

The TEMPO Green Paper
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The Tropospheric Emissions: Monitoring of Pollution (TEMPO; tempo.si.edu) satellite instrument will measure atmospheric pollution and much more over North America at high temporal resolution (hourly or better in daylight, with selected observations at 10 minute or better sampling) and high spatial resolution (10 km² at the center of the field of regard). It will measure O₃ profiles (including boundary layer O₃) and columns of NO₂, SO₂, H₂CO, C₂H₂O₂, H₂O, BrO, IO, and HONO, as well as clouds and aerosols. The instrument has been delivered and is awaiting spacecraft integration and launch in the next several years. This talk describes a selection of TEMPO applications based on the TEMPO Green Paper living document (<http://tempo.si.edu/presentations.html>). Applications to air quality and health will be summarized and the link with the NASA HAQAST presented. Applications include air quality and health; biomass burning and O₃ production; aerosol products including synergy with GOES infrared measurements; lightning NO_x; soil NO_x and fertilizer application; crop and forest damage from O₃; chlorophyll and primary productivity; foliage studies; halogens in coastal and lake regions; ship tracks and drilling platform plumes; water vapor studies including atmospheric rivers, hurricanes, and corn sweat; volcanic emissions; air pollution and economic evolution (e.g., for Cuba); high-resolution pollution versus traffic patterns; tidal effects on estuarine circulation and outflow plumes; air quality response to power blackouts and other exceptional events. An invitation to the scientific community to propose a specific longitudinal observing sequence for any of a number of investigator-defined experiments represents a unique aspect of the TEMPO mission. This ability of the community to experiment with a geostationary observing instrument for their specific purpose represents a new approach to space-borne atmospheric chemistry observation.