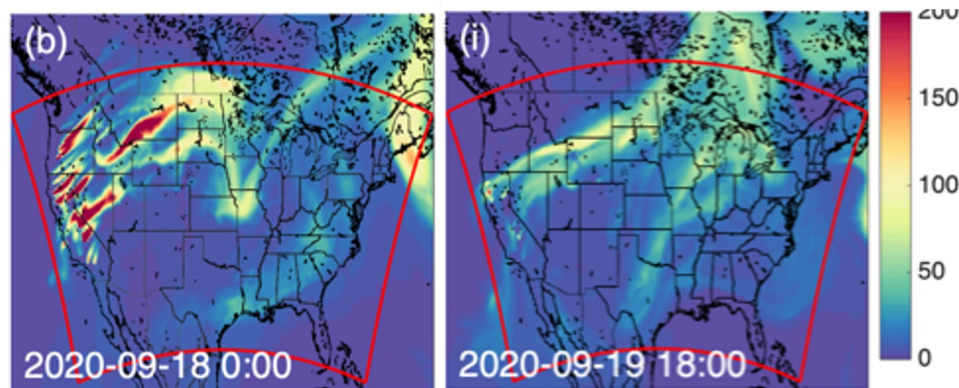


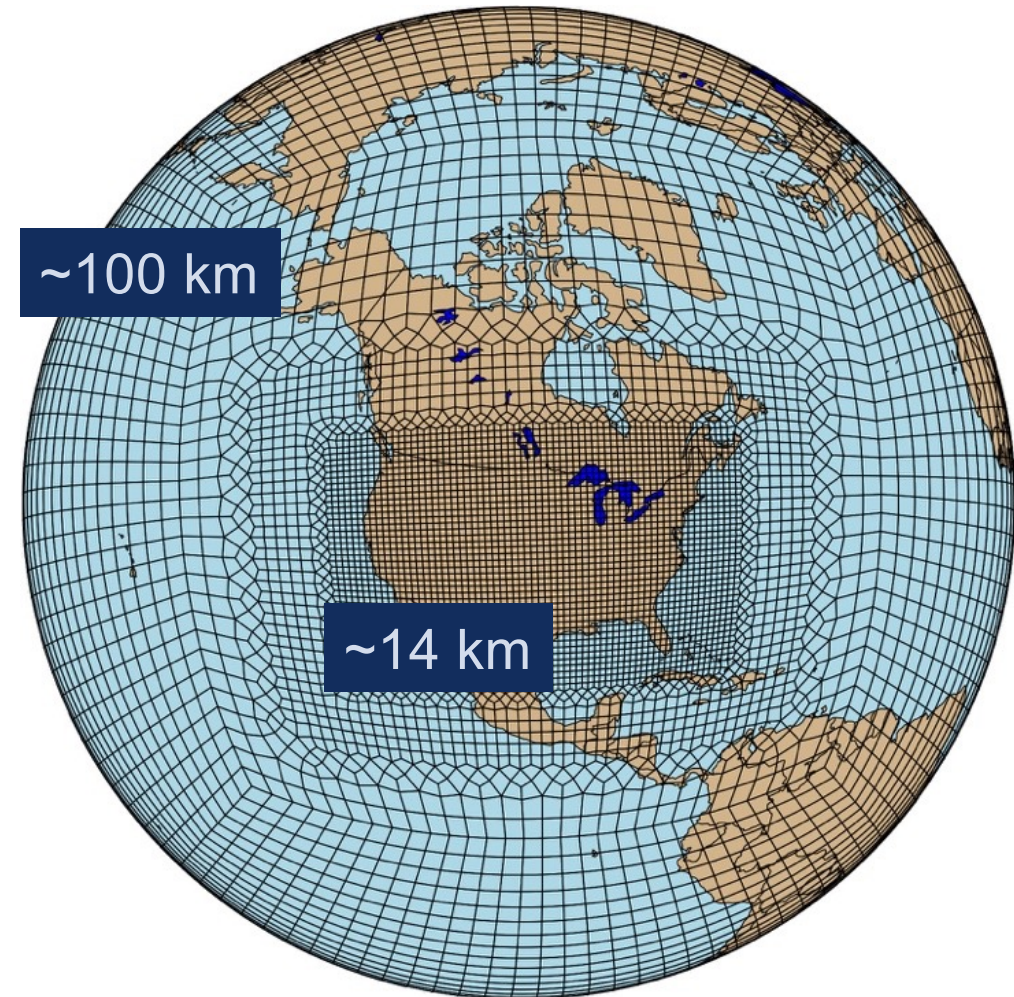
MUSICA: Multiscale Infrastructure for Chemistry and Aerosols

- ❖ A global model with mesh refinements to estimate air quality and climate impact
- ❖ Earth system model: includes land modelling
- ❖ Prediction of dynamical and physical parameters (radiation), chemical constituents.



Fire plumes simulated in global model with regional refinement get transported outside of, and back into, the WRF-Chem domain

Wenfu Tang et al., JGR, 2023





Fires, from detection to impacts

Current fire emissions algorithms mostly rely on satellite products

Low-Earth Orbit (LEO) and geostationary (GEO) satellites:

- ❖ **Active fire detection:** e.g. NASA FIRMS MODIS/VIIRS; Landsat and Sentinel-2, GOES, Meteosat, HIMAWARI
- ❖ **Burned Area data products**
- ❖ **Fire Radiative Power**

Fire emissions algorithms: GFAS, GFED, FINN, QFED, GBBEP, FEER etc.

- ❖ Timing, location, intensity
- ❖ Fuel load, vegetation maps, dry biomass consumed
- ❖ Smoke emissions source strength, burned area, fire behavior

Atmospheric Data Assimilation

Observations: AOD, CO, NO₂, CH₄
Sat. Inst.: MODIS, VIIRS, TROPOMI, IASI, CrIS etc.

Posterior emissions /
updated smoke pollution forecast

Global / Regional model
Smoke composition/concentration
Climate & air pollution