


Stratospheric Aerosol and Gas Experiment III/ISS

A photograph taken from the International Space Station (ISS) showing two astronauts in white space suits working on a large, rectangular solar panel array. The array is composed of many smaller solar cells and is mounted on a complex metal structure. The Earth's surface is visible in the background, showing blue oceans and white clouds. The sky is black, and the station's structure and equipment are visible in the foreground.

SAGE III/ISS Mission Team

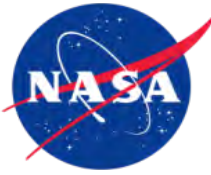
04 November 2021

sage.nasa.gov

Image Credit: NASA Astronaut Ricky Arnold

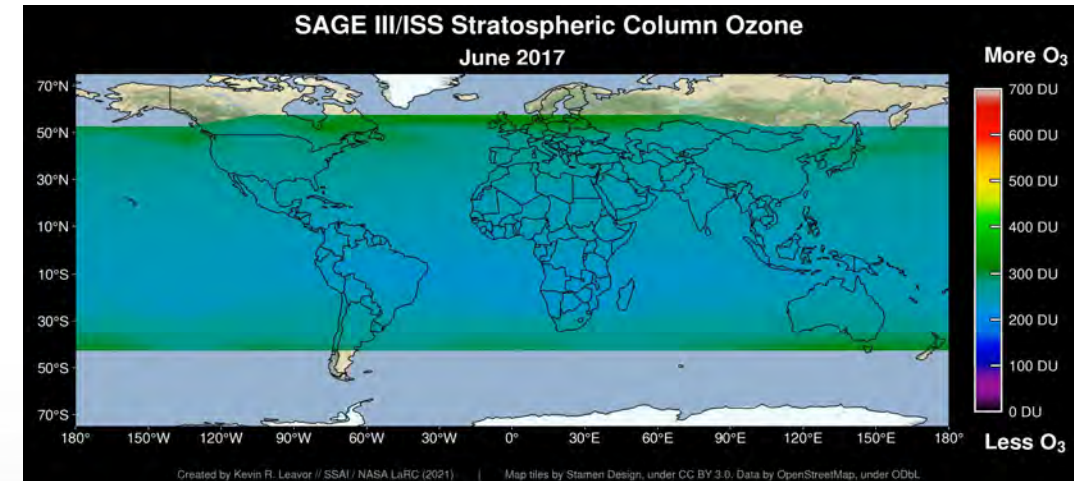


SAGE III/ISS Overview



- **SAGE produces high vertical resolution profiles of aerosols, ozone, water vapor, and other trace gases in the stratosphere and upper troposphere using the very stable occultation technique**
- **Core element of WMO International Ozone Assessment and WCRP SPARC**
- **Acquired >40k occultation events June 2017 - October 2021; No COVID-19 related data loss**
- **Transitioned to extended mission after successful 2020 Senior Review & End of Prime Mission Review**
- **New algorithm (V5.2) w/ improved water vapor**
- **ROSES Science Team, 2nd cycle, selected**
- **27 peer-reviewed papers using SAGE III/ISS data products, with others in review**
- **Vibrant internship program with ~5 NIFS students/yr (1024 applicants for summer 2021!)**

STRATOSPHERIC OZONE





SAGE III/ISS Operations



- **With support from HQ, LaRC, ISS Program and Payload Operations Center (MSFC) operated throughout COVID-19 era with no reduction in data efficiency or risks to SAGE personnel or hardware.**
- **Update of flight software in mid-July during high solar beta when nominally no solar science is obtained**
- **Payload is operating within nominal limits**
- **Contamination Monitoring Package (CMP) data to be available at Materials and Processes Technical Information System ([MAPTIS](#)) – See Tyler Dawson presentation today for examples of CMP data**
- **See presentation by the Mission Operations Manager (aka MOM) Jamie Nehrir today for more (better) details**



SAGE III/ISS Data Products



- **Newly released updated version of processing algorithm, v5.2, (<https://search.earthdata.nasa.gov/search?q=SAGE%20III/ISS>)**
 - V5.1 still available for Jun 2017-Feb 2021
- **See R. Manion [presentation](#) at Oct. 2020 STM for more details**
- **Important characteristics:**
 - Major improvement in stability of H₂O
 - Wavelength map and channel band pass refined:
 - H₂O increased by ~10%
 - NO₂ decreased by ~7%
 - O₃ about the same
 - No vertical smoothing applied so users can see full resolution
 - Increased layer-to-layer variability
 - Users can average as they see appropriate

- V5.1 DID apply smoothing
- V5.2 does NOT apply smoothing



Current and Near-term Work



- **Mission recently completed informational [video](#)**
- **Flight software updated in July 2021**
- **Prepared for addition of Multiple Logistic Module (MLM) to ISS configuration**
 - Configuration for which the SAGE payload was designed
 - Updating blockage prediction tools
- **Data visualization tools for mission team and web-site**
- **Algorithm Improvements**
 - Main focus is Level 1 product (Transmission)
 - See presentations by Marsha Larosee and Darrell Dolliver today for two examples
- **Evaluation of internal validation activities and correlative data sets**



Algorithm Improvement Objectives



➤ **Level 1 SOLAR Spectral Transmission**

- Review SAGE III & SAGE II Software & implement practical elements of SAGE II
- Organize code to improve maintenance and support improved product flags
- Utilize data from Disturbance Monitoring Package (DMP) in processing of Level 1 Transmission product (See M. Larosee)

➤ **Review/Improve QA Flags**

➤ **Improve Automated Filtering of Bad or Contaminated Events**

- Leading cause is partial blockage by ISS or visiting vehicles

➤ **Advance maturity of Meso. O₃: Beta -> Research (See D. Dolliver)**

➤ **Increase vertical resolution of input meteorological fields**

➤ **Determine cause of 520nm aerosol ext. coef. low bias**

➤ **Stabilize H₂O in upper stratosphere**



New Data Files/Products



➤ Gather single event granules into a “monthly” file (netcdf)

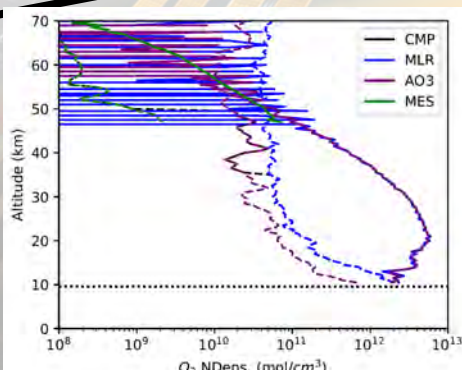
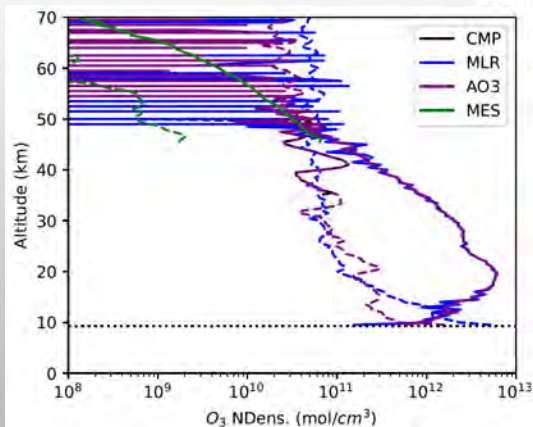
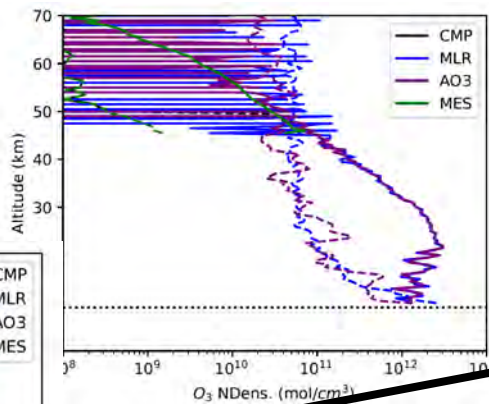
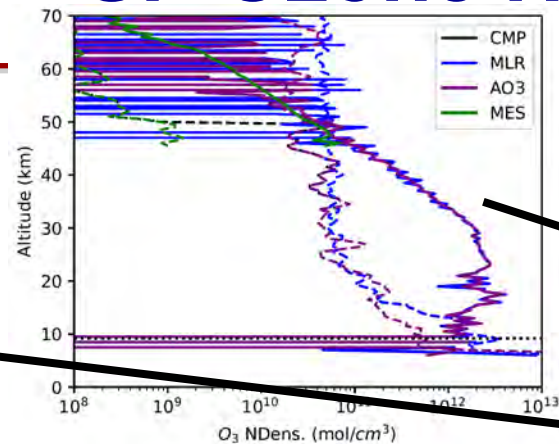
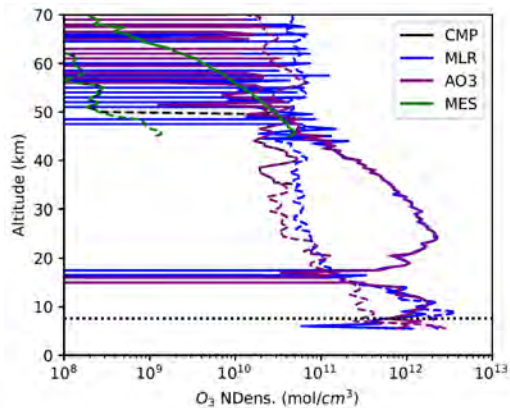
- Same content as single event files, but for ~ month
 - Last day of previous month thru next to last day of current month
- Available via Atmospheric Science Data Center (DAAC) starting in late November

➤ Level 3 Cloud Filter

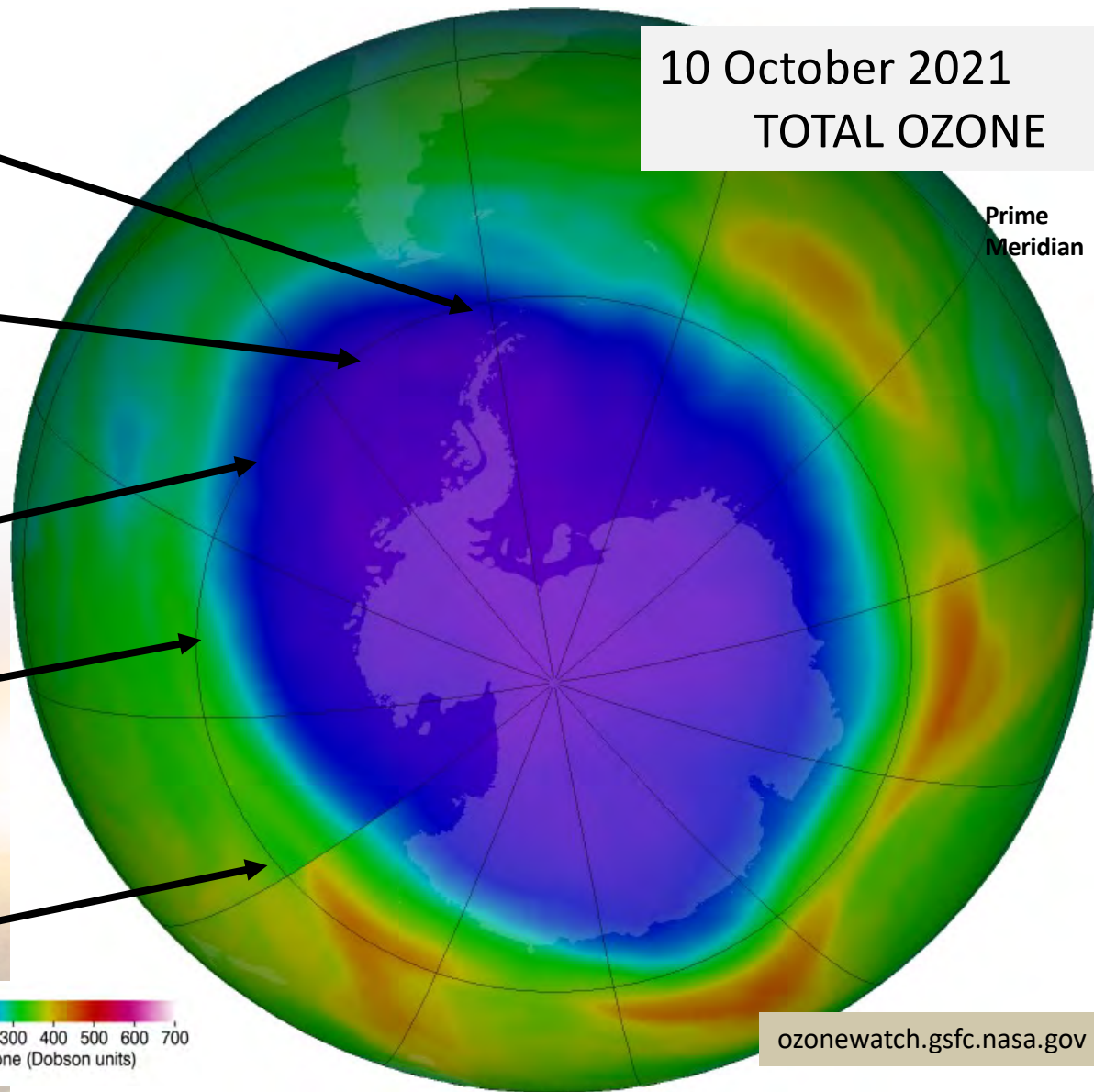
- Using aerosol extinction coefficient profiles to identify altitudes possibly contaminated by clouds on an event-by-event basis
- AGU invited talk "SAGE III/ISS aerosol/cloud categorization and its impact on GloSSAC" by Mahesh Kovilakam in A14B. Advances in remote sensing and modeling of vertical distributions of aerosols and clouds
- Release is expected before next Science Team Meeting 😊
 - Released on monthly cadence (same as current products)



SP Ozone Hole & SAGE III/ISS



10 October 2021
TOTAL OZONE



ozonewatch.gsfc.nasa.gov