

CAM3.5 Aerosol Datasets

Project overview

- Run CAM with prognostic aerosols with tropmozart for the following simulations:
 - 1870 control
 - 2000 control
 - time-varying between 1870 to 2000
- Use data from these simulations to feed into coupled CCSM simulations

Resources:

- Erik Kluzek – software engineering and dataset creation/manipulation
- Francis Vitt – trop-mozart software engineering
- Brian Eaton – CAM configure
- Phil Rasch – CAM scientific direction
- Peter Hess – Mozart science
- Mariana Vertenstein – software project oversight
- Dani Coleman – council on datasets

Meetings

- [CCSM3.5 Aerosols Mar-1-2007 meeting](#)

Sequence of work

1870 control

- Stand-alone CAM with head of trunk
- Set of Aerosol datasets for 1870
- Most of this should be on trunk (possibly some hard-coded parameter changes for tuning)
- Francis will commit changes
- Brian will modify configure to do the right thing
- Use the CMS input datasets, and the trop-mozart solver
- Need to preprocess a trop-mozart for this case (this will have a few constituents rather than 100 for the default case)
- Dust and sea-salt free-running – yes if possible
- Run a stand-alone CAM 1870 climatology

2000 emissions

- Stand-alone with 2000 emissions
- Confidence in both

1870-2000 simulation

- Stand-alone 1870 through 2000
- Confidence in the time-series

Prepare for the coupled simulations

- Create datasets from the prognostic cases above – in order to put in the coupled case
- Then use the above for coupled simulations after (after April 1)
- Need to make sure the namelists for CCSM are correct

Specifics:

[Details on CAM3.5 Aerosol dataset conversion.](#)

Stand-alone simulations:

- Horizontal resolution with FV dycore of 1.9x2.5
- Non-water tracers (16): Dust (4), sea-salt (4), sulfur-cycle (4), carbon (4)
- Units will need to change
- Change Smith dataset (SO₂, time-series and units), Kettle (DMS, repeating time-series, and units), the Bond dataset (4 species Black-carbon, organic-carbon, from fossil and bio-fuels – change units, split files) Hydrophobic Black-C, organic-carbon Hydrophobic Organic-C
- Repeat DMS climatology over the 130 years
- Sulfur emissions (SO_x) will need to be split into SO₄ and SO₂ emissions offline. Since these are input at two levels, these will need to be sent in two files (one for surface and one for above the surface) and converted to units of molecules/cm²/sec and these will then be input into the chemical solver as source terms.
- Emissions for the other species will need units of molecules/cm²/sec since these are input as surface emissions.
- Interpolate datasets from native resolution (1x1) to model grid with a conservative interpolation
- Each species has its own file – with multiple years in it
- Have each dataset come in at model resolution (tropmozart can do spatial interpolation, but it's not conservative)
- Create dataset that is monthly from 10-year dataset (for the Carbon dataset)
- Temporal frequencies of different files can be different
- Test datasets: Plot time-series of global emission, Dani has some test codes

CCSM functionality needed:

- Byron's greenhouse gas module? (specified production and loss, 2-CFC, N₂O, Methane) Francis and Peter will put this into the trop-mozart version
- Volcano dataset from last IPCC

- CO2 use a constant value from a ramping file
- Dynamic dust and sea-salt? (will need to be passed through coupler)

Cleanup that can be done later

- Later the trop-mozart preprocessor should be brought into CAM (after this project)
- Later remove current aerosol interpolation code that is not needed.
- Later provide functionality so input aerosol files can be broken up into more than one file