New Developments to the NASA GEOS Composition Forecasting System (GEOS-CF)

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Introduction

The NASA GEOS Composition Forecast (GEOS-CF), provides global near real-time analysis and 5-day forecasts of atmospheric composition, at a horizontal resolution of 25 km extending from the surface to 80 km altitude.

It combines the GEOS AGCM with the GEOS-Chem chemistry model.

GEOS-CF data is publicly available and is used for atmospheric chemistry research and to support NASA's suborbital and satellite missions, including TEMPO.

Here, **we present the upcoming GEOS-CF version 2** and evaluate its simulation of tropospheric composition for 2023.

See poster A41U-1913 (Thu am) for an analysis of stratospheric and mesospheric composition in GEOS-CF-2

Scan to learn more about GEOS-CF

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Upcoming updates to GEOS-CF and its simulation of tropospheric composition

Model upgrades

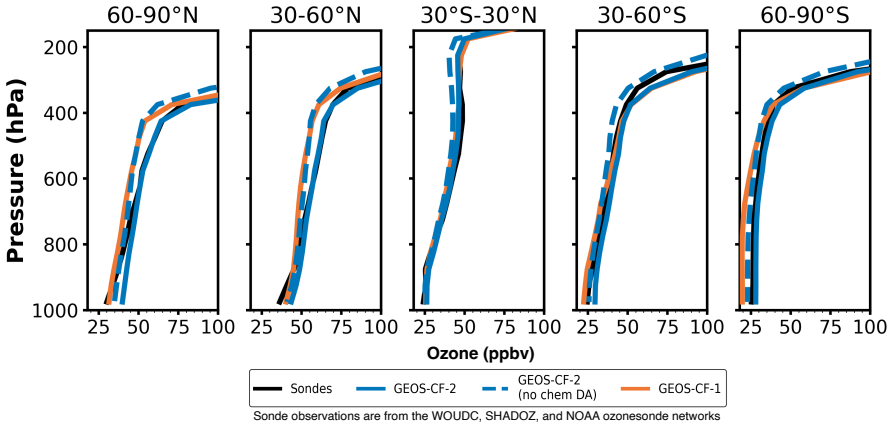
Emissions
- HTAP → CEDS
- Updated fire emissions
- Redistributed lightning NOx emissions

Model components
- GEOS-Chem 14.0
- Updated model physics
- Online convective transport

Data assimilation
- Assimilation of ozone, NO_2 and SO_2 satellite data from MLS and OMI

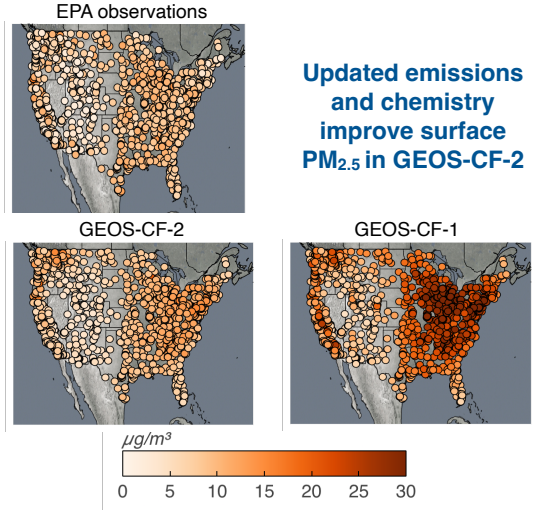
Tropospheric ozone distribution

Data assimilation improves tropospheric ozone simulation in GEOS-CF-2



Sonde observations are from the WOUDC, SHADOZ, and NOAA ozonesonde networks

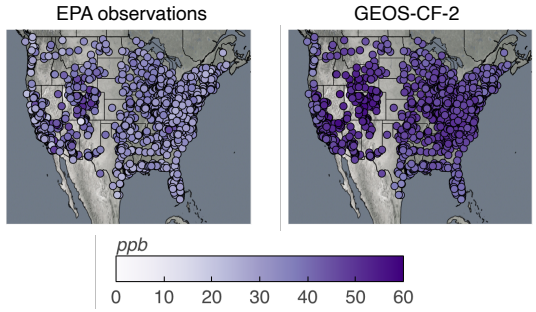
Annual mean surface $PM_{2.5}$



Updated emissions and chemistry improve surface $PM_{2.5}$ in GEOS-CF-2

Annual mean surface ozone

Surface ozone is biased high – a persistent problem in global models



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