CESM2.2: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 finite volume dynamical core, at 1 degree global horizontal resolution with 32 vertical levels. Meteorology is driven by specified dynamics, by nudging with 12h relaxation (10%) to MERRA2 reanalysis. Data is saved as instantaneous fields every 6 hours. See a list of saved species. Chemistry is calculated using the MOZART-T1 mechanism, described in Emmons et al. (2020). We use the MAM4-VBS scheme to model aerosols. Anthropogenic emissions are from CAMS-GLOB-ANTv5.1. Biogenic emissions are from online MEGAN2.1 modeled interactively via CLM. Fire emissions are from QFED CO2 x FINN emission ratios. Data Format: netCDF

- File size: 1.79 GB per day (4 x 6-hour instantaneous time slices per day)
- Data coverage: January 1, 2001 to December 30, 2020

> ⚠ ***** We have yet to simulate past 2020, and envision this could take some time as we finalize input datasets *****
>
> For more recent dates, you could consider using the WACCM forecast for boundary conditions, which is available from January 1, 2020 to 10 days from now: https://www.acom.ucar.edu/waccm/register.shtml.

Get the data

1. Subset from dates within the time period January 1, 2001 to December 31, 2022

Regional and temporal subsetting can be found at: https://www.acom.ucar.edu/cesm/subset.shtml. Note there is a **limit** to download data in chunks of **32 days per download**.

2. Global files

Direct data download of global files is also available from the NCAR Research Data Archive; registration is required.

Reference

When using the data, please cite:

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: https://doi.org/10.5065 /XS0R-QE86.

[†]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/documents/CESM-WRFchem_aerosols_20190822.pdf

which is linked from this page:
https://www2.acom.ucar.edu/wrf-chem/wrf-chem-tools-community

Other simulations

⚠ **Old Boundary Conditions:** CAM-chem simulations with CESM2.1 covering 2001 to 2020 can be found here: **CESM2.1:CAM-chem as Boundary Conditions** The dataset is no longer maintained.

Directions to access other experimental output can be found here: Benchmarks and Production