



SAGE III / ISS

Stratospheric Aerosol and Gas Experiment

An Earth Science Mission on the International Space Station

Data Product Status (2024 Edition)

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SAGE III/ISS Science Computing Facility





The “SCF”



➤ The Team

- Robbie Manion, Mike Heitz, Marsha Larosee

➤ What We Do

- Maintain, develop, and operate the algorithms which process SAGE III/ISS data into vertical profiles of aerosol and gas species

➤ Where

- Four dedicated servers at LaRC

➤ When

- Daily product generation with “expedited” processing (GEOS-IT Met)
- Monthly product releases with 3-8 week latency (MERRA-2 Met)



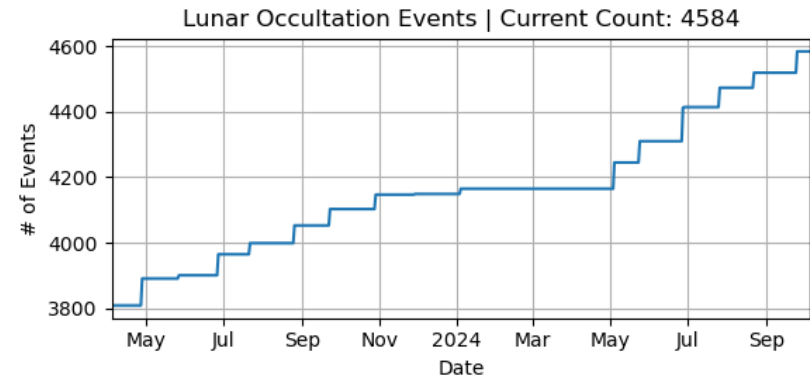
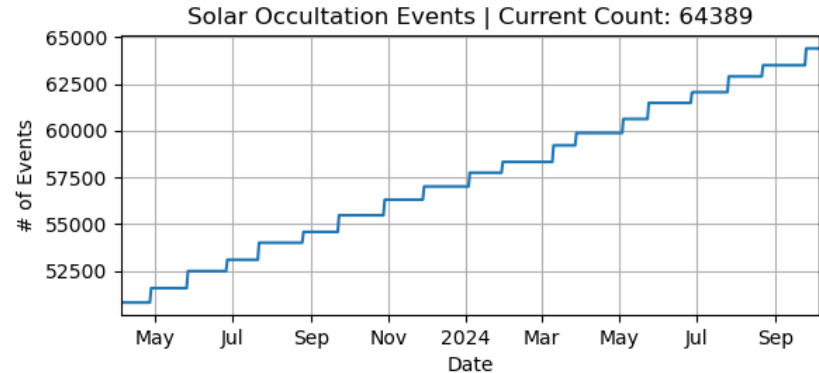
➤ Products

- Level 1 and Level 2 products for solar occultation; Level 2 for lunar
- Event-by-event: unformatted, HDF5
- Whole month: netCDF4
- Distributed by [Atmospheric Science Data Center](#)

➤ Lunar hiatus

- Aging CCD led to lunar acquisition troubles
- Resolved by change to the instrument's acquisition parameters

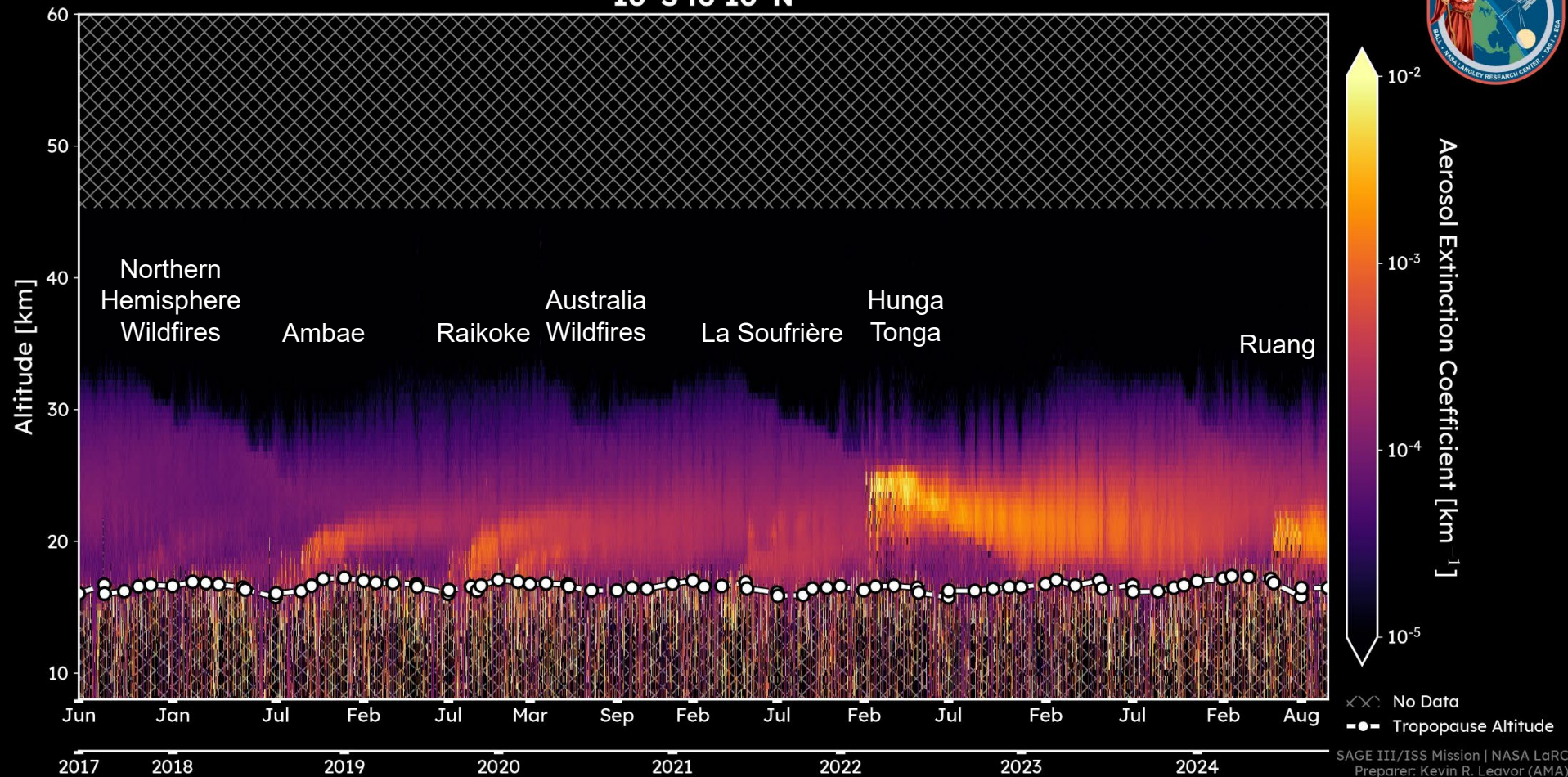
SAGE III/ISS v05.30 Product Availability from ASDC by Date





SAGE III/ISS 1021nm Aerosol Extinction Coefficient - Mission Overview

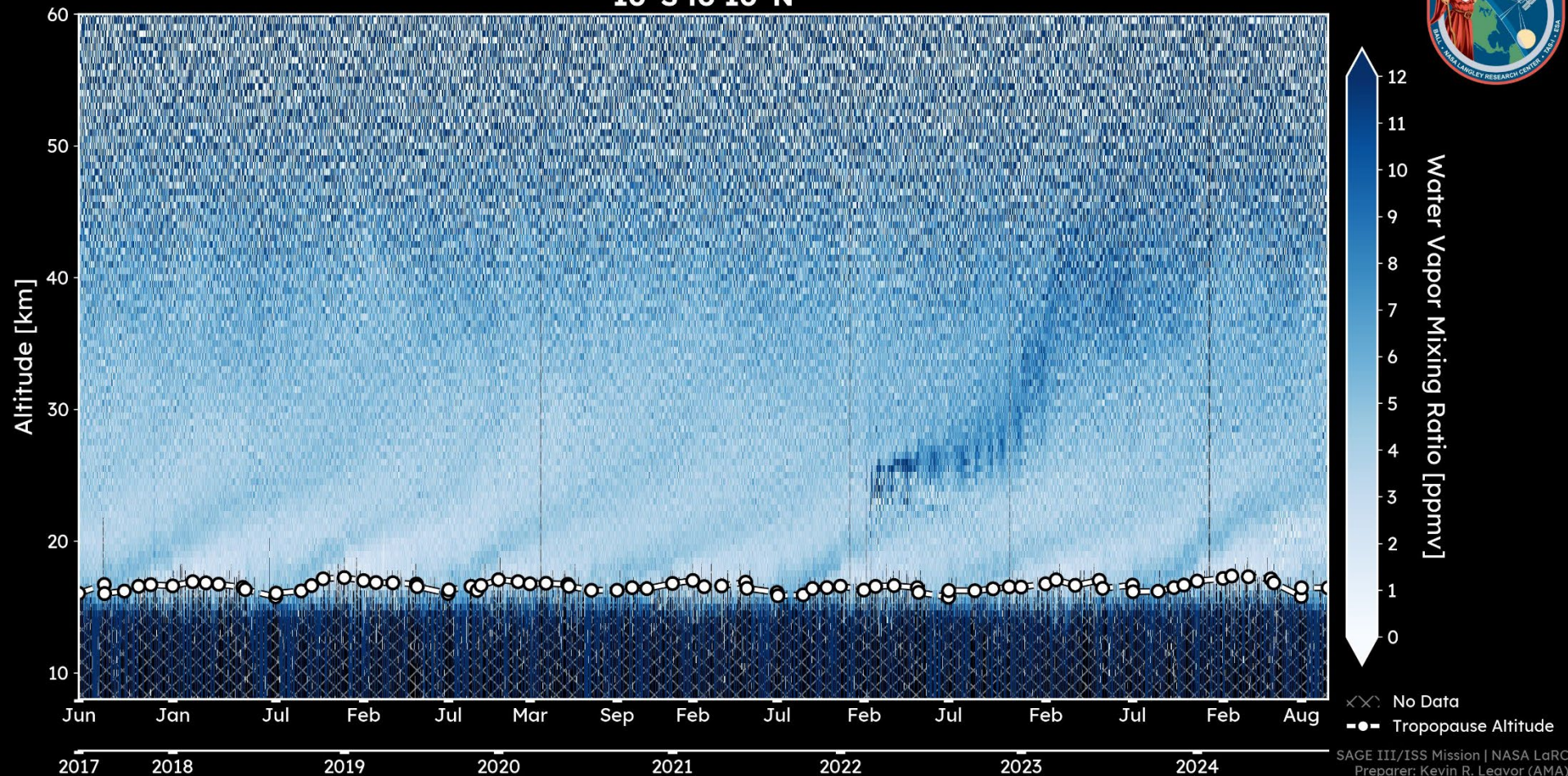
10°S to 10°N





SAGE III/ISS Water Vapor Mixing Ratio - Mission Overview

10°S to 10°N





Announcing version 6.0



- **Expected release January 2025**
- **6.0.0-alpha is available**
- **Now processing 6.0.0-beta**
- **Warning: product file changes!**
 - For us, the changes resolve some significant maintainability issues.
 - For you, we'll still deliver the usual products, but names and groupings will be a little different in our readers and formatted (HDF5, NetCDF) product files.
 - lowercase_underscore_separated naming convention, for example
 - You'll also see improved documentation, usability, flexibility, and consistency, especially around our Python reader.
 - As a stopgap for your existing code, we'll provide a wrapper for the new Python reader which emulates the v5.3 Python readers.



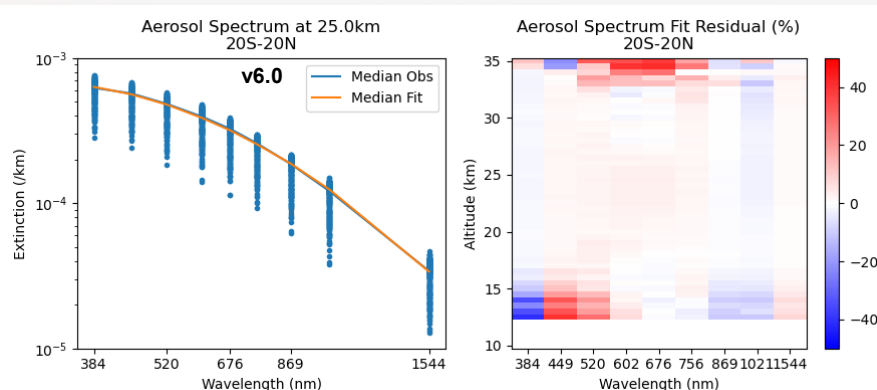
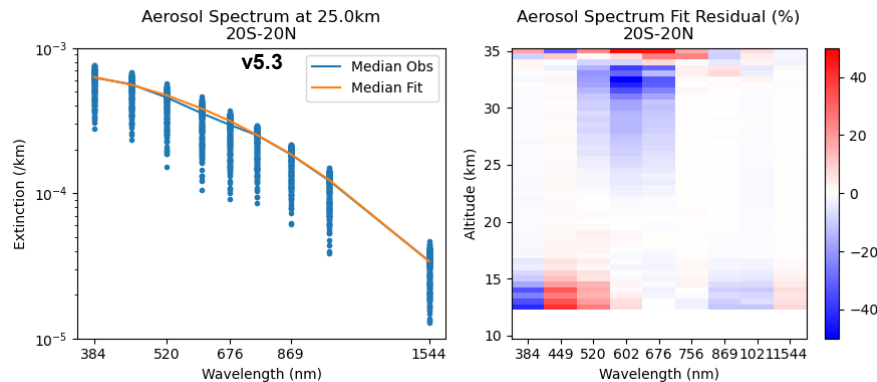
Version 6.0 Improvements



➤ Saying “so long” to the “seagull”

- Aerosol extinctions at 520 nm, 602 nm, and 676 nm have been persistently smaller than what would be expected by the power law.
- We changed the ozone cross section source from [SCIAMACHY version 3.0 \(2004\)](#) to [Serdyuchenko-Gorshchev version 1.0 \(2014\)](#).
- The aerosol extinction spectrum we retrieve now fits much better with the power law model.

June 2021 | 244 events



Status: In 6.0

October 16, 2024

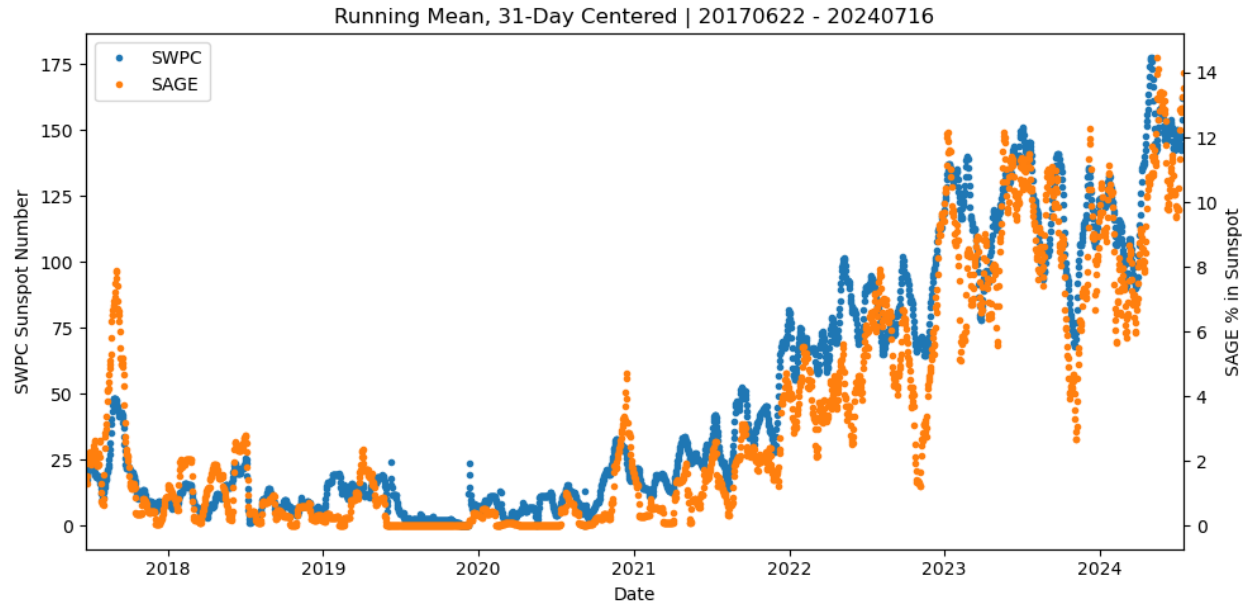


Version 6.0 Improvements



➤ Recovering profiles lost to gaps

- When there are too few valid samples to estimate atmospheric transmission, we can lose altitude bins resulting in onion-peeling failures.
- We now linearly interpolate through up to three consecutive missing bins.
- This amounts to hundreds of recovered profiles.



Status: In 6.0

October 16, 2024

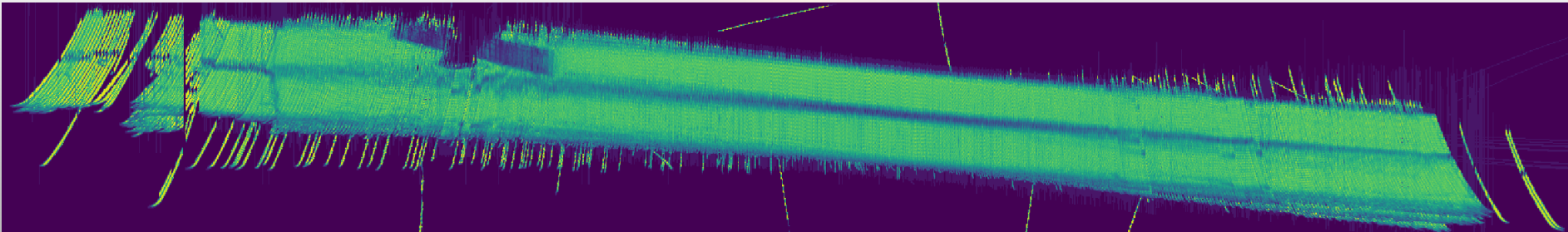


Version 6.0 Improvements



➤ Filtering blockages

- ISS modules can partially block line-of-sight, causing oddities in retrieved profiles which aren't always detected by automated QA.
- We mapped blocking modules in our elevation and azimuth domain. At run-time we can consult an ISS manifest to drop scans that venture too near an active blockage zone.
- Prototype code changes were developed and tested in July with promising results.



Status: In development



Version 6.0 Improvements



- Incorporate particle size distribution for our solar level 2 product files (**In review**)
- Incorporate cloud/aerosol flagging for our solar level 2 product files (**In development**)
- Improve estimations of uncertainty (**In 6.0**)
- Recover of disturbance monitoring package-based pointing correction where it was missing (**In 6.0**)
- Remove unpopulated products, add some ancillary information like sunspot percentage, and replace QA bit flags with self-documenting Boolean values (**In 6.0**)



Beyond 6.0.0



➤ Expect patching as necessary, like we did for 5.3

- You'll see patch number increments like **6.0.1**, **6.0.2**, etc. which are still collectively part of "6.0". There's no back-processing for patches as they are only for minor changes and bug fixes which don't compromise reproducibility.

➤ What are we thinking for 6.1.0?

- Additional products
 - Retrieved meteorological profiles
- Algorithm (re-)development
 - Level 1: Improve on-target positioning and altitude registration, refraction, stray light correction
 - Level 2: Improve water vapor



Thanks!



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