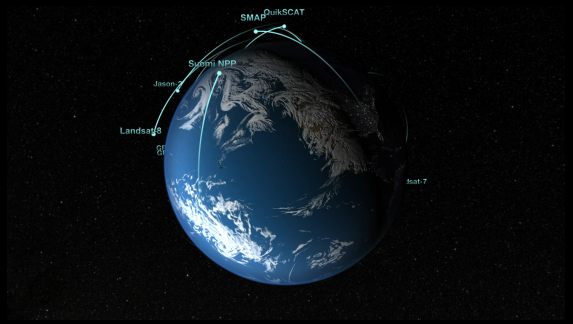
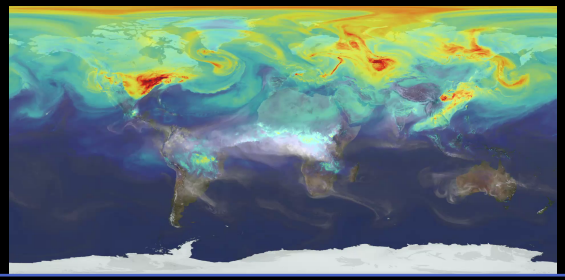




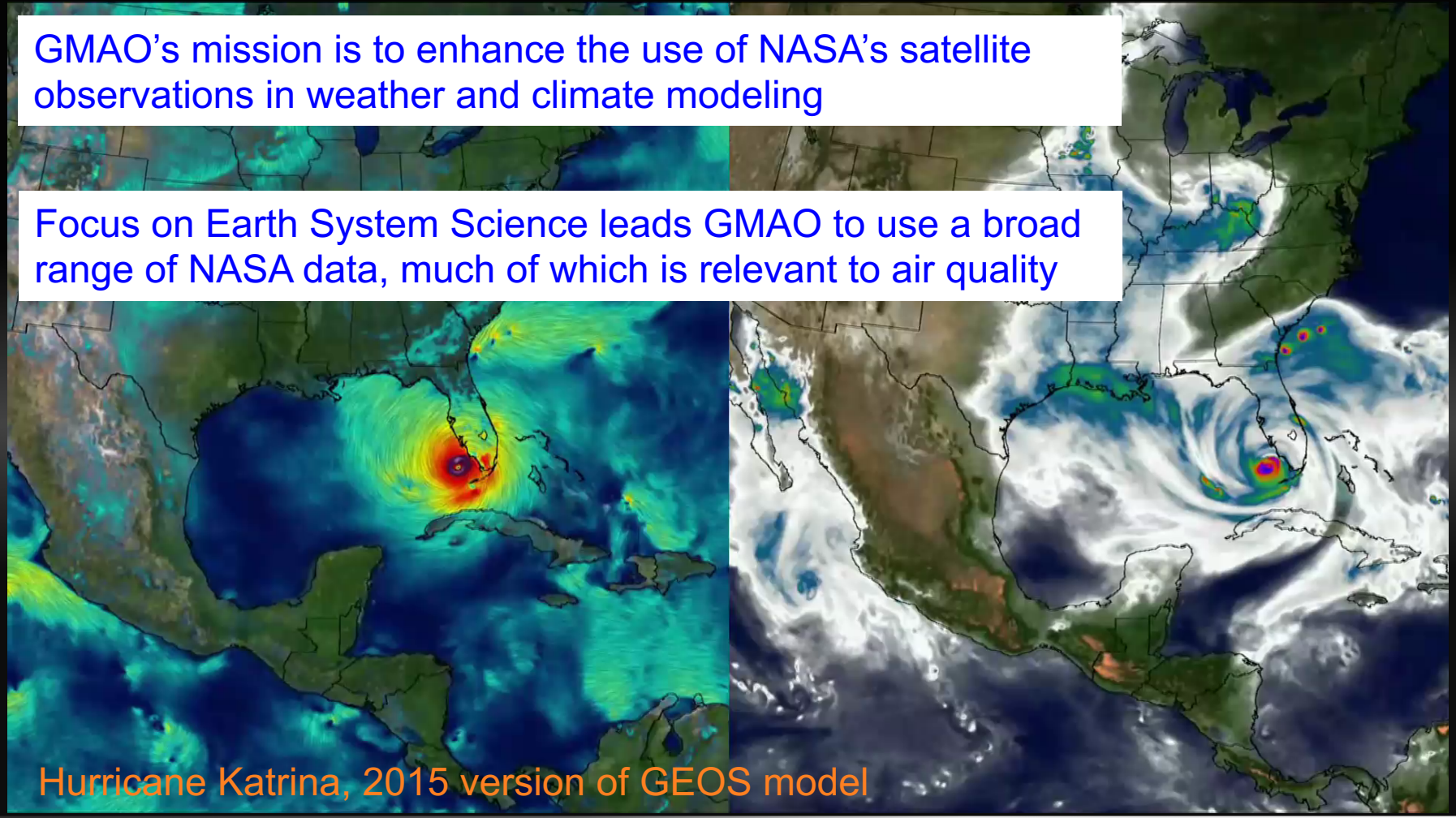
Air Quality Activities in the Global Modeling and Assimilation Office

Steven Pawson

NASA Goddard Space Flight Center

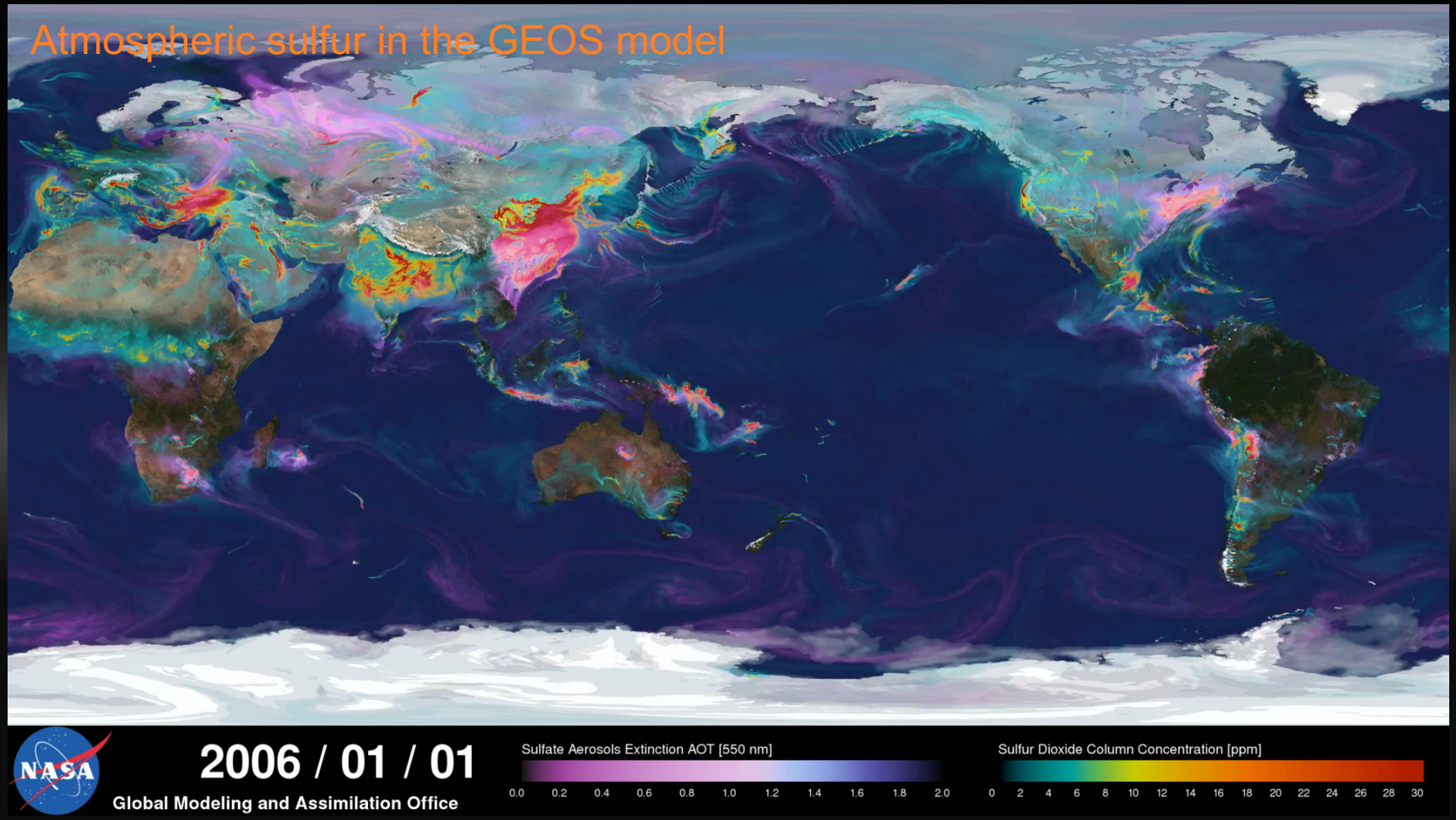
GMAO's mission is to enhance the use of NASA's satellite observations in weather and climate modeling

Focus on Earth System Science leads GMAO to use a broad range of NASA data, much of which is relevant to air quality



Hurricane Katrina, 2015 version of GEOS model

Atmospheric sulfur in the GEOS model



Value of Data Assimilation

Observations typically provide partial information on global distributions:

- In-situ observations are typically over land on some continents
- Satellite orbits typically repeat every 16 days, with gaps
- Clouds can obscure the view from space

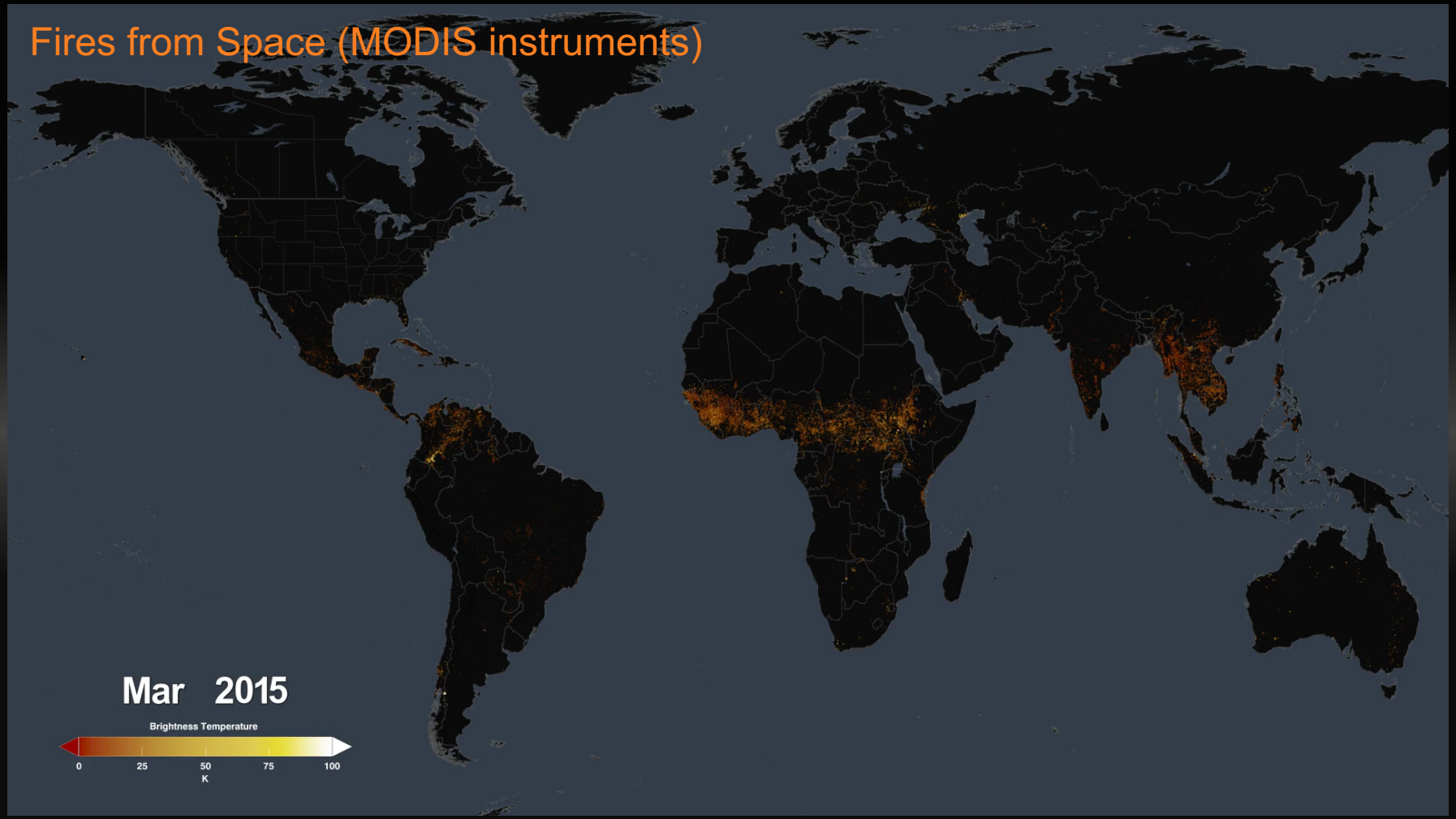
Traditional “mapping” does not account for the dynamic nature of the atmosphere

- Extremely valuable in (say) monitoring long-term changes in pollution

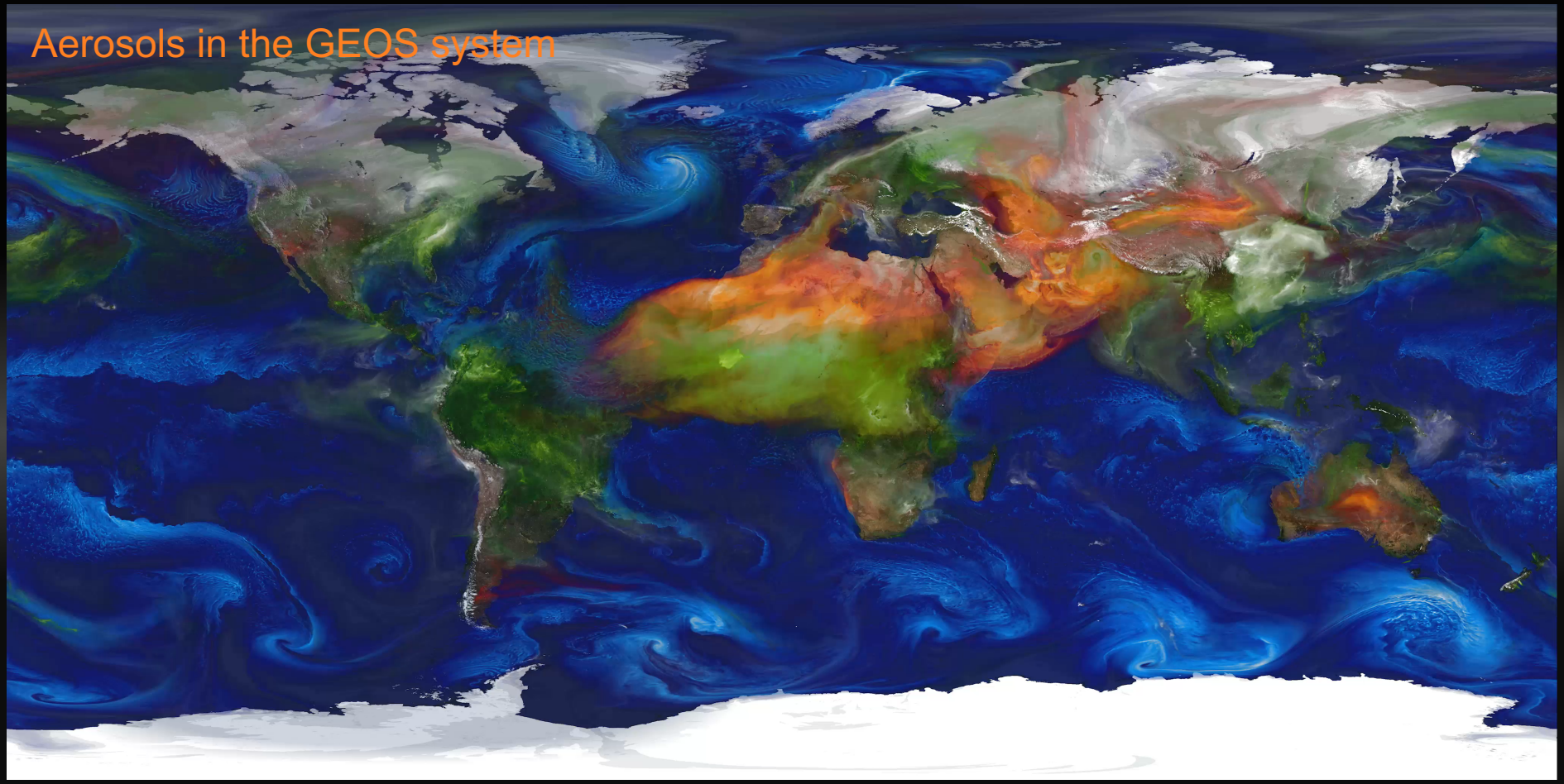
Data assimilation is based on optimal combinations of model and observations:

- Accounts for spatio-temporal variations of emissions and transport
- Resolves features down to the finest scales of the underlying (transport) model
- Combines information from multiple sources
- Provides vertically and temporally resolved information

Fires from Space (MODIS instruments)



Aerosols in the GEOS system



Some Relevant (Available) GMAO Data Products

Daily, real-time “weather” analyses and forecasts:

- Demonstrate value of NASA data in real time
- Includes aerosols and some chemistry (working to complex reactive chemistry)
- 25-km spatial resolution, upgrade to 12.5-km grid in January 2017

Forefront “global mesoscale” model simulations

- Demonstrate forefront modeling techniques in powerful computing environment
- 7-km dataset including aerosols and some chemistry

Long-term “reanalysis” (1980-present):

- Demonstrate value of NASA data in climate record
- MERRA-2 includes aerosols and stratospheric ozone
- 50-km spatial resolution in MERRA-2