Development of TEMPO Data at NASA SPoRT for Air Quality and Public Health Applications

Aaron Naeger, Michael Newchurch, Susan Alexander, Emily Berndt, and Erika Duran

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HAQAST6 Meeting

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Mission: Transition unique NASA and NOAA observations and research capabilities to the operational weather community to improve short-term weather forecasts on a regional and local scale.

SPoRT prepares the community of end users and mission scientists for next generation satellite missions and capabilities through an interactive R2O/O2R paradigm.

Current/Future Activities:

• Successful partnerships to prepare NWS forecasters for GOES-R and JPSS through use of experimental proxy products.

• Expanding partnerships to other government agencies and new NASA missions.
Keys to successful day 1 readiness

- Data in the end users’ display system
- Targeted training
- Assessments to gather feedback from users for the mission scientists

Pre-launch R2O/O2R activities can provide valuable input to data processors, mission scientists, algorithm developers, and guide baselining of products/capabilities.
Synthetic TEMPO data

TEMPO NO₂

- Synthetic TEMPO proxy data generated using simulated gaseous and aerosol composition from GEOS-NR

- Goal: Utilize TEMPO proxy data for applications to accelerate operational use of real TEMPO products after launch in early 2022

https://weather.msfc.nasa.gov/sport/
Synthetic TEMPO data

TEMPO NO$_2$

• Diurnally varying mobile source emissions and smoke plumes shown in TEMPO proxy data

https://weather.msfc.nasa.gov/sport/
Synthetic TEMPO data

• NO$_2$ point source emission from Alabama Power Gaston Plant is apparent in morning TEMPO scan, no signal in later OMI scan

https://weather.msfc.nasa.gov/sport/
• TEMPO at county level, broader scale NO$_2$ field shows at county level, but NO$_2$ emission from Alabama Power Gaston Plant is no longer apparent
Preparing and storing L2 products and formatted text files of gas concentrations and meteorology at county level for public health stakeholders (e.g., Alabama Hospital Association, Alabama Quality Assurance Foundation)
Advantages of ESRI platform

1) Point and click feature for retrieving raw geophysical variables

2) Perform analysis via locally installed ArcGIS

3) Can ingest GRIB, NetCDF (CF compliant), GeoTIFF
Accurate geolocation of TEMPO data, high NO$_2$ associated with strong emissions from coal plant in Owensboro Corridor of mobile-source NO$_2$ from Chicago to Milwaukee

https://weather.msfc.nasa.gov/sport/
Fully ingest TEMPO proxy dataset from July 2013-June 2014 into ESRI platform for allowing effective analysis of L2 products

Setup FTP server for distributing proxy data to community, LDM solution for future real-time data

**Goal: Engage with end users/stakeholders on assessing TEMPO applications and preferred visualization frameworks prior to launch**

Plans to use TEMPO data, low-cost sensor network over northern AL, and hospital claims data for public health study

Proposed study to start ingesting upcoming GEMS data into NASA modeling system over South Asia, which will help identify future capabilities of TEMPO

**TEMPO public health conference at University of Alabama in Huntsville with conference date of 10/10/19**
The public health conference aims to promote multidisciplinary understanding of TEMPO mission data products, scientific and technological components of the TEMPO mission, and applications of the TEMPO data products to health-related endeavors.