Near real-time air quality forecasts using the NASA GEOS model

K. Emma Knowland
USRA/GESTAR
NASA Global Modeling and Assimilation Office (GMAO)

In collaboration with:
GMAO: Christoph Keller, Pamela Wales, Larry Coy, Kris Wargan, Brad Weir, Lesley Ott, Steven Pawson
Atmospheric Chemistry and Dynamics Lab: Bryan Duncan, Sarah Strode, Junhua Liu, Julie Nicely, Dan Anderson, Eric Fleming

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GEOS Composition Forecast

GEOS NWP + GEOS-Chem → GEOS - CF

https://gmao.gsfc.nasa.gov/weather_prediction/GEOS-CF/
• 250 Chemical Species
• 725 Chemical Reactions

GEOS-Chem v12
➢ Tropospheric and Stratospheric chemistry

https://svs.gsfc.nasa.gov/4754
https://gmao.gsfc.nasa.gov/weather_prediction/GEOS-CF/
Daily composition forecast

GEOS - CF

One 5-day forecast per day

- 1-day replay
- 5-day forecast
- c360 (0.25°, ~25x25 km²) resolution, 72 model layers
- O₃, NOₓ, VOCs, PM ...
- T, U, V, RH ....
Daily composition forecast

GEOS - CF

One 5-day forecast per day
- 1-day replay
- 5-day forecast
- c360 (0.25°, ~25x25 km²)
- 15 minute “surface”
- 1-hour average and instantaneous 2D & 3D
Planned upgrades for GEOS-CF

- Model update to GEOS-Chem v13.0
  - Improvements to ozone deposition
  - Updates to NO$_3$ washout → likely reduce PM2.5 bias
- GEOS AGCM update
- CEDS emission inventory (latest release through 2019)
- Constituent Data Assimilation System (CoDAS)
  - Multi-constituent assimilation with O$_3$, CO, NO$_2$
  - Satellite-based emission scale factors