Meteorology

This page provides information on running with the OLD "Specified Dynamics (SD)". If you are using the newer "nudging" scheme, see Physics-based meteorological data.

Default meteorology at 56 vertical levels

Specified dynamics is used when the aim of simulations is to reproduce the meteorology as close to reality as possible, for example when analyzing field campaigns or station data. The default meteorology for specified dynamics is MERRA2 with 56 levels and nudging of 1% (`met_rlx_time = 50`). GEOS5 reanalysis is also supported. When beginning a run, the meteorology starting file must be the same date as described in `RUN_STARTDATE` in `env_run.xml` (see changing dates). To change the meteorological specifications add the following to `user_nl_cam`:

```
&metdata_nl
met_data_file        = 'YYYY/MERRA2_0.9x1.25_YYYYMMDD.nc'
met_data_path        = '/glade/p/cesmdata/cseg/inputdata/atm/cam/met/MERRA2'
met_filenames_list   = '/glade/p/cesmdata/cseg/inputdata/atm/cam/met/MERRA2/0.9x1.25/filenames_1975-
2017_c180430.txt'
met_rlx_time         = 50.
/
```

The file `met_filenames_list` records a list of all available meteorology files in order and will be used by CAM-chem to determine the order of meteorology files when CONTINUE_RUN = True (i.e. after the initialization).

Another example is in the CAM6 User Guide.

GEOS5 and MERRA2 meteorology files are available at multiple resolutions from the Research Data Archive:

GEOS5: https://rda.ucar.edu/datasets/ds313.0/
MERRA2: https://rda.ucar.edu/datasets/ds313.3/

Using meteorology at 32 vertical levels

We have recently found that MERRA2 regridded to the CESM2, 32 layer grid could produce better results because the internal model physics is consequently aligned better with the nudged meteorology. In order to use 32 layer specified dynamics, in step 6 of running CAM-chem on Cheyenne invoke:

```
./xmlchange CAM_CONFIG_OPTS='-phys cam6 -chem trop_strat_mam4_vbs -age_of_air_trcs -offline_dyn -nlev 32'
```

Then follow the instructions above, but for 32L MERRA2 meteorology, located at: `/glade/p/cesm/chwg_dev/met_data/MERRA2/L32/0.9x1.25/`

The initialization files will also need to be 32 layers.

Which vertical levels are recommended?

Read about model layer history and our decision to eventually move towards using 32 layers here: History of model layers: 56 versus 32