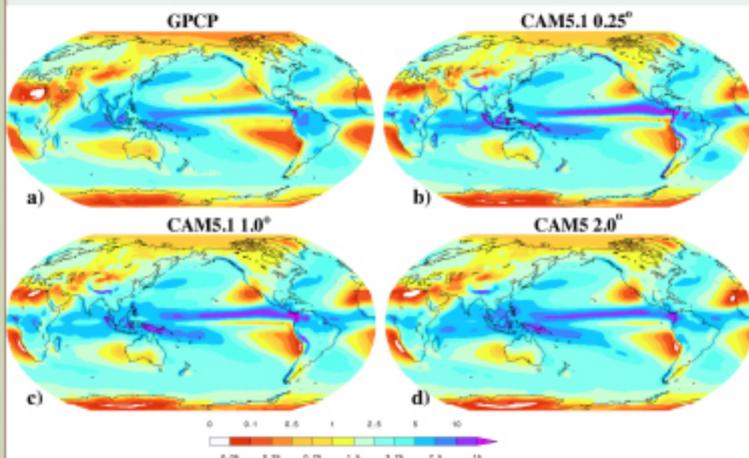


The effect of horizontal resolution on simulation quality in the Community Atmospheric Model, fvCAM5.1

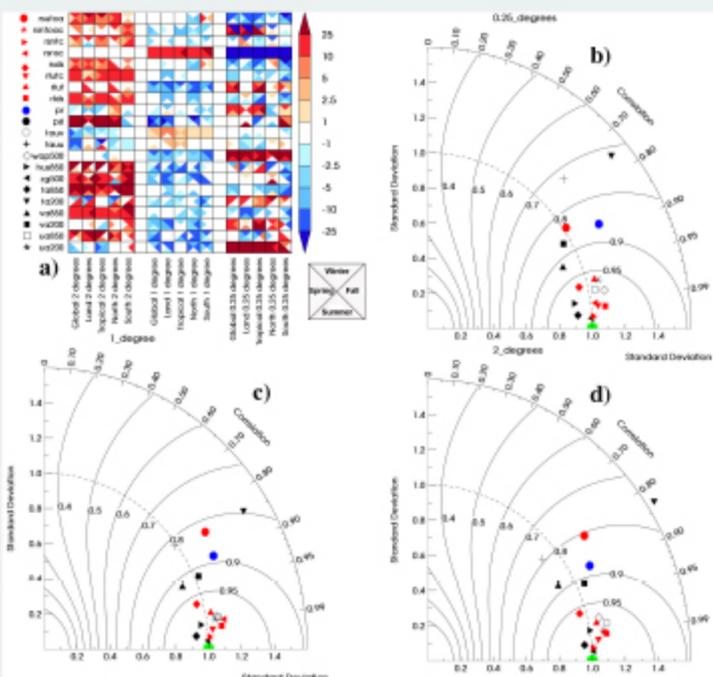
Michael F. Wehner, Kevin Reed, Fuyu Li, Prabhat, Julio Bacmeister, Cheng-Ta Chen, Chris Paciorek, Peter Gleckler, Ken Sperber, William D. Collins, Andrew Gettelman, Christiane Jablonowski, Chris Algieri



We present an analysis of version 5.1 of the Community Atmospheric Model (CAM5.1) at a high horizontal resolution. Intercomparison of this global model at approximately 0.25°, 1° and 2° is presented for extreme daily precipitation as well as for a suite of seasonal mean fields.



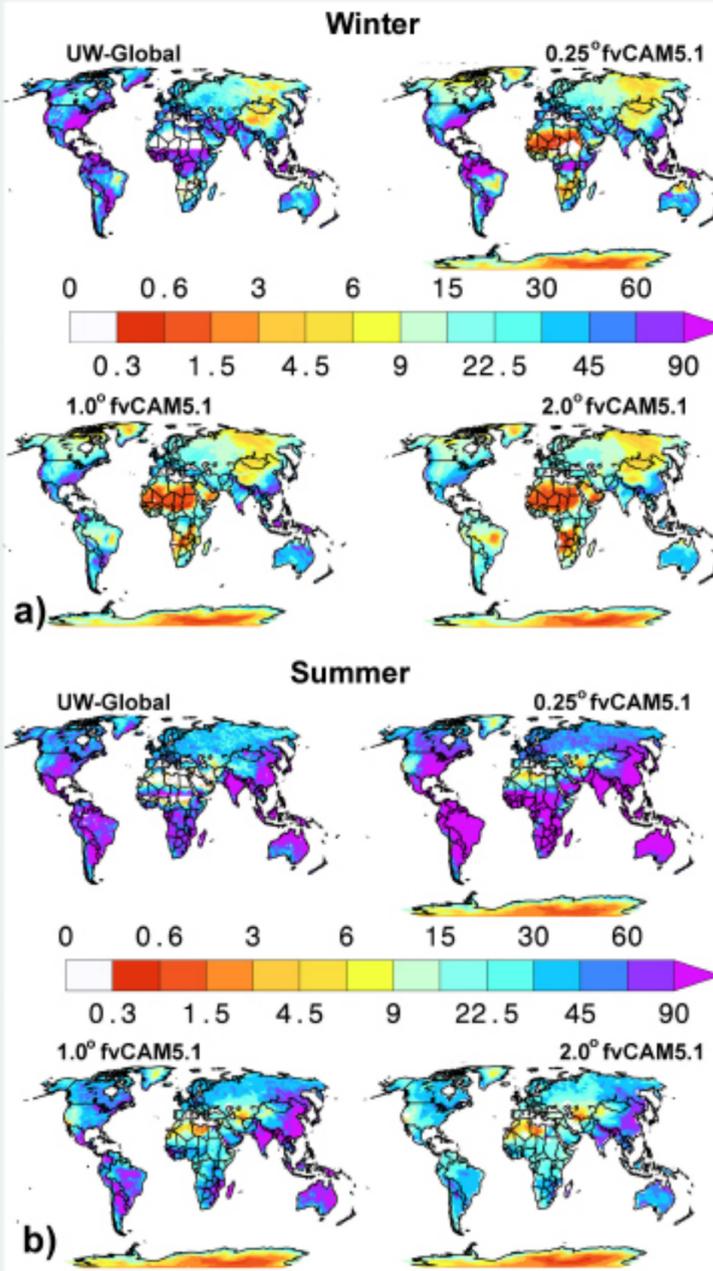
Annual Mean precipitation (mm/day)



Performance portrait of simulated fvCAM5.1

In the absence of extensive model tuning at high-resolution, simulation of many mean fields is degraded compared to the tuned lower resolution public released version of the model.

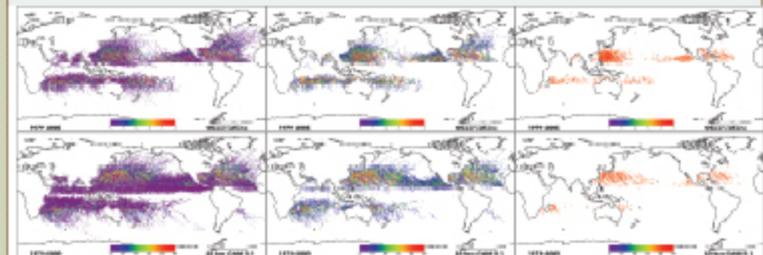
In general, extreme precipitation amounts are larger in high resolution than in lower resolution configurations. In many but not all locations and/or seasons, extreme daily precipitation rates in the high-resolution configuration are higher and more realistic.



Observed and simulated 20 year return values of winter and summer maximum daily precipitation

- Higher resolution leads to larger extreme precipitation rates.
 - Generally more realistic.
 - Biased high in regions/seasons where cumulus processes are significant.
 - This is partly due to a mismatch in time scales in parameterizations.

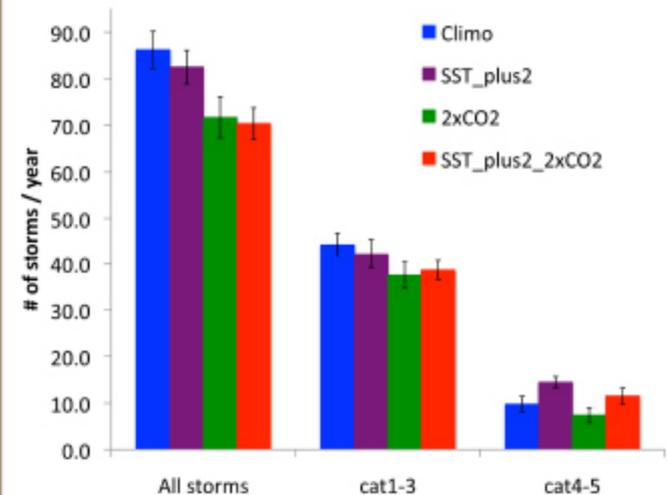
The high-resolution configuration produces tropical cyclones up to category 5 on the Saffir-Simpson scale and a comparison to observations reveals both realistic and unrealistic model behavior.



Observed and simulated tropical storm tracks 1979-2005

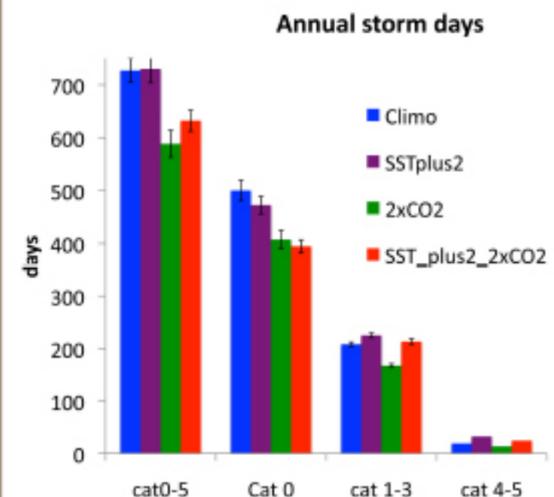
The US CLIVAR Hurricane Working Group

- Climatological SST, 330ppm CO₂
- Climatological SST plus 2°, 330ppm CO₂
- Climatological SST, 660ppm CO₂
- Climatological SST plus 2°, 660ppm CO₂



US CLIVAR HWG: Annual tropical storm counts

- Fewer total TS, more intense TC in a warmer world



Tropical cyclones last longer in a warmer world