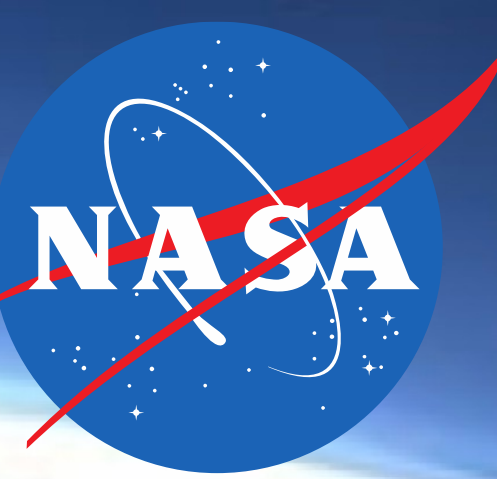


Developing a United States Air Quality Assessments System Based on GEOS-Chem High Performance (GCHP) to Support NASA Earth Science to Action (ES2A) for Air Quality

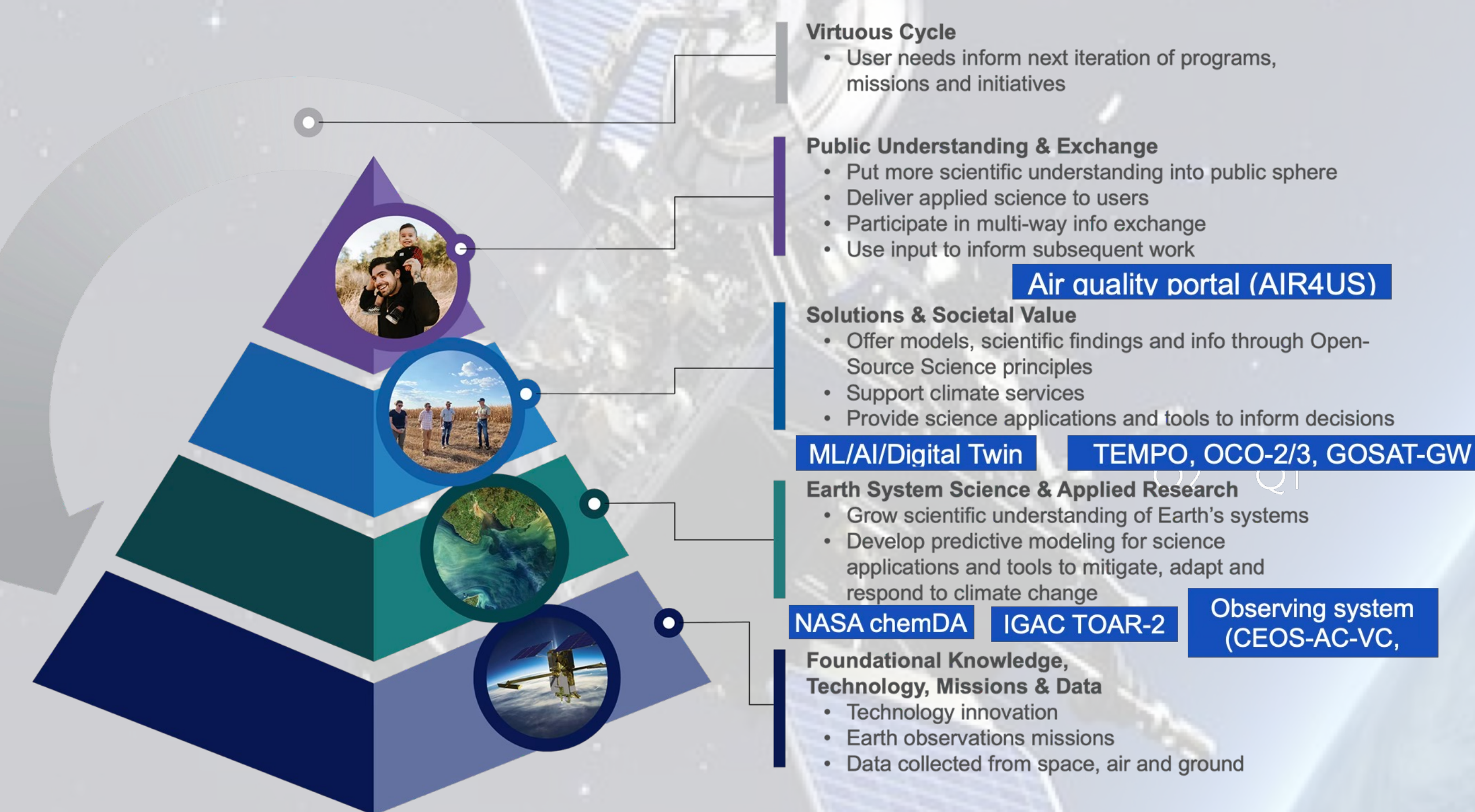
National Aeronautics and
Space Administration



Jinhyeok Yu, Kazuyuki Miyazaki, Longtao Wu, Sina Hasheminassab (Jet Propulsion Laboratory, California Institute of Technology, USA)

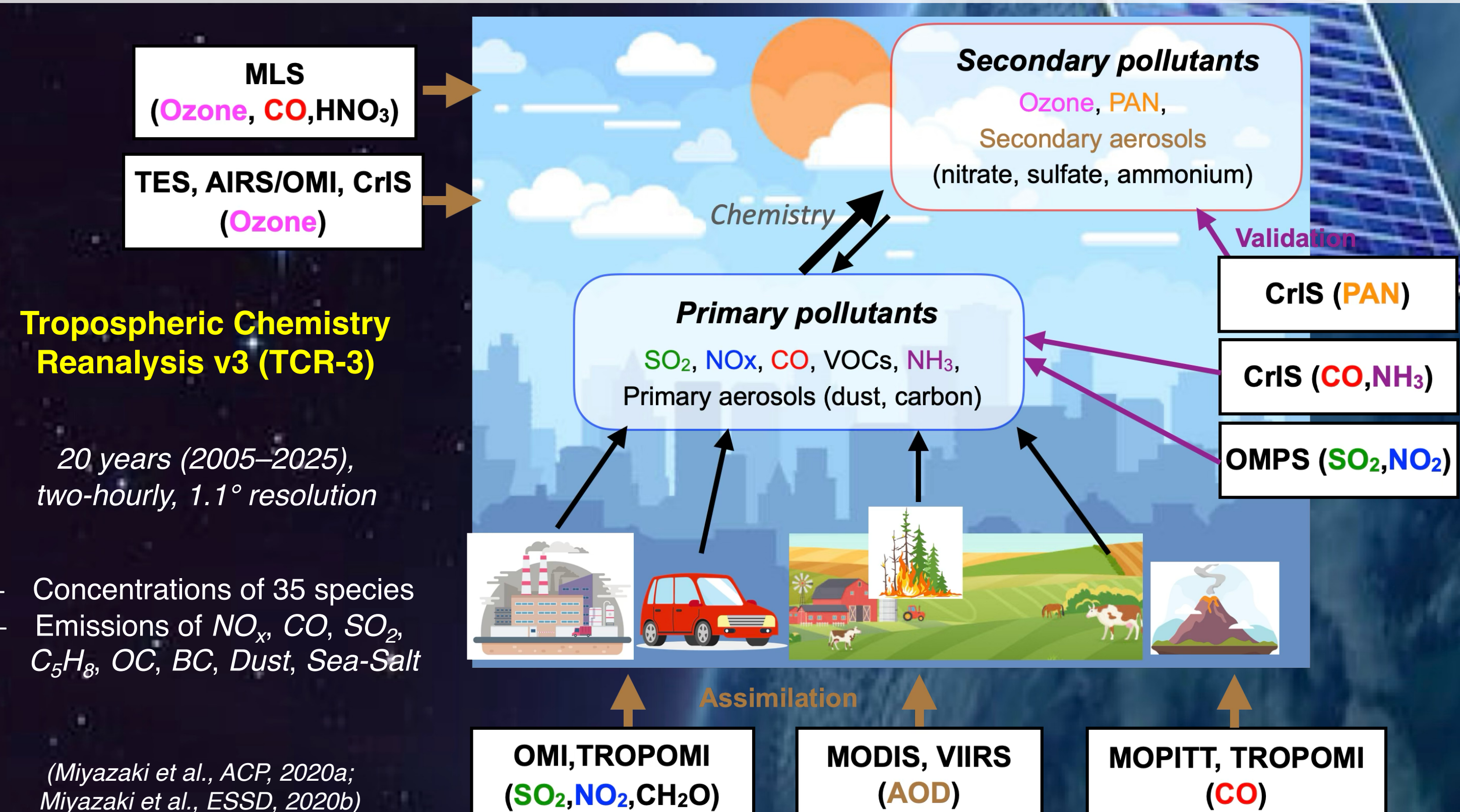
NASA's Earth Science to Action (ES2A) for Air Quality

- Builds on NASA's portfolio to create an air quality information system (**A**ir-quality **I**nformation **R**esource **f**or the **U**nited **S**tates; **AIR4US**) to support policy decisions
- Satellite-constrained emissions to enhance air quality (AQ) prediction
- Provide AQ attribution information and "what-if" scenario analyses

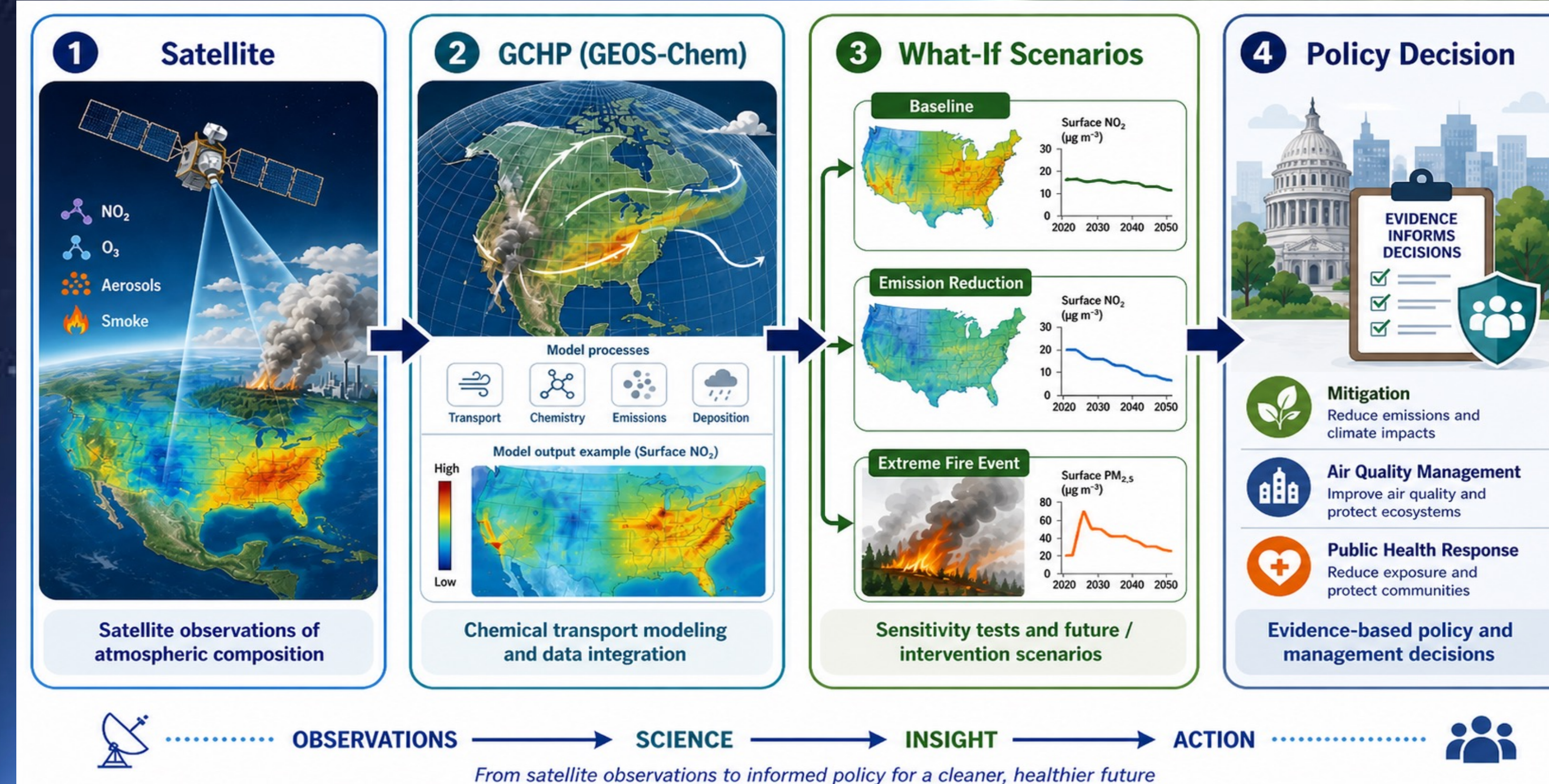


Satellite Data Integration: JPL MOMO-Chem System

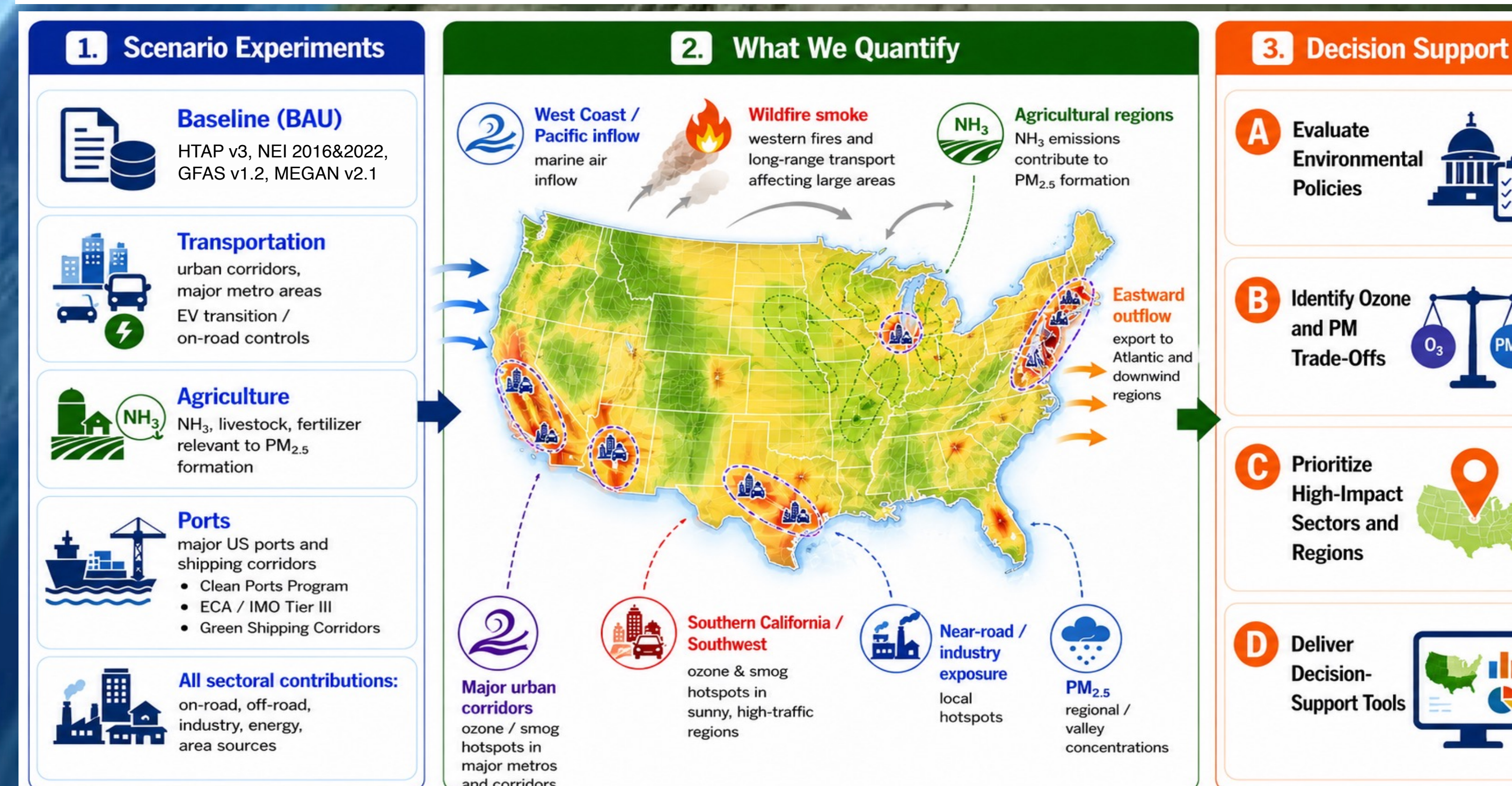
- Recent advances in satellite remote sensing and data assimilation (DA) have generally improved the ability to quantify AQ attributions.
- JPL's **M**ulti-m**O**del **M**ulti-c**O**nstituent **C**hemical data assimilation (MOMO-Chem) is a powerful capability that harnesses NASA's satellites to quantify AQ changes and provides information for decision-making.
- Daily anthropogenic, biomass burning, and biogenic emissions for 2005–2025 provide a basis for assessing trajectories to support policy decisions.



Our Science to Action Approach



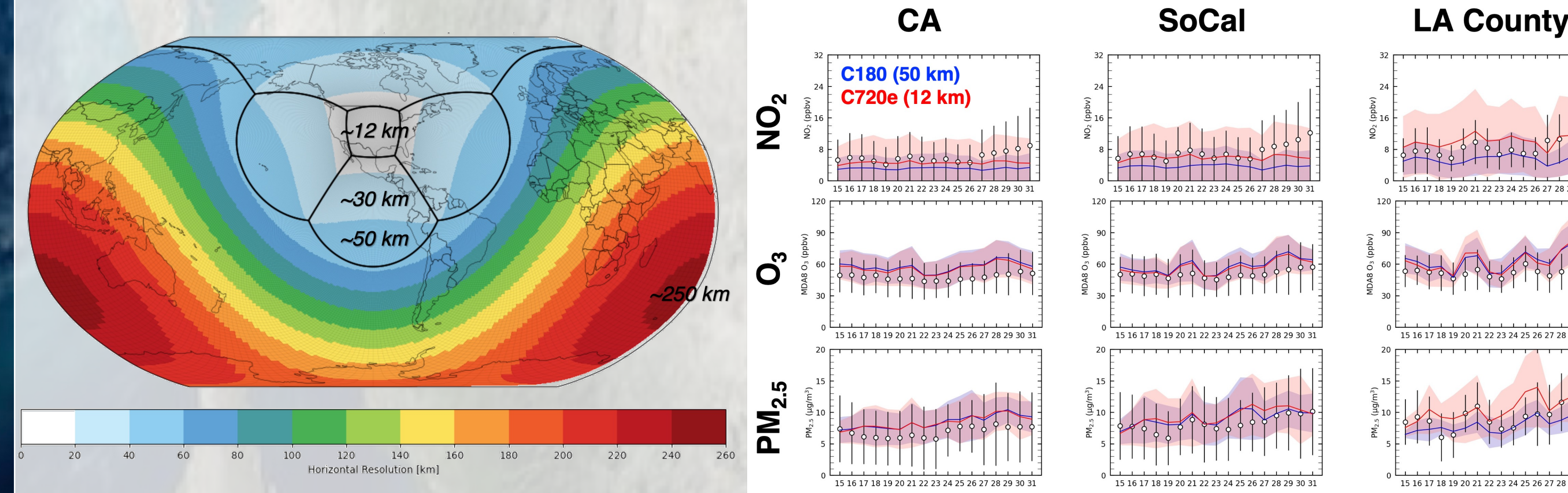
Targeted Environmental Policies



Modeling Approach

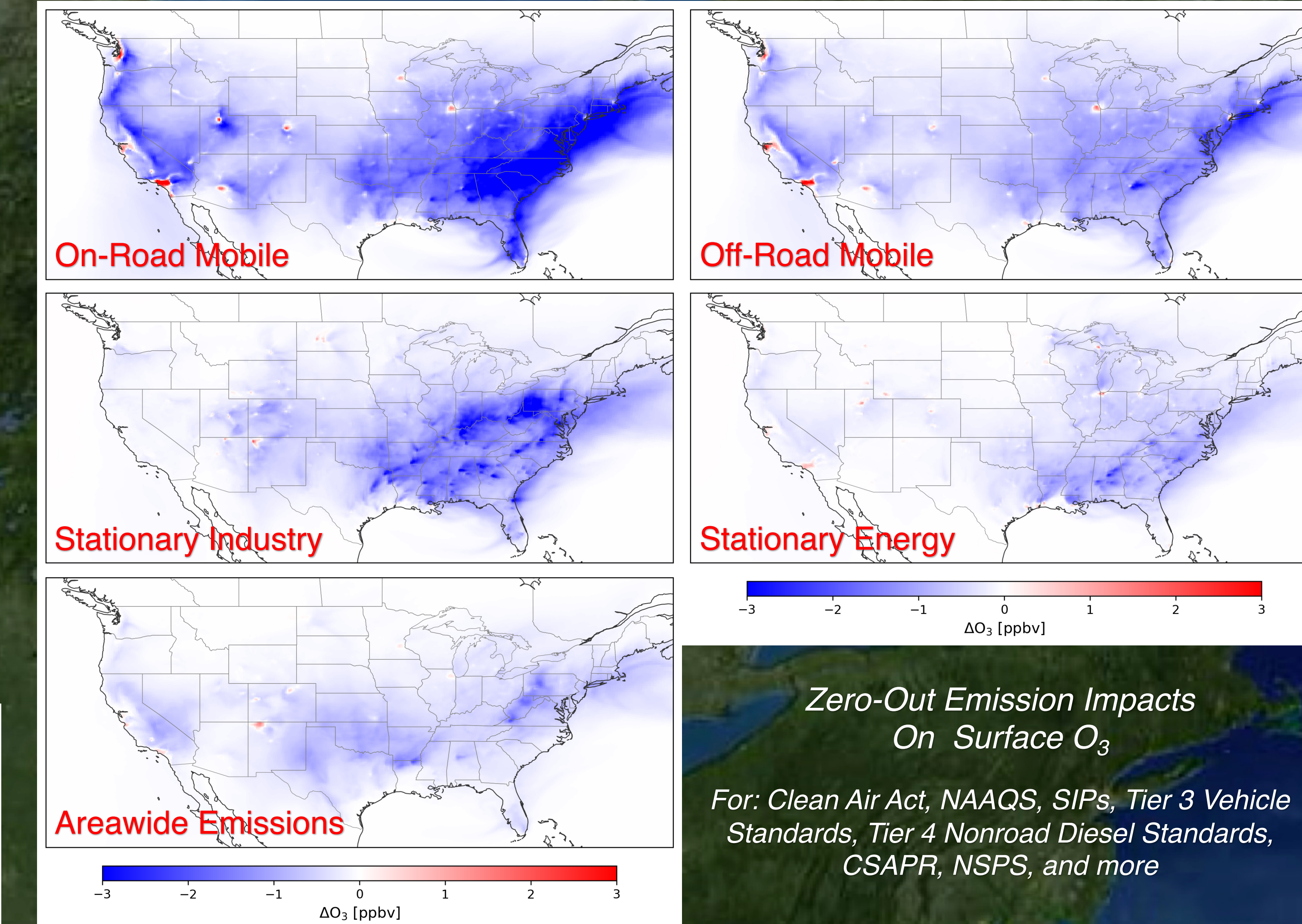
	Tropospheric Chemistry Reanalysis (TCR-2/3)	GEOS-Chem High Performance (GCHP)
Horizontal resolution	0.56° × 0.56° – 1.1° × 1.1°	C90 (1° × 1.25°) – C720 (0.125° × 0.156°)
Vertical resolution	32 layers to 4 hPa	72 layers to 0.01 hPa
Forecast model	MIROC-Chem	GEOS-Chem v14
A priori emissions	HTAPv3, GFED, MEGANv2.1	HTAPv3+NEI, GFASv1.2, MEGANv2.1
Assimilated measurements	TROPOMI, OMI, SCIAMACHY, GOME-2, MODIS, VIIRS, MOPITT, MLS, CrIS, TES	TROPOMI, MOPITT, MLS
Assimilated species	O ₃ , CO, NO ₂ , SO ₂ , HNO ₃ , CH ₂ O, AOD	O ₃ , CO, NO ₂

The U.S.-Focused GCHP Stretched Grid System (0.125° × 0.156° over the U.S.)

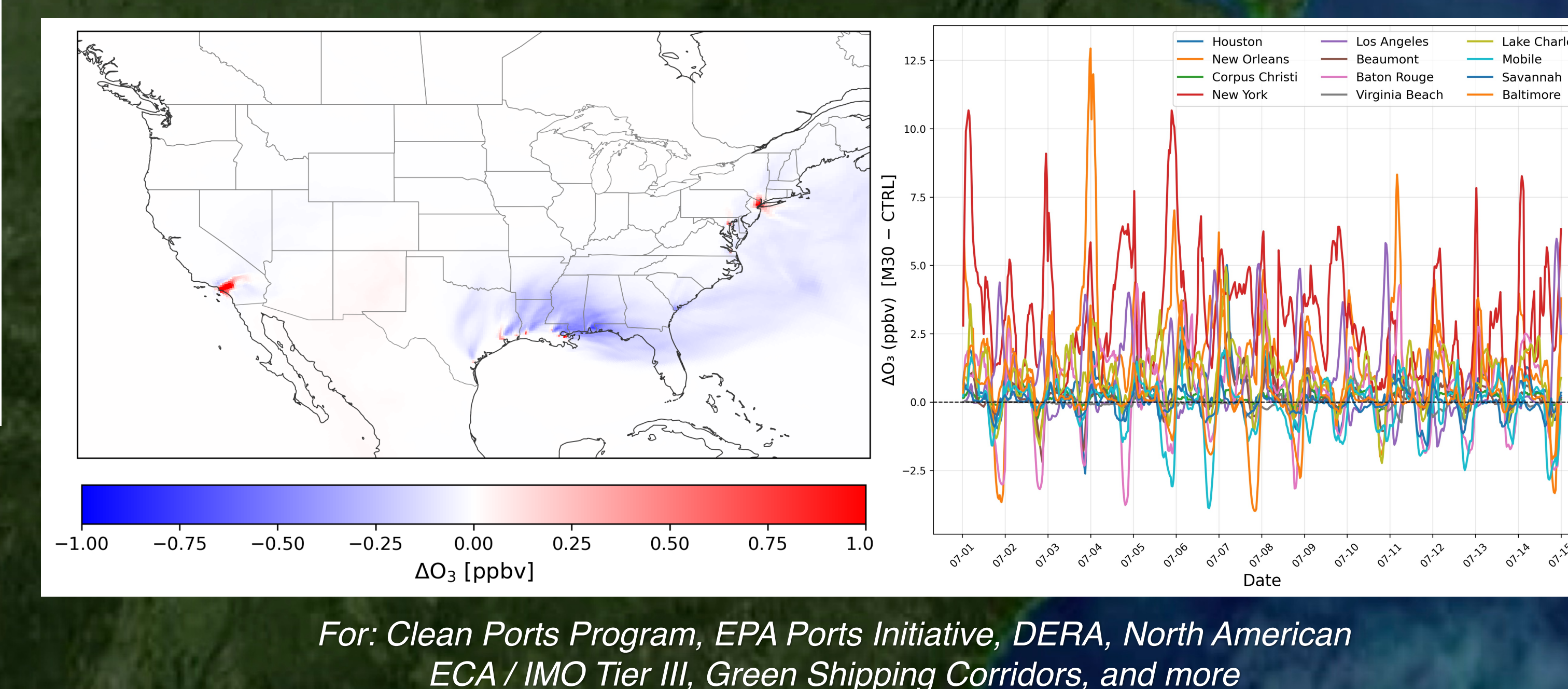


AQ What-If Scenario Examples

Impacts of Sectoral Emission Reductions



Impacts of the U.S. Ports Emission Reductions



Impacts of the 2023 Canadian Wildfires on the U.S.

