National Aeronautics and Space Administration

SAGE III/ISS

Stratospheric Aerosol and Gas Experiment

An Earth Science Mission on the International Space Station

Data Product Status (2023 Edition)

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The “SCF”

The Team

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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 FP-IT Met)
- Monthly product releases with ~3 week latency (MERRA-2 Met)

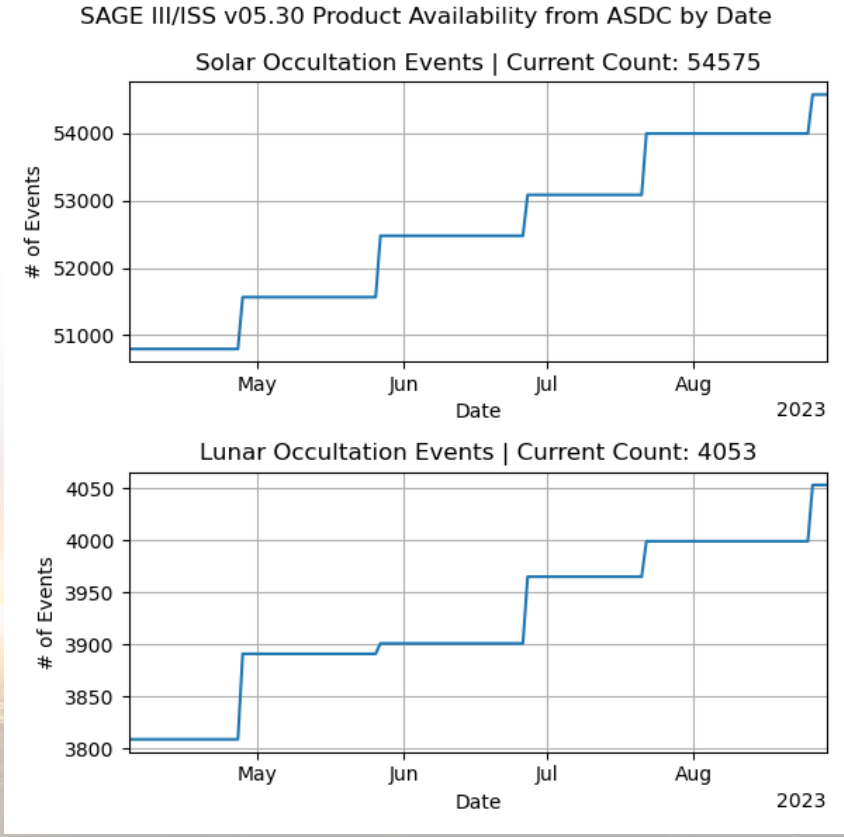
Version 05.30

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

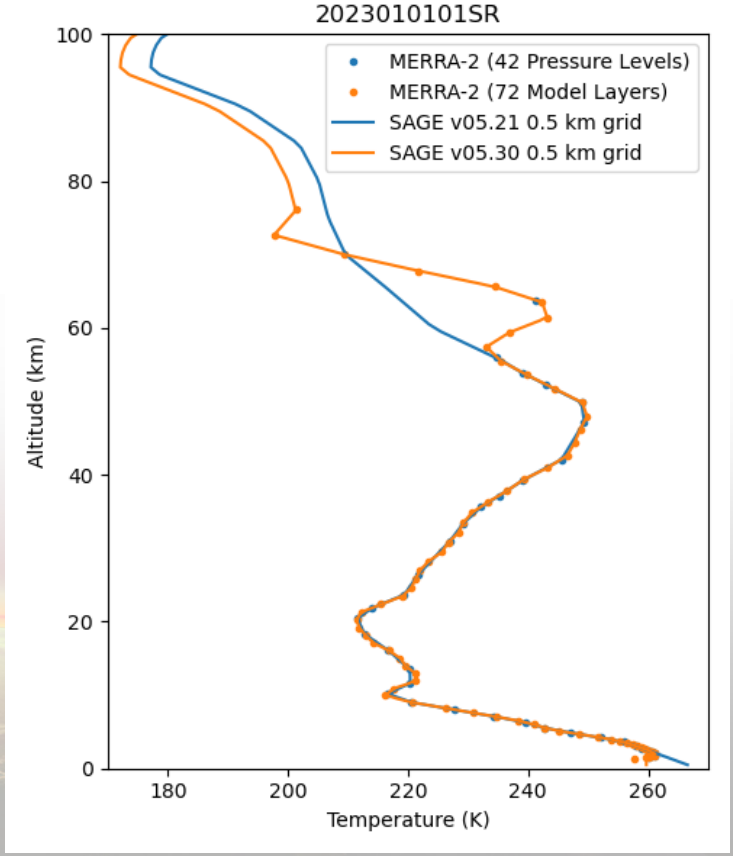
New in v05.30: Full calendar months

- Previous version postponed processing the final day of the month to the next month's processing



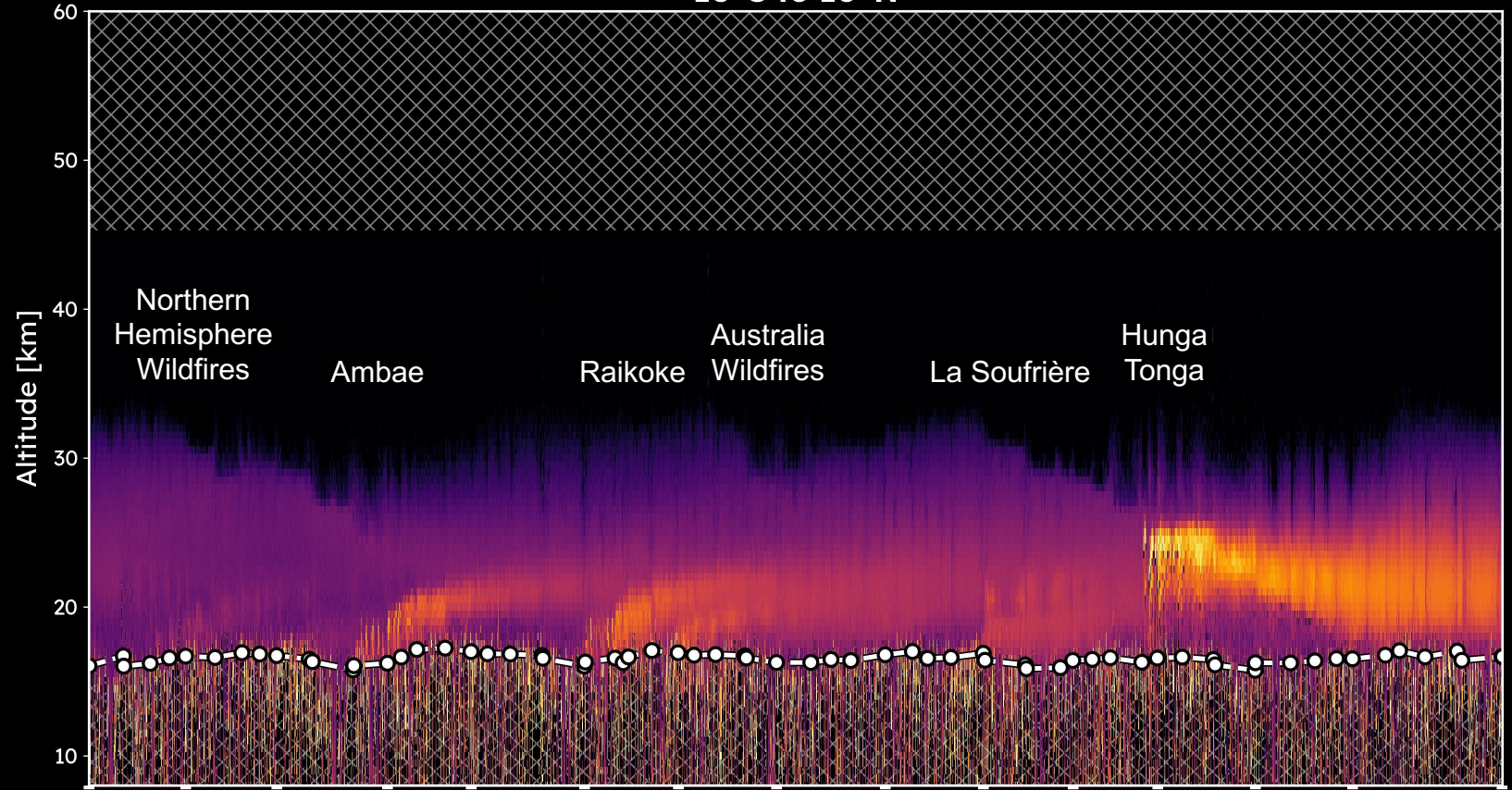
Also New In v05.30

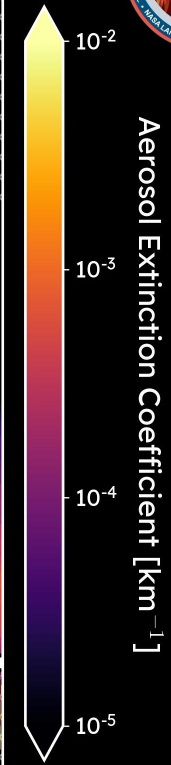
- **Disturbance Monitoring Package (DMP) used for pointing correction**
  - Improved solar position registration → improved transmission calculation, altitude registration
- **60+ events recovered from overzealous automated QA**
  - Mostly Hunga Tonga observations
- **Some data quality flags restored**
- **Meteorological input changed (higher extent, better resolution)**



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

10°S to 10°N





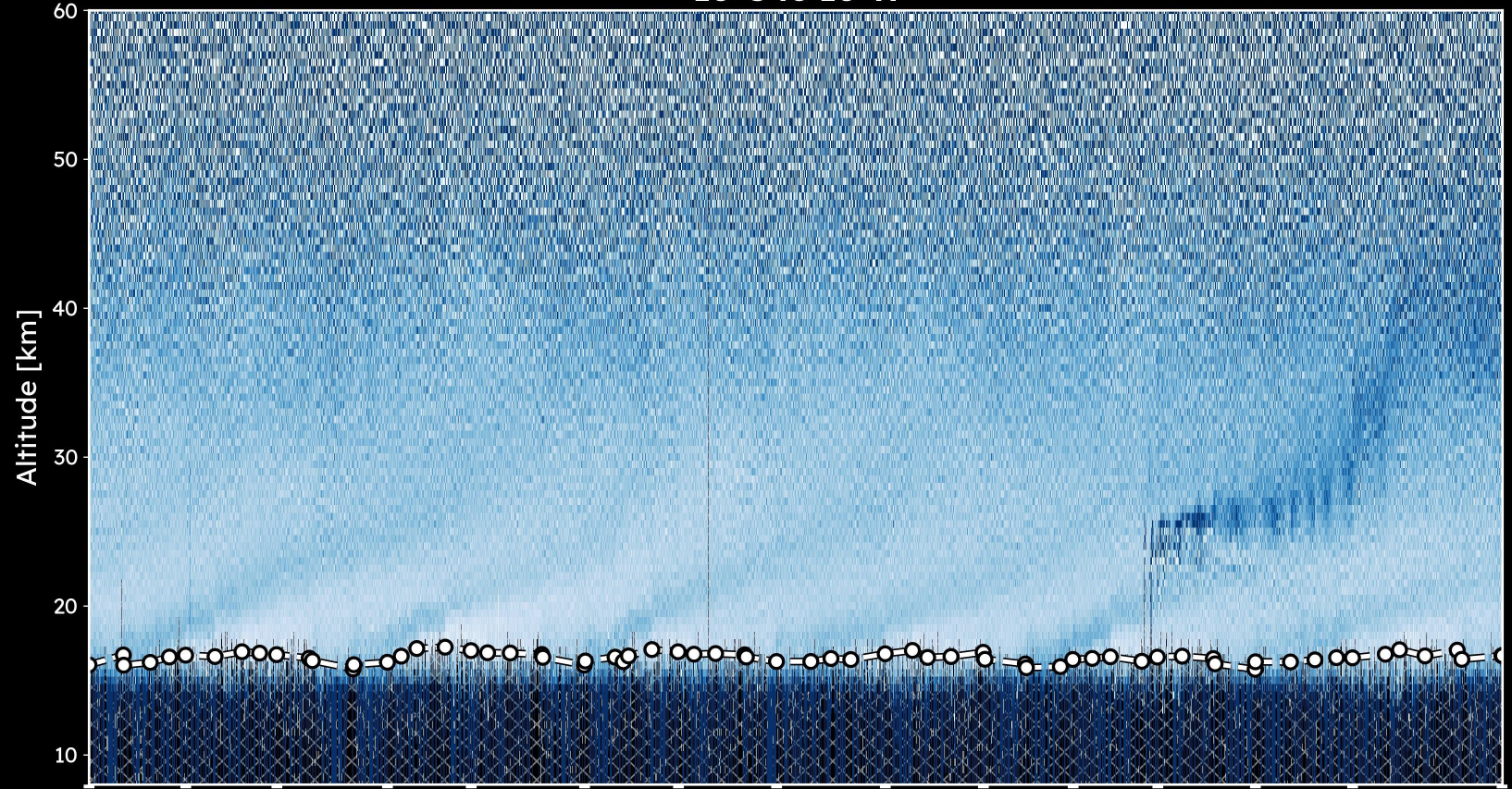
No Data

Tropopause Altitude

SAGE III/ISS Mission | NASA LaRC
Preparer: Kevin R. Leavor (AMA)
Generated 2023-08-26 14:00
Data Version: 5.3

SAGE III/ISS Water Vapor Mixing Ratio - Mission Overview

10°S to 10°N



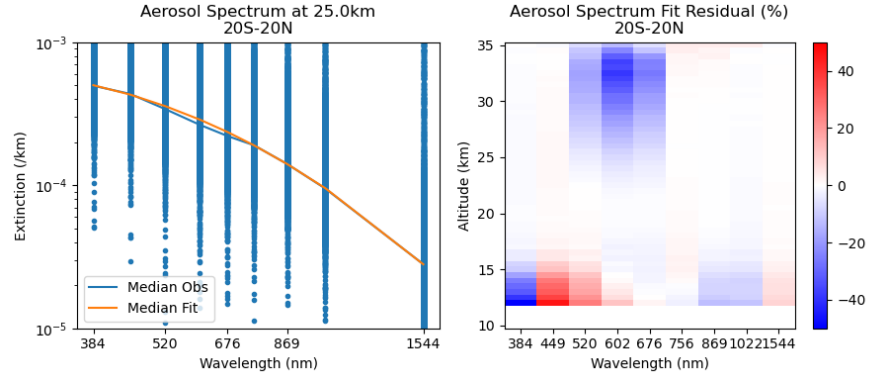
No Data

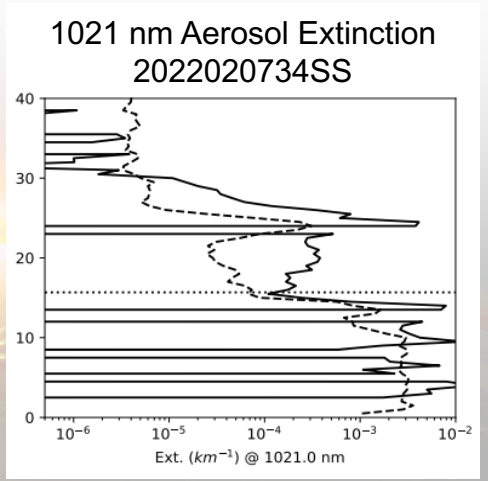
Tropopause Altitude

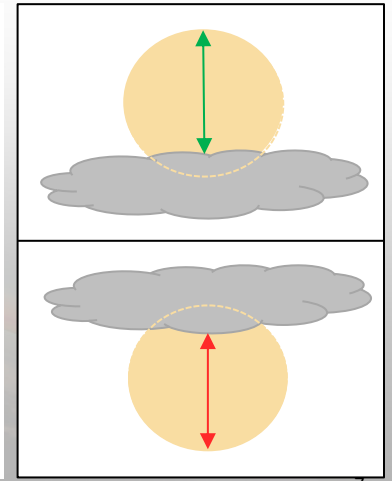
SAGE III/ISS Mission | NASA LaRC
Preparer: Kevin R. Leavor (AMA)
Generated 2023-08-26 14:00
Data Version: 5.3

Previously Known Problems

- "Aerosol seagull"
- ~~Physical disturbances flagged but not otherwise accounted for~~
- ~~Data quality flags largely unpopulated~~
- Misregistration of data in the presence of optically thick layers (top-edge obscuration)
- ~~Overzealous automated QA following Hunga Tonga eruption~~

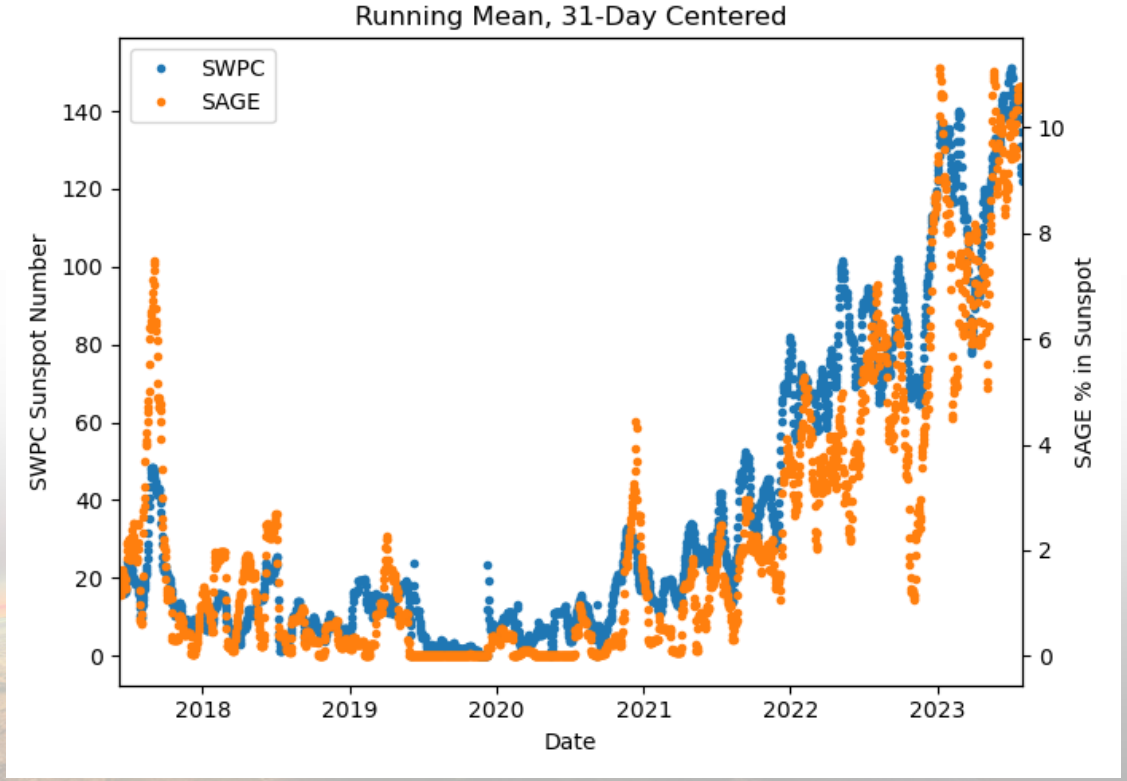






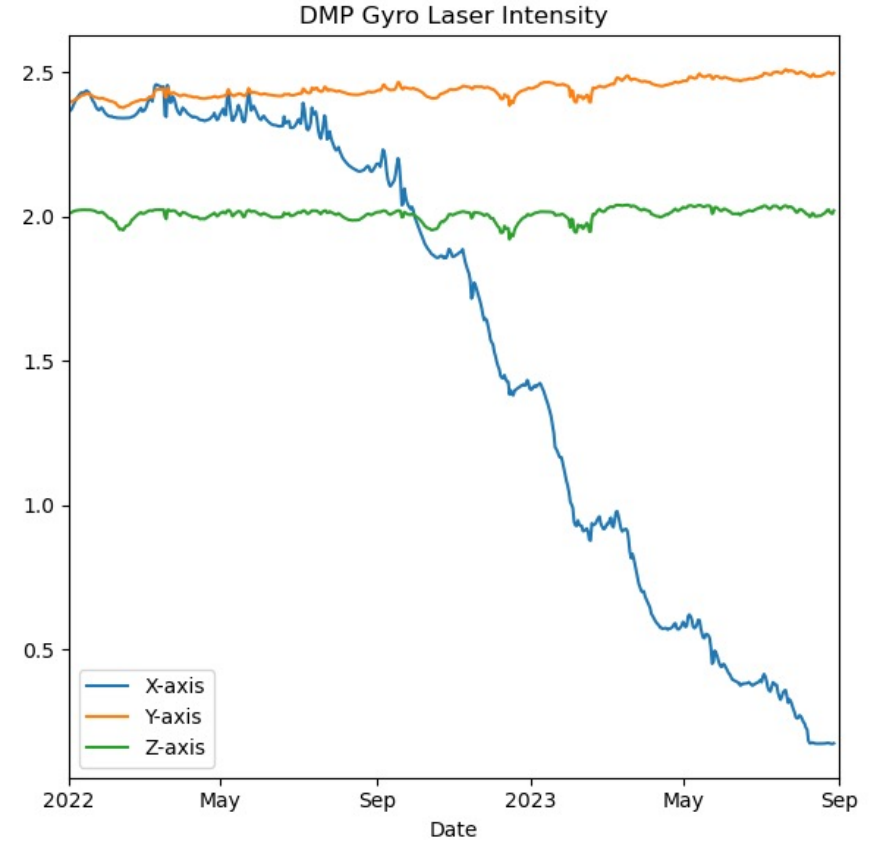
Newly-Identified Problems

- **An increasing number of events impacted by sunspots**
  - Algorithm detects sunspots and drops affected datapoints
  - Sometimes leaves us with empty altitude bins in the level 1 (slant-path transmission) profile
  - Results in species profiles that are incomplete, triggering our automated QA
- **Currently experimenting with mitigations in the algorithm**



Newly-Identified Problems

- One of three gyro axes on the Disturbance Monitoring Package has failed
- More on this from Charles Hill in the next talk
- Luckily not the most consequential axis for our pointing correction
- Data from this axis is no longer reliable and must be removed from the pointing correction



Announcing v05.30 Patch 1

- **Motivated by need to accommodate the DMP X-axis failure**
- **Ensures continuity of the pointing correction introduced in v05.30**
- **Patch 1 software is in use starting with the events of 1-August 2023**
  - DMP X-axis screened out of pointing correction starting with the events of 3-August 2023 (date parameter added to algorithm)
- **Does not affect reproducibility of products for events before 1-August, hence the "patch" rather than a version increment**
- **Release notes are being updated to describe Patch 1**
- **Also: Python readers are updated to accommodate the deprecation of some NumPy data type aliases**
  - Completely backward-compatible

Ongoing Work

Algorithm (re-)development

- Level 1: improvements to on-target position & altitude registration, refraction, stray light correction
- Level 2: improvement to water vapor and aerosol products

Housekeeping for existing products

- File formats, extensions (.h5, .dat, .nc4), documentation
- Improved versioning, behind-the-scenes info (input specifics, compiler info, etc.)

Additional products

- Level 3 aerosol/cloud categorization product – see Mahesh Kovilakam's paper
- Retrieved meteorological profiles – see Michael Pitts's talk tomorrow

Thanks!

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We speak… GitHub python™ F

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