Development of high-performance GEOS-Chem (GCHP):
Massively parallel off-line capability for global chemical transport modeling enabled by ESMF/MAPL in partnership with GMAO

1-month simulation of troposphere-stratospheric chemistry at cubed-sphere 180 (~50 km) resolution requires only 1 day of wall time with 540 cores

Ozone at 4 km altitude, July 2016

Aerosol optical depth (AOD), July 2016

Atmospheric Chemistry Modeling using Machine Learning

- Numerical models of atmospheric chemistry are computationally expensive due to the stiffness of the ordinary differential equations that describe the chemical system.
- Machine learning algorithms offer an alternative method that is potentially much faster.
- A chemistry emulator based on the random forest regression method is able to reproduce the numerical solution with high accuracy even after 30 days of forward integration.