

# OPT-MPC



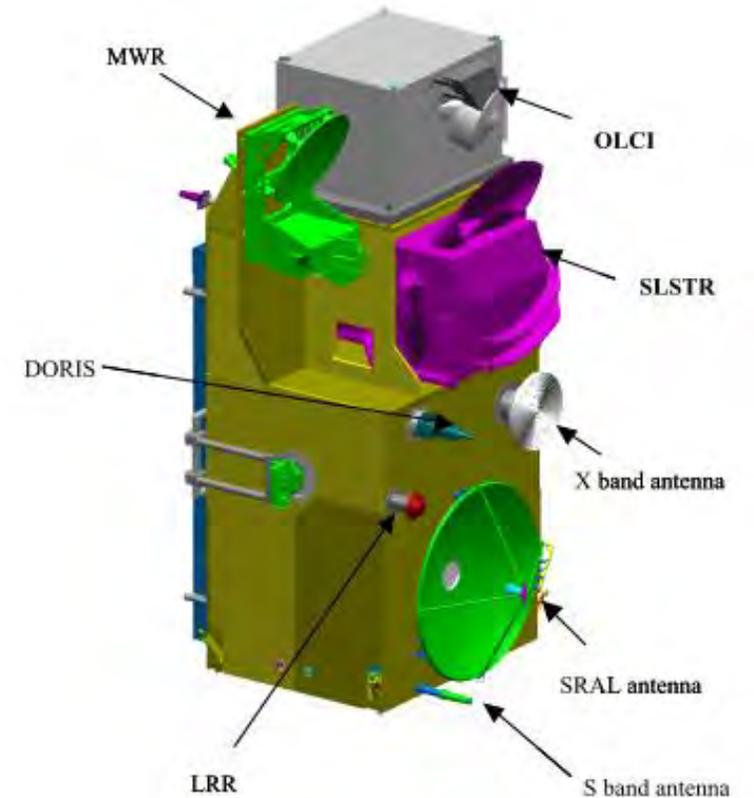
## OLCI Calibration status

IOCCG Ocean Colour sensors calibration Task Force  
4 February 2021

### L. Bourg and the OLCI L1 ESL

#### Disclaimer

The work performed in the frame of this contract is carried out with funding by the European Union. The views expressed herein can in no way be taken to reflect the official opinion of either the European Union or the European Space Agency.



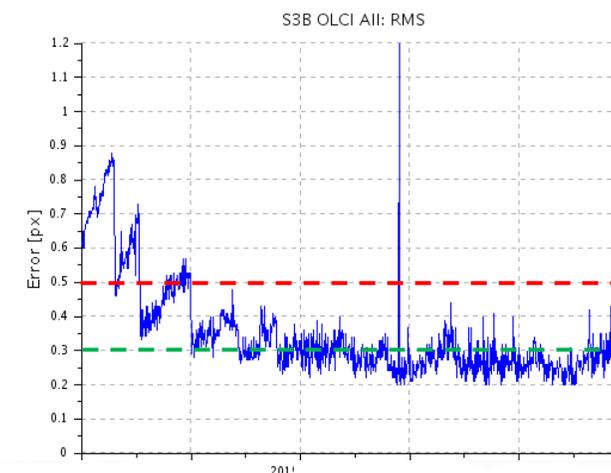
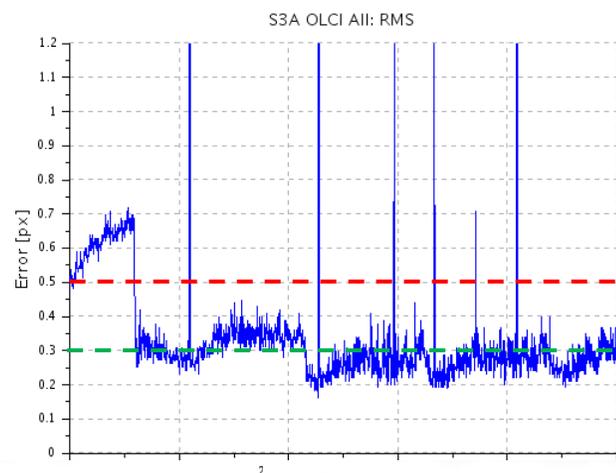
- **Geometric Calibration**
- **Spectral Calibration**
- **Radiometric Calibration**
- **Conclusions**

- **Geometric Calibration**
- Spectral Calibration
- Radiometric Calibration
- Conclusions

- **OLCI-A stable without re-calibration since 30/07/2019**
- RMS below 0.3, biases below 0.2

- **OLCI-B now stabilized with frequent re-calibrations (since 17/12/2019)**
- RMS below 0.3, biases below 0.2

Overall RMS



S3A OLCI Camera 1: Across Track Errors

S3A OLCI Camera 1: Along Track Errors

S3B OLCI Camera 1: Across Track Errors

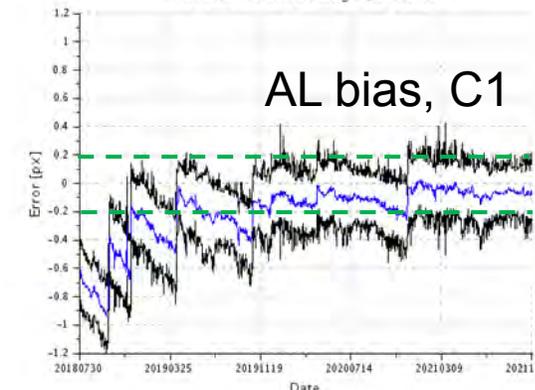
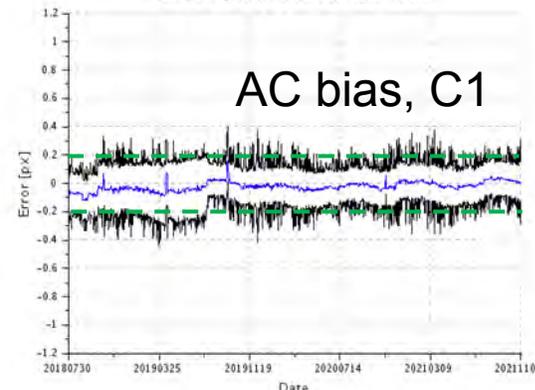
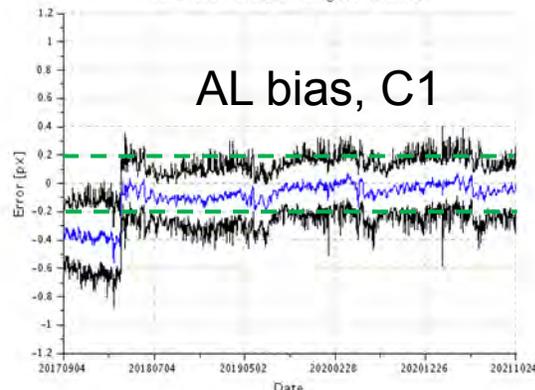
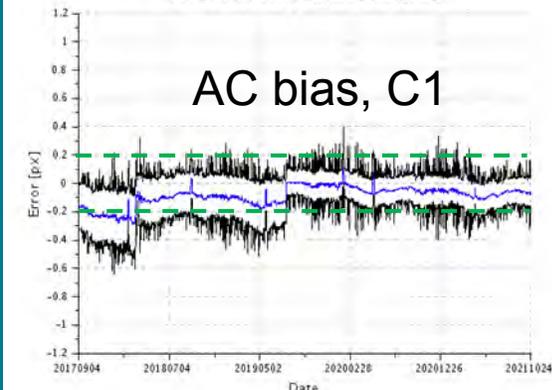
S3B OLCI Camera 1: Along Track Errors

AC bias, C1

AL bias, C1

AC bias, C1

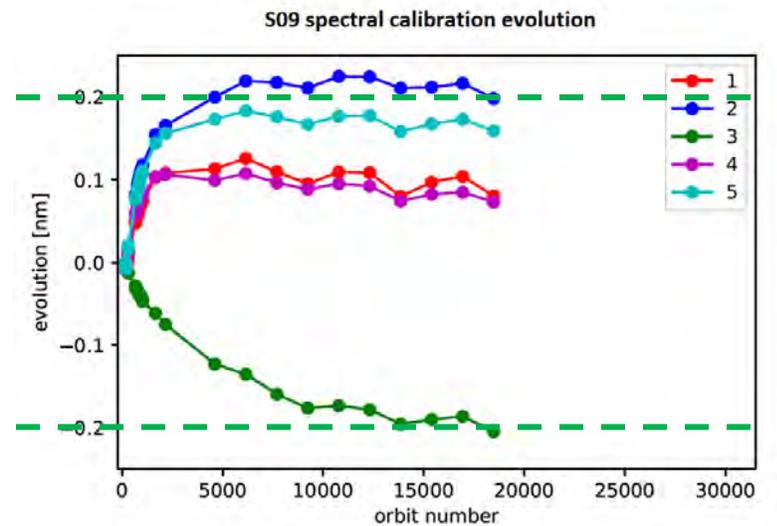
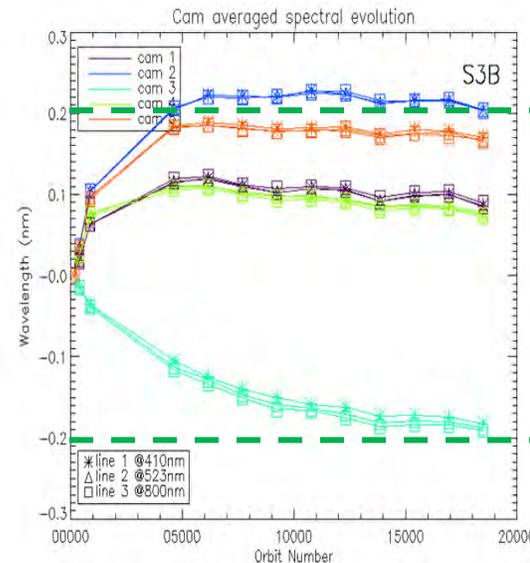
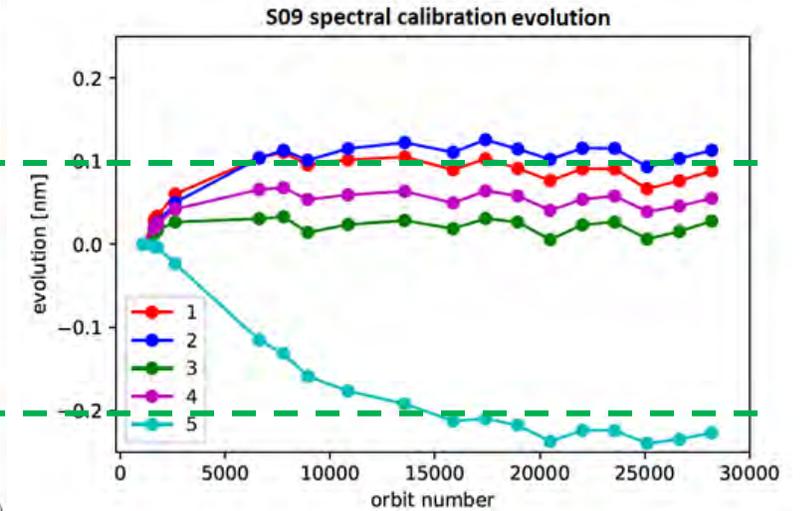
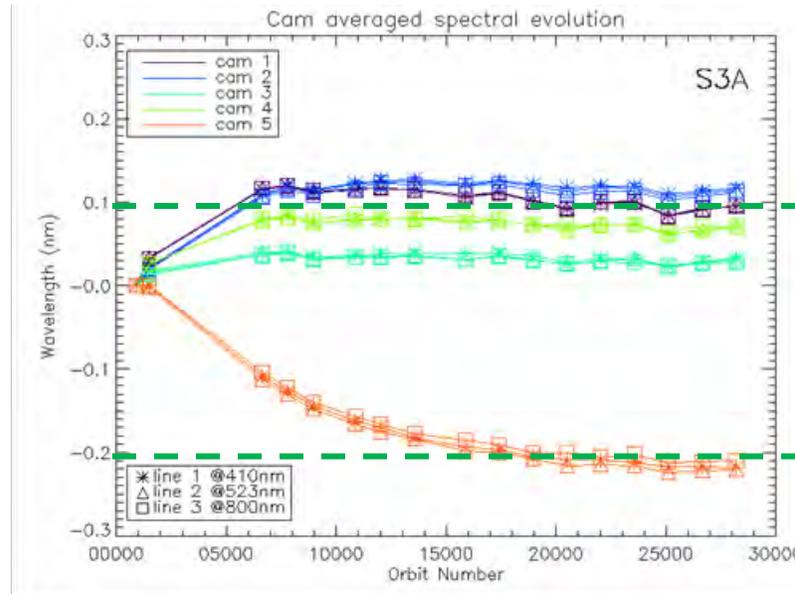
AL bias, C1



- Geometric Calibration
- **Spectral Calibration**
- Radiometric Calibration
- Conclusions

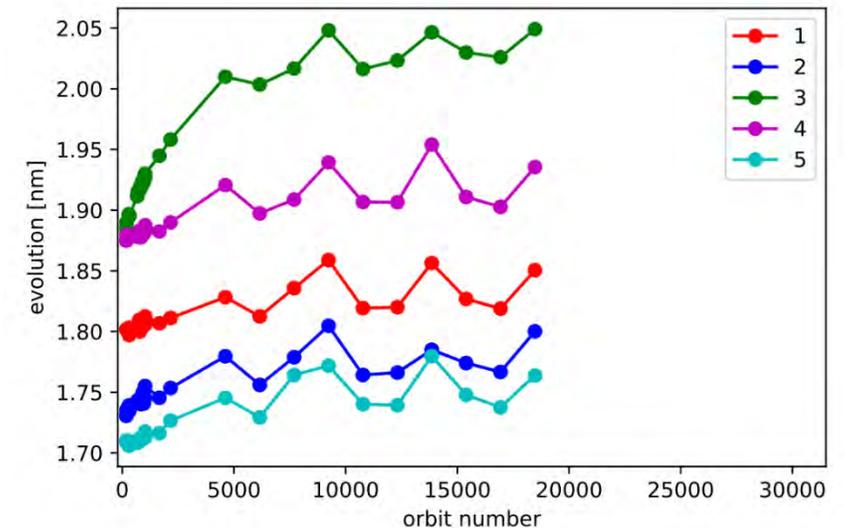
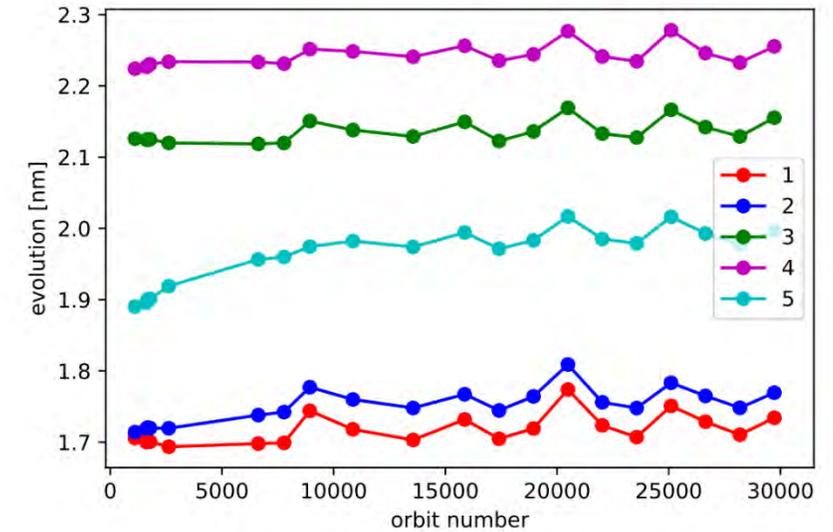
# Spectral Calibration

- **Spectral evolution:  $\lambda$**
- Doped diffuser and Fraunhofer/O2 say the same
- Evolution within:  
[-0.2,+0.1] for A  
[-0.2,+0.25] for B (but ref. earlier)
- For both A & B:
  - 4 cameras stabilized after ~1 year
  - 1 camera still evolving ( $\searrow$ ), slowing down



# Spectral Calibration

- **Spectral evolution:  $\delta\lambda$**
- Fraunhofer/O2 only
- No measurable evolution except for:
  - A-C5 (<0.1nm)
  - B-C3 (<01.5)
  - (anti)correlated with central wavelength evolution



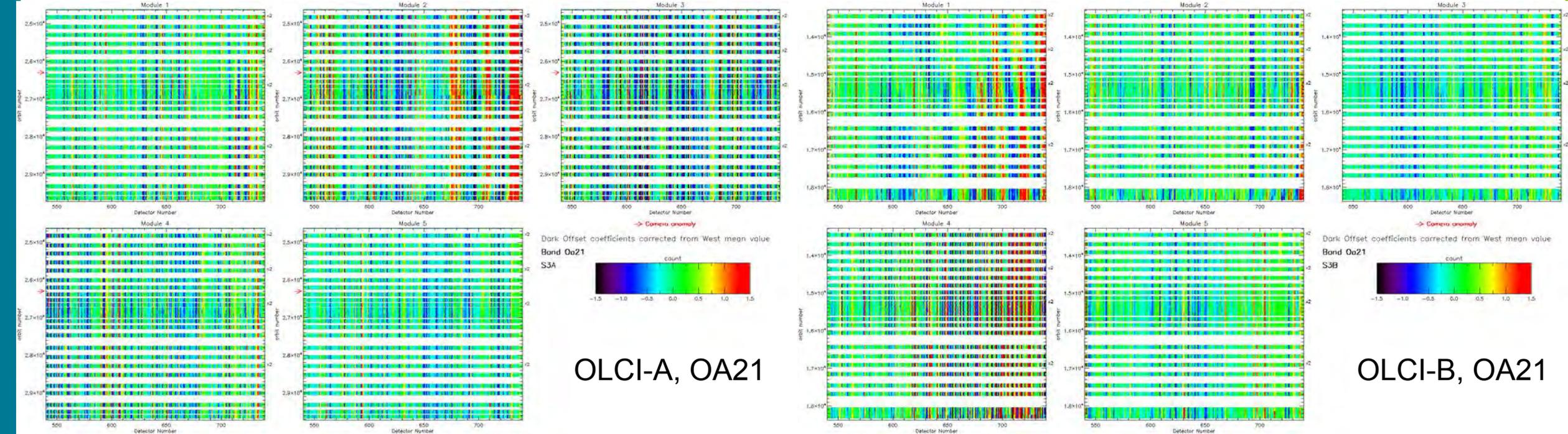
- Geometric Calibration
- Spectral Calibration
- **Radiometric Calibration**
- Conclusions

# Radiometric Calibration

## Periodic Noise and Dark Correction

Periodic Noise = pseudo-periodic spatial structure in dark level, slowly varying with time

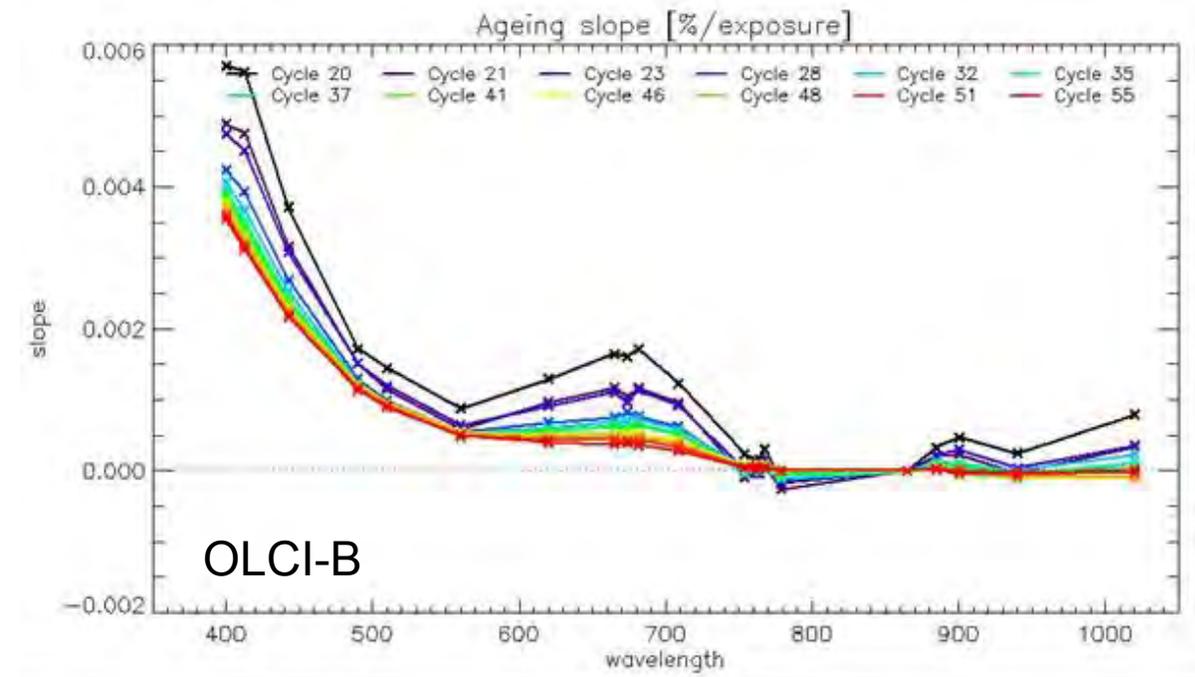
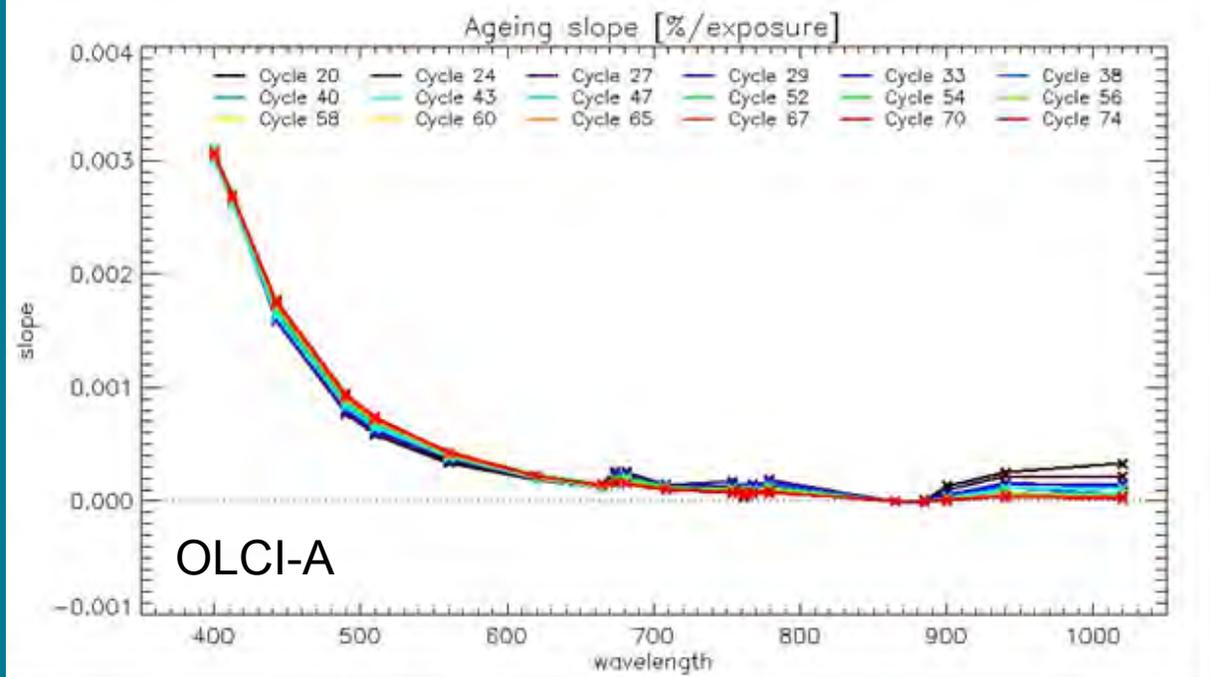
- Now almost stable for A and B (very slow for A)
- Mitigated by automated refresh of Dark Tables every 3 days (now also for A)



Maps of dark offset for the 200 most affected pixels (“east side”), corrected for background

## Ageing assessment, modelling and correction

- Very stable for A, no issue.
- Still an issue for B **due to diffuser BRDF differences between nominal and reference**, needs specific methodology
  - Up to now based on Yaw Manoeuvres: 2 acquisitions with almost same geometry, same day, at 7 exposures distance
  - Currently based on comparisons of Ageing sequences at (almost) equal SAA

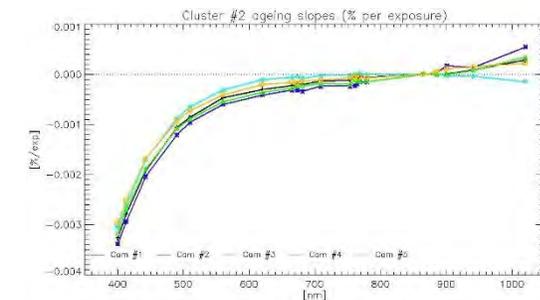
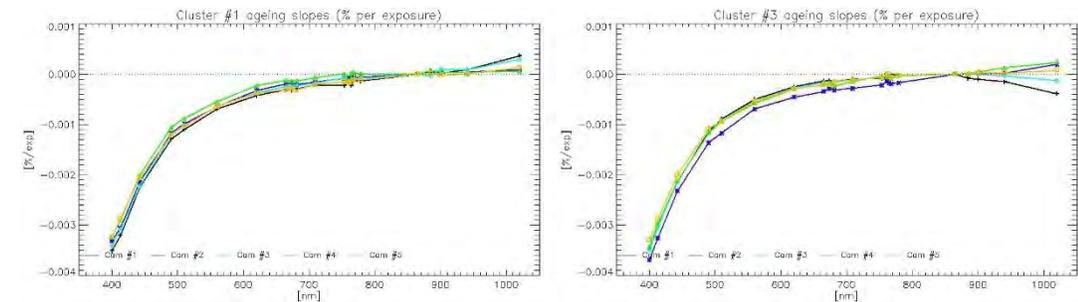
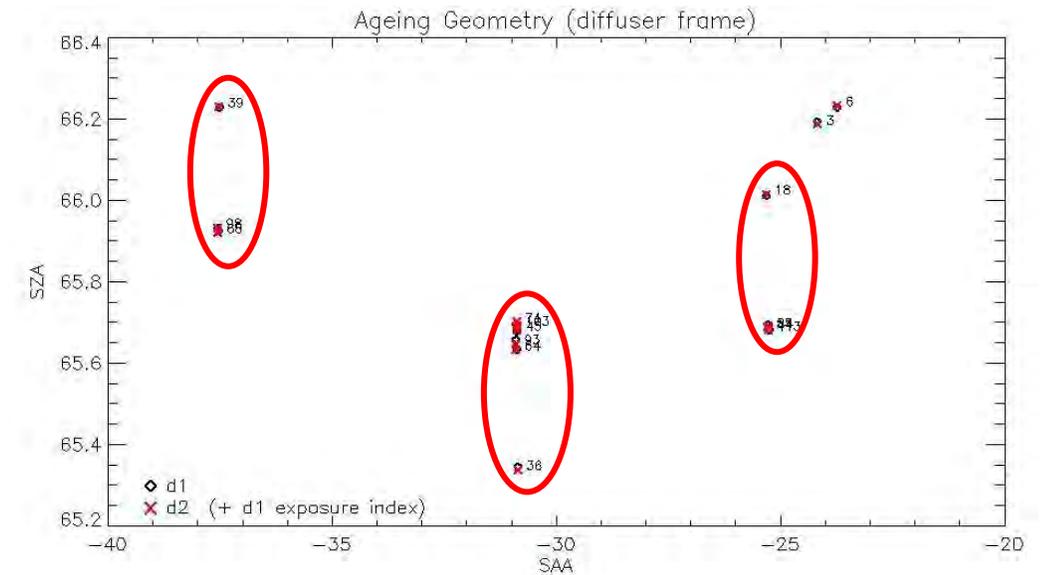


# Updated OLCI-B Ageing assessment and modelling

Ratios of nominal/reference diffusers signal sensitive to SAA

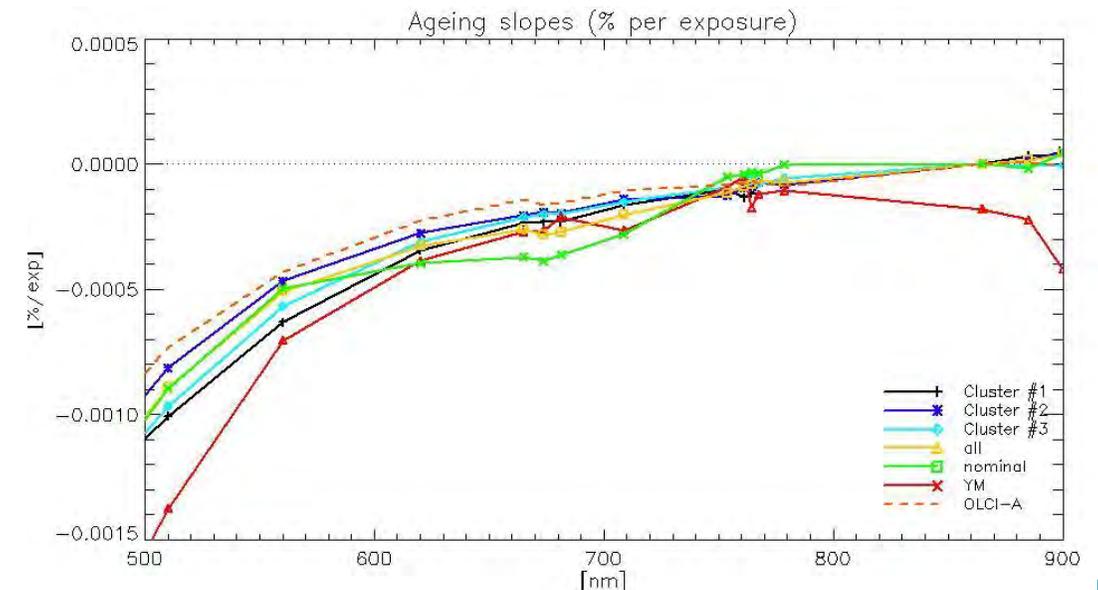
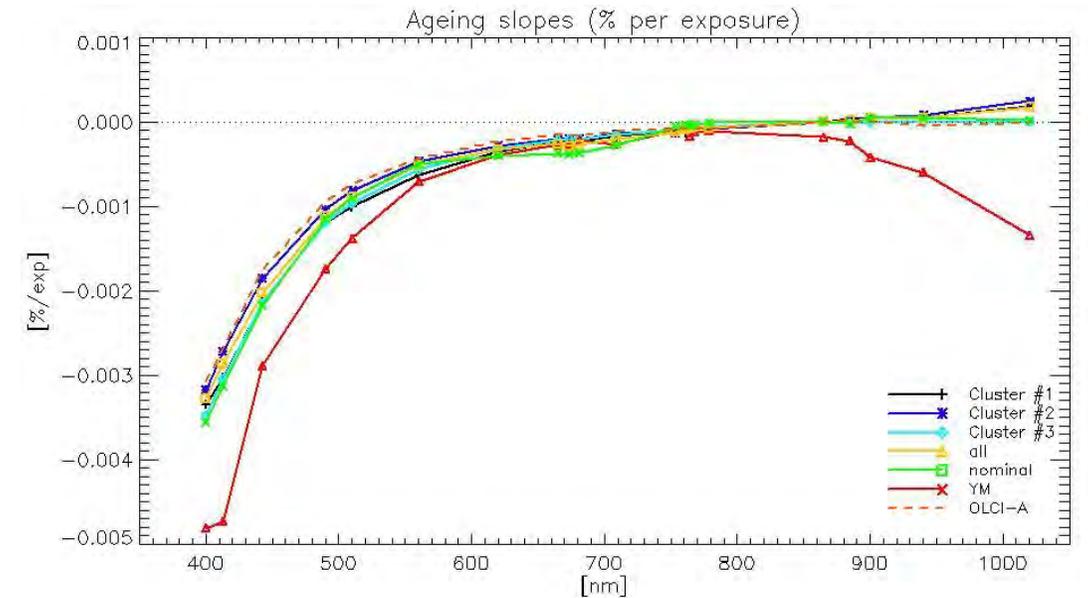
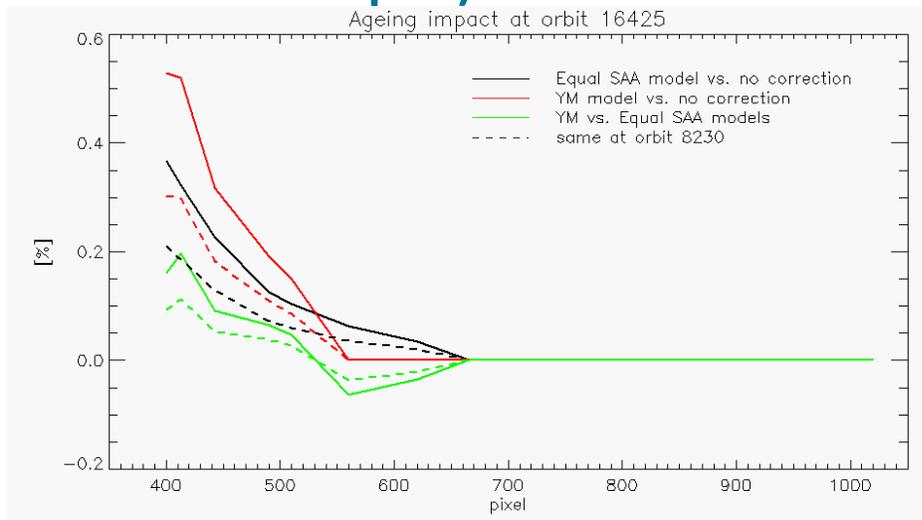
→ group Ageing sequences by sets of similar SAAs, compute ageing rates independently and compare.

- 3 SAA clusters provide 3 independent estimates
- Quality of each estimate assessed from in-FOV consistency (inter and intra-camera)
- Outputs a weighted average as Ageing Model



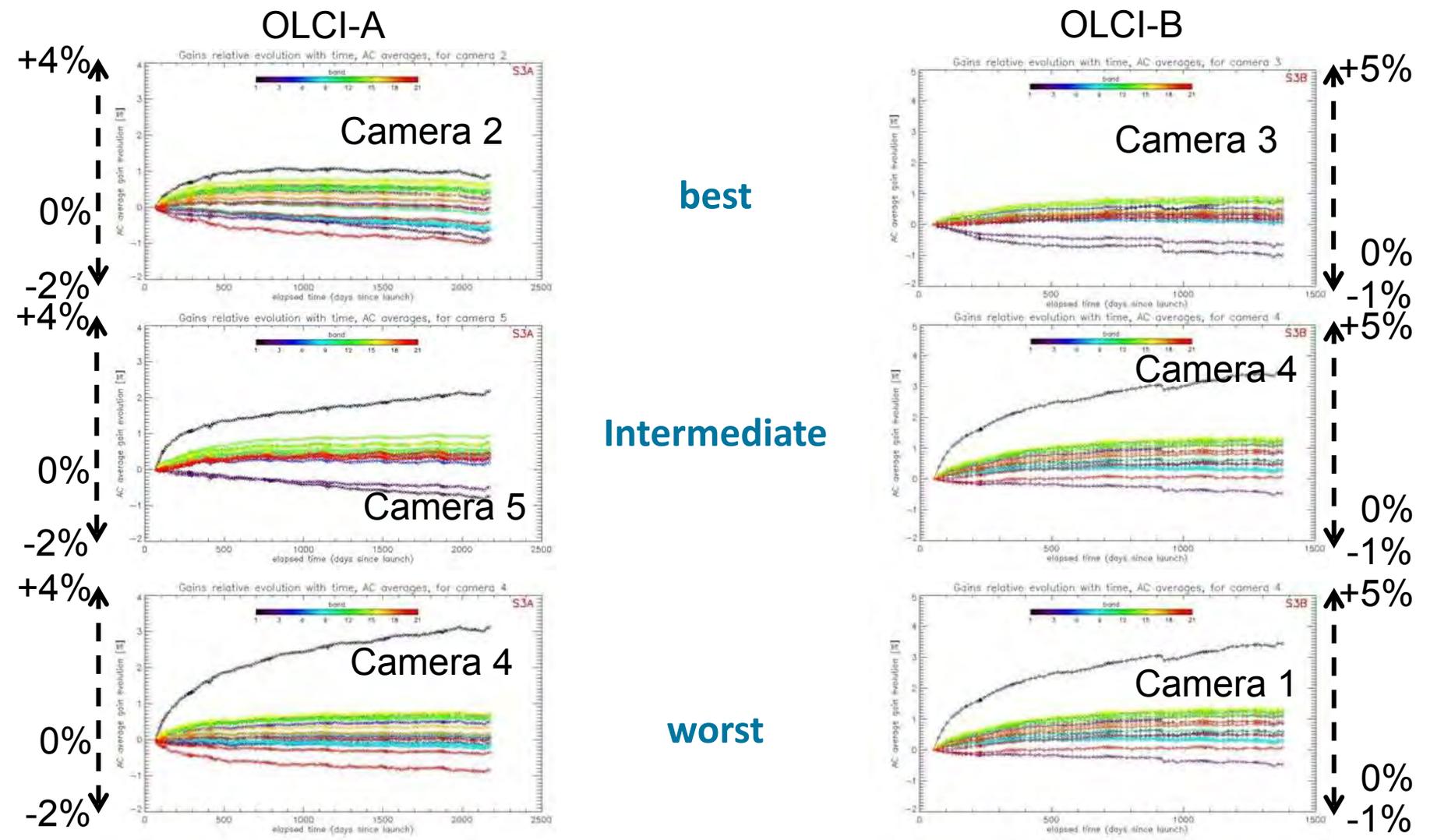
# Updated OLCI-B Ageing assessment and modelling

- Provides 3 independent and rather consistent estimates (black, blue & cyan curves)
- Much improved in-FOV consistency (not shown) and spectral shape
- Previous workaround largely overestimated (+0.2% @412 nm at present, red curve on top plot, green curves on bottom plot)



# Radiometric Calibration: Sensitivity evolution (Data)

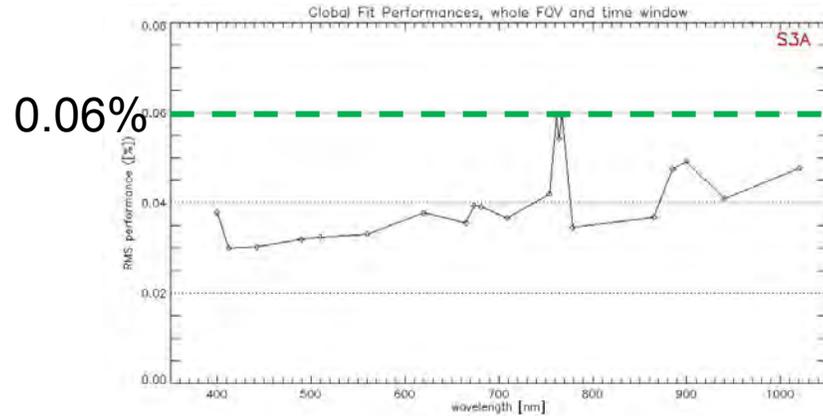
Evolution relative to 1<sup>st</sup> valid, whole usable dataset



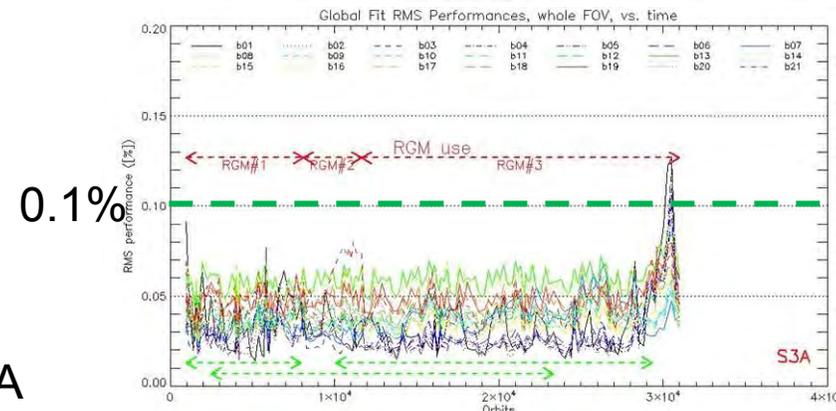
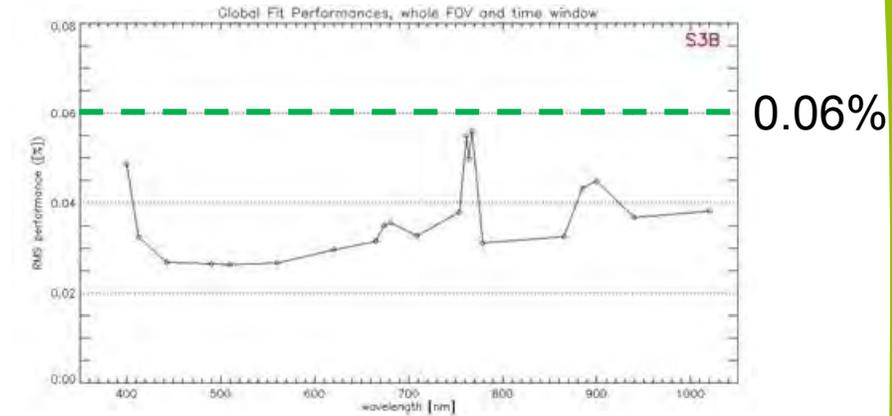
Gain ratios  $G(t)/G(t_0)$ , in-flight BRDF models

# Radiometric Calibration Gain Models

- A & B Models refreshed in November 2021
- Overall performance rather good: RMS < 0.06% for A & B
- Some fluctuations with time, in particular for B. December 2021 “peak” (~0.05%) is in gains, not due to model. Common to A & B, synchronous, performance recovered. Not explained yet, under investigation.

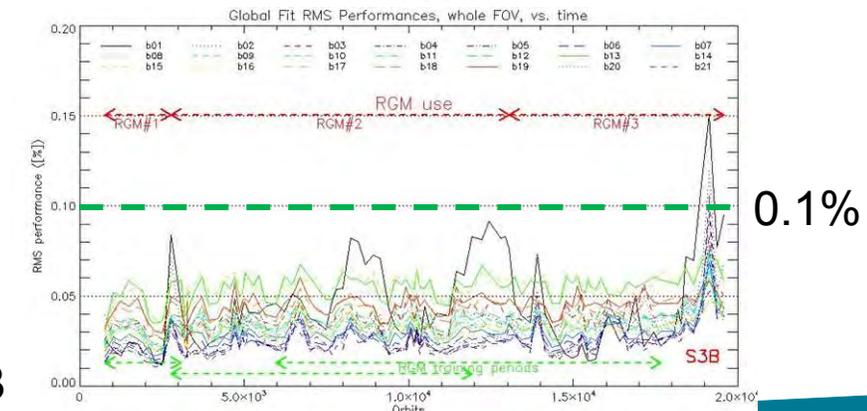


RMS vs  $\lambda$



OLCI-A

RMS vs time



OLCI-B

- Geometric Calibration
- Spectral Calibration
- Radiometric Calibration
- **Conclusions**

- ❖ **Conclusion 1: geometric calibration under control with good performance**
- ❖ **Conclusion 2: spectral calibration under control with good performance**
- ❖ **Conclusion 3: radiometric calibration and corrections**
  - ❖ Dark Correction and PN under control
  - ❖ Nominal diffusers ageing assessment and modelling: OK for A, revised for B, with significant impact (0.2% at 400 nm)
  - ❖ RGMs: recently refreshed for A and B, methodology improved; good performance.

# THANK YOU FOR YOUR ATTENTION