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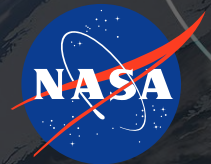


An Overview of OMI Collection 4

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Sentinel-5P Mission: 5 years anniversary
10 - 14 October 2022 | Taormina, Italy



What is a Collection?

L2 products



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- Collections are umbrella versions for L1 & L2 products for a satellite instrument mission.
- Incrementing an instrument's collection number indicates a change at the least in calibration of the Level 1B product.
- Level 2 products using the new Level 1B inherit the new collection number; algorithms may also change.



- UV-Vis grating spectrometer built by the Netherlands and Finland (2 x CCD).
- Operating on Aura since 2004 in afternoon orbit.
- Very stable instrument calibration and performance.
- Swath coverage is reduced due to obstruction of entrance slit by insulating material outside the instrument ("row anomaly").

Band	Total range	Average spectral resolution (FWHM)
Band 1 (UV-1)	264–311 nm	0.63 nm
Band 2 (UV-2)	307–383 nm	0.42 nm
Band 3 (VIS)	349–504 nm	0.63 nm



- Address OMI instrument degradation.
- Enhance the quality of OMI Level 1B products.
- Facilitate and promote synergy with TROPOMI.
- Prepare for Aura future operations & post-mission.
- Reduce OMI project overhead.
- Last OMI collection was released 2006.

"Make a habit of two things—to help, or at least to do no harm." - Hippocrates



Processing Algorithms and Software

- Entirely new L0-1b processor and correction algorithms (TROPOMI based)
- L2 Science algorithm updates

Instrument Calibration

- Degradation corrections
- Revised calibration
- Full reconstruction of calibration chain

Operations and Monitoring

- Thermal Stabilization
- Baseline Operations
- Preparations for A-Train Exit
- Calibration trending

Major coordination effort between NASA & KNMI,
L1B & L2 teams, Science & Support Teams

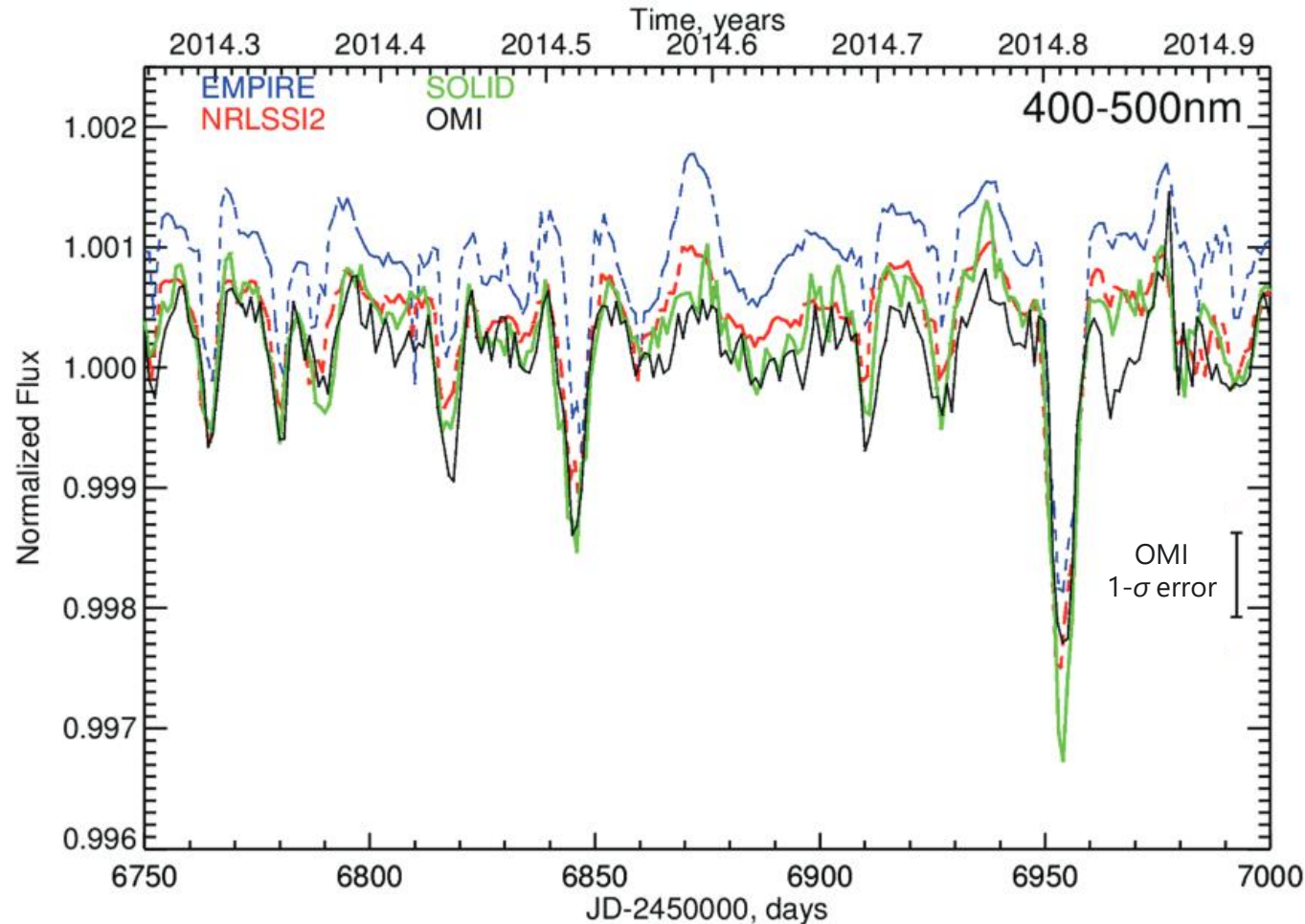
Aura/OMI Solar Spectral Irradiance (SSI)



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- Stable and precise measurements of SSI over 3 solar cycles [$\sim 0.1\%$ uncertainty, 265-500-nm.]
- Facilitating validation of leading solar models and independent data sets (Marchenko et al. 2019).
- Unique source of validation for TSIS-1/SIM.
- Being used to develop next-generation high-resolution solar models to serve the climate community (Lean et al. 2022).

OMI Antarctic Ice Radiance Trends



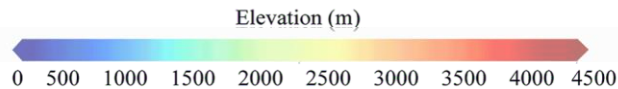
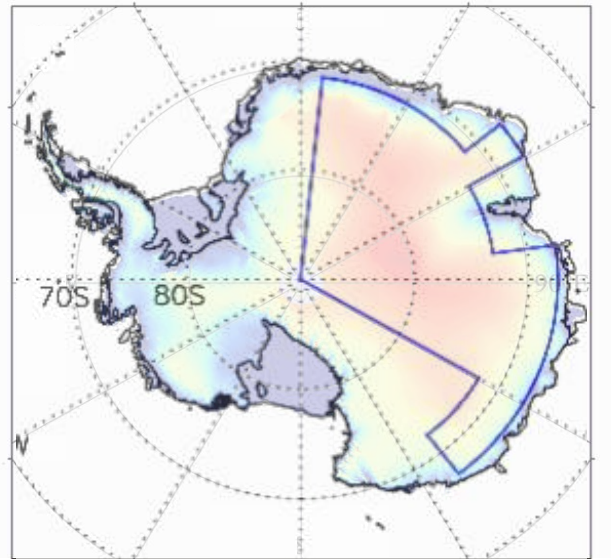
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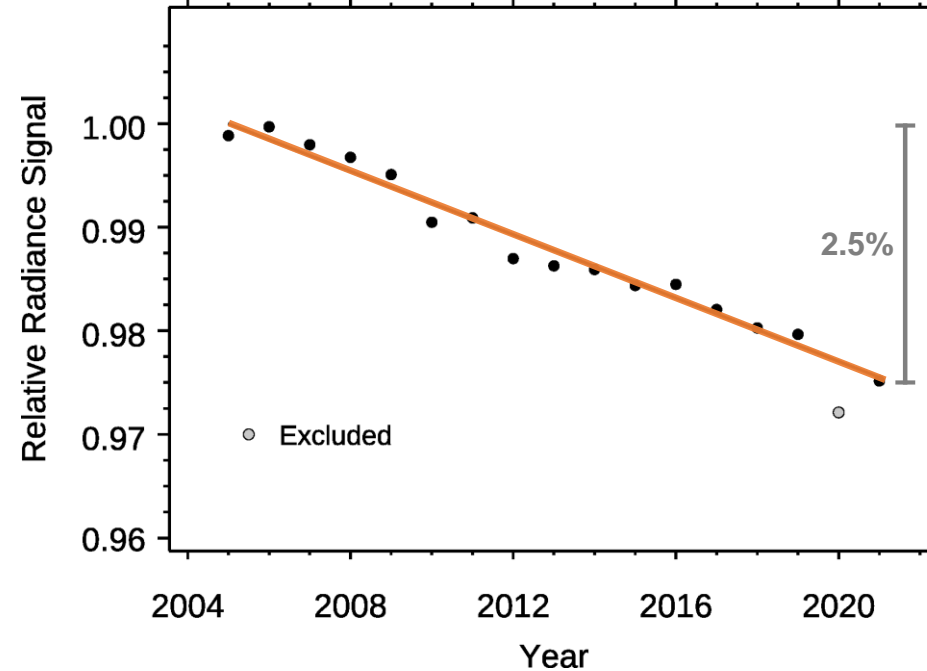
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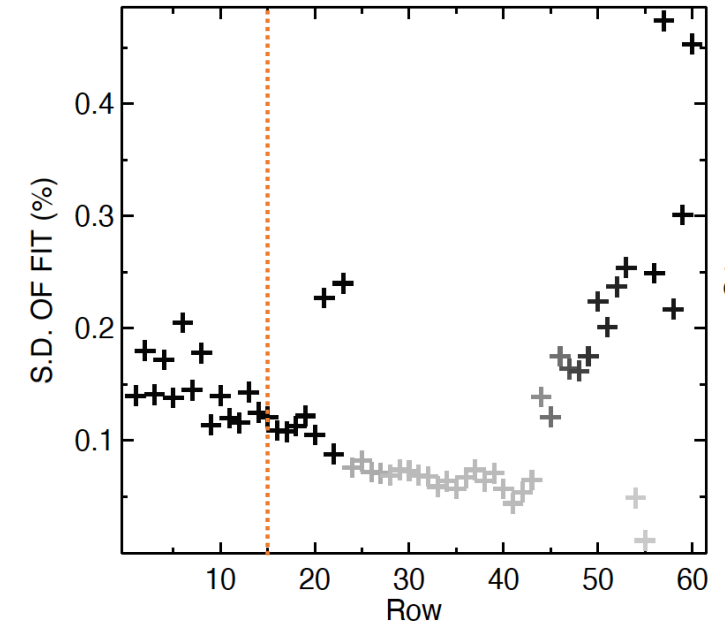
Sampling Region (SZA=55-65)



Antarctica January Row 15 SZA=55-65



Standard Deviation of Fit, All Rows



- Method used in Collection 4 (Col 4) to correct absolute drift in OMI radiance channel.
- Stable Aura orbit → OMI view angles are highly repeatable.
- Directional variation in reflectance is of lesser concern.
- Assumption that changes in ice reflectance are smaller than instrument changes.
- Uncertainty due to variations in aerosols → screen outliers (2019 Australian Wildfires?)

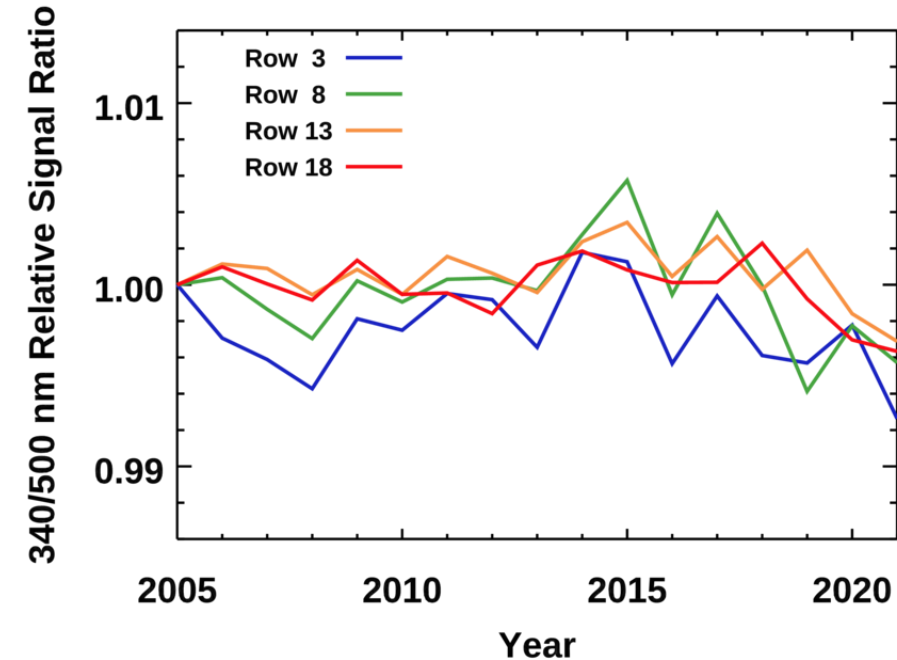
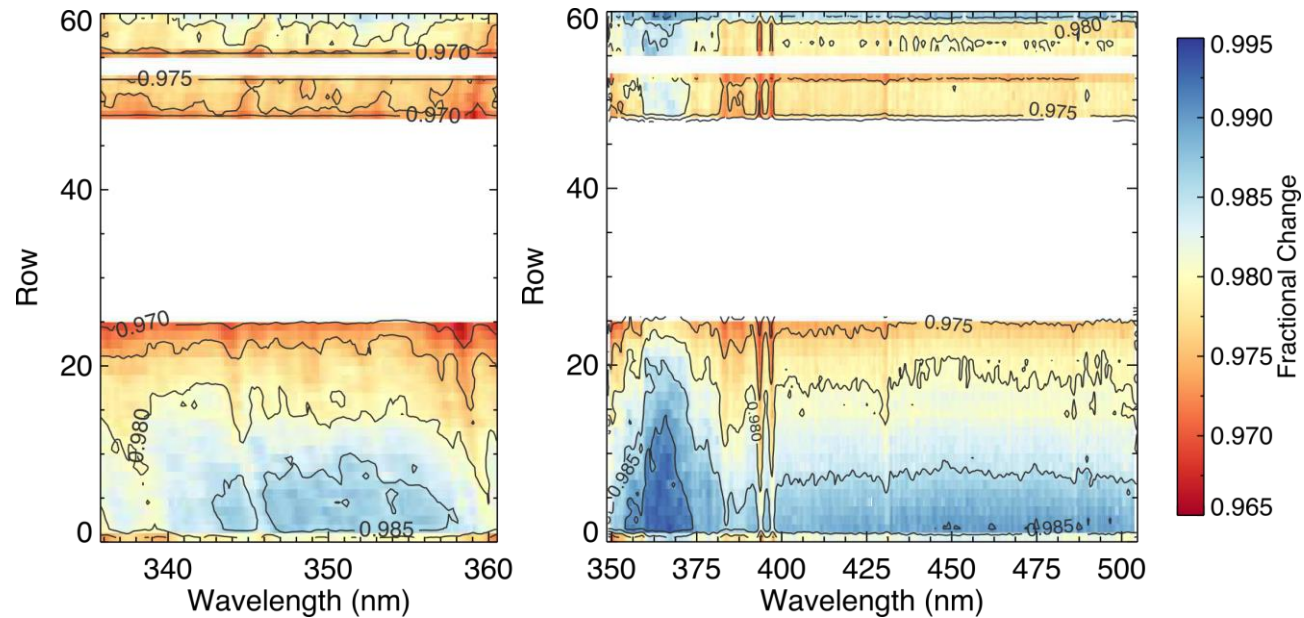
Spectral Drift in OMI Ice Radiances



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- No evidence of significant spectral drift.
- Qualifications on previous slide apply.
- Col 4 radiance correction is independent of λ .

Conclusions



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- OMI calibration and L01b correction algorithms have been updated for Collection 4.
- Radiance and irradiance degradation are now both corrected.
- Pixel flagging is significantly improved.
- TROPOMI compatibility has been achieved and is expected to pay off.



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OMI/Aura Level 1B Products



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Product	Description	DOI
OML1BIRR	Averaged Solar Irradiances	https://doi.org/10.5067/AURA/OMI/DATA1401
OML1BRUG	UV Global Geolocated Earthshine Radiances	https://doi.org/10.5067/AURA/OMI/DATA1402
OML1BRUZ	UV Zoom Geolocated Earthshine Radiances	https://doi.org/10.5067/AURA/OMI/DATA1403
OML1BRVG	VIS Global Geolocated Earthshine Radiances	https://doi.org/10.5067/AURA/OMI/DATA1404
OML1BRVZ	VIS Zoom Geolocated Earthshine Radiances	https://doi.org/10.5067/AURA/OMI/DATA1405