

Home

Current versions: **CESM2.1 & CESM2.2 (with MUSICA v0)**

Welcome to the **CESM with Chemistry** Wiki

CAM-chem (Low and Mid-Top): The **Community Atmosphere Model with Chemistry** (CAM-chem) is a component of the NCAR Community Earth System Model (CESM) and is used for simulations of global tropospheric and stratospheric atmospheric composition. Chemistry in CAM-chem is based on the MOZART family of chemical mechanisms, with various choices of complexity for tropospheric and stratospheric chemistry. The first version of CAM-chem is described in [Lamarque et al. \(2012\)](#). An overview of CESM2, which is based on CAM6, is provided by [Danabasoglu et al. \(2020\)](#), with details of the chemistry described in [Emmons et al. \(2020\)](#) and the secondary organic aerosols in [Tilmes et al. \(2019\)](#). CAM6-chem uses the MAM4 modal aerosol model ([Liu et al., 2016](#)).

WACCM (High-Top): The **Whole Atmosphere Community Climate Model** (WACCM) is a comprehensive numerical model, spanning the range of altitude from the Earth's surface to the thermosphere.

Run	<ul style="list-style-type: none">• Get an NCAR HPC Account• Quick Start - Run CAM-chem on Derecho (the new NCAR HPC)• Home Machine (fully coupled version in CESM)• Glossary for **new users**• Release Versions and Compsets• Troubleshooting
Tutorials	<ul style="list-style-type: none">• CESM Tutorials• CESM 2022 Tutorial videos• CESM Chemistry 2023 Tutorial Lab• MUSICA Tutorial Series
Easy Changes and Common Resources	<ul style="list-style-type: none">• Changing Dates of Run• Changing Emissions Input• Changing Output (time and species)• Defining Meteorology for specified dynamics (old: on met field levels)• Defining Meteorology for physics-based nudging (recommended: on model levels)• Restart Files• Clone a Case• Create a Branch• All CAM Namelist Variables• Emission-driven greenhouse gases simulations
Advanced Changes	<ul style="list-style-type: none">• Updating Gas-phase Chemistry (including kinetics, deposition, aerosol uptake, etc.)• Tagging CO and simple tracers• CAM-chem with regional refinement: MUSICA• Physics-based nudging - creating regridded reanalyses (on model levels)• Use MOSAIC scheme in CESM/CAM-chem• Use GEOS-Chem in CESM NEW!
Model Component Descriptions	<ul style="list-style-type: none">• Wet Deposition• Dry Deposition• Gas-phase Chemistry• Emission Inventories• HEMCO (online emission regridding) NEW!• Aerosols• Data Assimilation• Vertical Resolution
Online Interactive Emissions	<ul style="list-style-type: none">• Biogenic Emissions from CLM-MEGAN• Dust emissions• Online Air-Sea Interface for Soluble Species (OASISS)• Ammonia

Use and Diagnostics	<ul style="list-style-type: none"> • Boundary conditions for regional modeling • Atmospheric Diagnostics (ADF) in python NEW! • Automated CESM diagnostic package (using NCL) • Using CAM-chem output • MELODIES MONET model-obs comparison package
User Community	<ul style="list-style-type: none"> • Current Users/Projects • Contributions to Model Intercomparisons (MIPs) • CAM-chem Forum • Chemistry-Climate Working Group Publications • CAM-chem Publications from NCAR • CESM Publications
Other links and documents	<ul style="list-style-type: none"> • Recent Bug Fixes • CAM Documentation (User and Scientific Guides) • ACOM CAM-chem page • CESM Chemistry Climate Working Group • Join the CESM Chemistry WG mailing list • Benchmarks and Production Experiment Diagnostics

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