



Mission Overview

Aura was conceived as a scientific discovery mission, hosting a suite of instruments that constitutes an integrated observatory of atmospheric constituents. Nevertheless, its long stable data record supports multiple applied sciences communities and operational users:

❖ **Weather and atmospheric composition forecasting:**

improving forecast accuracy.

Key data products: most listed below.

❖ **Stratospheric O₃ monitoring and policy support:**

meeting commitments under the 1987 Montreal Protocol (arguably the most successful international environmental agreement ever enacted) and assessing the impact on stratospheric O₃ of plumes from volcanic eruptions and severe wildfires that penetrate the stratosphere.

Australian New Years Fires



USA Today



NY Times

Key data products:

Microwave Limb Sounder (MLS): O₃ profiles and column; profiles of temperature, water vapor, and trace gases related to chemical O₃ loss and atmospheric dynamics.

Undersea Hunga Volcanic Eruption



NASA/NOAA/NESDIS

❖ **Human health and air quality (AQ):**

providing long stable pollution records for exposure studies, assessing the effectiveness of pollution control strategies, constraining pollutant emissions, etc.

Key data products: **Ozone Monitoring Instrument (OMI):** columns of key air pollutants [nitrogen dioxide (NO₂), sulfur dioxide (SO₂), formaldehyde (HCHO), and ozone (O₃)]; dust and smoke aerosols; and surface ultraviolet (UV) index.

Nitrogen Dioxide (NO₂)



NASA SVS

Operational Users and Applications for Societal and Economic Benefit

Aura data continue to be of unique value to applied science stakeholders, including for situational awareness of short- and long-term events that informs national preparedness and resilience.

Weather and atmospheric composition forecasting

- ❖ **The European Centre for Medium-range Weather Forecasts (ECMWF)** uses MLS and OMI O₃ data to provide the backbone for their 5-d atmospheric composition forecasts, US users of which include the EPA, The Weather Channel, and CNN. ECMWF also assimilates these data in their meteorological and atmospheric composition reanalysis.
- ❖ **NASA Global Modeling and Assimilation Office (GMAO)** uses MLS and/or OMI O₃ data in most of their official assimilated products. For operational analysis and forecasting, they assimilate near-real-time (NRT) MLS and OMI O₃ data into GEOS-FP to produce initial conditions for 10-d meteorological forecasts. GEOS-CF is initialized using NRT MLS and OMI O₃, which greatly improves the resulting forecast accuracy. For reanalyses, MERRA-2 assimilates OMI and MLS O₃ along with MLS temperature profiles. M2-SCREAM assimilates multiple additional MLS species. GEOS-CR, under development, will assimilate OMI O₃ and NO₂, as well as O₃ and several other trace gas products from MLS.
- ❖ **Naval Research Laboratory (NRL)** relies on MLS across a range of applications, from data assimilation for numerical weather prediction (NWP) to the monitoring of stratospheric clouds. NRL also leads NASA's INSPYRE airborne campaign, which will study the effects of pyroconvection in the lower stratosphere in 2026 and 2027. For this effort, MLS NRT data will support flight planning, and MLS products will provide invaluable spatial and temporal context for data collected during the campaign.



Stratospheric O₃ monitoring & policy support

A reduction of stratospheric O₃ increases surface UV radiation, negatively affecting human health and crop yields. The suite of MLS products, some unique, is used to support NASA's Congressional mandate under the Clean Air Act to assess the health of the stratospheric O₃ layer (e.g., 2026 World Meteorological Organization (WMO) Ozone Assessment, in preparation). Unique MLS data are essential for monitoring and understanding the impacts of the 2022 eruption of the undersea Hunga volcano on stratospheric composition (e.g., 2025 WCRP report). See MLS publications.



Human health and AQ

The long stable OMI records are valuable for human health and AQ stakeholders (e.g., EPA Air Trends Report, surface net O₃ production, and human health studies) as shown in numerous OMI publications, including to evaluate products from AQ satellites (e.g., TROPOMI and TEMPO).

