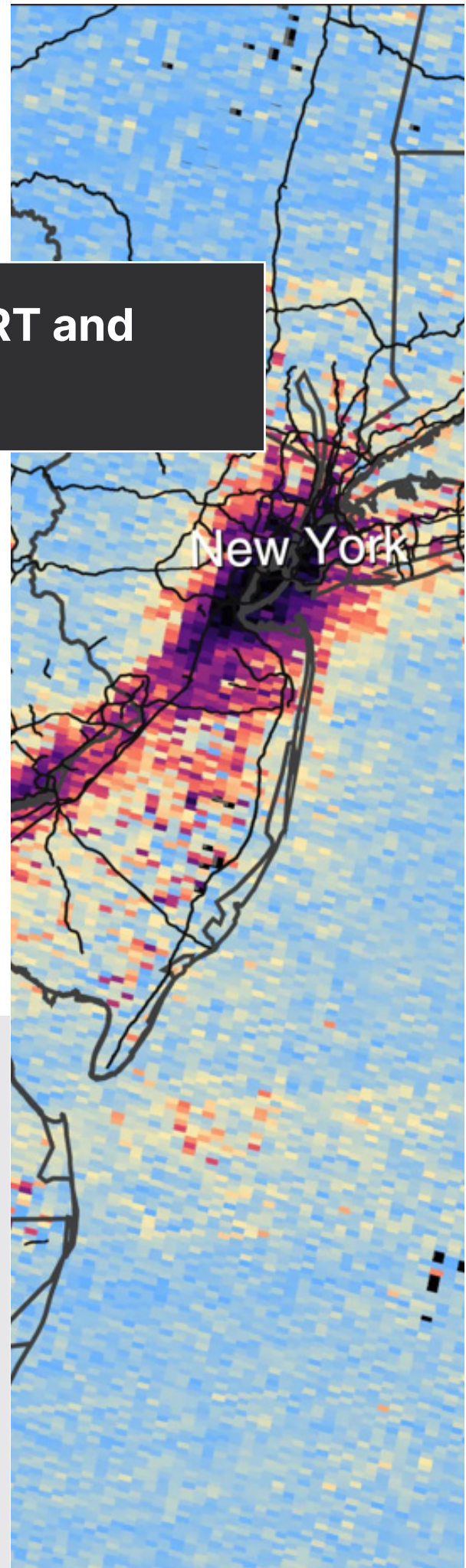


National Aeronautics and
Space Administration



Training Resources: TEMPO NRT and Enhanced Products

Summary

The TEMPO Near Real-Time (NRT) and Enhanced Products, a Satellite Needs Working Group (SNWG) solution, provides hourly, NRT air quality products from TEMPO and aims to provide seven additional science-quality products of trace gas measurements.

A number of training resources relevant to this solution are aggregated into five categories (specified below). For more information about this solution, visit the [TEMPO NRT and Enhanced Products webpage](#).

Table of Contents

| | |
|--|---|
| Fundamentals of Remote Sensing..... | 2 |
| Missions and Instruments..... | 2 |
| Data Products and Descriptions..... | 3 |
| Data Access and Code Examples..... | 4 |
| Use Case and Application Examples..... | 5 |
| Contact Information..... | 5 |

Fundamentals of Remote Sensing

This category's resources provide an introduction to remote sensing techniques used to develop this solution.

| | |
|--|---|
| <p><u>What is Spectroscopy?</u></p> | <p>Article that provides an overview of spectroscopy, the measurement technique used by the Tropospheric Emissions: Monitoring of Pollution (TEMPO) mission.</p> |
| <p><u>Passive Instruments for Remote Sensing</u></p> | <p>Article providing an overview of passive remote sensing instruments, which detect energy emitted or reflected from the natural environment. The TEMPO spectrometer is a passive remote sensor that measures atmospheric constituents important for air quality monitoring.</p> |
| <p><u>Remote Sensing of Trace Gases</u></p> | <p>Training from NASA's Applied Remote Sensing Training (ARSET) program on the use of remote sensing data for monitoring atmospheric trace gases.</p> |

Missions and Instruments

This category's resources describe the missions and instruments used to develop this solution.

| | |
|---|--|
| <p><u>TEMPO Mission Website</u></p> | <p>TEMPO mission website that provides an overview of the mission, mission-related news, an interactive data viewer, data access information, an image and video gallery, and other mission-related information.</p> |
|---|--|

| | |
|--|---|
| <u>TEMPO: A Revolutionary Instrument for Measuring Air Pollution</u> | <p>Video summarizing the TEMPO instrument and its impacts on air quality monitoring. It describes monitoring capabilities such as neighborhood-level pollution source tracing, air quality indexing by zip code, and data collection during hazardous events such as dust storms and wildfires.</p> |
| <u>TEMPO Mission Fact Sheet</u> | <p>Document providing background information on the TEMPO mission including science questions addressed by TEMPO, mission organization, and instrument capabilities.</p> |

Data Products and Descriptions

This category's resources describe the solution's resulting data products and provide other descriptive materials.

| | |
|--|--|
| <u>TEMPO/GOES NRT Products: SNWG Solution Fact Sheet</u> | <p>SNWG solution fact sheet for the TEMPO/GOES NRT products that includes an overview of the solution, its scientific and societal benefit, and data specifications such as temporal coverage and spatial resolution.</p> |
| <u>TEMPO Project NRT Data Products: User Guide and ATBD Supplement</u> | <p>Document describing the TEMPO NRT products, provided as a supplement to the user guide and algorithm theoretical basis document (ATBD) for the standard baseline TEMPO products. The document includes details on differences between the standard V04 and NRT V02 retrievals and examples of differences between the standard and NRT versions for each NRT product.</p> |

| | |
|--|--|
| <p><u>TEMPO Project Webpage - Atmospheric Science Data Center (ASDC)</u></p> | <p>TEMPO project webpage providing an overview of TEMPO products, including links to user guides and technical documents, and access to NRT data products.</p> |
|--|--|

Data Access and Code Examples

This category's resources provide links to access the solution's data as well as open source code for using the data.

| | |
|---|--|
| <p><u>TEMPO NRT data access via NASA Earthdata Search</u></p> | <p>Access TEMPO NRT data products through Earthdata Search.</p> |
| <p><u>NASA Short-term Prediction Research and Transition (SPoRT) Center Data Viewer - TEMPO NRT</u></p> | <p>Interactive data viewer for TEMPO NRT products provided by NASA SPoRT. Users can select the product type, geographic location, and the date/time of observation.</p> |
| <p><u>Finding your TEMPO: Introduction to the Mission, Products, and Data Services for Air Quality Observations</u></p> | <p>Webinar from NASA Earthdata providing an overview of the TEMPO mission, data products, and ways to access TEMPO data products using NASA's Earthdata Search. TEMPO NRT products can be accessed through the same methods.</p> |

Use Case and Application Examples

This category's resources provide examples of the solution in-use as well as other potential scientific applications of the data.

| | |
|---|--|
| <p><u>TEMPO Early Adopters Program: Applications</u></p> | <p>Webpage providing an overview of TEMPO application areas, including air quality forecasting which relies on NRT observations to generate accurate forecasts.</p> |
| <p><u>TEMPO Early Adopters Program: Events</u></p> | <p>Webpage compiling TEMPO workshop and other mission materials, covering mission updates, applications, data products, tools, and resources. Workshops include stakeholder need discussions for TEMPO NRT data.</p> |
| <p><u>Stratosphere-troposphere separation of nitrogen dioxide columns from the TEMPO geostationary satellite instrument</u></p> | <p>Publication describing a TEMPO stratosphere-troposphere separation algorithm for nitrogen dioxide, including NRT algorithm performance.</p> |
| <p><u>Geostationary Remote Sensing of Trace Gases for Air Quality Applications in North America</u></p> | <p>Training from NASA ARSET on TEMPO capabilities, available products, and data visualization techniques in NASA Worldview, including real-world case studies for trace gas monitoring.</p> |

Contact Information

Need additional help using this solution? Let us know what gaps or questions still exist, what tools interest you, and/or how you want to apply this solution. We are happy to connect you with more information and ongoing efforts to fill those gaps. Contact us at info@snwg-impact.net.