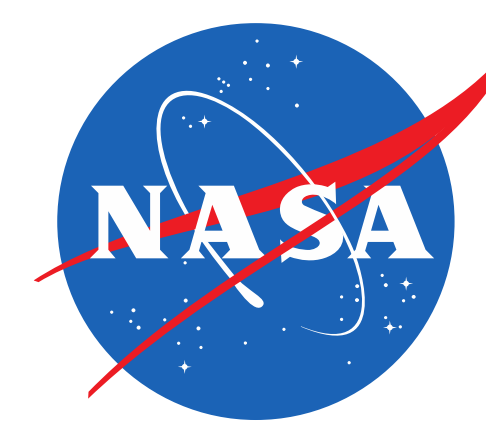


Satellite-derived emission and air quality data to Support NASA's Earth Science to Action (ES2A) for Air Quality

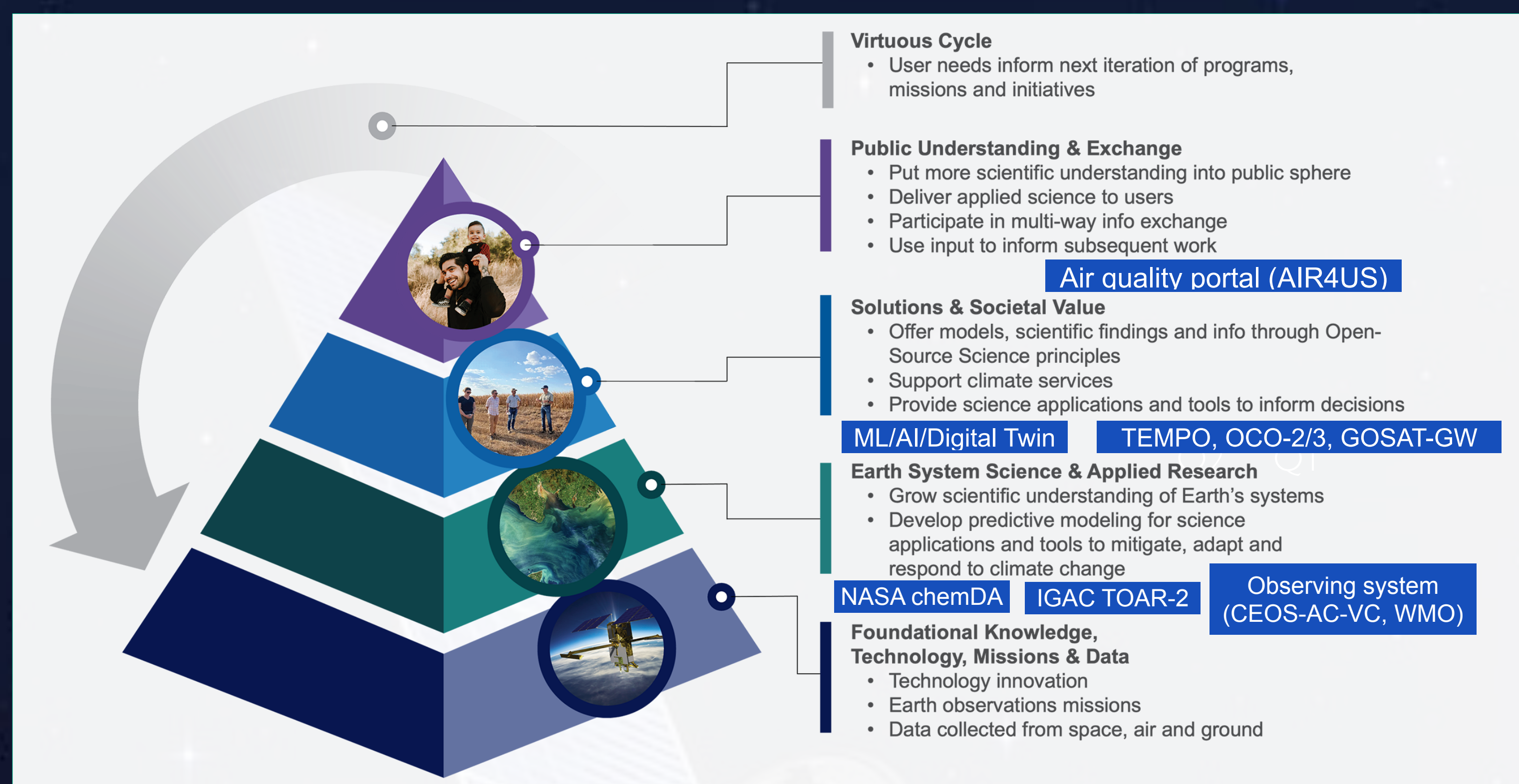
National Aeronautics and
Space Administration



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

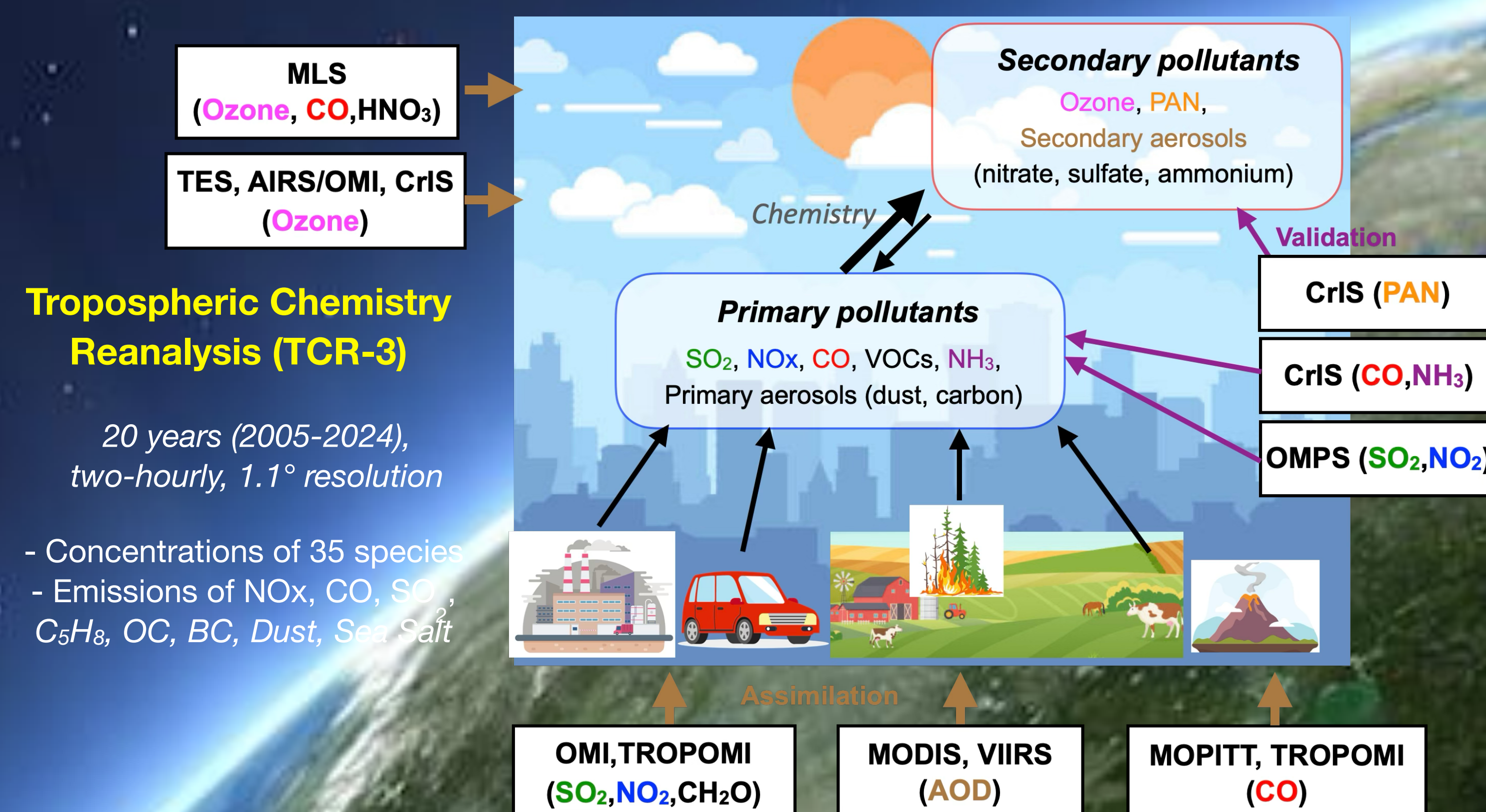
NASA's Earth Science to Action (ES2A) for Air Quality

- Builds on NASA's portfolio to create an information system for decision-makers
- Provide satellite-constrained emissions to enhance AQ prediction
- Deliver multi-species AQ information to improve data availability for stakeholders
- Support policy decisions by providing AQ attribution and "what-if" scenario analyses



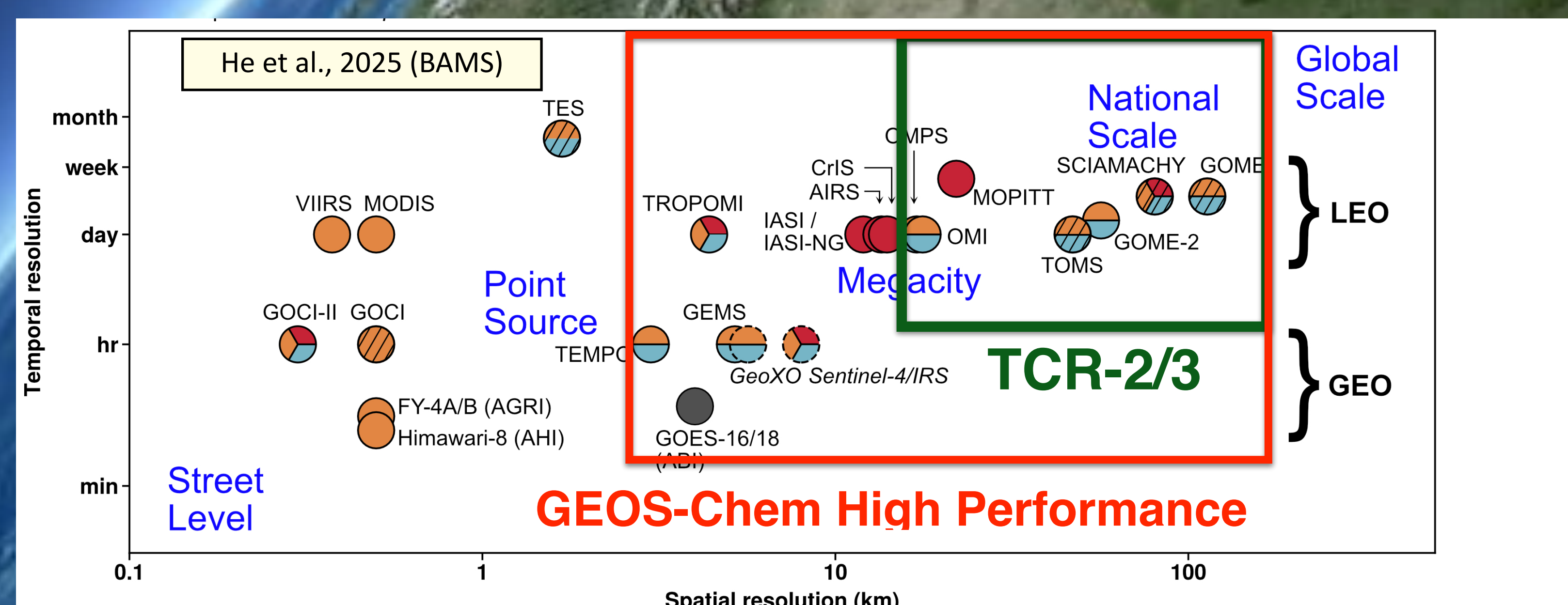
JPL MOMO-Chem data assimilation

- Recent advances in satellite remote sensing and DA have greatly improved the ability to quantify AQ attributions.
- JPL's MOMO-Chem is a powerful capability that harnesses NASA's satellites to quantify AQ changes and provides information for decision-making and the relationship between AQ and human activities (i.e., emissions).

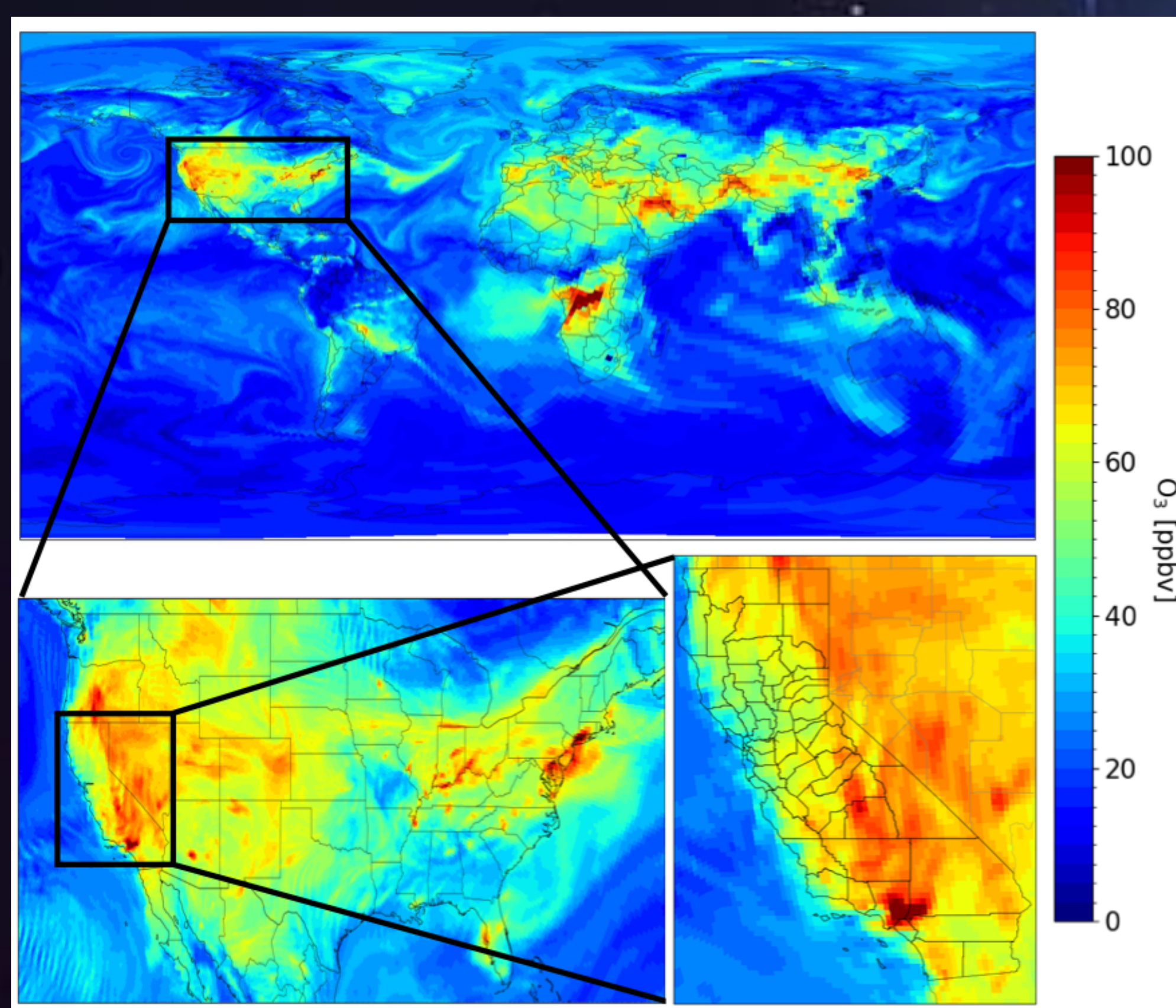


Integration of multiple satellite observations to inform AQ attributions and impacts

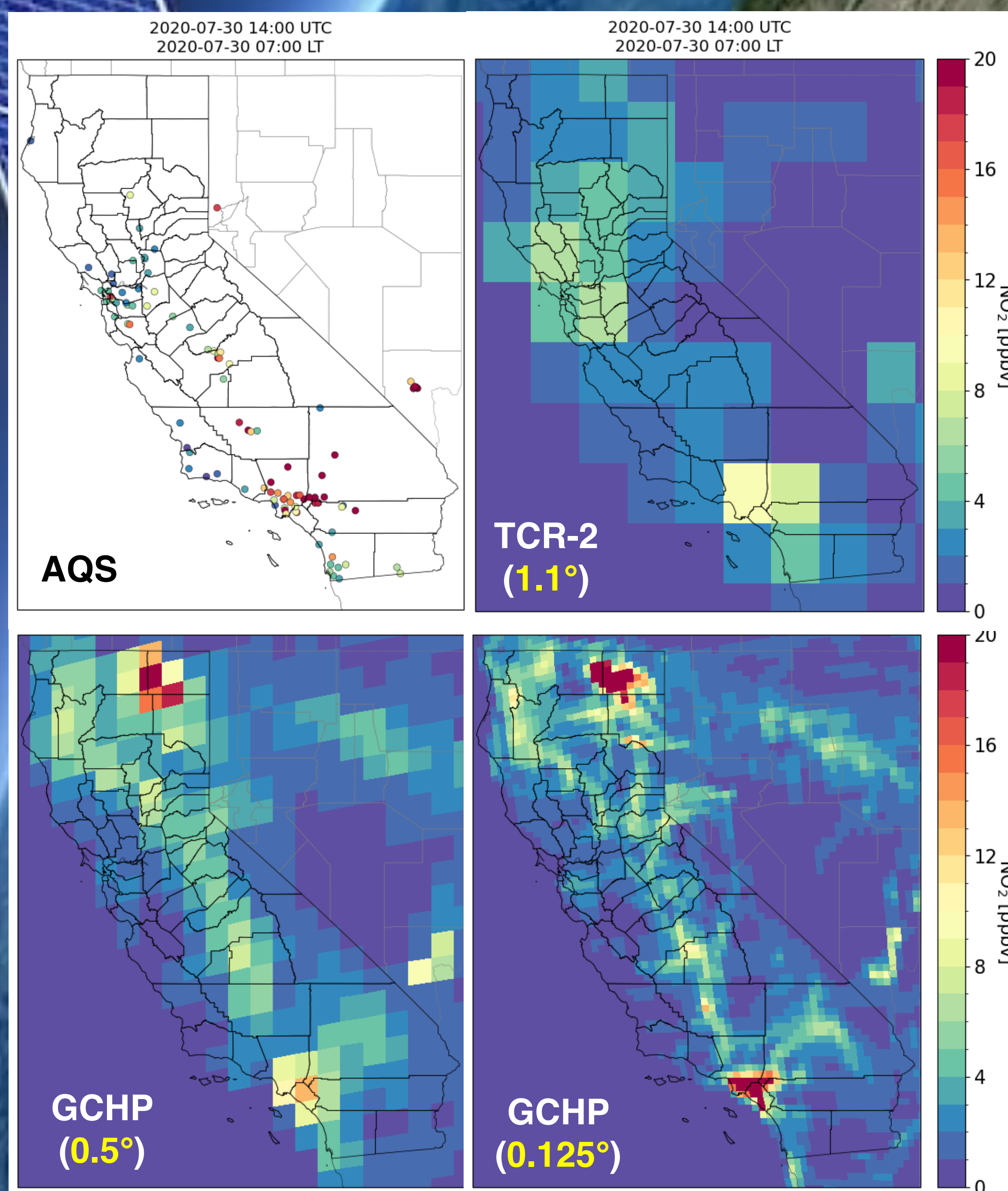
	Tropospheric Chemistry Reanalysis (TCR-2/3)	GEOS-Chem High Performance (GCHP)
Horizontal resolution	0.56° ~ 1.1°	C90 (1°x1.25°) – C720 (0.125°x0.156°)
Vertical resolution	32 layers to 4 hPa	72 layers to 0.01 hPa
Forecast model	MIROC-Chem	GEOS-Chem v14
A priori emissions	HTAPv3, GFAS, MEGANv2.1	CEDSv2, GFEDv4, MEGANv2.1
Assimilated measurements	TROPOMI, OMI, SCIAMACHY, GOME-2, MODIS, VIIRS, MOPITT, MLS, CrIS, TES	TROPOMI, MOPITT, MLS
Assimilated species	O ₃ , CO, CH ₂ O, AOD, NO ₂ , SO ₂ , HNO ₃	O ₃ , CO, NO ₂



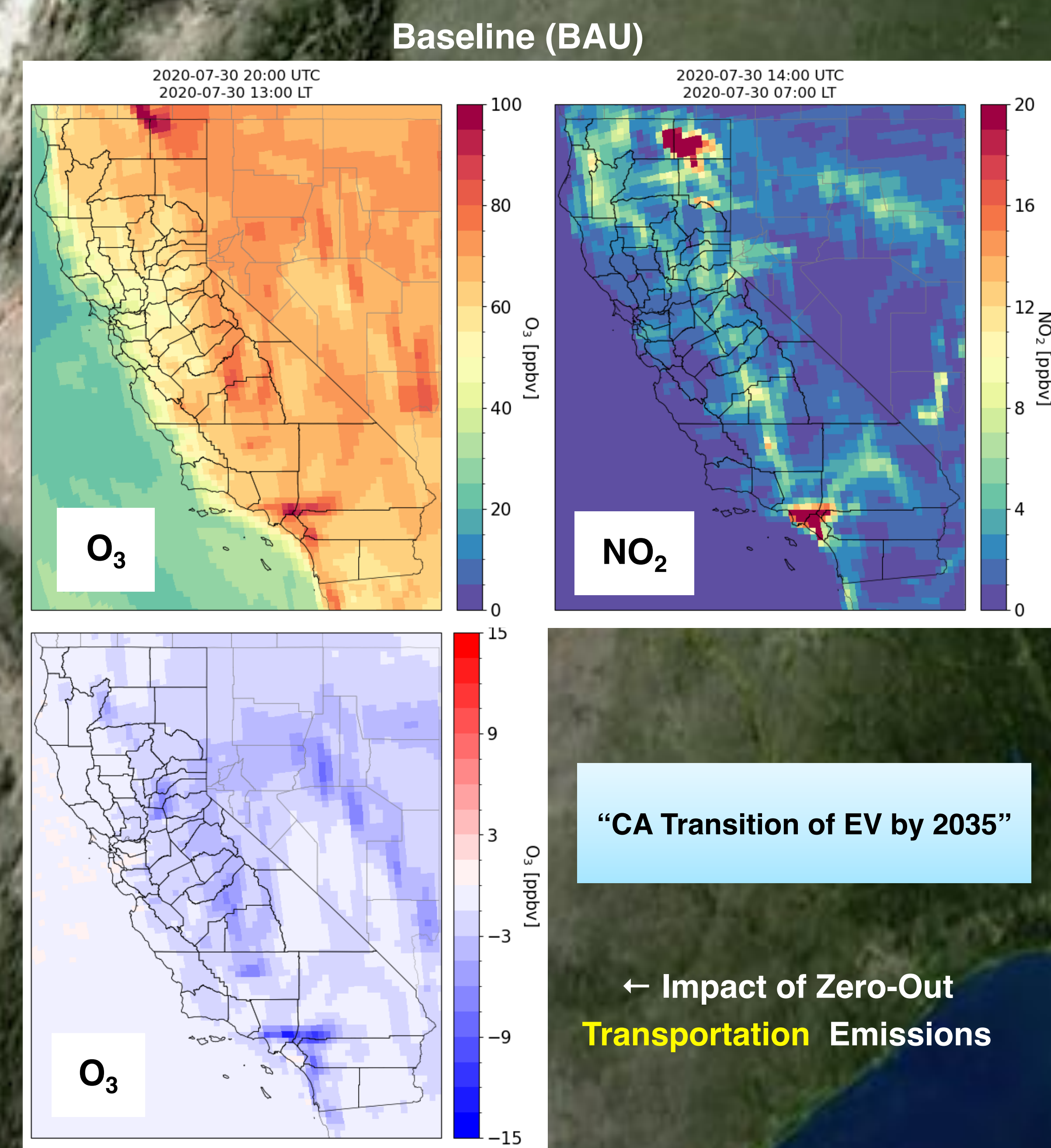
GCHP for ES2A AQ: Stretched Cubed Sphere Grid 0.125° (~12 km)



Spatial patterns of morning rush-hour NO₂



Air Quality "What-If" Scenarios to support policy decisions



- The developed system captures detailed spatial and temporal AQ patterns. NASA's satellite observations will be integrated to improve AQ attribution.
- "What-if" emission reduction scenarios will be expanded to support key stakeholders under the ES2A program.
- New-generation satellite measurements, such as TEMPO, provide greatly enhanced spatial and temporal coverage. Combined with the developed modeling and data assimilation framework, these observations will advance both AQ and climate applications.