

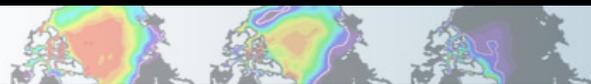


Center update: NCAR

Jean-François Lamarque
CESM Chief Scientist

Community Earth System Model

CESM

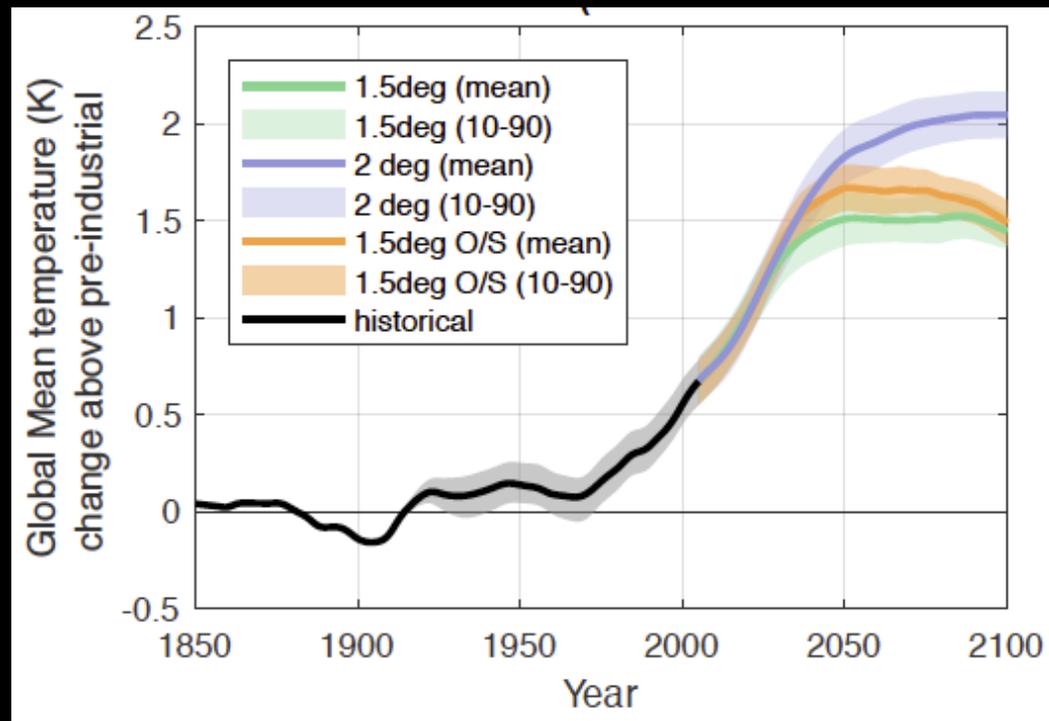


USGCRP ACTIVITY

Simulations in support of IPCC report on 1.5C/2.0C targets

Only coupled simulations available to study targets, performed using CESM1 Large Ensemble (1-deg)

More information and path to output available at <http://www.cesm.ucar.edu/experiments/1.5-2.0-targets.html>



Sanderson et al., ESDD, 2017

STATE OF CESM2

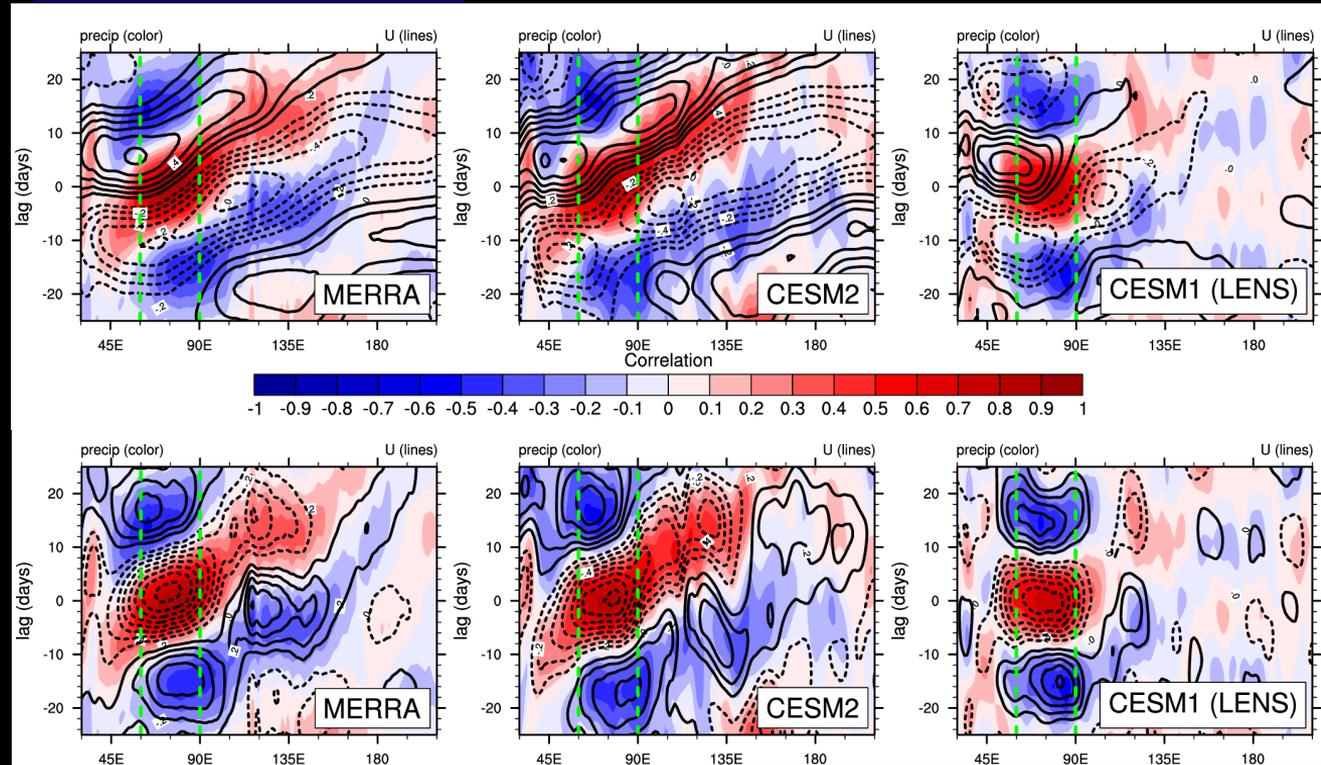
CESM2: Comparison to CESM1 LENS

Precipitation

Contours: 850-mb U

Madden-Julian Oscillation

- Lag correlation with Indian-Ocean precip
- 20-100day band pass filter, 10S-10N
- 9 years, DJFMAM

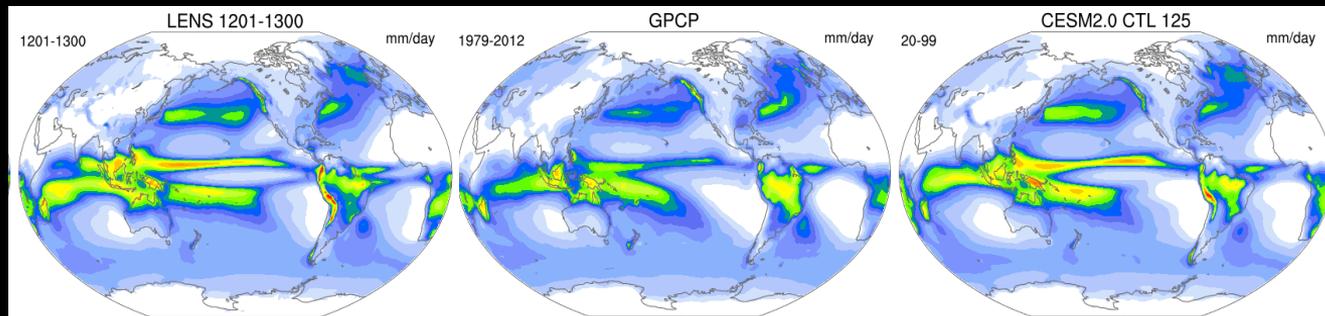


Contours: OLR

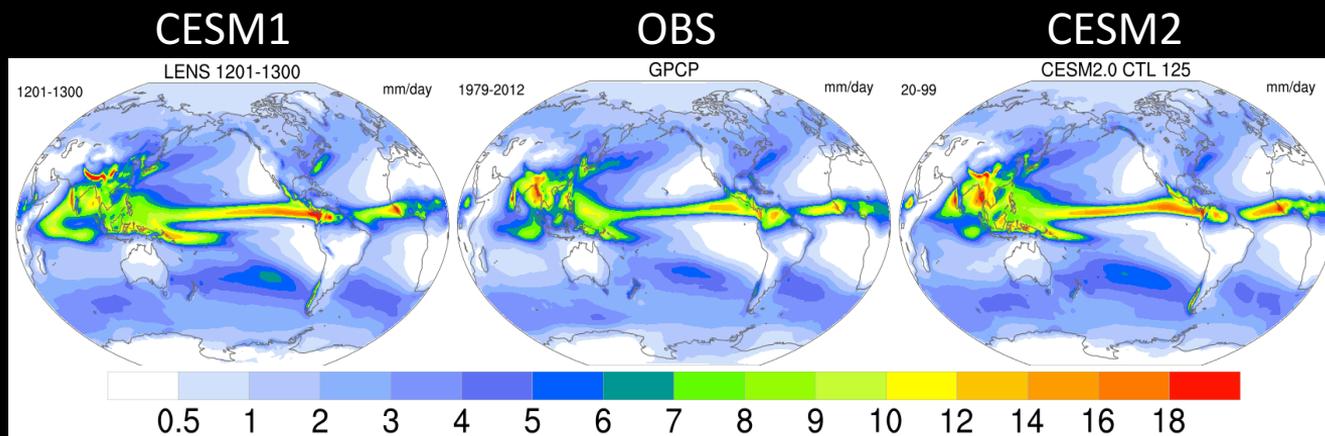
CESM2: Comparison to CESM1 LENS

Precipitation Climatology

DJF



JJA

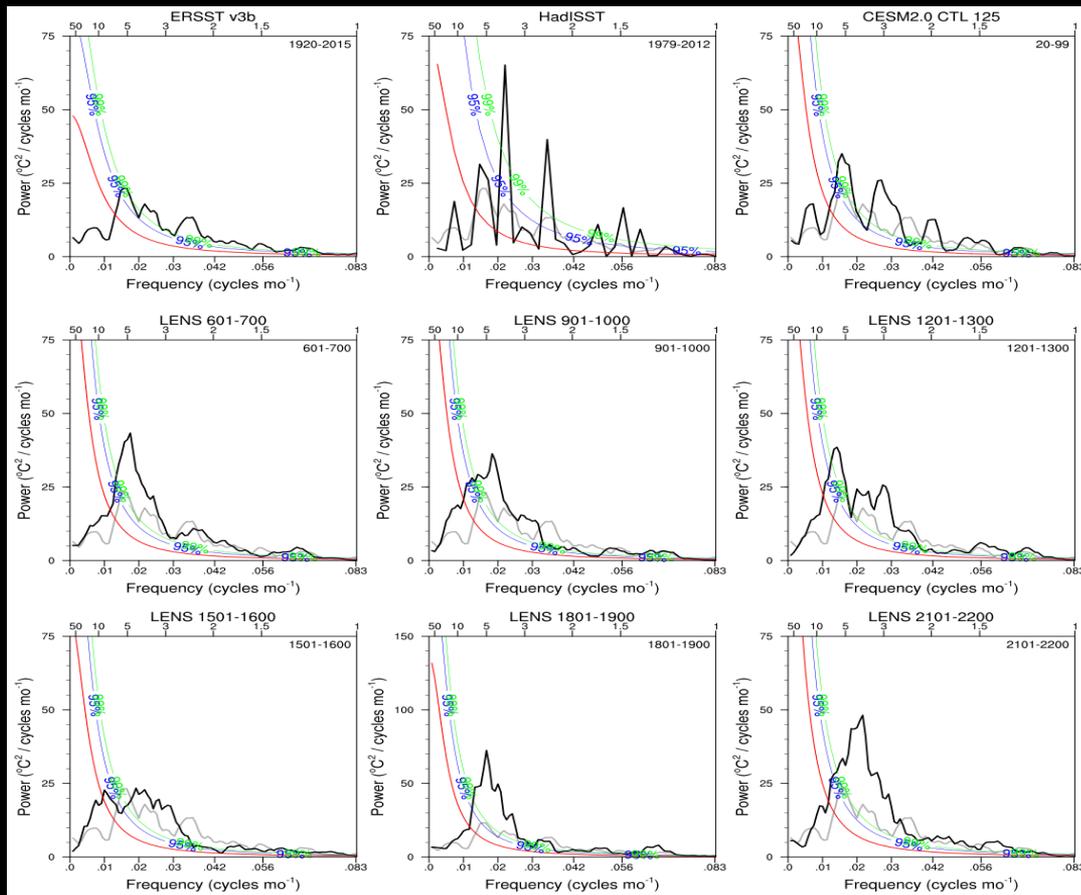


Improvements in Indian Ocean, Indian Monsoon & SPCZ

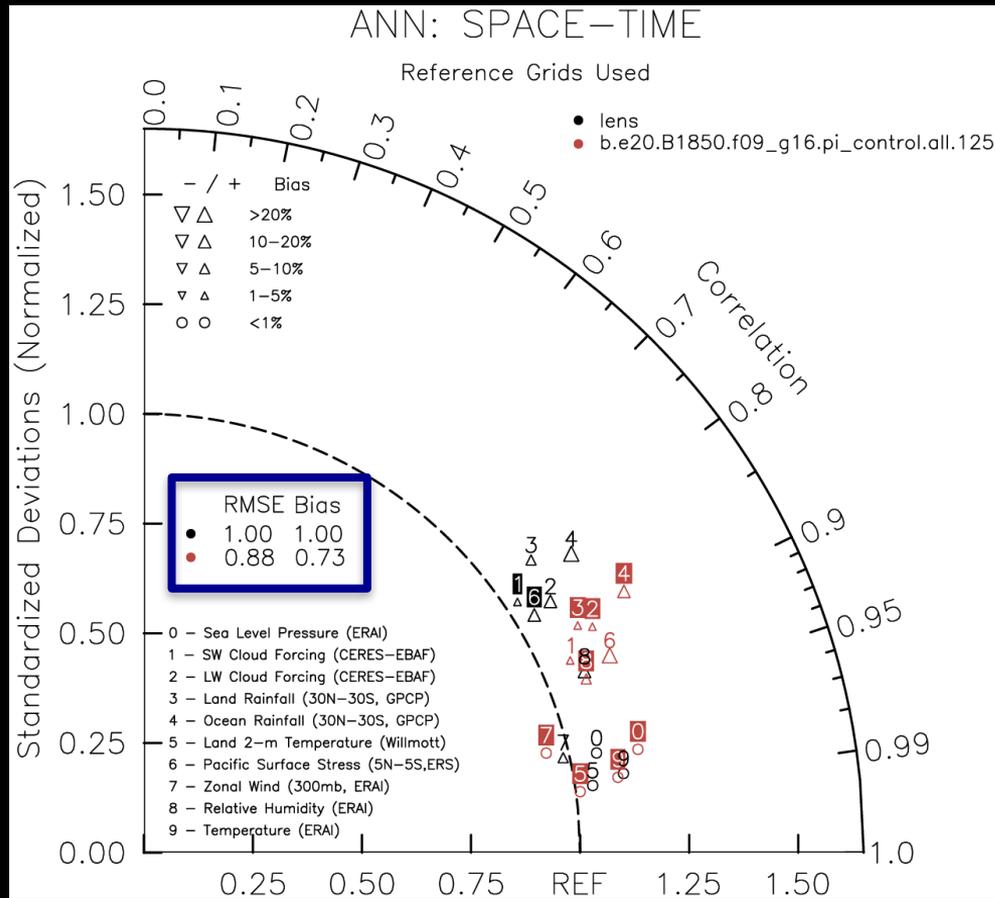
CESM2: Comparison to CESM1 LENS

Nino3.4 SST
Power
Spectrum

Too early to say
whether there are
improvements over
LENS (need another
500 years)



CESM2: Comparison to CESM1 LENS

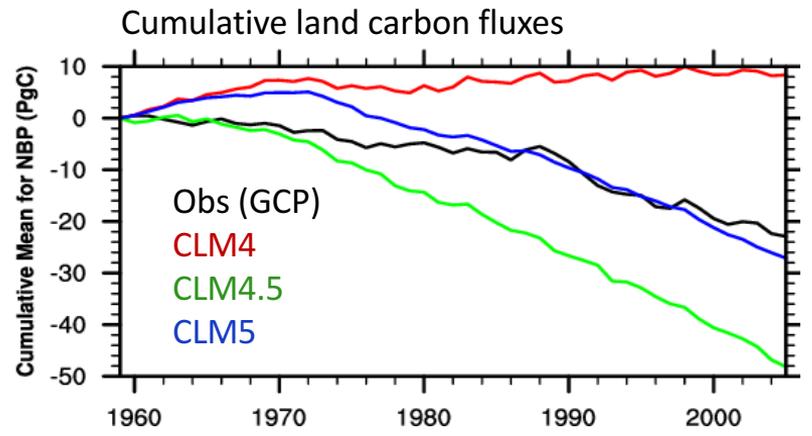
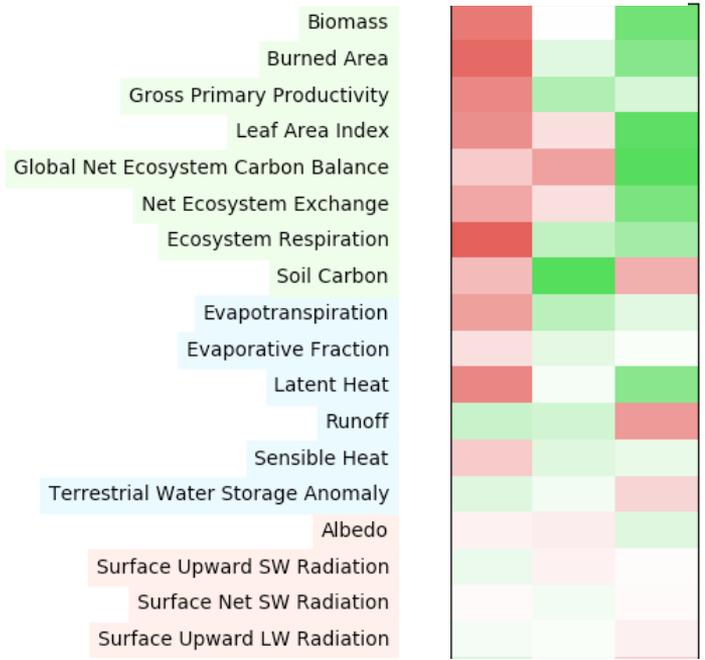
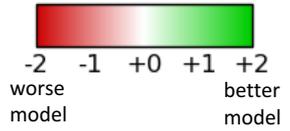


Summary

- Metric mean improved **bias** and **RMSE**
- Largest improvements in tropical precipitation (3,4), SWCF (1) and Pacific surface stress (6)
- Surface pressure field (0) degrading slightly (mostly variance)

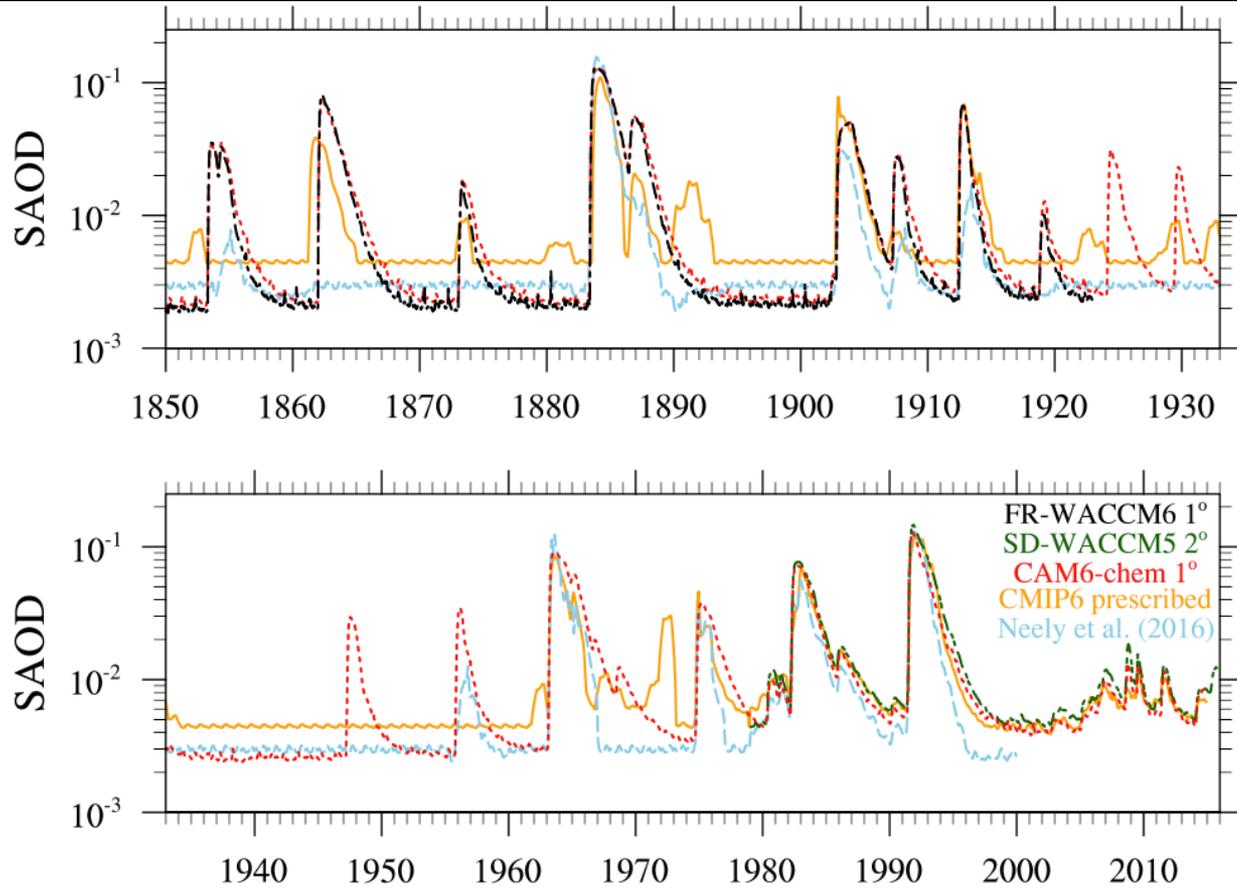
Assessment of CLM5 (land-only) with ILAMB

ILAMB = Land diagnostics package (25 variables, 60 datasets) with metrics for RMSE, bias, spatial pattern corr, interannual variability, funct relationships



Correcting a very large bias in CMIP5!

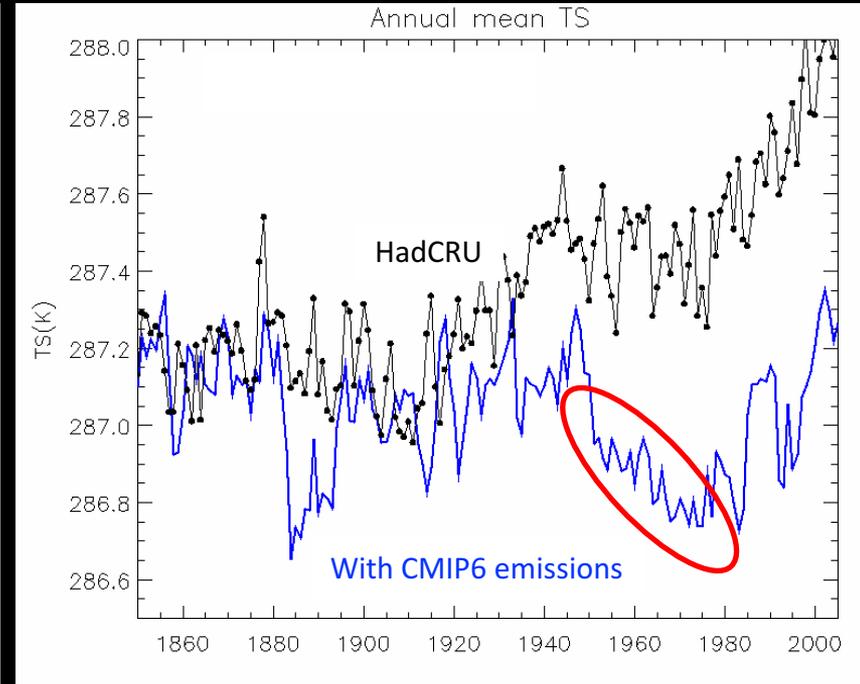
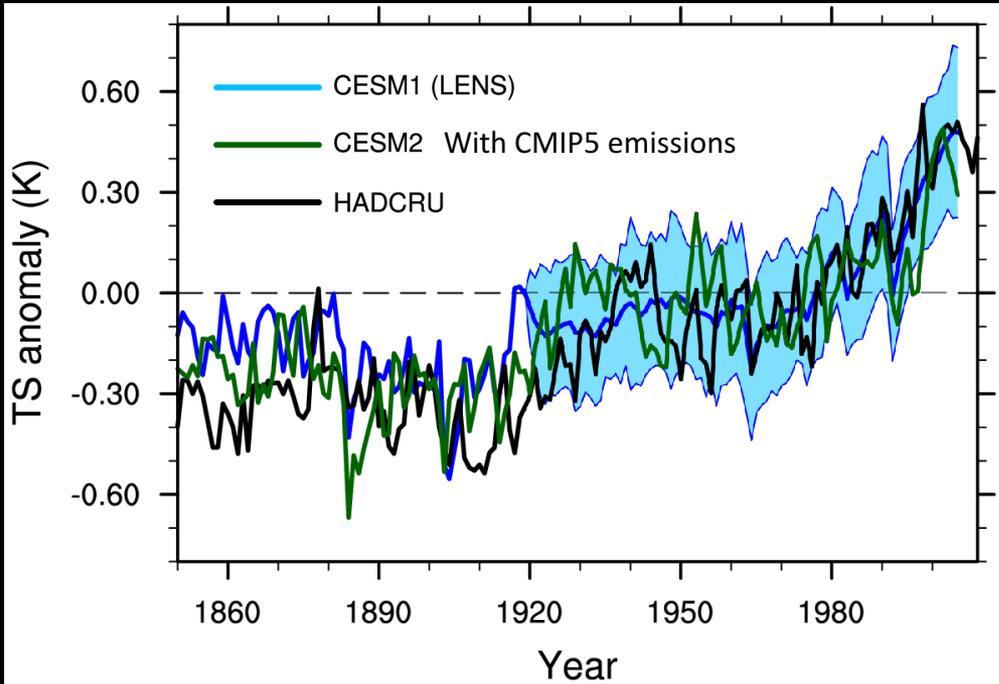
20th century volcanoes



The CAM-chem simulation of the impact of volcanoes is very close to WACCM and obs.

Background is rising with rising OCS

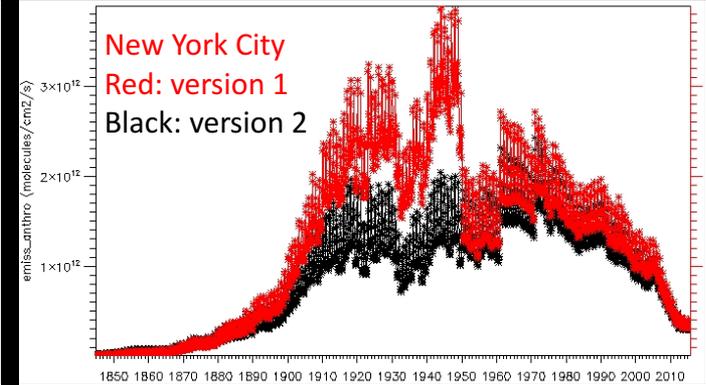
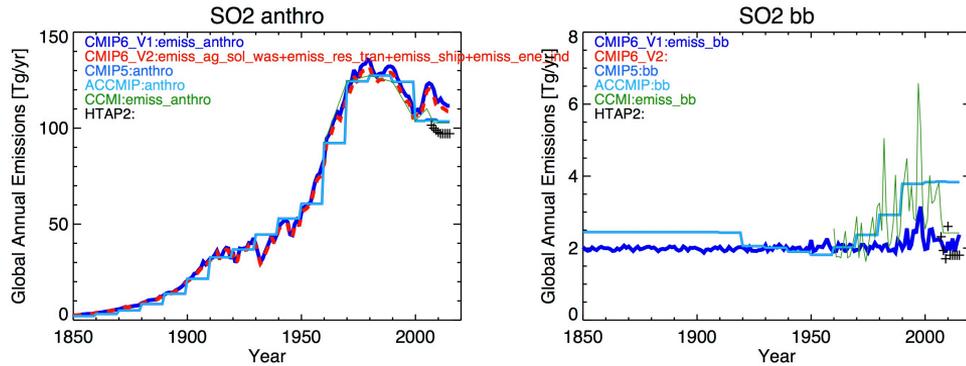
20th Century: influence of CMIP6 emissions



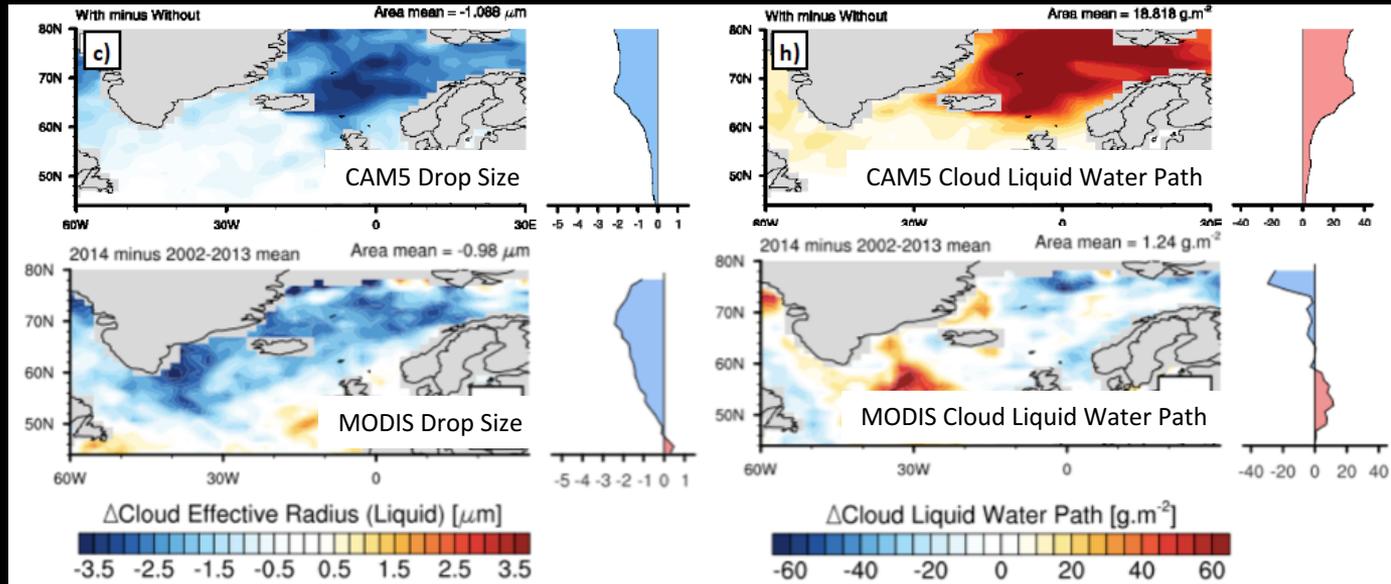
Feb. 2017

May 2017

2 hypotheses: Emissions and/or AIE



Response to
Iceland volcano
SO2 emissions.
Malavelle et al.,
Nature, 2017



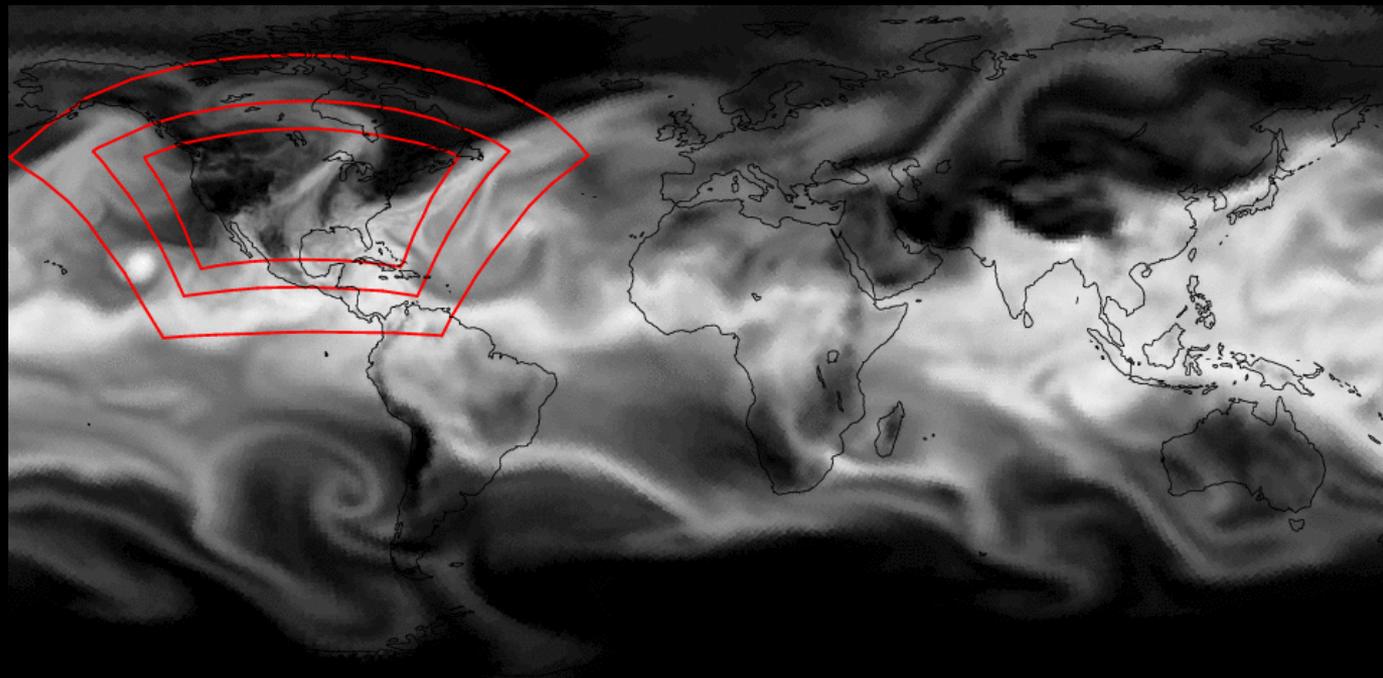
Coordination with weather community

- Definition of Interoperable Physics Driver (IPD) in collaboration with NCAR/MMM and NOAA
- Introduction of MPAS and FV3 (collaboration with NOAA) in CESM
- Expansion to CIME (drivers, intra-component)
- All are part of model unification at NCAR

HIGH-RESOLUTION

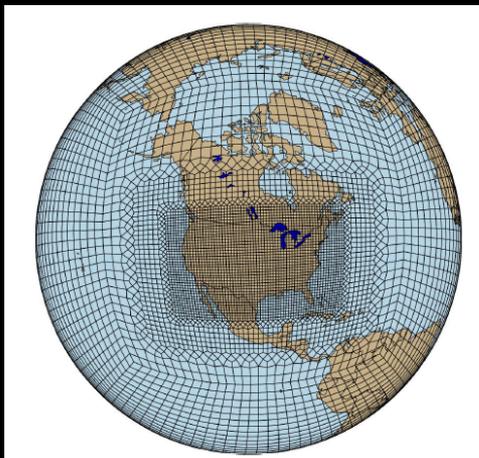
CESM2 with Regional refinement

Regional-refinement in CAM6 (AMIP) with the Spectral Element (SE) and MPAS dynamical cores (effort led by A. Gettelman and C. Zarzycki)



Precipitable water Sept 23-Oct 3, 111 km -> 14 km

Slide from C. Zarzycki



Collaboration with QNLM (China) and TAMU

- Goal: perform DECK experiment with CAM5-SE (0.25°)/POP(0.1°)

Continuation of the simulations performed by Justin Small in 2013

A new synoptic scale resolving global climate simulation using the Community Earth System Model

R. Justin Small¹, Julio Bacmeister¹, David Bailey¹, Allison Baker², Stuart Bishop¹, Frank Bryan¹, Julie Caron¹, John Dennis², Peter Gent¹, Hsiao-ming Hsu¹, Markus Jochum³, David Lawrence¹, Ernesto Munoz¹, Pedro diNezio⁴, Tim Scheitlin², Robert Tomas¹, Joseph Tribbia¹, Yu-heng Tseng¹, and Mariana Vertenstein¹

- Simulations will be performed in Qingdao (125M core-hours/yr for 5 years, 15 PB), with model output available to the Community (2 PB at TAMU)

CMIP6

CMIP6: revised timeline and workflow

