CESM2.2 Spectral Element:CAM-chem as Boundary Conditions

Description

We have saved CAM-chem simulation output that is intended to be used as boundary conditions for regional modeling. We used CAM-chem in the spectral element dynamical core, at approximately 1 degree global horizontal resolution with 32 vertical levels. Meteorology is driven by specified dynamics, by nudging with 50h relaxation (1%) to MERRA2 reanalysis. Data is saved as instantaneous fields every 6 hours. Chemistry is the MOZART-T1 mechanism, described in Emmons et al. (2019). You can find a description of all simulated species online. We use the MAM4-VBS scheme to model aerosols. Anthropogenic emissions are from CAMS-GLOB-ANTvXYZ. Biogenic emissions are from online MEGAN2.1. Fire emissions are from QFED CO2 x FINN emission ratios. SST in 2020 are repeated from 2019.

- Data Format: netCDF
- File size: X.X GB per day (?? x ??-hour instantaneous time slices per day)
- Data coverage: January 1, 2010 to December 30, 2020
- Output has been saved on a regular grid for ease of use with WRF-chem tools.

A list of saved output is here (add on another page).

Get the data

Currently, the data is only available via the NCAR glade HPC system at this location:

/glade/campaign/acom/acom-climate/tilmes/CO_CONUS/f.e22.FCnudged.ne30_ne30_mg17.release-cesm2.2.0_spinup.2010_2020.001/atm/hist

We are working on creating a NCAR Research Data Archive storage location.

Reference

To cite the data directly, please use:

Tilmes, S., Emmons, L.K., Buchholz, R.R. & The CESM2 Development Team, (2022). CESM2.2/CAM-chem Output for Boundary Conditions. UCAR/NCAR - Atmospheric Chemistry Observations and Modeling Laboratory. Subset used[†] XXX, Accessed[*] dd mmm yyyy, DOI: TBD.

[†]Please fill in the "subset used" with region and/or date of the subset you used (e.g. Lat: -10 to 10, Lon: 100 to 150, September 2015 - February 2016).

[*]Please fill in the "Accessed" date with the day, month, and year that you last accessed the data (e.g. - 5 Aug 2011).

Using the boundary conditions with WRF-Chem

The CAM-chem chemistry and aerosols for this run are identical to the WACCM forecasts. Mapping CAM-chem output to WRF-Chem chemistry schemes can be found in:
https://www2.acom.ucar.edu/sites/default/files/wrf-chem/CESM-WRFchem_aerosols_20190822.pdf
which is linked from this page:
https://www2.acom.ucar.edu/wrf-chem/wrf-chem-tools-community

Other simulations

CAM-chem simulations with CESM2.1 covering 2001 to 2020 can be found here: CESM2.1:CAM-chem as Boundary Conditions