Supporting health impact assessment using satellite-derived emission and air quality data
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MOMO-Chem satellite data assimilation
- The impact of air quality (AQ) on human health is dynamic through rapid changes in population, emissions, climate, and human exposure.
- Recent advances in satellite remote sensing and DA have greatly improved the ability to quantify these factors.
- MOMO-Chem is a powerful capability that harnesses NASA’s satellites to quantify AQ changes and provides information for decision-making, such as the relationship between AQ and human activities as represented by emissions.

Decadal changes
- COVID lockdown

Surface ozone changes: 2005-2014
- Gridded Surface Obs (TOAR-1)
- TCR-2

Long-term ozone exposure difference between 2016 and 2005 [%]

MOMO-Chem will contribute to the future missions
- Emission optimization
- Attribution
- AO-GHG synergy
- New satellite products by JPL TROPFES (flash talk by David Moroni)

Remarks
- The chemical reanalysis data, combined with suborbital and ground-based measurements, has been used to improve our understanding of atmospheric composition.
- New LEO and GEO measurements provide much-improved spatial and temporal resolution and coverage in conjunction with the chemical reanalysis. They should lead to greater usefulness of satellite measurements for climate and AQ applications.
- Future applications: New satellites (GOSAT-GW, CO2M, GEMS, TEMPO, GEO-XO, 54), aircraft missions (ASIA-AQ), new focuses (trace gas & aerosol interactions, OH, wildfires, biogenic), new techniques (ML).

MDA8 ozone and PM2.5 response to the COVID emission anomaly

Global anthropogenic emission reductions in 2020: 7% (CO2) 8% (NOx)

- 2,100 more ozone-related and at least 60,000 fewer PM2.5-related mortality incidences
- Augmented efforts to reduce hospital admissions and alleviate negative impacts from potential delayed treatments