

PROBA-V radiometric calibration

Sindy Sterckx, Stefan Adriaensen

QWG13, 21-22 April 2021

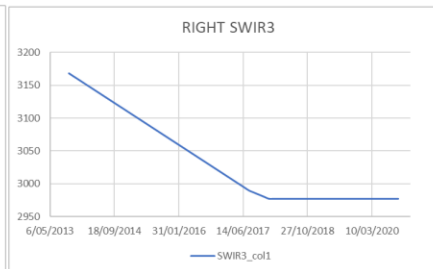
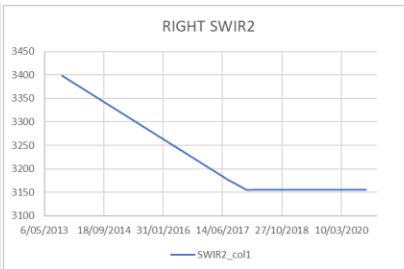
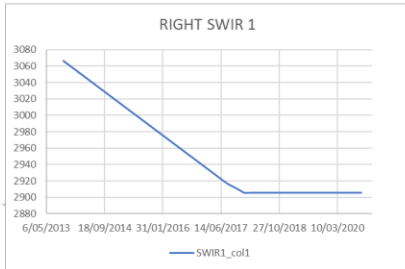
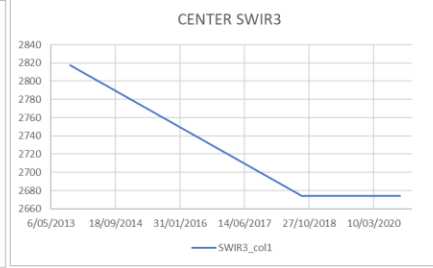
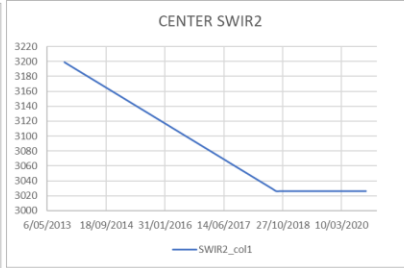
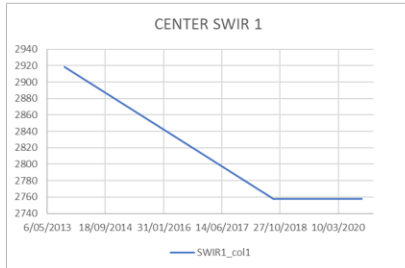
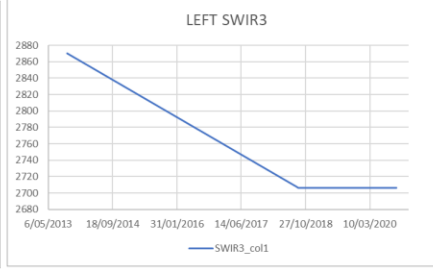
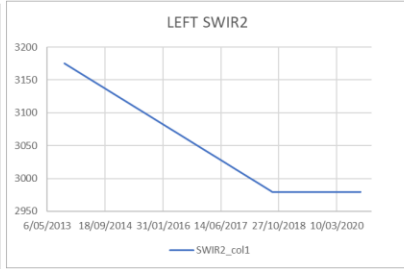
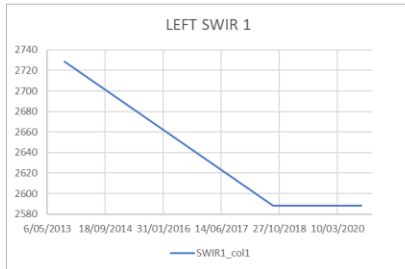


ICP FILES COL 2 UPDATES

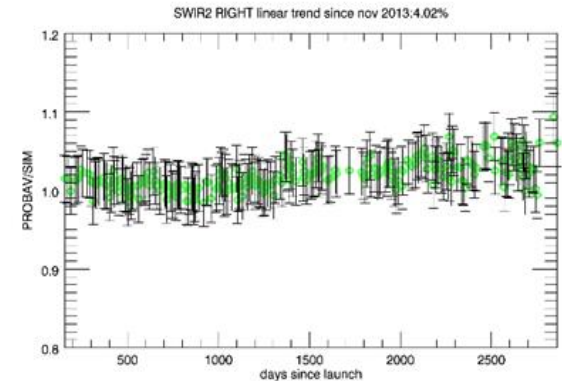
- Overview of updates
 - Trending model all cameras & bands
 - Bias correction BLUE LEFT
 - Bias correction SWIR RIGHT
 - SWIR equalization updates based on Yaw maneuver data



SWIR : DEGRADATION MODEL COL 1

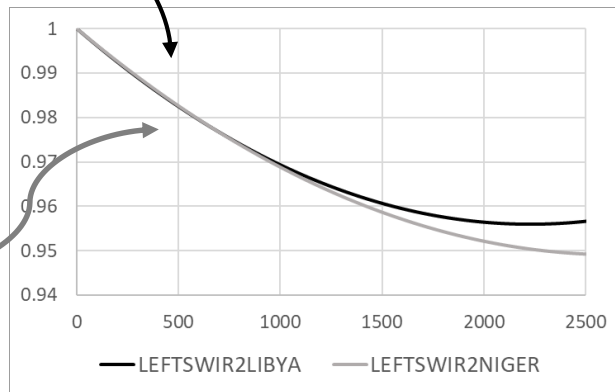
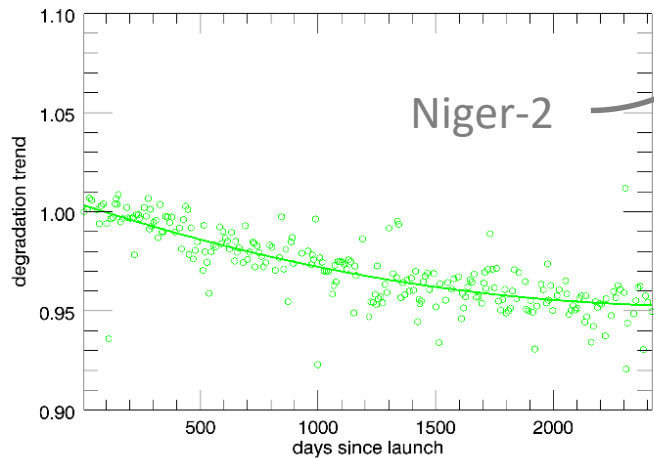
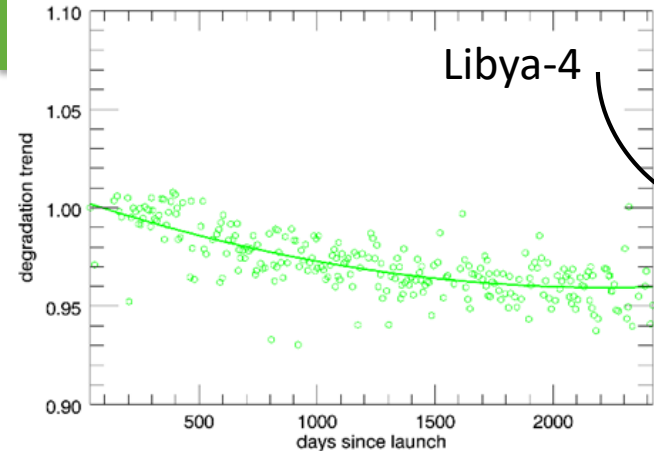


- Initial linear degradation model
- But due some overcorrection it was decided to no longer apply degradation model





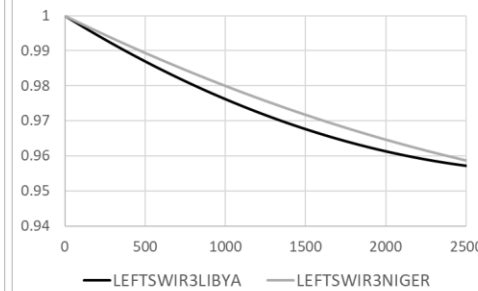
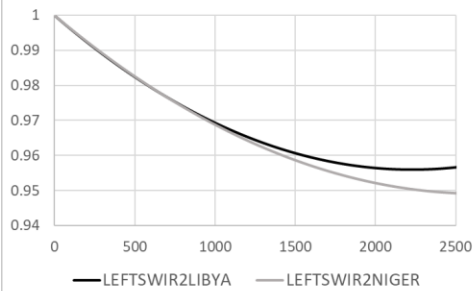
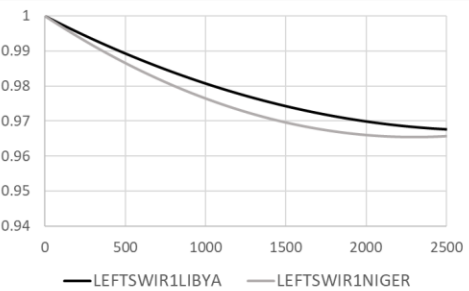
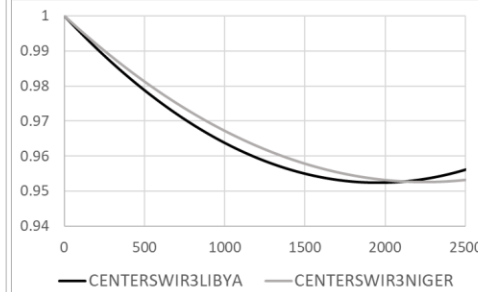
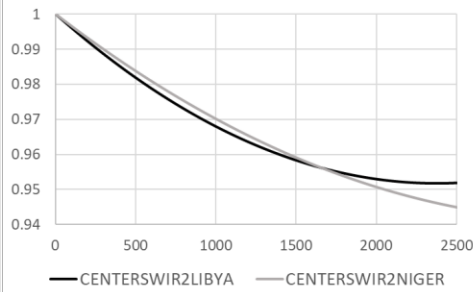
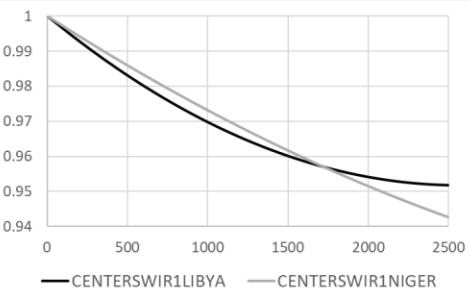
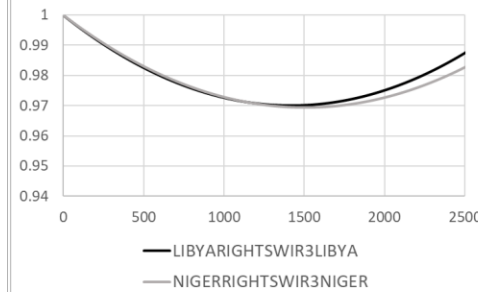
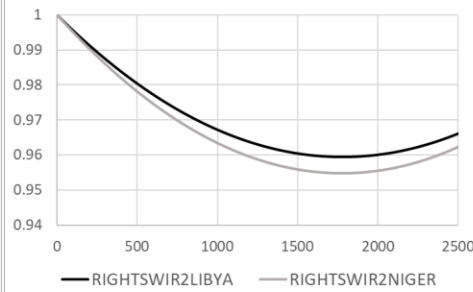
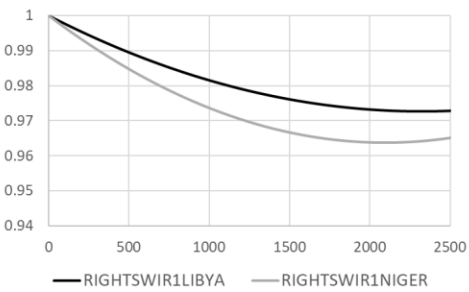
SWIR : DEGRADATION MODEL COL 2



- 2nd order degradation model
- Derived on Libya-4 results
- Verified on the basis of Niger2



SWIR : DEGRADATION MODEL COL 2

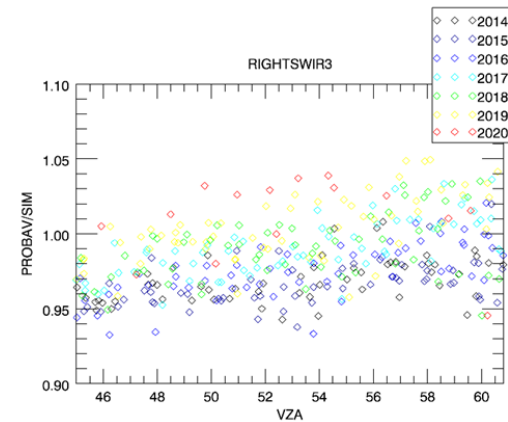
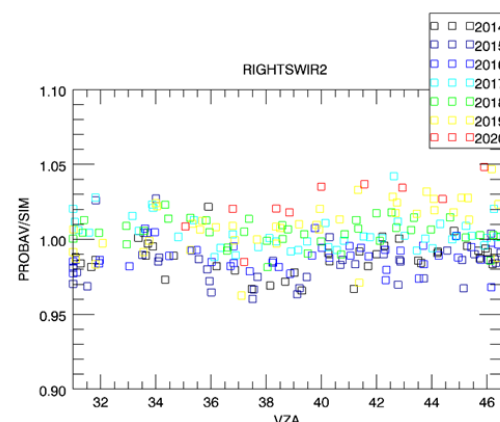
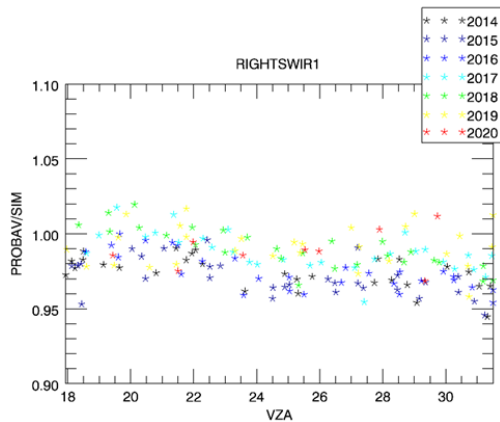
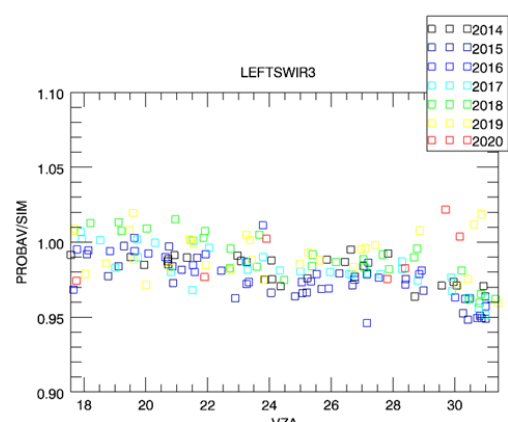
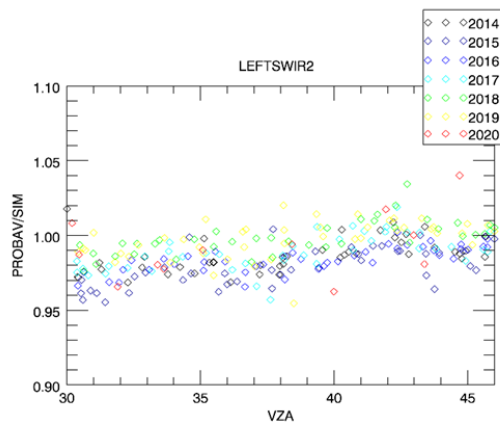
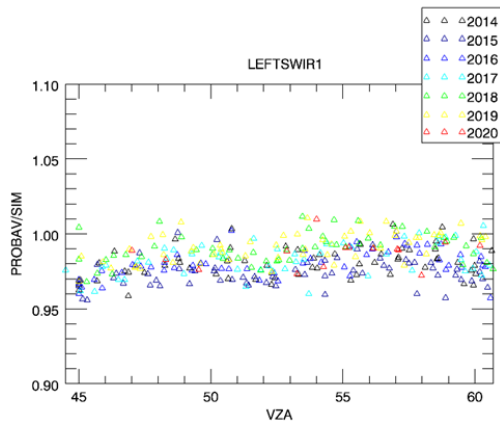


Good consistency :

Differences $\ll 1\%$
Between Libya-4
and Niger2 model

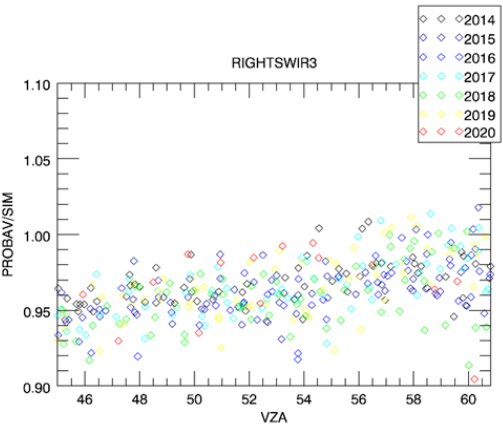
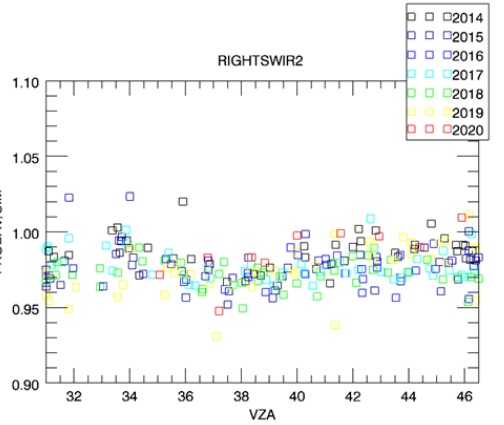
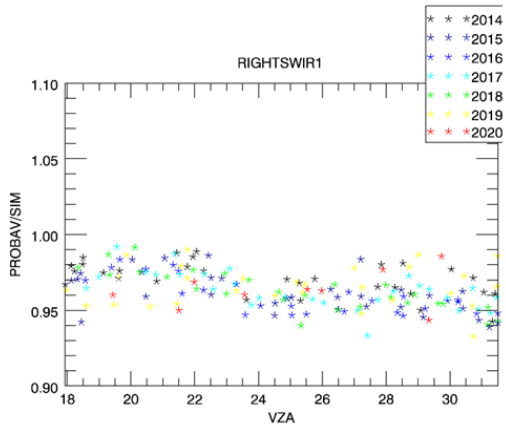
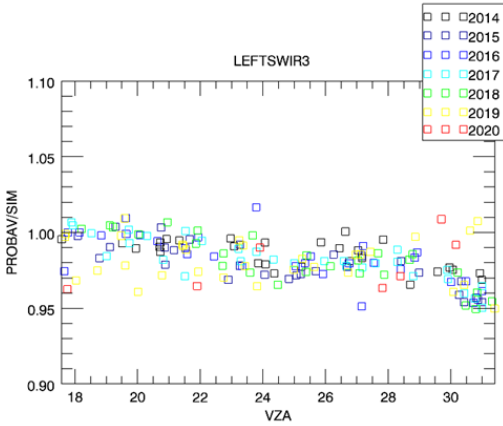
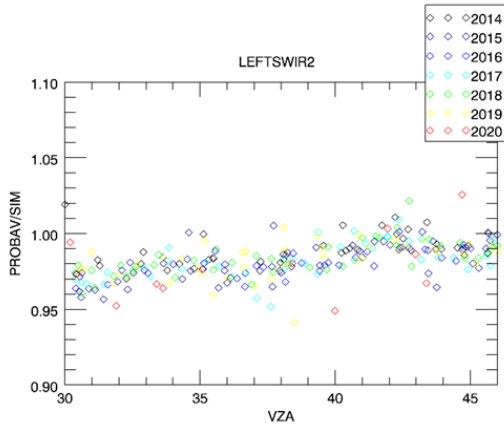
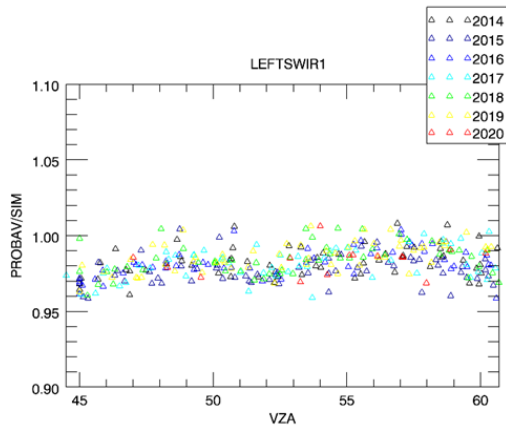


COL1 DEGRADATION MODEL APPLIED



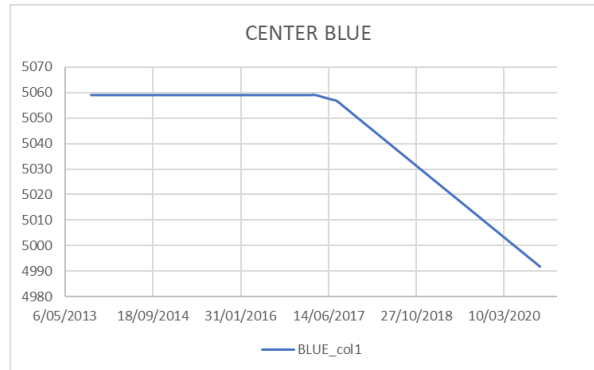
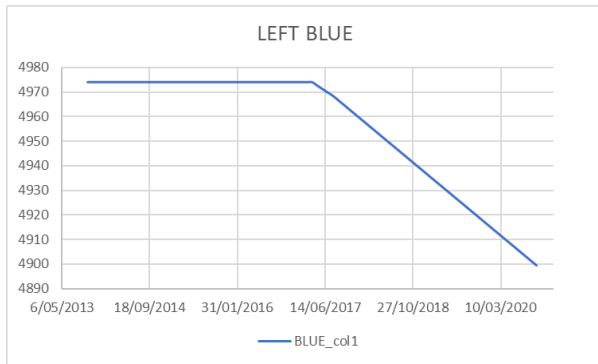


COL2 DEGRADATION MODEL APPLIED

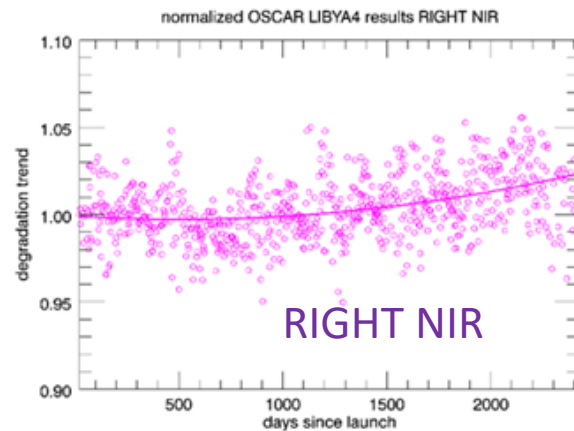
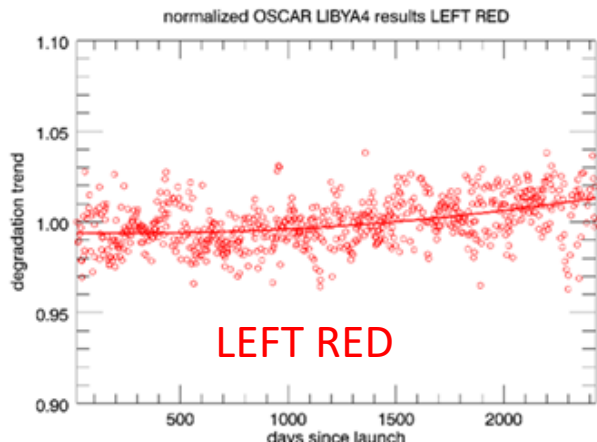




VNIR : DEGRADATION MODEL COL 1



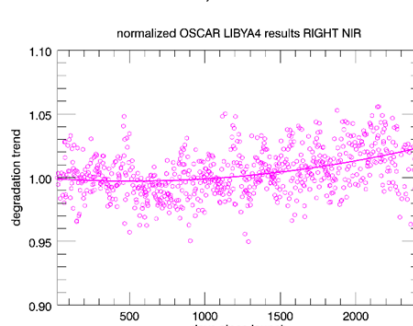
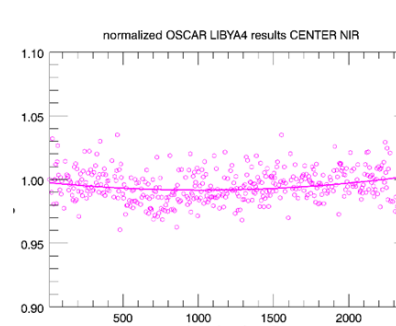
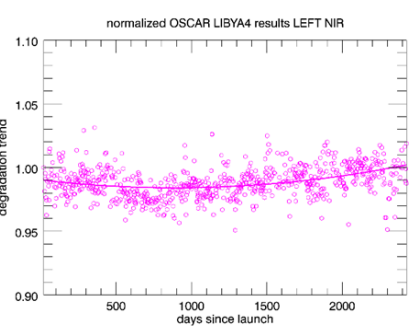
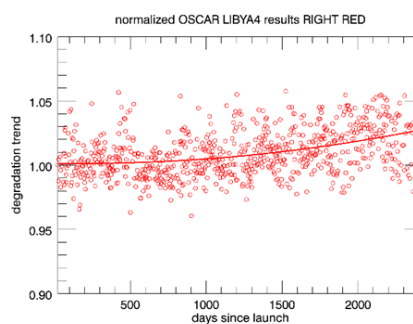
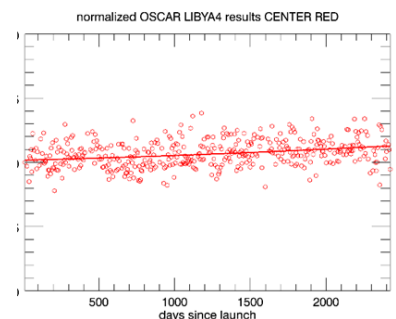
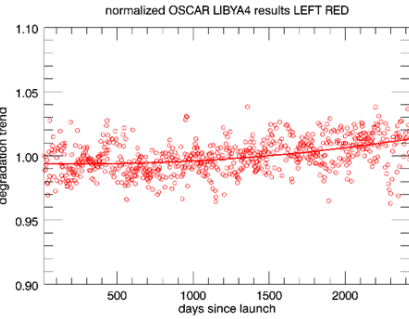
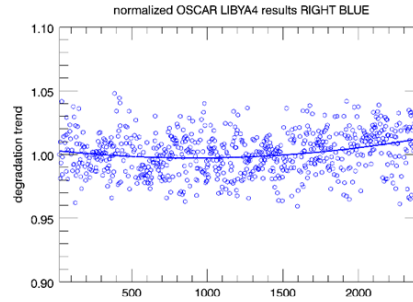
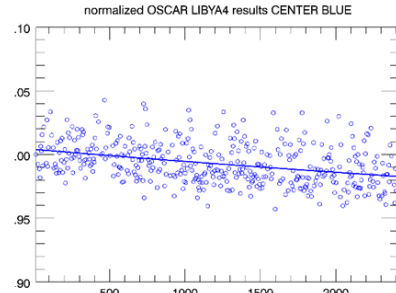
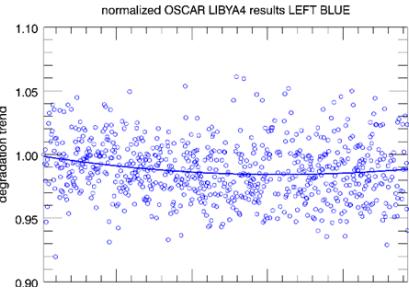
- No correction until April 2017
- Since 2017 linear model for BLUE LEFT & CENTER



- No correction for increasing trend RED and NIR strips



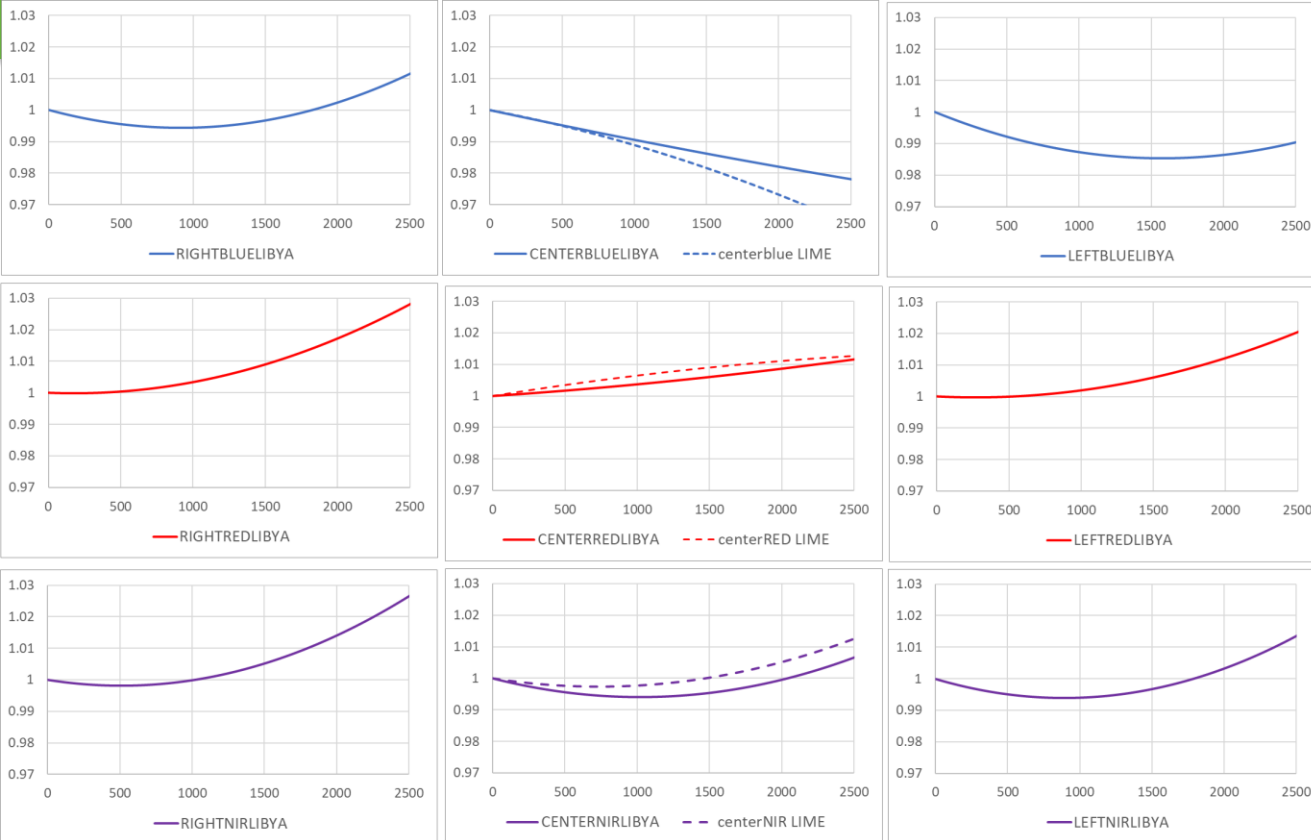
VNIR : DEGRADATION MODEL COL 2



- 2nd degree polynomial model all VNIR strips determined based on Libya-4
- Correction for “degradation” in BLUE LEFT/CENTER as well as for “increase” in responsivity for other strips



VNIR : DEGRADATION MODEL COL 2



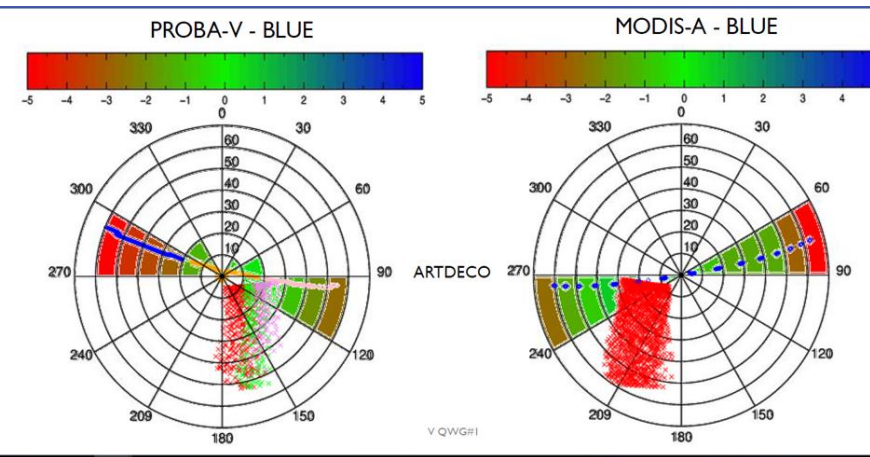
- 2nd degree polynomial model all VNIR strips determined based on Libya-4
- Correction for “degradation” in BLUE LEFT/CENTER as well as for “increase” in responsivity for other strips



BIAS CORRECTION LEFT BLUE

Analyses Y. Govaerts (QWG 11)

Analyses VITO (QWG 12)



- Smaller difference ($\sim 0.7\%$) in overlap region between LEFT BLUE and CENTER BLUE
- Polarisation sensitivity might explain some of larger uncertainties near edge

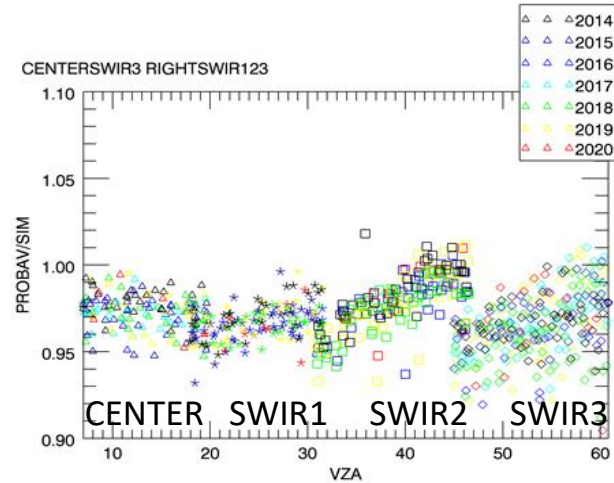
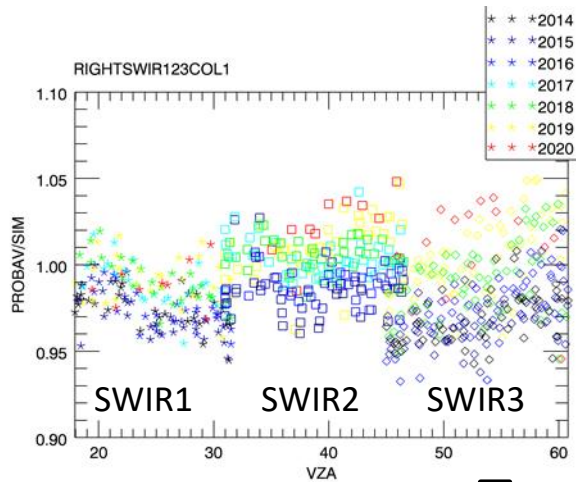
C2 ICP 1 % Bias correction to LEFT BLUE
(increase of TOA refl)

PROBA-V				
	BLUE	RED	NIR	SWIR
ALL	1.024	1.005	0.997	1.004
LEFT	1.040	1.005	0.997	1.001
CENTRAL	1.011	1.012	1.001	1.003
RIGHT	1.010	0.999	0.993	1.014

For PROBA-V, it is suggested to apply a correction per camera



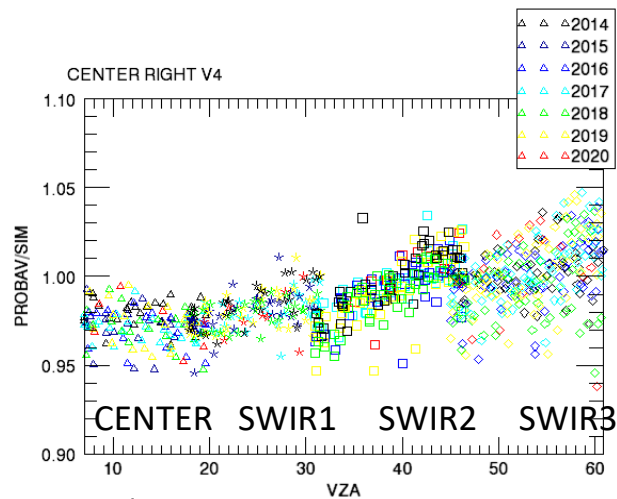
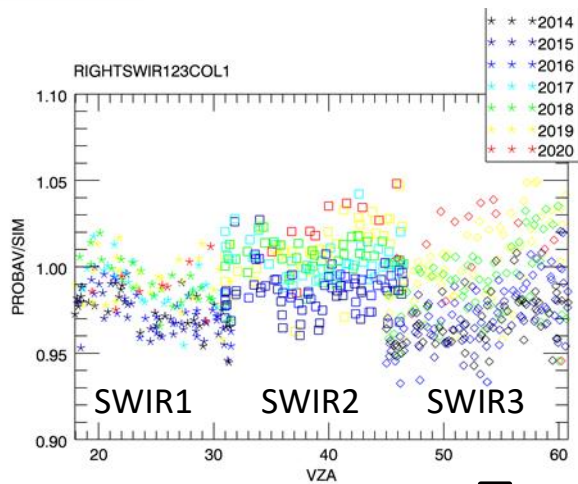
BIAS CORRECTION RIGHT SWIR STRIPS



Impact application C2 degradation model +
yaw based equalization correction (see next slides)



BIAS CORRECTION RIGHT SWIR STRIPS

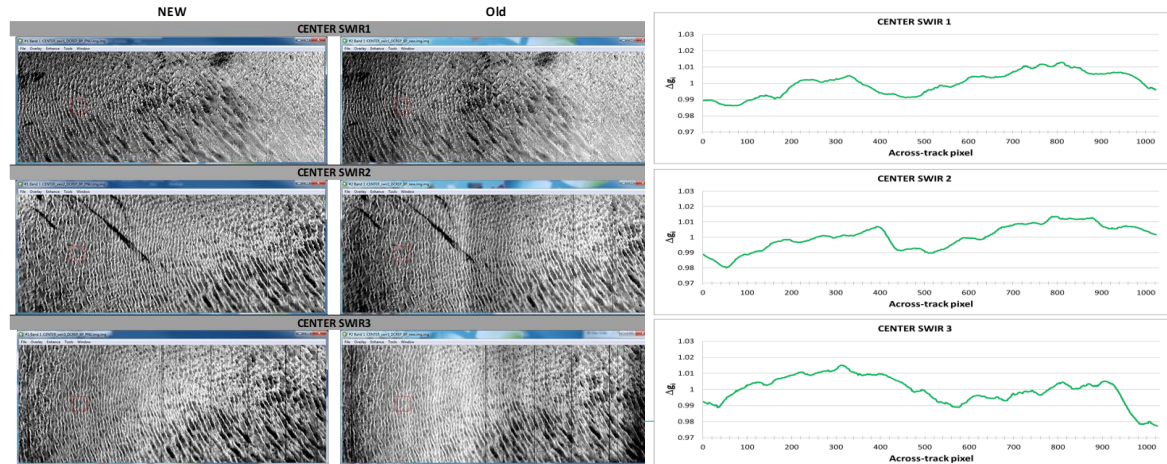


Impact application C2 degradation model +
yaw based equalization correction (see next slides)+
bias correction RIGHT SWIR strips



EQUALISATION SWIR STRIPS-C1

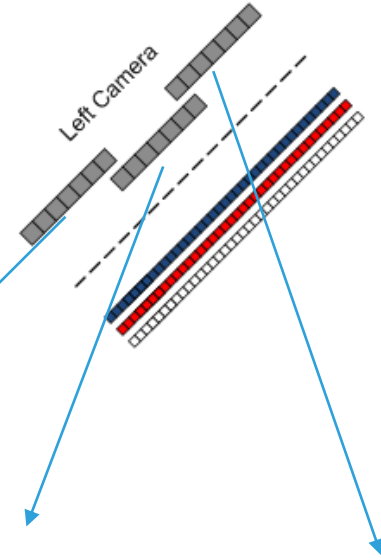
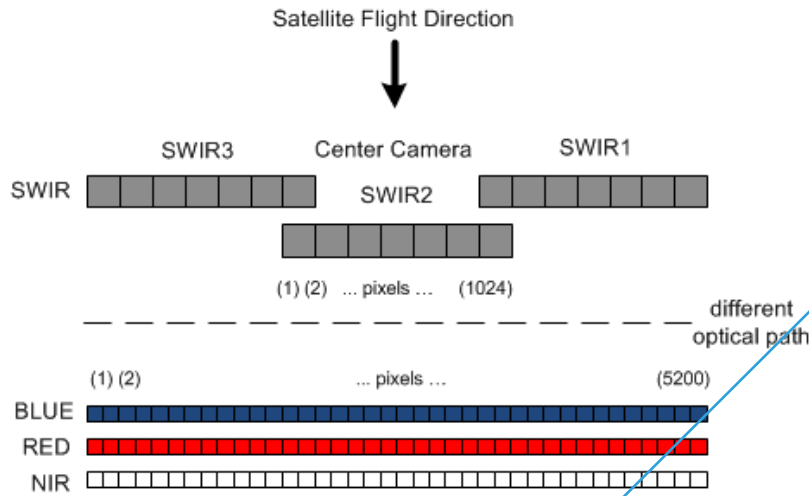
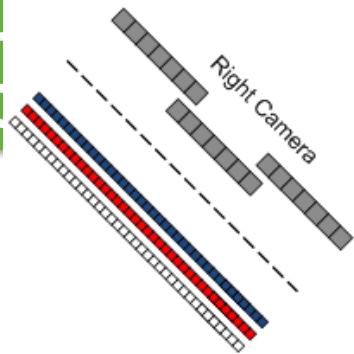
- **Collection 1**
 - **CENTER SWIR : Low Frequency (LF) equalization correction** based on yaw maneuver from April 2016 used for Col 1 reprocessing from Oct. 2013



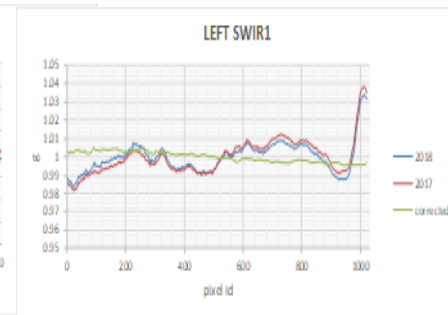
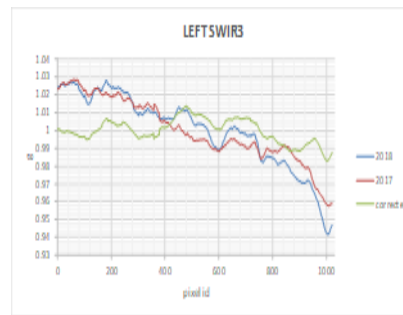


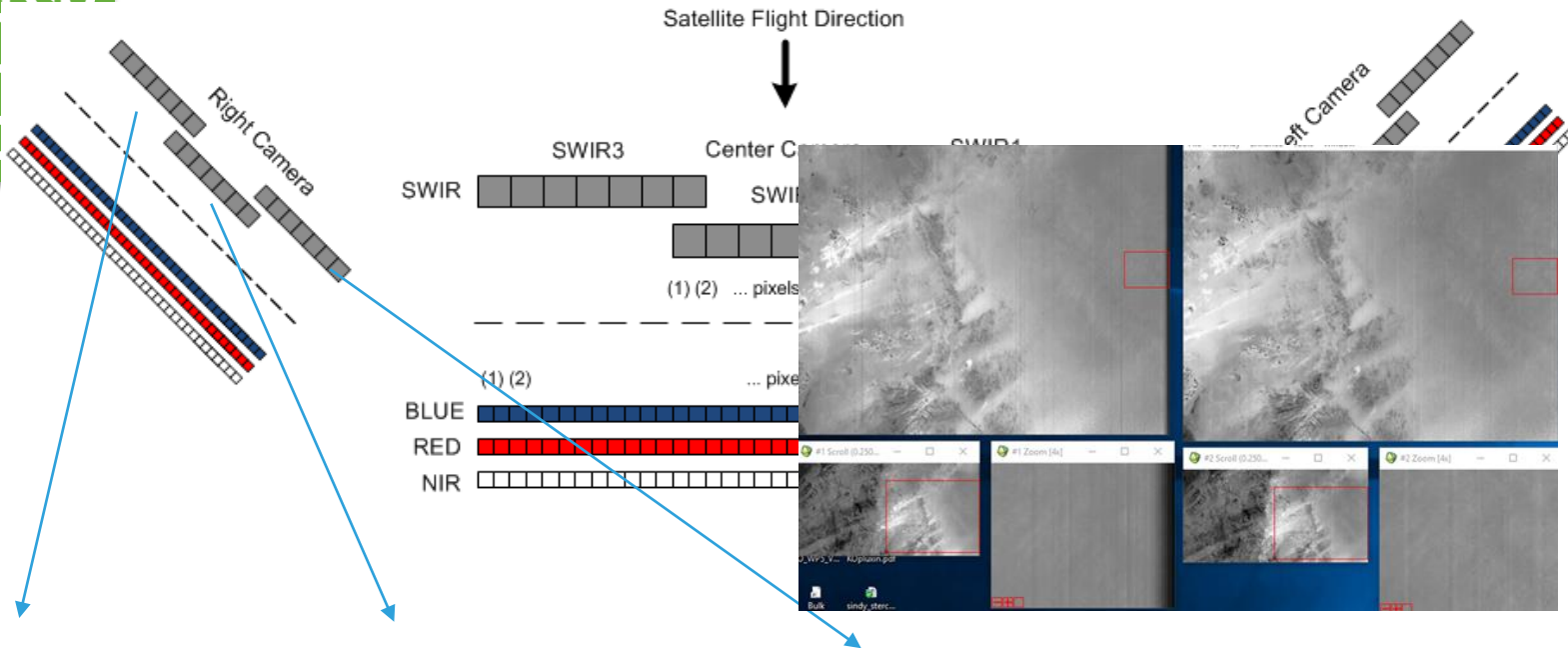
EQUALISATION SWIR STRIPS-C1

- **Collection 1**
 - **CENTER SWIR : Low Frequency (LF)** equalization correction based on yaw maneuver from April 2016 used for Col 1 reprocessing from Oct. 2013
 - **LEFT/RIGHT SWIR : LF and High Frequency (HF)** correction based on yaw maneuver only from July 2019 onwards based on yaw data analyses from 2017/2018.



$g < 1 \Rightarrow$ Increase in radiances after application
 $g > 1 \Rightarrow$ decrease in radiances after application





$g < 1 \Rightarrow$ Increase in radiances after application

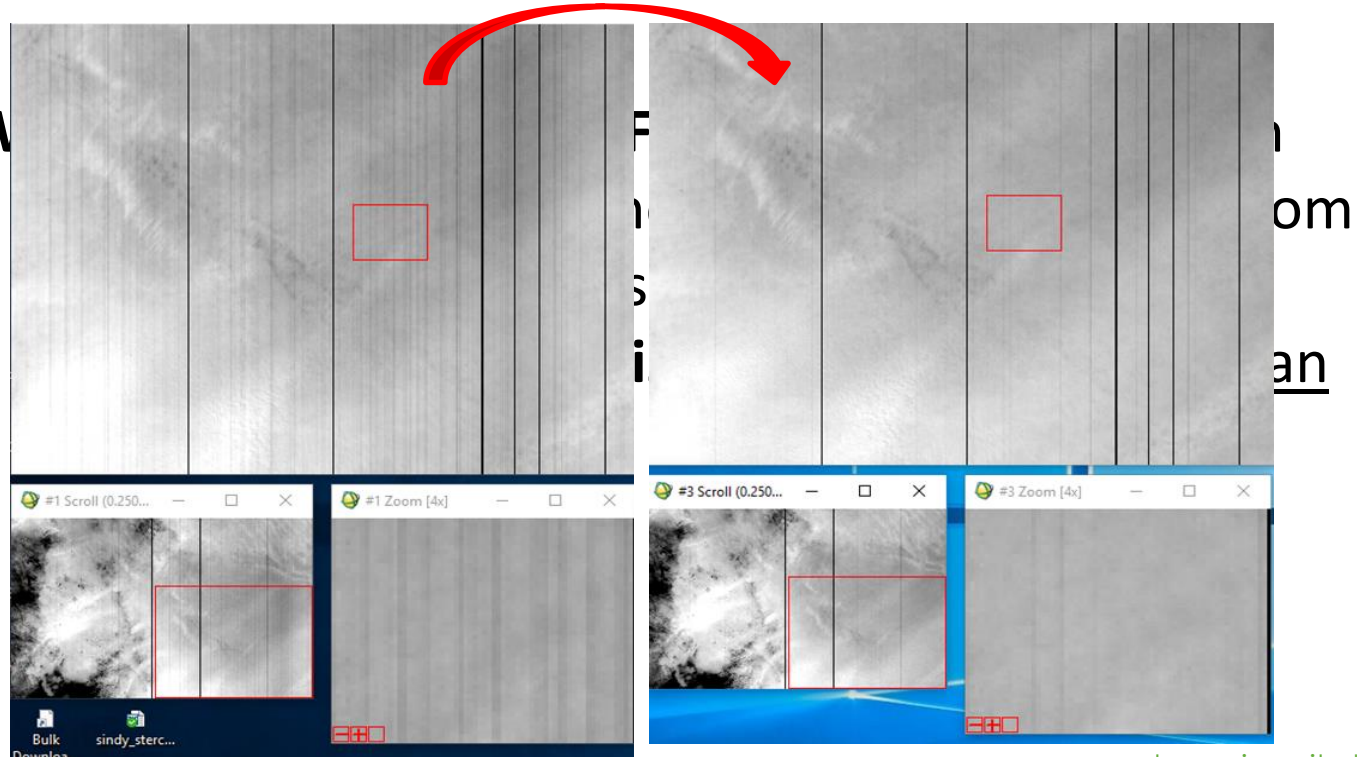
$g > 1 \Rightarrow$ decrease in radiances after application



EQUALISATION SWIR STRIPS-C2

- **Collection 2**

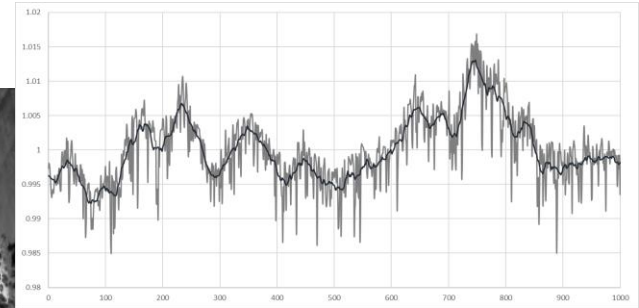
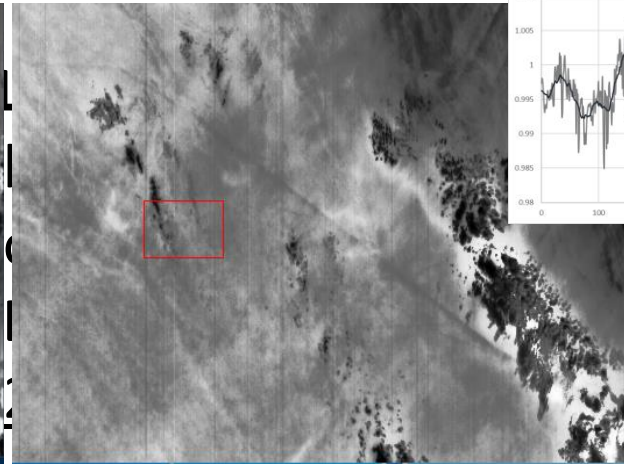
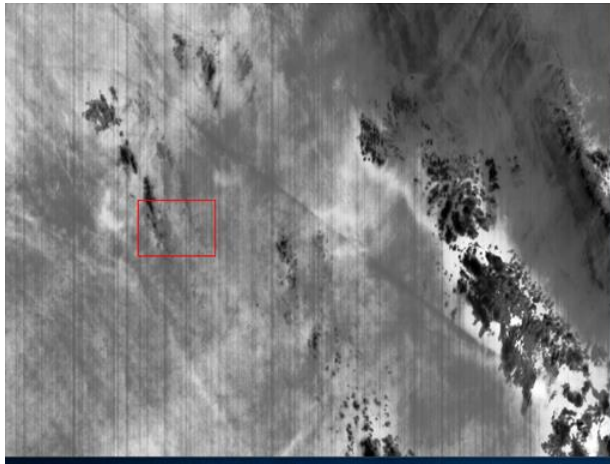
- **CENTER SWIR**



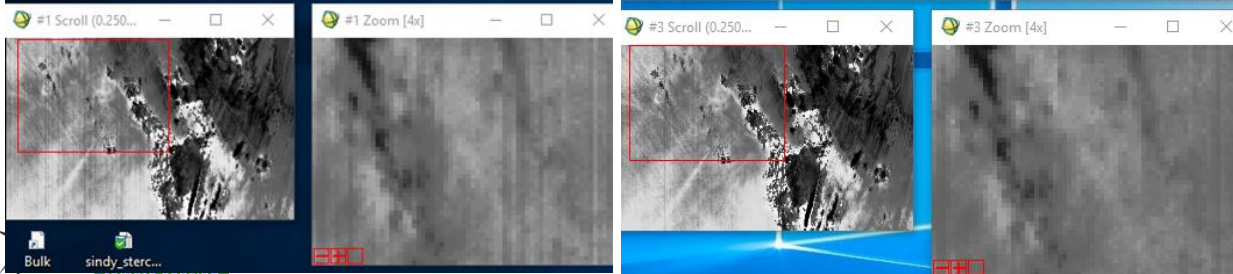


EQUALISATION SWIR STRIPS-C2

- Collection 2



... correction from Jan
... yaw data analyses.





SUMMARY UPDATES

- 2nd degree polynomial model for observed radiometric change (both increase & decrease of responsivity)
- Correction for small negative bias in LEFT BLUE and SWIR RIGHT
- Updates to SWIR equalization/multi-angular calibration coefficients based on yaw maneuver data (pixel depended changes)



**THANKS FOR YOUR
ATTENTION**