

GEOS-FP Upgrade to system version 5.43.0

Feb 26, 2026 (06:00 GMT forecast cycle)

Summary

GEOS version 5.43.0 will replace 5.29.5 in GEOS-FP starting with the 06:00 GMT forecast cycle on February 26, 2026. The main change in Version 5.43.0 of the GEOS Atmospheric Data Assimilation System is the upgrade of the aerosol model from [GOCART to GOCART-2G](#); this introduces brown carbon as a new aerosol family, explicitly provides the PM2.5 fields, and revises the treatment of anthropogenic emissions of aerosols and their precursors. This necessitates numerous changes to the file specification for aerosol collections.

Additionally, this release includes the following changes in the hybrid variational-ensemble atmospheric analysis:

- For the microwave sounders, brightness temperature is now assimilated for all platforms.
- Assimilation of the GNSS-RO observations up to high altitudes facilitates allows for introduction of variational bias correction for the high-peaking microwave radiance channels (channel 14 of AMSU-A and channel 15 of ATMS), for the first time in GEOS-FP.
- AVHRR observations from MetOp-C are introduced in to the ocean-surface skin temperatures.
- Ozone profiles from OMPS-LP on NOAA-21 are added to the ozone observations.

The changes in the observing system enhance consistency between the assimilation of radiance and radio occultation observations in the stratopause region (above 2 hPa), leading to an overall reduction in stratospheric temperature biases.

The updates amount to noticeable positive impact in the GEOS analysis and short-term forecast as evaluated through traditional skill-scores and observation residual statistics. The most noticeable forecast improvements are expressed in the Southern Hemisphere due to its dominant reliance on radiance observations.

One minor deterioration in product quality is seen in the skin and lower atmospheric temperatures of the high Northern latitudes, especially over Greenland. This issue will be addressed in a future patch.

The first GEOS-FP cycle to run with the new GEOS system will be 06:00 GMT on 2026-02-26. Users can expect to see a discontinuity in many scientific fields at this time.

File Specification Changes

The upgrade of the aerosol model to GOCART-2G in this version of GEOS-FP necessitates numerous changes to the aerosol collections in the file specification. These changes eliminate two variables from tavg3_2d_aer_Nx (DUAERIDX and SSAERIDX), add new variables to fully describe the aerosols in the system, and rename several other aerosol fields. Details about these changes can be found in the section titled “File Specification Changes” in GMAO Office Note NO. 23, linked here:

https://gmao.gsfc.nasa.gov/media/publications/zbly36ziNFDQeVqPhUoFbmYmvh/fpaerosoldocumentation_o9h168lymkj3xde5u4t27n0iv.pdf

Note that the “long_name” descriptions for many variables throughout the file specification have been updated to be more clear and accurate.

Impact of File Specification changes on OpenDAP data availability

GMAO GEOS-FP assimilated data products are available via HTTPS download from the NCCS data portal spanning many different versions of GEOS-FP as far back as 2014. These products are also available to OpenDAP clients via an OpenDAP server which runs on the data portal. Due to limitations with the OpenDAP server, any **assimilation** collection with variable changes will no longer be available via OpenDAP for dates prior to this upgrade. This will not affect the OpenDAP availability of any **forecast** collection. The list of assimilation collections that will not be available from prior versions of GEOS-FP are listed below:

Description	File Collection
3D instantaneous aerosol diagnostics	inst3_3d_aer_Nv
2D time-averaged aerosol diagnostics (extended)	tavg3_2d_adg_Nx
2D time-averaged aerosol diagnostics	tavg3_2d_aer_Nx

Sample Data Availability

Due to the significant changes in the aerosol collections with this GEOS-FP upgrade, we are posting one complete day of sample data to facilitate testing. The URL of the NCCS data portal for the distribution of standard GEOS-FP products is:

<https://portal.nccs.nasa.gov/datashare/gmao/geos-fp/>

Sample data from the GEOS-5.43.0 FP system for 2026-02-01 are available at the following URL, which has the same directory structure and file naming convention as the standard location:

<https://portal.nccs.nasa.gov/datashare/gmao/geos-fp-sample/>