



EXPLORE EARTH

Unlocking Atmospheric Data: A Guide to Air Quality and Sustainable
Development with the Atmospheric Science Data Center

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ASDC Science Lead ADNET

01/19/2024

A vibrant space-themed background featuring a large blue circle on the left containing a detailed view of Earth's horizon. The rest of the background is a deep blue space filled with stars, a bright yellow sun, and several planets, including Saturn with its rings, Mars, and the Moon. The text is overlaid on the right side of the image.

EXPLORE EARTH

Agenda

ASDC Overview

Introduction to TEMPO

Tools and Services

User Support

Earth Science Data and Information System *ESDIS*

NASA's Distributed Active Archive Centers (DAACs)

A federated approach to data management

Land Process DAAC
Land Cover, Surface Reflectance, Radiance, Temperature, Topography, Vegetation Indices

Physical Oceanography DAAC
Gravity, Sea Surface Temperature, Ocean Winds, Ocean Surface Topography, Sea Surface Salinity, Ocean Circulation

National Snow and Ice Data Center DAAC
Frozen Ground, Glaciers, Ice Sheets, Sea Ice, Snow, Soil Moisture, Cryosphere, Climate Interactions

Alaska Satellite Facility DAAC
Synthetic Aperture Radar (SAR) Products

Global Hydrometeorology Resource Center DAAC
Hazardous Weather, Lightning, Tropical Cyclones, Storm-Induced Hazards

Oak Ridge National Laboratory DAAC
Biogeochemical Dynamics, Ecological Data, Environmental Processes

Atmospheric Science Data Center
Radiation Budget, Clouds, Aerosols, Tropospheric Composition



Socioeconomic Data and Applications Center
Human Interactions, Land Use, Environmental Sustainability, Geospatial Data

Ocean Biology DAAC
Ocean Color, Sea Surface Temperature, Sea Surface Salinity

Crustal Dynamics Data Information System
Space Geodesy, Solid Earth

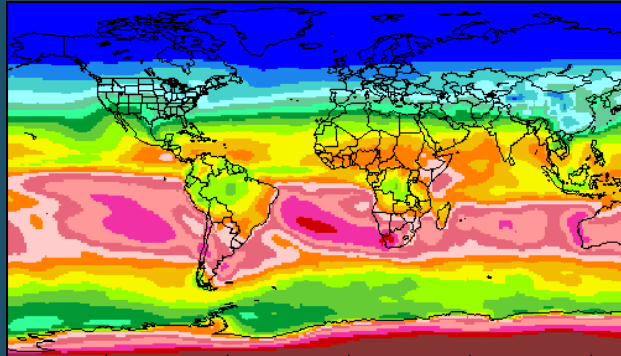
Goddard Earth Sciences Data and Information Services Center
Global Precipitation, Solar Irradiance, Atmospheric Composition and Dynamics, Global Modeling

Level 1 and Atmosphere Archive and Distribution System DAAC
MODIS Level-1 and Atmosphere Data Products

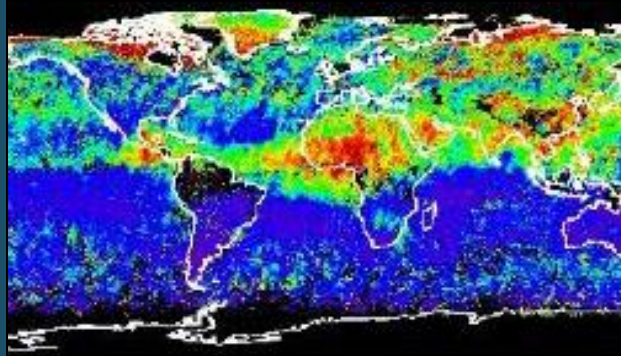
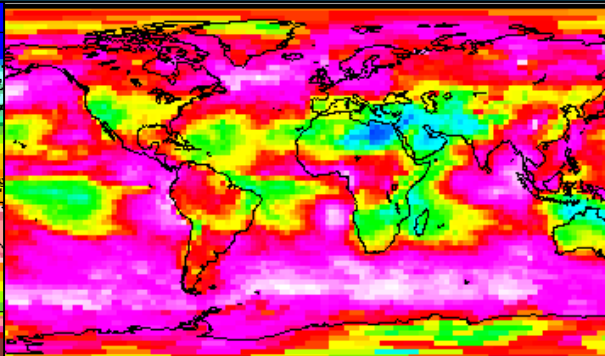


ASDC at a Glance

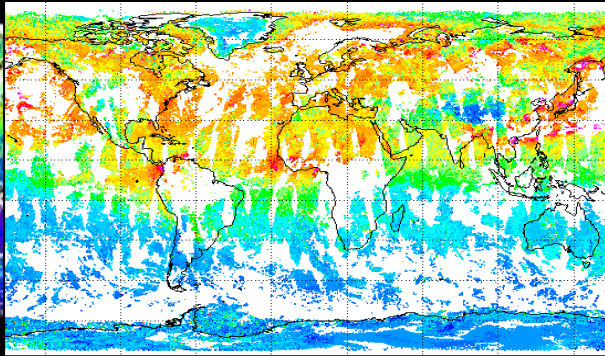
RADIATION BUDGET



CLOUDS



AEROSOLS



TROPOSPHERIC COMPOSITION

- ✓ 110+ Science projects
 - MISR ◦ MOPITT ◦ MAIA ◦ TEMPO ◦ CERES
 - TEMPO & CALIPSO → RSIG (EPA)
 - Airborne field campaigns (KORUS AQ, DISCOVER AQ, FIREX AQ)
- ✓ 1500+ unique science products
- ✓ Data usage (2022)
 - 3.5 Petabytes ◦ 160,000 users
 - 158 countries
- ✓ Data archive (2022)
 - 8+ Petabytes ◦ 168 million files (5,500 TB) on high-speed disks
- ✓ Data in cloud (ongoing)
 - Data and services in the cloud
 - Scalable infrastructure

Primary Functions of ASDC

Ingest receive data from data provider

Archive preservation & provenance

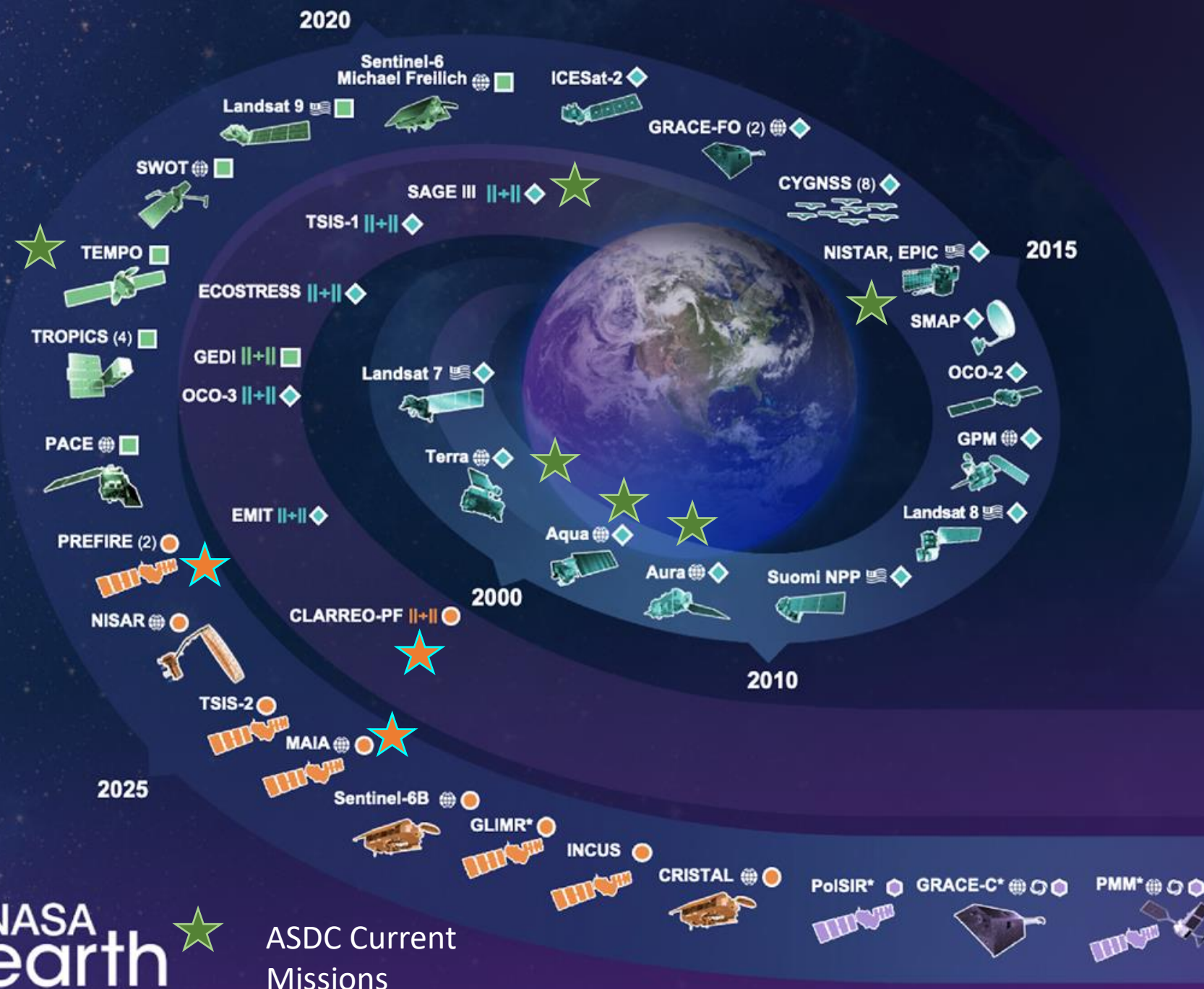
Distribute tools and services

Process create higher level products

Outreach & Support research community



EARTH FLEET



Key

- International Partners: 🌐
- U.S. Partner: 🇺🇸
- ISS Instrument: ||+||
- JPSS Instrument: +-+
- Cubesat: 📦
- Launch Date TBD: *
- Earth System Observatory Mission (Pre) Formulation: 🌀
- Implementation: 🟠
- Operating: 🟢
- Extended: 🔹

Invest/CubeSats

- NACHOS 2022: 🟢
- CTIM 2022: 🟢
- NACHOS-2 2022: 🟢
- MURI-FD 2023: 🟢
- SNOOPI* 2024: 🟠
- HYTI* 2024: 🟠
- ARGOS* 2024: 🟠

JPSS Instruments

- OMPS-LIMB 2022: +-+
- LIBERA 2027: +-+
- OMPS-LIMB 2027: +-+
- OMPS-LIMB 2032: +-+

ISS INSTRUMENTS



MISSIONS

Featured Stories and Events

Europa Clipper Launch
MISSION LAUNCH
OCTOBER 10TH, 2024



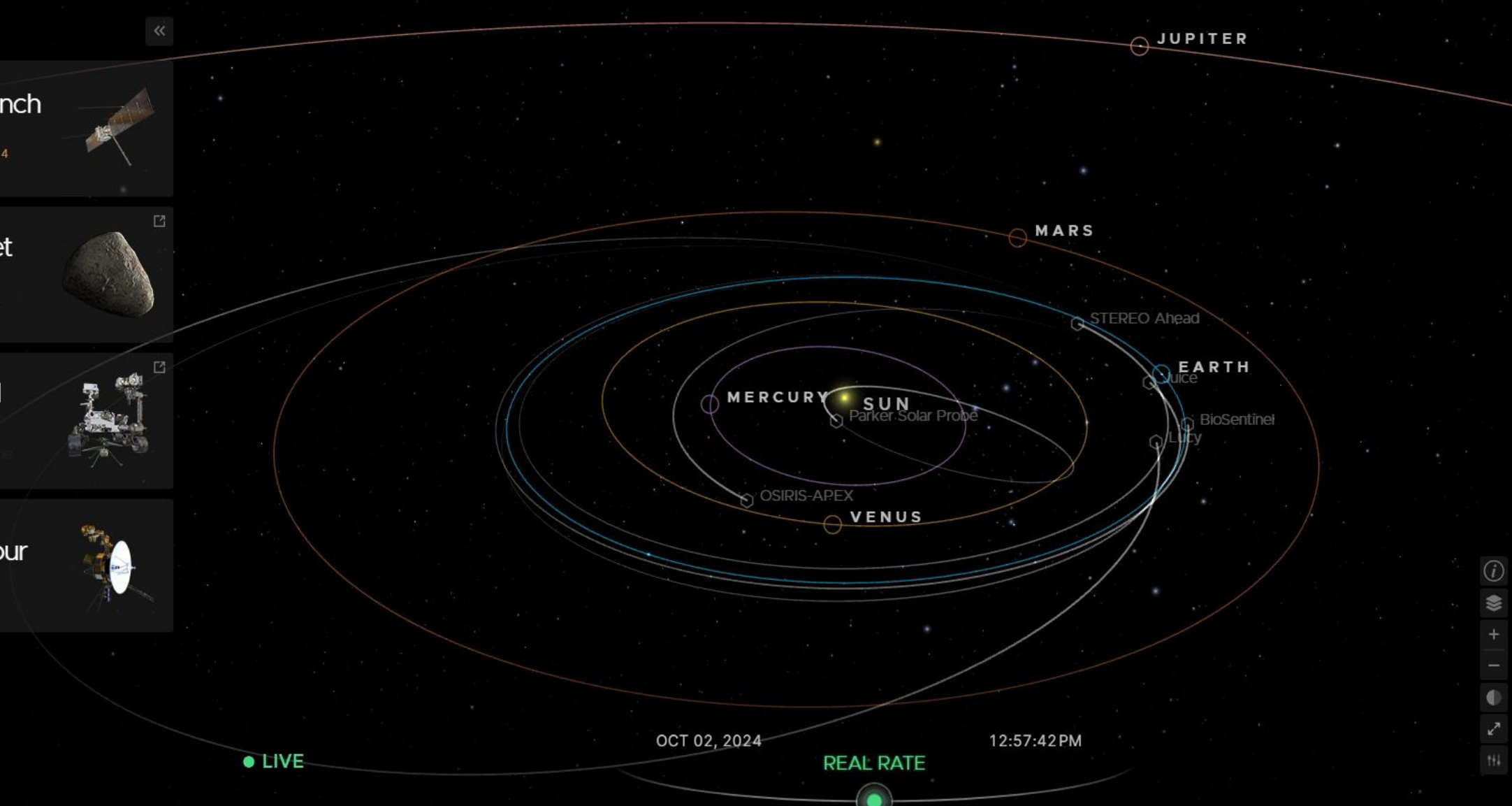
Asteroid and Comet Missions
EYES ON ASTEROIDS



Entry, Descent, and Landing
PERSEVERANCE



Voyager's Grand Tour
1977 - TODAY

LIVE

OCT 02, 2024

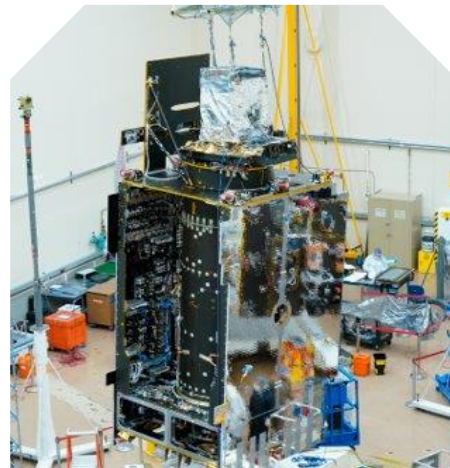
REAL RATE

12:57:42 PM

Information icons: info, layers, zoom in (+), zoom out (-), full screen, share, and refresh.

Tropospheric Emissions: Monitoring of Pollution

- Hourly daytime air pollution measurements over North America.
- NASA's first Earth Venture Instrument (EVI), selected in 2012.
- First Light August 2nd 2023 Mission objective is 20 months.
- **Geostationary orbit** means TEMPO can scan the continent continuously.
 - High temporal resolution
 - High spatial resolution
- Baseline data products:
 - Ozone
 - Nitrogen dioxide
 - Formaldehyde
 - Cloud properties

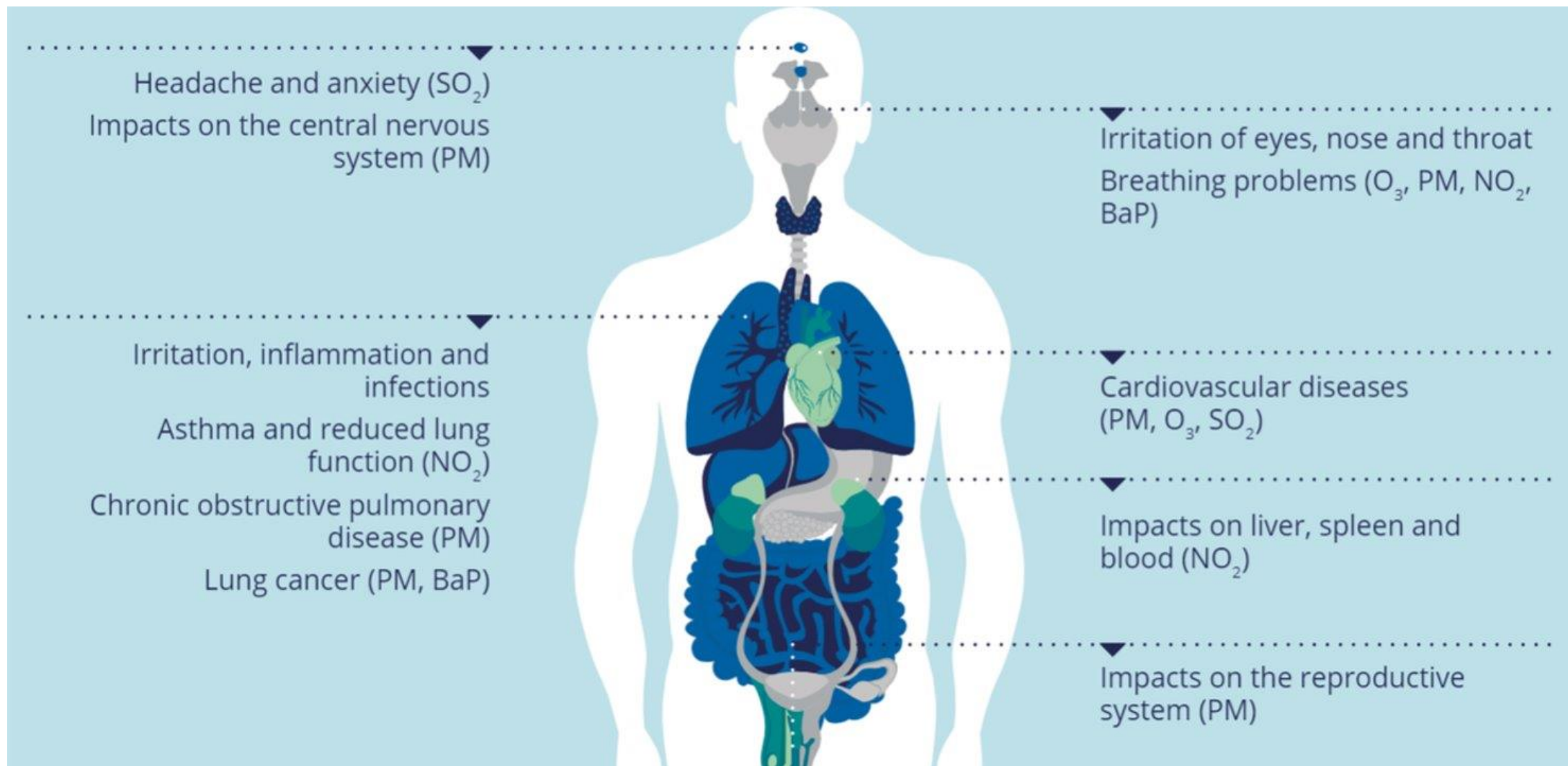


Credit: NASA's Scientific Visualization Studio

SUSTAINABLE DEVELOPMENT GOALS

1 NO POVERTY 	2 ZERO HUNGER 	3 GOOD HEALTH AND WELL-BEING 	4 QUALITY EDUCATION 	5 GENDER EQUALITY 	6 CLEAN WATER AND SANITATION 
7 AFFORDABLE AND CLEAN ENERGY 	8 DECENT WORK AND ECONOMIC GROWTH 	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE 	10 REDUCED INEQUALITIES 	11 SUSTAINABLE CITIES AND COMMUNITIES 	12 RESPONSIBLE CONSUMPTION AND PRODUCTION 
13 CLIMATE ACTION 	14 LIFE BELOW WATER 	15 LIFE ON LAND 	16 PEACE, JUSTICE AND STRONG INSTITUTIONS 	17 PARTNERSHIPS FOR THE GOALS 	SUSTAINABLE DEVELOPMENT GOALS 

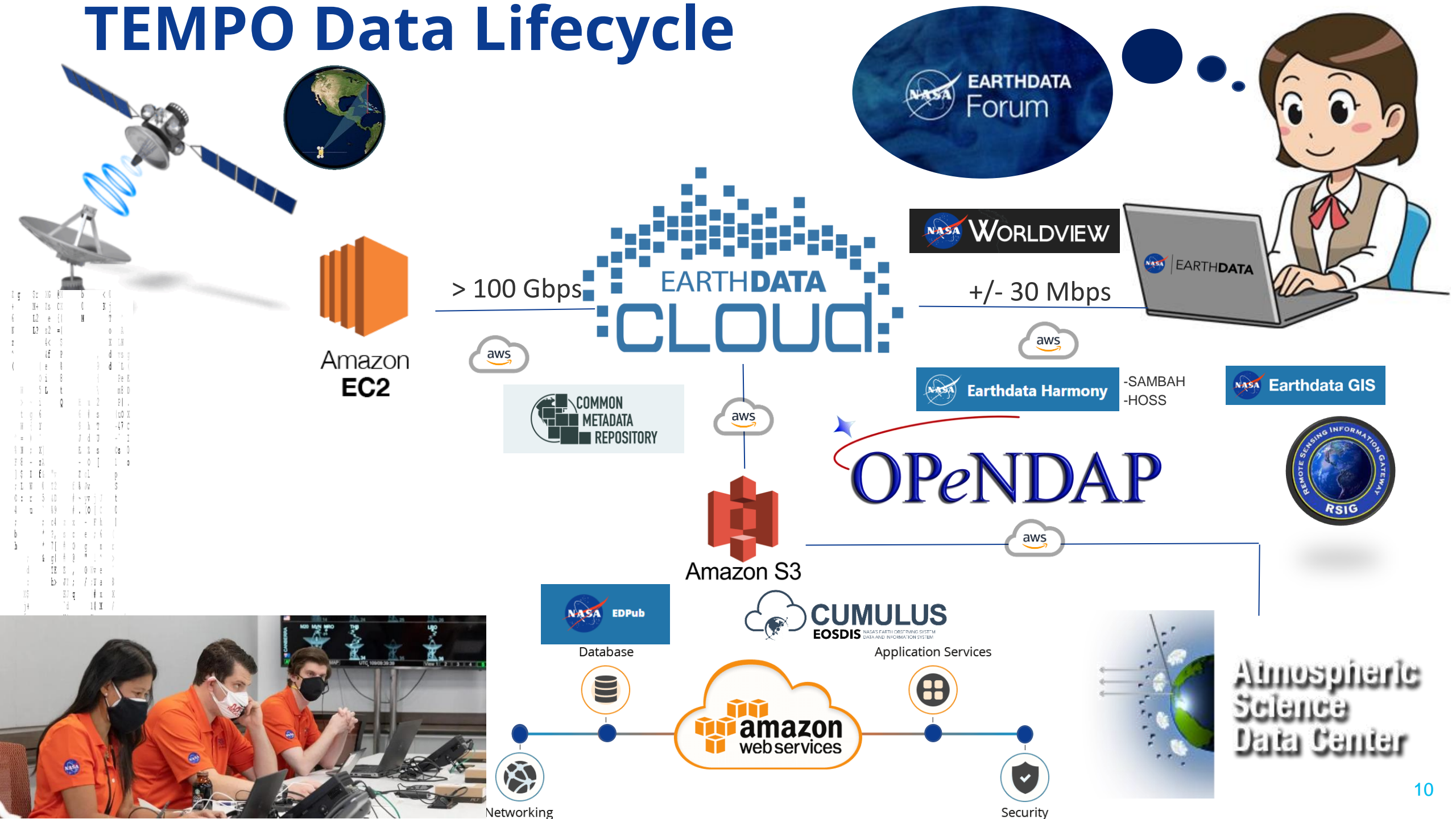
European Environment Agency 2023



EARTHDATA

<https://www.eea.europa.eu/en/topics/in-depth/air-pollution/eow-it-affects-our-health>

TEMPO Data Lifecycle



The background of the slide is a composite of two cosmic images. The top half features a dark blue and black space filled with numerous small, bright stars and a prominent, wispy blue nebula on the right side. The bottom half features a bright orange and yellow space filled with many small, bright stars and a large, glowing green and yellow nebula on the right side. A dark blue horizontal band runs across the middle of the slide, containing the text.

Tools and Services

Earthdata Search

- Search and Order
 - On Premise
 - Amazon Web Services
- Subsetting & Aggregation
- Browse Imagery
- File Conversions
- Application Programming Interface (API) Access

Historical Urban Population: 3700 BC - AD 2000

1 Granule 1700-01-01 to 2000-12-31

The Historical Urban Population, 3700 BC - AD 2000, originally developed by the Yale School of Forestry & Environmental Studies, is the first spatially explicit...

GEOSOS • CIESIN_SEDAC_USPAT_HUP v1.00 - SEDAC



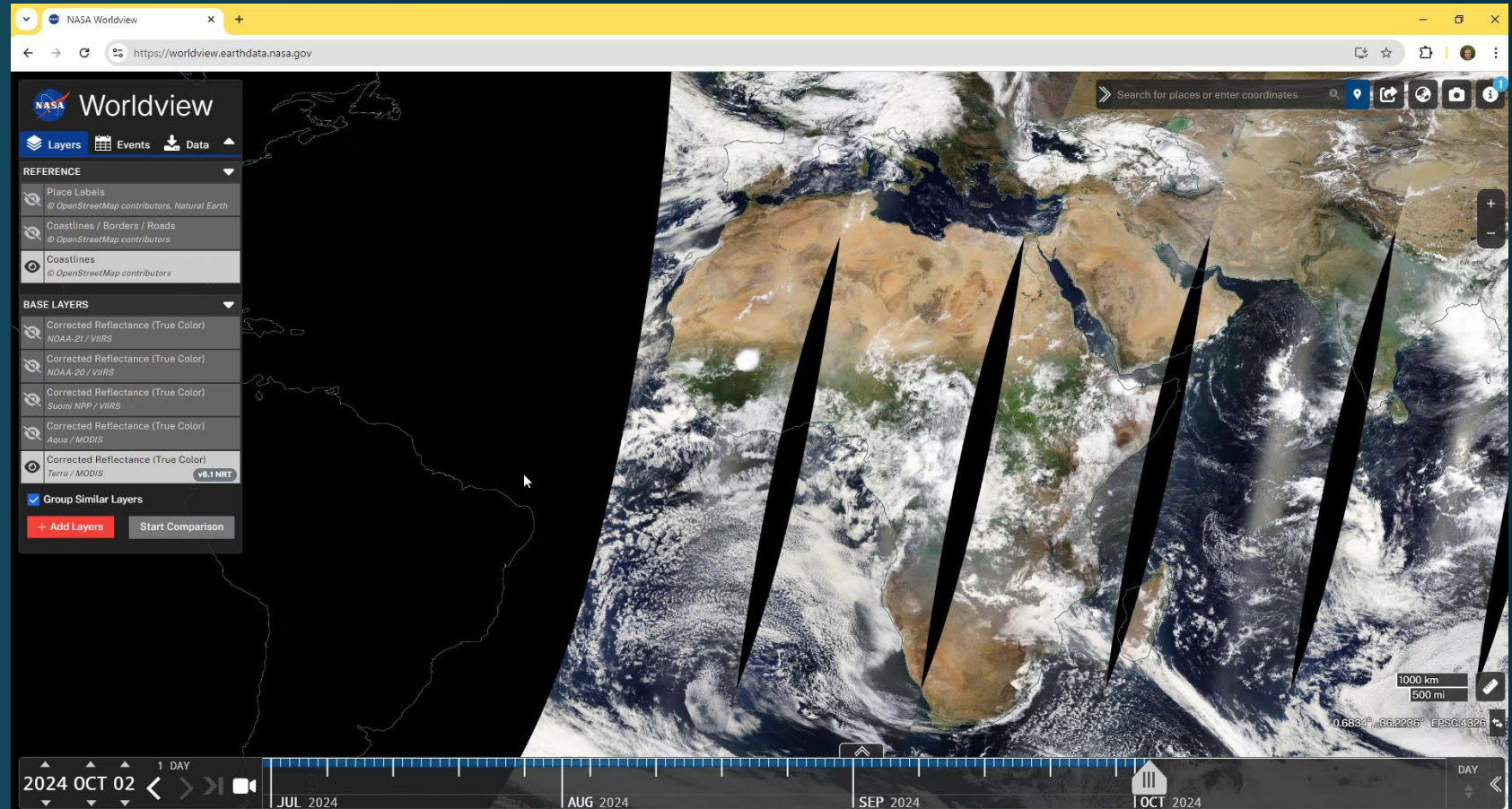
The screenshot displays the Earthdata Search web application. The search bar at the top contains the query "lat=-0.0703125". The results page shows 9,582 matching collections. The left sidebar contains filters for Features, Keywords, Platforms, Instruments, Organizations, Projects, Processing Levels, Data Format, Tiling System, Horizontal Data Resolution, and Latency. The main content area lists several collections, including Sentinel-1A SLC, Sentinel-1B SLC, Sentinel-1A Dual-pol GRD High Res, ECOSTRESS Land Surface Temperature and Emissivity Daily L2 Global 70m V001, and NASA Shuttle Radar Topography Mission Global 1 arc second V003. A map of the world is visible on the right side of the interface.

<https://search.earthdata.nasa.gov>



Worldview / Global Imagery Browse Service (GIBS)

- Browse Imagery
- Animations
- Event Information
- GIBS API



<https://worldview.nasa.gov>

OPeNDAP

- API Access
- Subsetting & Aggregation
- File Conversions

DAP4 Data Request Form TEMPO

https://opendap.earthdata.nasa.gov/collections/C2930764281-LARC_CLOUD/granules/TEMPO_O3TOT_L3_V03_20241001T202756Z_S009.nc.dmr

OPeNDAP DAP4 Data Request Form

dataset: TEMPO_O3TOT_L3_V03_20241001T202756Z_S009.nc

Actions Download Encoding: Choose One... Get Data !! Attention !!

Data URL https://opendap.earthdata.nasa.gov/collections/C2930764281-LARC_CLOUD/granules/TEMPO_O3TOT_L3_V03_20241001T202756Z_S009.nc

Copy encoded Data URL Copy raw Data URL

Global Attributes View/Hide

Global Dimensions View/Hide

Variables

- longitude [longitude= 0..-7749] [Type is: float64]
attributes
- latitude [latitude= 0..-2949] [Type is: float64]
attributes
- time [time= 0..0] [Type is: float64]
attributes
- weight [latitude= 0..-2949] [longitude= 0..-7749] [Type is: float64]
attributes
- product [Type is: Group]
member variables
- qa_statistics [Type is: Group]
member variables
- support_data [Type is: Group]
member variables
- geolocation [Type is: Group]
member variables

debug

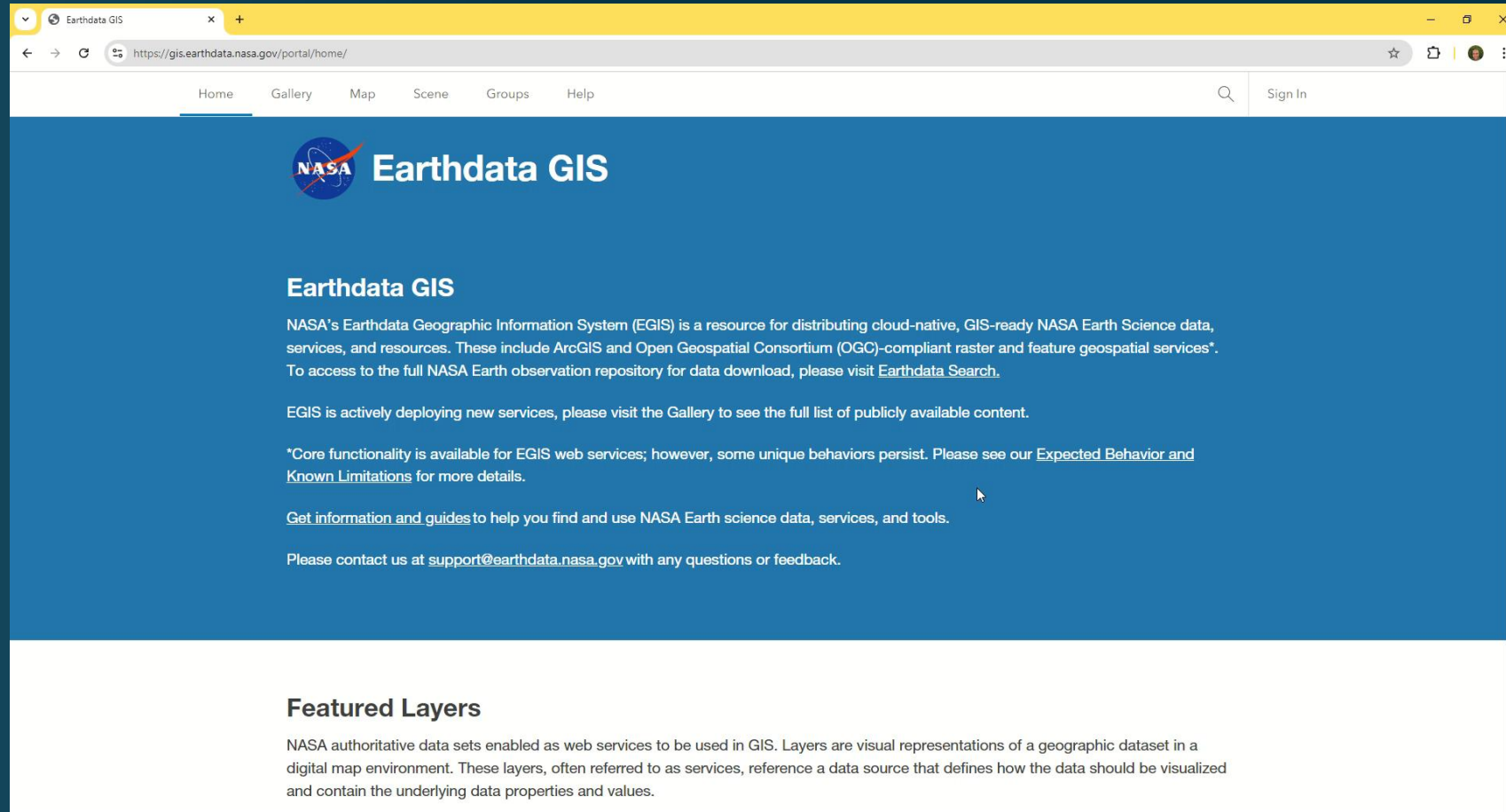
OPeNDAP Hyrax (1.17.0-166)

Hyrax development sponsored by NSF, NASA, and NOAA

<https://opendap.earthdata.nasa.gov>

ArcGIS Enterprise in the Earthdata Cloud

- Geospatial Services
- Maps
- StoryMaps
- Applications



The screenshot shows the Earthdata GIS homepage in a web browser. The browser's address bar displays the URL <https://gis.earthdata.nasa.gov/portal/home/>. The page features a blue header with the NASA logo and the text "Earthdata GIS". Below the header, there is a navigation menu with links for Home, Gallery, Map, Scene, Groups, and Help. A search icon and a "Sign In" button are also present in the top right corner. The main content area has a blue background and contains the following text:

Earthdata GIS

NASA's Earthdata Geographic Information System (EGIS) is a resource for distributing cloud-native, GIS-ready NASA Earth Science data, services, and resources. These include ArcGIS and Open Geospatial Consortium (OGC)-compliant raster and feature geospatial services*. To access to the full NASA Earth observation repository for data download, please visit [Earthdata Search](#).

EGIS is actively deploying new services, please visit the Gallery to see the full list of publicly available content.

*Core functionality is available for EGIS web services; however, some unique behaviors persist. Please see our [Expected Behavior and Known Limitations](#) for more details.

[Get information and guides](#) to help you find and use NASA Earth science data, services, and tools.

Please contact us at support@earthdata.nasa.gov with any questions or feedback.

Featured Layers

NASA authoritative data sets enabled as web services to be used in GIS. Layers are visual representations of a geographic dataset in a digital map environment. These layers, often referred to as services, reference a data source that defines how the data should be visualized and contain the underlying data properties and values.

<https://gis.earthdata.nasa.gov>

Sub-Orbital Order Tool (SOOT)

- Search and Access Sub-Orbital Data
- Merge to Common Time Scale
- Supports general and power users

Sub-Orbital Order Tool (SOOT) Power User Interface

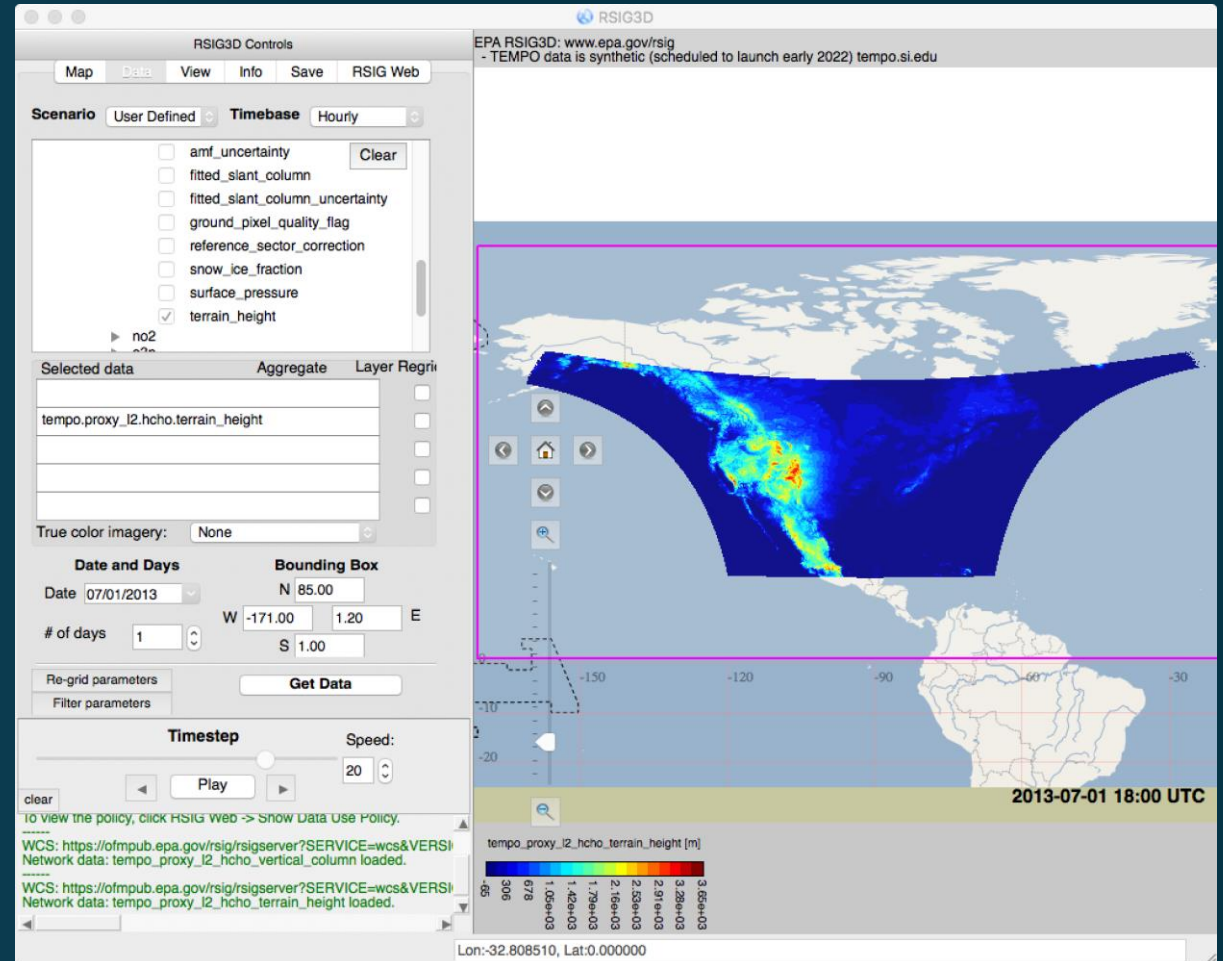
Welcome to the [Sub-Orbital Order Tool \(SOOT\)](#) which is designed to promote suborbital research and analysis. Here you can discover and access the airborne and field campaign data archived at the Atmospheric Science Data Center (ASDC). The SOOT Power User Interface is intended for experienced airborne data users and airborne science teams.

Select a campaign and deployment: 

 ACEPOL Support Documentation 2017	 ACTIVATE Support Documentation 2020 2021 2022	 Aeolus Cal/Val Support Documentation 2019
 AJAX Support Documentation 2011 2012 2013 2014 2015 2016 2017 2018	 ARISE Support Documentation 2014	 CAMP2EX 2018 2019
 DCOTSS 2021	 FIREX-AQ 2019	 LISTOS Support Documentation 2017 2018 2019
 LMOS 2017 Support Documentation 2017	 NAAMES Support Documentation 2015 2016 2017 2018	 ORACLES 2016 2017 2018

EPA Remote Sensing Information Gateway (RSIG)

- Visualization (2D/3D) & Animations
- Subsetting to CMAQ Modeling Grids
- File Conversions
- API Access

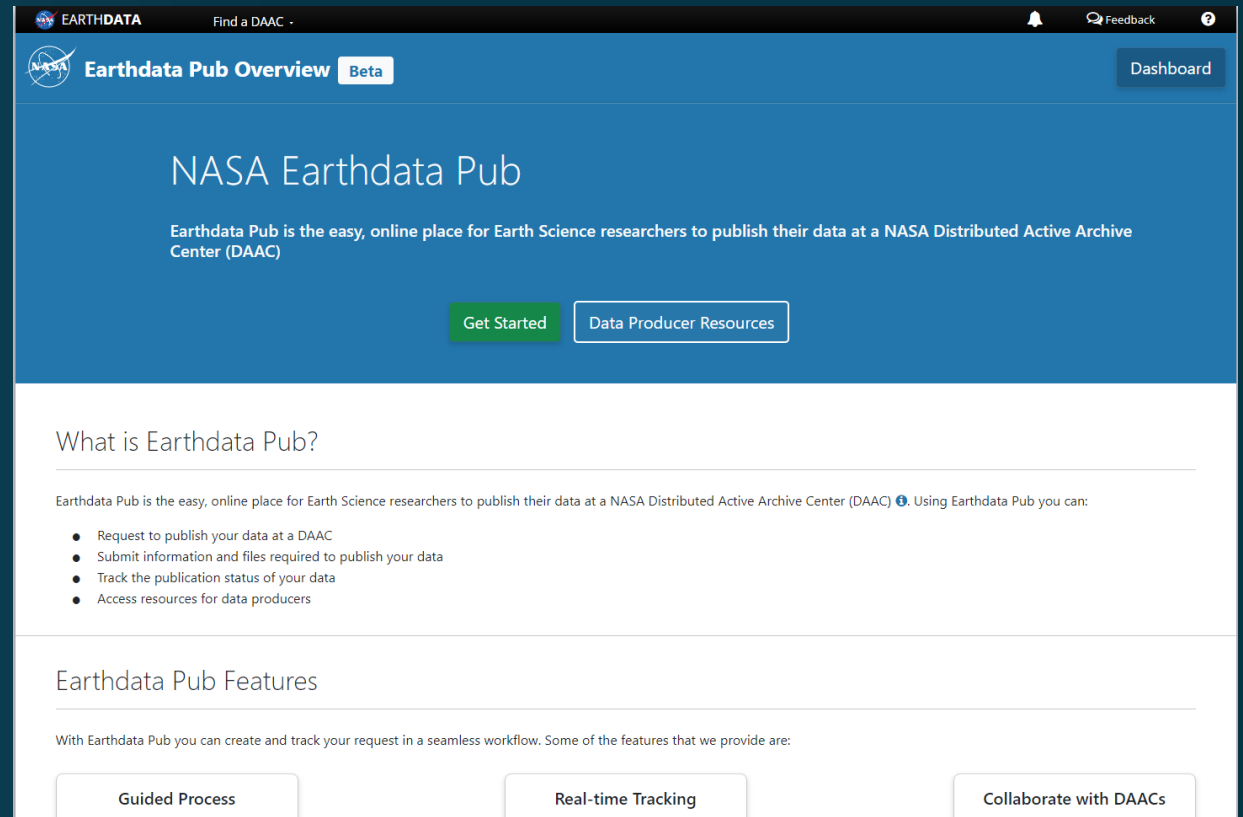


The background of the slide is a cosmic scene. The top half features a dark blue and black space filled with numerous small, bright stars and a prominent, glowing blue nebula on the right side. The bottom half is dominated by a bright orange and yellow nebula on the left, which transitions into a greenish-blue nebula on the right. The text 'User Support' is centered in a white, sans-serif font across the middle of the image.

User Support

Earthdata Pub

- Request to publish your data at a DAAC
- Submit information and files required to publish your data
- Track the publication status of your data
- Access resources for data producers



EARTHDATA Find a DAAC - Feedback

NASA Earthdata Pub Overview Beta Dashboard

NASA Earthdata Pub

Earthdata Pub is the easy, online place for Earth Science researchers to publish their data at a NASA Distributed Active Archive Center (DAAC)

[Get Started](#) [Data Producer Resources](#)

What is Earthdata Pub?

Earthdata Pub is the easy, online place for Earth Science researchers to publish their data at a NASA Distributed Active Archive Center (DAAC). Using Earthdata Pub you can:

- Request to publish your data at a DAAC
- Submit information and files required to publish your data
- Track the publication status of your data
- Access resources for data producers

Earthdata Pub Features

With Earthdata Pub you can create and track your request in a seamless workflow. Some of the features that we provide are:

[Guided Process](#) [Real-time Tracking](#) [Collaborate with DAACs](#)

<https://pub.earthdata.nasa.gov/>

Earthdata Forum

- View Existing Questions/Answers
- Ask New Questions to Subject Matter Experts
- Science and Technical Support

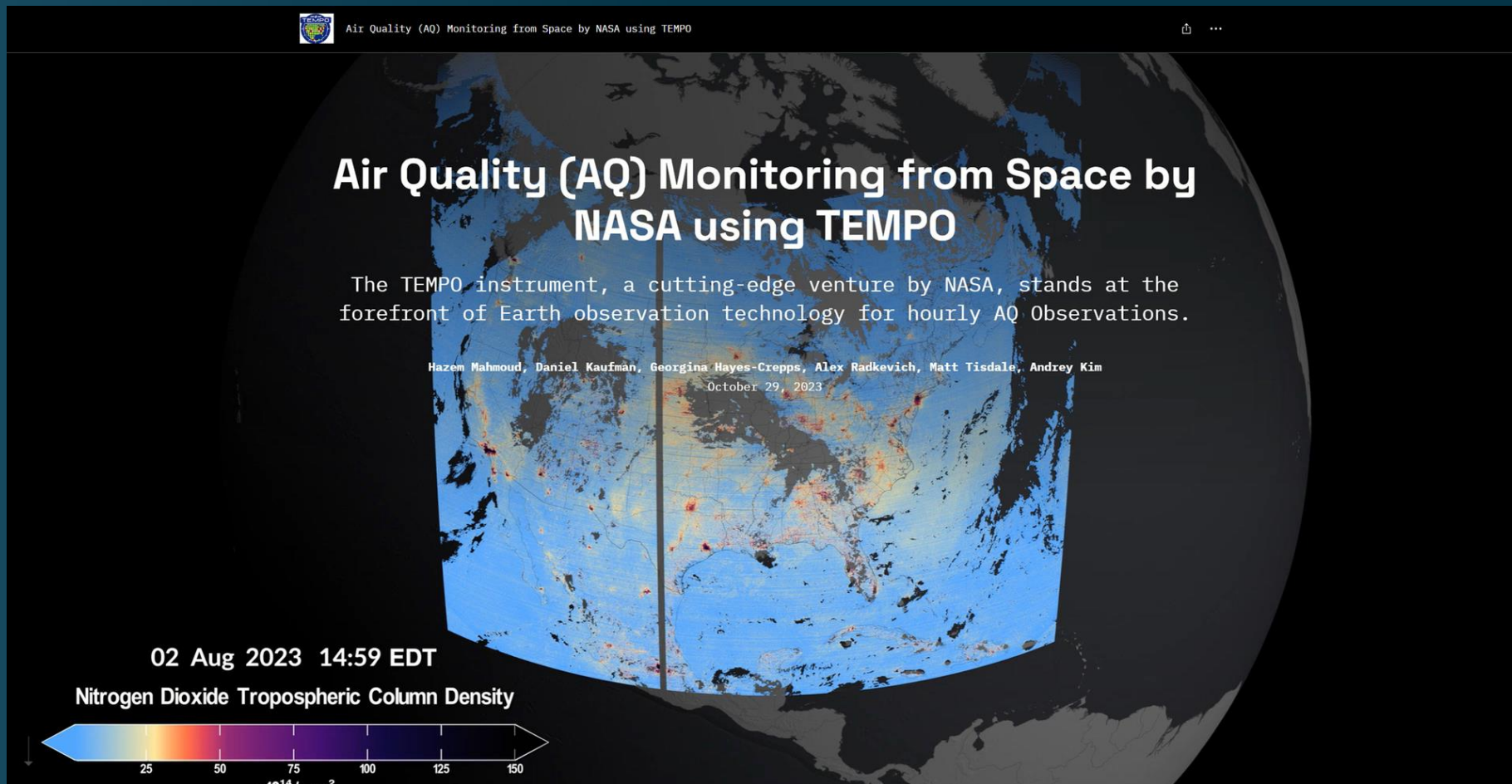
The screenshot displays the Earthdata Forum website. At the top, there is a navigation bar with the Earthdata logo and a search bar. Below the navigation bar, there is a header section with the text "Welcome to the Earthdata Forum! Here, the scientific user community and subject matter experts from NASA Distributed Active Archive Centers (DAACs), and other contributors, discuss research needs, data, and data applications." The main content area is divided into several sections:

- Filter Results:** A sidebar on the left with various filter options: "Filter by Best Answer", "With a Best Answer", "Without a Best Answer", "Filter by Text", "Selected Tag Match" (ANY, HYBRID, ALL), "Filter by Discipline", "Filter by DAAC", "Filter by Projects", "Filter by Services/Usage", "Filter by Dates", and "Filter by Author".
- Announcements:** A list of recent announcements including "FLASHFlux Data", "UPDATE: Terra data and imagery outage starting October 10th 2022", "GCMD Keywords Version 14.5 Released", "Disaster Assessment Using Synthetic Aperture Radar: Open, Online NASA ARSET Training Invitation", and "Best Practices For Using Machine Learning Keywords in Collection and Service Records in the CMR".
- Questions and Comments:** A table listing various questions and their details. The table has columns for "REPLIES" and "LAST POST".

QUESTION AND COMMENTS	REPLIES	LAST POST
Can I get weather details ? ASDC Atmosphere	1	by ASDC - Ingridis o Tue Jul 26, 2022 9:41 am America/New_York
SAGE III on ISS Version 5.21 Release ASDC Announcements Atmosphere SAGE	0	by ASDC - David W. o Tue Jun 28, 2022 12:01 pm America/New_York
Solar radiation ASDC Atmosphere Data Access ORNL POWER - SSE	4	by ASDC - David W. o Tue May 10, 2022 1:36 pm America/New_York
CALIPSO Data Download Doesn't work ASDC Atmosphere CALIPSO Data Download	1	by ASDC - David W. o Mon Mar 28, 2022 3:01 pm America/New_York
Climate scenarios 2.6, 4.5 and 6.5 downscaled data download ASDC Atmosphere Data Access GES DISC GLDAS/NLDAS MERRA-2 POWER - SSE	3	by ASDC - David W. o Wed Mar 23, 2022 12:25 am America/New_York
ACCESS TO DATA CONTENT ASDC Atmosphere CALIPSO	1	by ASDC - cheyenne.e.land o Wed Mar 16, 2022 9:26 am America/New_York
Release Announcement of New CALIPSO V2.00 Lidar Level 2 Polar Stratospheric Cloud Data Product ASDC Announcements Atmosphere CALIPSO Data Access Data Download Data Search	0	by ASDC - Joseph.F.tech o Tue Mar 08, 2022 12:31 pm America/New_York
Data discrepancy between CERES and ERA5 ASDC Atmosphere CERES	2	by ASDC - cheyenne.e.land o Thu Mar 03, 2022 9:04 am America/New_York

<https://forum.earthdata.nasa.gov>

TEMPO Storymap





EXPLORE EARTH

Science Directorate

Atmospheric Science Data Center (ASDC)

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ASDC Science Lead ADNET

10/03/2024

AQI by EPA

AQI Basics for Ozone and Particle Pollution

Daily AQI Color	Levels of Concern	Values of Index	Description of Air Quality
Green	Good	0 to 50	Air quality is satisfactory, and air pollution poses little or no risk.
Yellow	Moderate	51 to 100	Air quality is acceptable. However, there may be a risk for some people, particularly those who are unusually sensitive to air pollution.
Orange	Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is less likely to be affected.
Red	Unhealthy	151 to 200	Some members of the general public may experience health effects; members of sensitive groups may experience more serious health effects.
Purple	Very Unhealthy	201 to 300	Health alert: The risk of health effects is increased for everyone.
Maroon	Hazardous	301 and higher	Health warning of emergency conditions: everyone is more likely to be affected.

Pollutant	Averaging Time	2005 AQGs	2021 AQGs
PM _{2.5} , µg/m ³	Annual	10	5
	24-hour ^a	25	15
PM ₁₀ , µg/m ³	Annual	20	15
	24-hour ^a	50	45
O ₃ , µg/m ³	Peak season ^b	-	60
	8-hour ^a	100	100
NO ₂ , µg/m ³	Annual	40	10
	24-hour ^a	-	25
SO ₂ , µg/m ³	24-hour ^a	20	40
CO, mg/m ³	24-hour ^a	-	4

AIR POLLUTION - THE SILENT KILLER

Air pollution is a major environmental risk to health.
By reducing air pollution levels, countries can reduce:

Every year, around **7 MILLION DEATHS** are due to exposure from both outdoor and household air pollution.

Stroke

Heart disease

Lung cancer, chronic obstructive pulmonary disease, pneumonia and asthma

REGIONAL ESTIMATES ACCORDING TO WHO REGIONAL GROUPINGS:



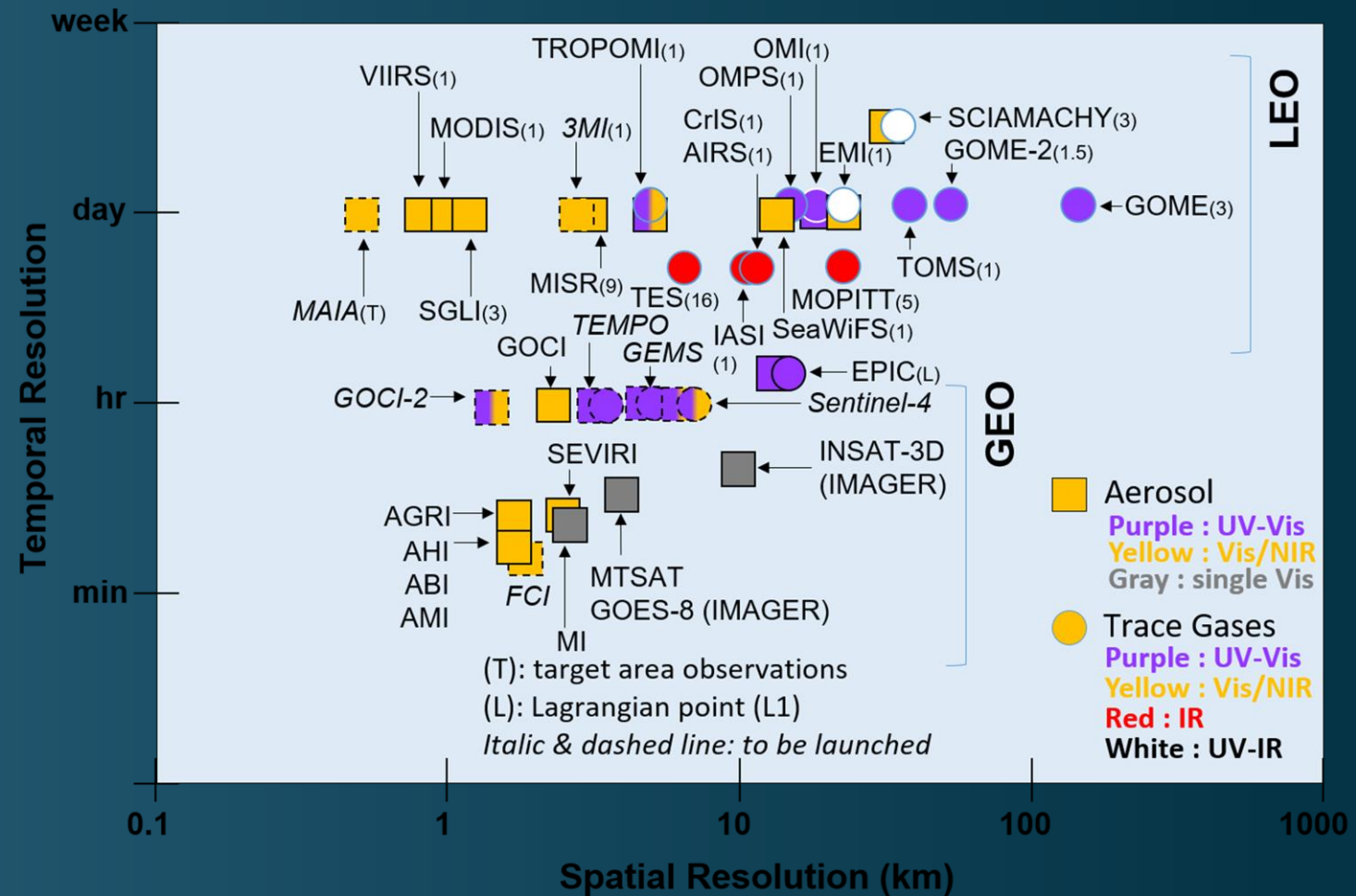
WHO Air Quality Guidelines set goals to protect millions of lives from air pollution.

CLEAN AIR FOR HEALTH

#AirPollution



AQ from Space



Kim et al. (BAMS 2020)

ASDC Data and User Services

📁 TEMPO	Add files via upload	4 months ago
📁 TOLNet	Add files via upload	last week
📁 images	Add files via upload	2 years ago
📄 README.md	Update README.md	2 weeks ago
📄 ncompare-example-usage.ipynb	add URLs for two example MOPITT data files	10 months ago

📖 README

ASDC_Data_Tutorials_and_User_Services

This GitHub page serves as a comprehensive resource for end users seeking tutorials on various missions conducted by the Atmospheric Science Data Center (ASDC). The page's primary objective is to provide step-by-step guidance and instructions on utilizing the NASA missions archived and distributed by ASDC DAAC. By offering these tutorials, the page aims to enhance the knowledge and proficiency of end users, enabling them to leverage the valuable resources made available by ASDC effectively. This GitHub page facilitates the seamless transfer of expertise from ASDC to end users, fostering a collaborative environment that drives innovation and progress in space-related endeavors.

https://github.com/nasa/ASDC_Data_and_User_Services/tree/main/TEMPO

Earthdata Website

- Data Tools
- Data Recipes
- Data Pathfinders
- Webinars and Tutorials

The screenshot shows the Earthdata website homepage. At the top, there is a navigation bar with the Earthdata logo and the tagline "OPEN ACCESS FOR OPEN SCIENCE". The main header features a row of colorful circular icons representing various Earth science disciplines. Below this, the text reads "Your Gateway to NASA Earth Observation Data" and "The Earth Science Data Systems (ESDS) Program provides full and open access to NASA's collection of Earth science data for understanding and protecting our home planet. Begin your Earthdata exploration by clicking on any of the discipline icons above." Three buttons labeled "Get Started", "Find Data", and "Use Data" are positioned below the text. The main content area is divided into two sections: "Data Pathfinders" on the left, which includes a brief description and a "View All >" link, and "Agriculture & Water" on the right, which is a featured topic with a large image and navigation arrows. At the bottom, there is a "Resource Spotlight" section with three highlighted topics: "Agriculture", "Open Science", and "Environmental Justice", each with a corresponding icon and a short description.

<https://www.earthdata.nasa.gov/>

Giovanni

- Time Series
- Time Averaged Maps
- Comparisons
- Vertical Cross Sections

The screenshot shows the Giovanni Data Selection interface. The top navigation bar includes the GIOVANNI logo, the tagline "The Bridge Between Data and Science v 4.38", and links for Feedback, Help, and Log out (mstisdal). The main interface is divided into several sections:

- Select Plot:** A dropdown menu set to "Time Averaged Map".
- Select Date Range (UTC):** Fields for start and end dates and times, currently showing "00 : 00" to "23 : 59". A "Valid Range: 2000-04-01 to 2022-05-01" is displayed below, along with a red error message: "Please specify a start date."
- Select Region (Bounding Box or Shape):** A text input field containing "-180,-90,180,90".
- Select Variables:** A sidebar on the left with expandable sections: Observations (9), Disciplines (Atmospheric Chemistry (9) is selected), Measurements, and Platform / Instrument (AIRS (68), GEOS-CHEM (2), MERRA-2 Model (138), MODIS-Aqua (3), MODIS-Terra (2), MOPITT (9) is selected, OMI (7), TOMS EP (1), TOMS Meteor-3 (1), TOMS Nimbus-7 (1)). Below these are sections for Spatial Resolutions, Temporal Resolutions, and Portal.
- Number of matching Variables: 9 of 1967** and **Total Variable(s) included in Plot: 1**.
- Keyword:** A search bar with "Search" and "Clear" buttons.
- Table of Variables:** A table with columns: Variable, Units, Source, Temp. Res., Spat. Res., Begin Date, End Date, and Vert. Slice. The "Multispectral CO Mixing Ratio Profile (Daytime/Descending) (MOP03JM v008)" is selected.

Variable	Units	Source	Temp. Res.	Spat. Res.	Begin Date	End Date	Vert. Slice
<input type="checkbox"/> Thermal-Only CO Mixing Ratio Profile (Daytime/Descending) (MOP03TM v008)	ppbv	MOPITT	Monthly	1.0 °	2000-04-01	2022-05-01	500 hPa
<input type="checkbox"/> Thermal-Only CO Mixing Ratio Profile (Nighttime/Ascending) (MOP03TM v008)	ppbv	MOPITT	Monthly	1.0 °	2000-04-01	2022-05-01	500 hPa
<input type="checkbox"/> Thermal-Only CO Surface Mixing Ratio (Daytime/Descending) (MOP03TM v008)	ppbv	MOPITT	Monthly	1.0 °	2000-04-01	2022-05-01	-
<input type="checkbox"/> Thermal-Only CO Surface Mixing Ratio (Nighttime/Ascending) (MOP03TM v008)	ppbv	MOPITT	Monthly	1.0 °	2000-04-01	2022-05-01	-
<input type="checkbox"/> Thermal-Only CO Total Column (Daytime/Descending) (MOP03TM v008)	mol/cm ²	MOPITT	Monthly	1.0 °	2000-04-01	2022-05-01	-
<input type="checkbox"/> Thermal-Only CO Total Column (Nighttime/Ascending) (MOP03TM v008)	mol/cm ²	MOPITT	Monthly	1.0 °	2000-04-01	2022-05-01	-
<input checked="" type="checkbox"/> Multispectral CO Mixing Ratio Profile (Daytime/Descending) (MOP03JM v008)	ppbv	MOPITT	Monthly	1.0 °	2000-04-01	2022-05-01	500 hPa
<input type="checkbox"/> Multispectral CO Surface Mixing Ratio (Daytime/Descending) (MOP03JM v008)	ppbv	MOPITT	Monthly	1.0 °	2000-04-01	2022-05-01	-
<input type="checkbox"/> Multispectral CO Total Column (Daytime/Descending) (MOP03JM v008)	mol/cm ²	MOPITT	Monthly	1.0 °	2000-04-01	2022-05-01	-

At the bottom of the interface, there is a footer with the NASA logo, "Responsible NASA Official: Angela Li", "Web Curator: M. Hogue", "Privacy", "Powered By", and "Contact Us" links. On the right side of the footer, there are "Reset" and "Plot Data" buttons.

<https://giovanni.earthdata.nasa.gov>

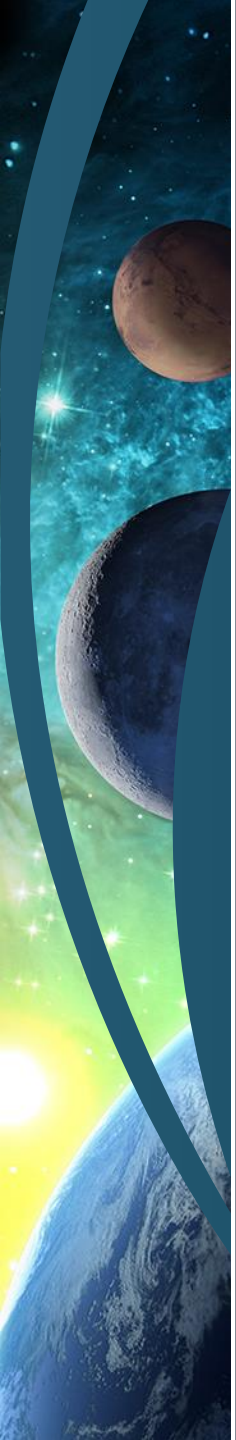
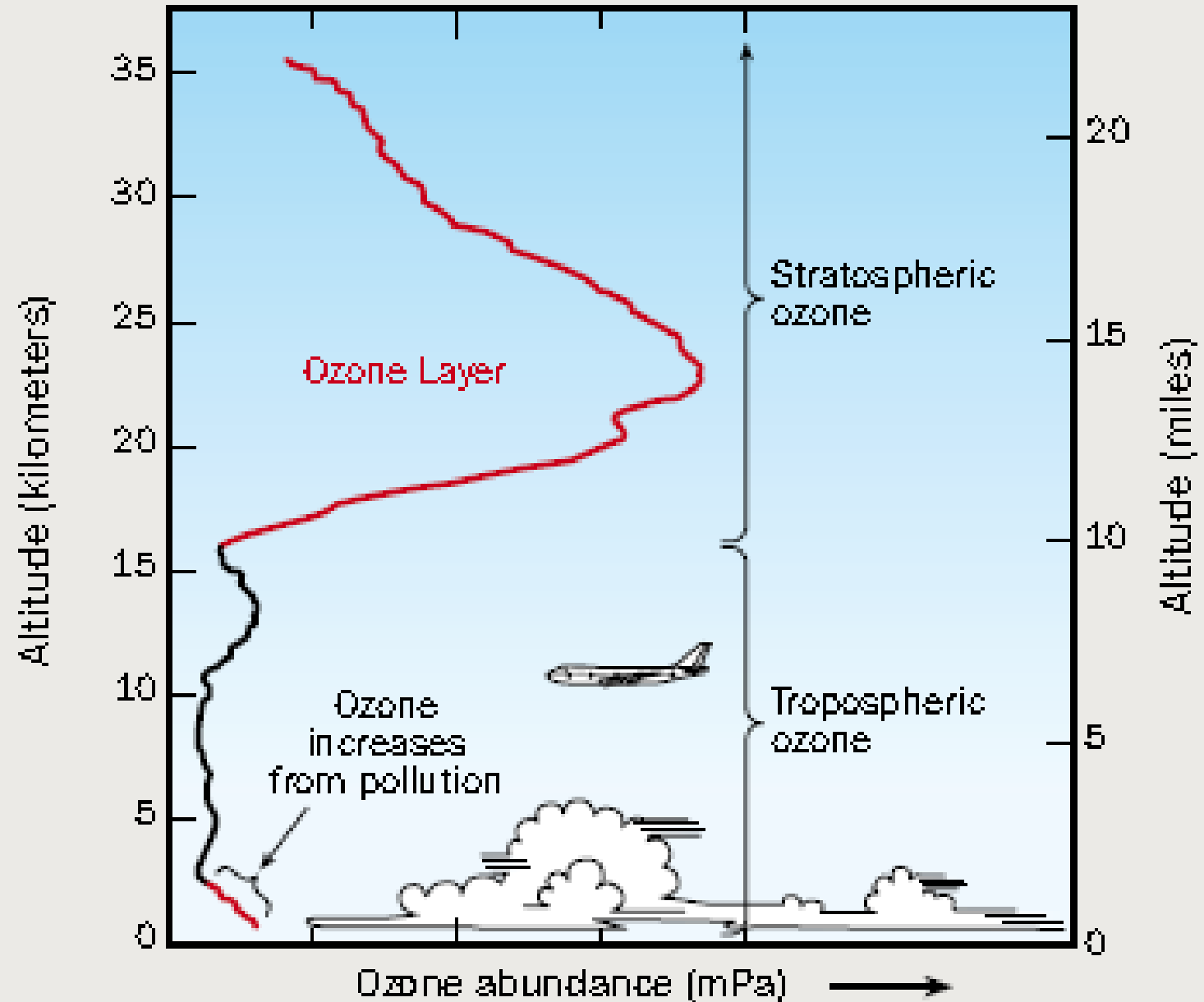


Figure Q1-2 Ozone in the atmosphere. Ozone is present throughout the troposphere and stratosphere. This profile shows schematically how ozone changes with altitude in the tropics. Most ozone resides in the stratospheric "ozone layer." The vertical extent or thickness of this layer varies from region to region and with season over the globe (see Q4). Increases in ozone occur near the surface as a result of pollution from human activities.

Ozone in the Atmosphere





What's different about TEMPO compared to other satellite instruments measuring air quality?

- TEMPO is geostationary v. polar-orbiting satellites (e.g., OMI, TROPOMI)
 - Limited Field of Regard (FOR): greater North America, not global coverage
 - Higher temporal & spatial resolution than polar-orbiting
 - More data: scans east-to-west during daylight hours (~18 scans per day)
 - Scans follow available daylight so they don't all start over the East coast
 - **Note: Granule #s don't correspond to specific geographic areas**—granules are used to divide a scan into more manageable file sizes (e.g., Scan 001 Granule 01 in the morning may start over East coast, but Scan 016 Granule 01 in the evening may start over central US)

