NASA’s Planned Air Quality Missions – Need to Engage Stakeholders

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Tropospheric Composition
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OMI NO$_2$ for United States (2005)

Source: Bryan Duncan (GSFC)
OMI NO$_2$ for United States (2014)

Source: Bryan Duncan (GSFC)
OMI NO$_2$ Trends (Annual 2005 to 2016)

Ohio River Valley & SW Pennsylvania

Northeast India

Source: Bryan Duncan (GSFC)
Tropospheric Emissions: Monitoring of Pollution (TEMPO)

OMI NO₂ in April (2005–2008) over TEMPO FOR

Source: Kelly Chance (SAO)
Future Global Air Quality Monitoring Constellation

**TEMPO (hourly)**
Tropospheric Emissions: Monitoring of Pollution

**Sentinel-4 (hourly)**

**GEMS (hourly)**
Geostationary Environmental Monitoring Spectrometer

**Sentinel-5P (once per day)**

**GaoFen-5 (once per day)**
MAIA uses a twin-camera instrument that will make radiometric and polarimetric measurements needed to characterize the sizes, compositions and quantities of particulate matter in air pollution. As part of the MAIA investigation, researchers will combine MAIA measurements with population health records to better understand the connections between aerosol pollutants and health problems such as adverse birth outcomes, cardiovascular and respiratory diseases and premature deaths.
TEMPO 1st applications workshop (July 2016)

Applications Workshop
July 2016

- First TEMPO Applications Workshop Meeting Summary.pdf
- Agenda.pdf
- TEMPO Applications Workshop Introduction.ppt
- TEMPO Mission Overview and Status.pptx
- Quick overview of existing Early Adopter paradigms in NASA Earth Science.pptx
- The National Air Quality Forecast Capability (NAQFC) and related global prediction efforts.pptx
- Applications of satellite observations for understanding, verifying, improving and prepositioning NAQFC.ppt
- Impacts of Assimilation of Air Quality Data from Geostationary Platforms on Air Quality Forecasts.pptx
- Global and regional air quality forecasting and assimilation relevant to the TEMPO mission.pptx
- Opportunities for TEMPO to Enhance Air Quality Management and Exposure Assessment.pptx
- Moving from interannual analyses to day-to-day (and even glimpsing minute-to-minute) NO2 variations.pptx
- Initial thoughts on the benefits of TEMPO data for AQ management.ppt
- Emissions and TEMPO.ppt
- Potential Improvements for the Temporal and Spatial Allocation of Emissions using TEMPO data.pptx
- TEMPO Applications to Emissions Quantification and Understanding.pptx
- Smoke Modeling - Supporting Wildfire and Prescribed Fire Operations.pptx
- How Can TEMPO Contribute to Air Pollution Health Effects Research.pptx
- Using TEMPO to Evaluate the Impact of Ozone on Agriculture.pptx
- Tropospheric Ozone Enhancement Due to Lightning -- Observations and Models.pptx
- Estimating volcanic ash emissions by assimilating satellite observations with the HYSPLIT dispersion model.pptx
- Capturing Diurnal Variability of Coupled Anthropogenic and Biogeochemical Processes.pptx
- A Web System Application Framework for use of Remote Sensing Obs in Air Quality Planning.pptx
- Data Needs for Model Evaluation for Ozone and Regional Haze Planning.pptx
Combined assets from the international atmospheric science communities to implement an integrated observing system for improving our understanding of Air Quality

- Broad spatial and temporal coverage for key air quality components, but lacking details and specific ground-level information
- Detailed atmospheric composition and vertical structure needed for process-level understanding, but only possible for short, targeted periods of time
- Model evaluation and improvement, chemical process understanding, satellite validation and observing strategies
- Operational Air Quality Forecasts, Prediction and Evaluation of Air Quality Mitigation Strategies
- Continuous monitoring of exposure to key pollutants and their precursors, but limited to discrete locations with limited information on conditions aloft.