CNES
Report on Cal/Val Activities

Patrice Henry

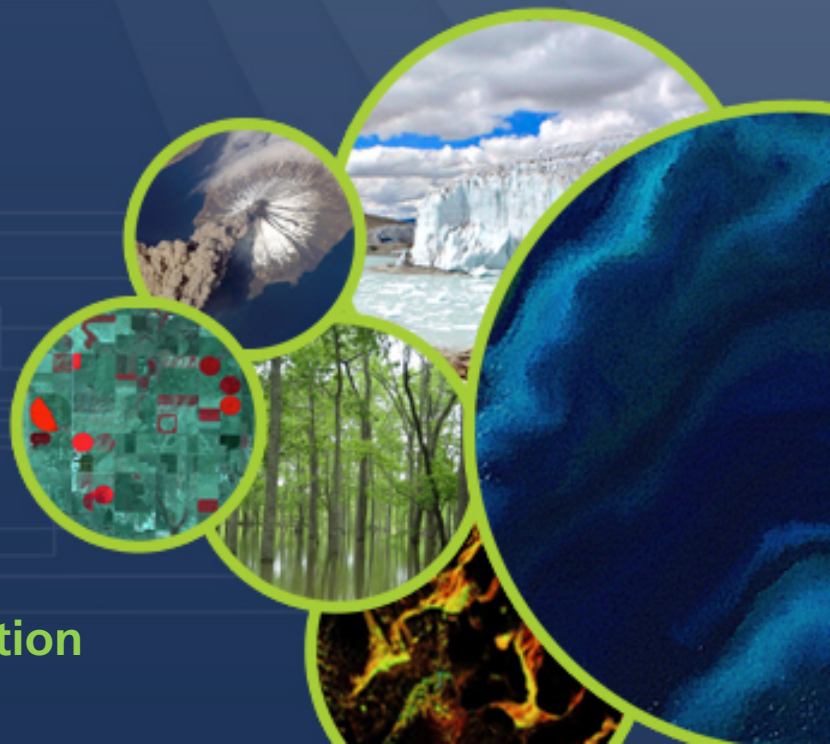
CNES

Agency Report V

WGCV Plenary # 39

Berlin

May 6 - 8, 2015



Working Group on Calibration and Validation

SUMMARY

- Recalibration of completed missions
- Calibration monitoring of in-flight missions
- Preparation of calibration activities for future missions
- Conclusion

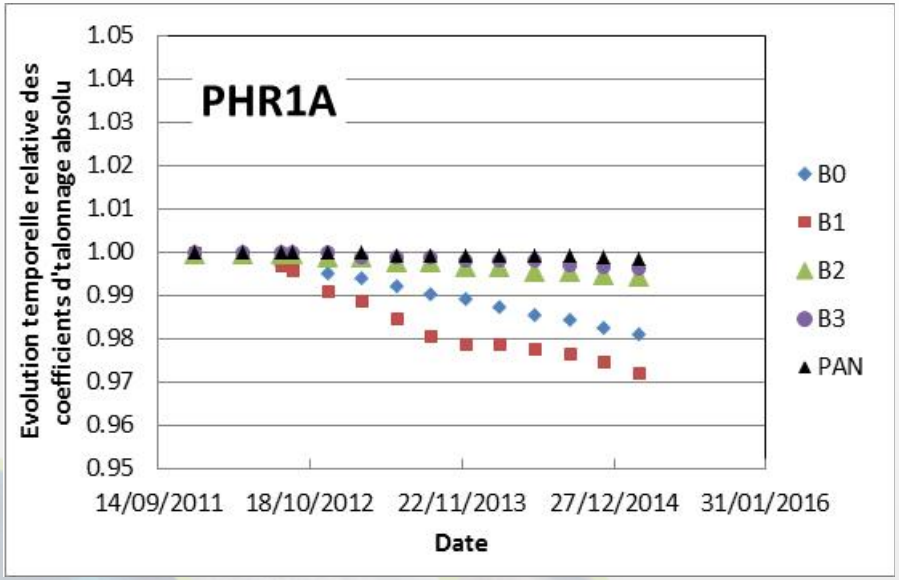
RECALIBRATION OF COMPLETED MISSIONS

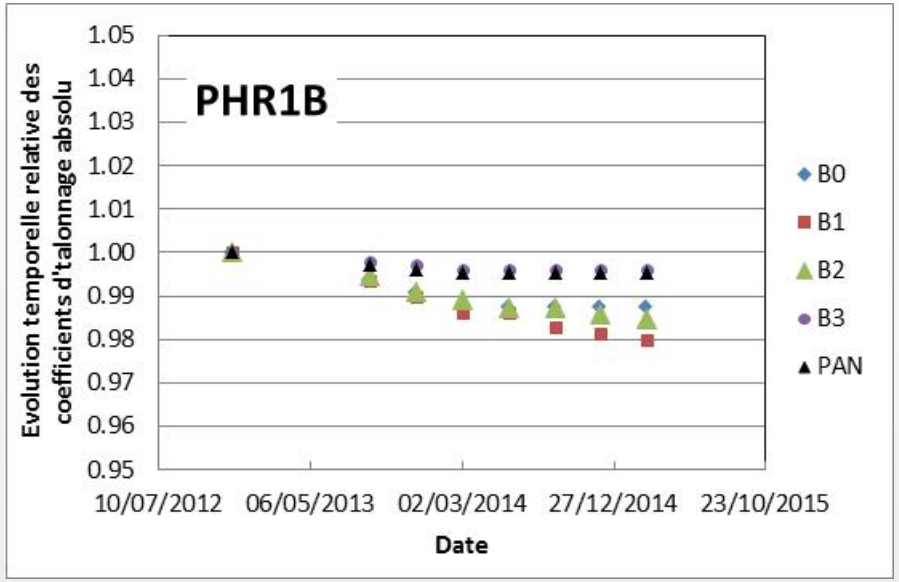
- Parasol : mission completion Nov. 2013
  - Reanalysis of level 1 (new calibration) and level 2 products (algo. improvement)
  - Level 1 reprocessing completed (CNES)
  - Level 2&3 reprocessing in progress (ICARE)
- VGT : mission completion May 2014
  - Improved calibration for VGT1 and VGT2
  - Level 2&3 reprocessing in progress (VITO)
- SPOT5 : mission completion April 2015
  - Improved calibration for SPOT1 to 5
  - Reprocessing of orthorectified products in the frame of the « SPOT World Heritage » program (CNES)

CALIBRATION MONITORING OF IN-FLIGHT MISSIONS (1)

- Pléiades 1A & 1B
  - Accurate geometric and MTF calibration monitoring
  - Radiometric calibration monitoring mainly based on lunar and desert calibration
- IASI A & B
  - Spectral and radiometric calibration using on-board device
  - Intercalibration activities : IASI-A/IASI-B ; IASI/AIRS ; IASI/CRIS
- Megha-Tropiques : Saphir & Scarab
  - Saphir calibration monitoring on ground targets
  - Scarab/Ceres intercalibration
- IIR on-board Calipso
  - New calibration procedure in progress
  - Intercalibration with MODIS

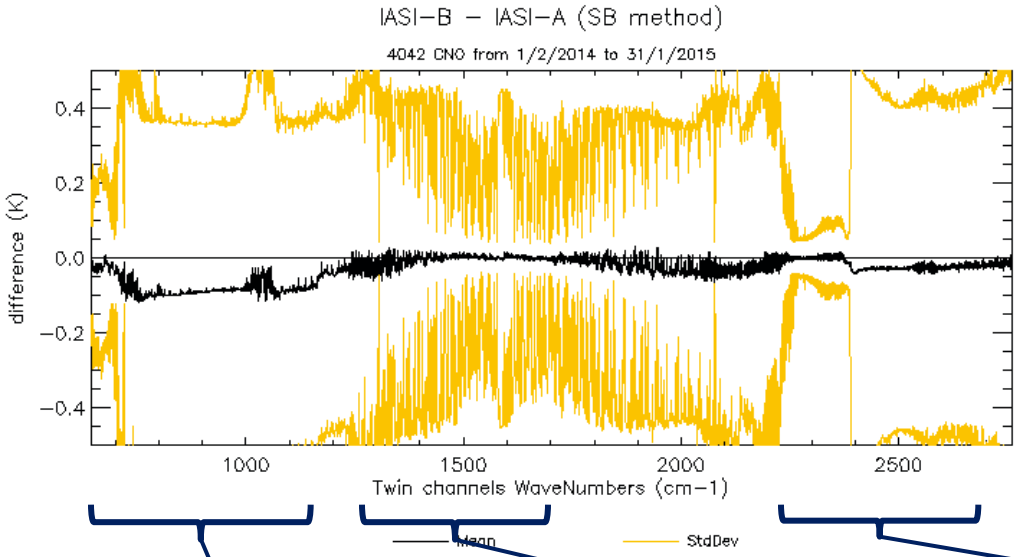
Pléiades-1A et Pléiades-1B radiometric calibration since launch





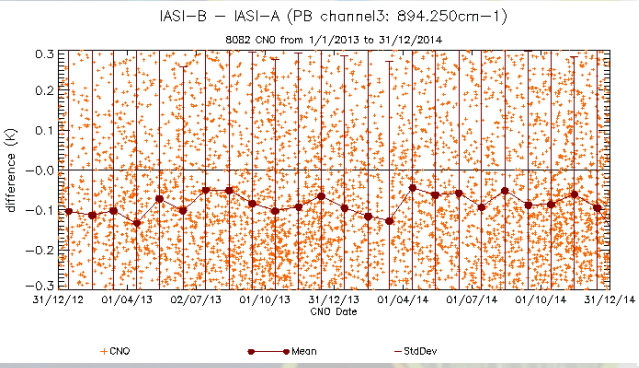
- Slight sensitivity decrease for B0 et B1 bands (and B2 for PHR1B)
- B3 et PAN bands are stabilized
- Update of the calibration parameters every 3 months

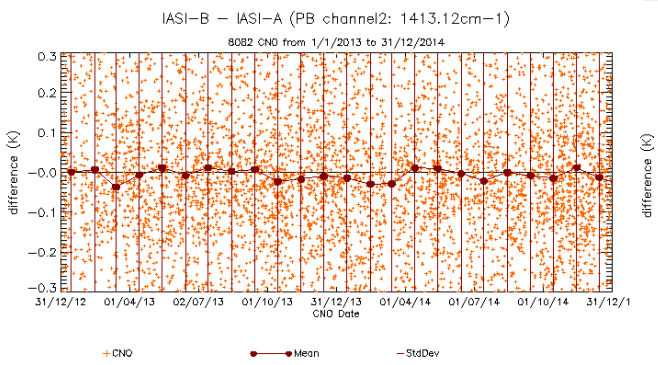
Direct IASI-B / IASI-A cross calibration over 2 years

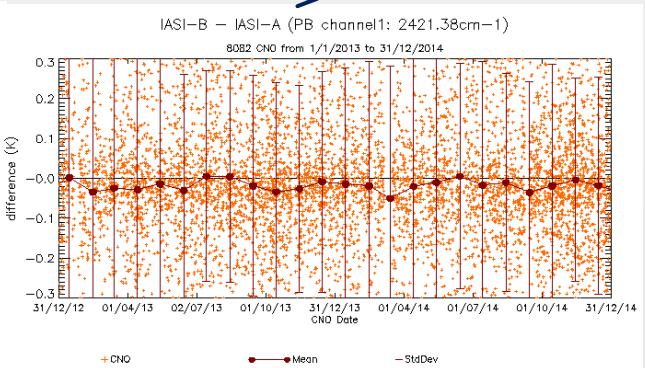


- Biases < ~0.1K
  - ➔ Very good cross calibration
  - ➔ Compliant with the 0.5K spec.
- Highest bias in B1
  - ➔ Shape still under investigation
- Very stable results with time

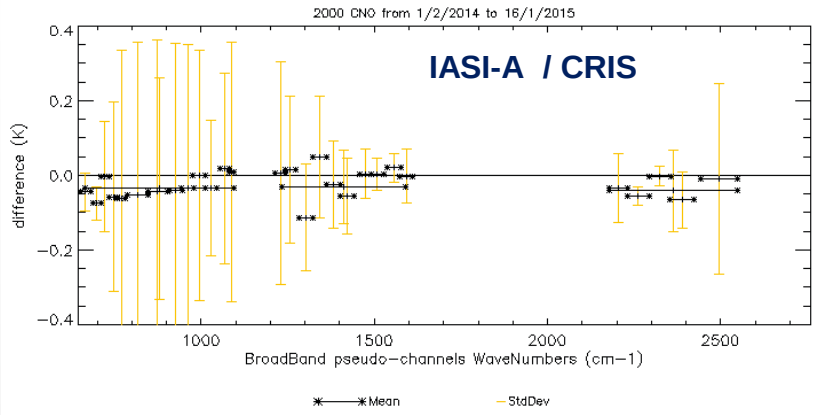
B1 B2 B3

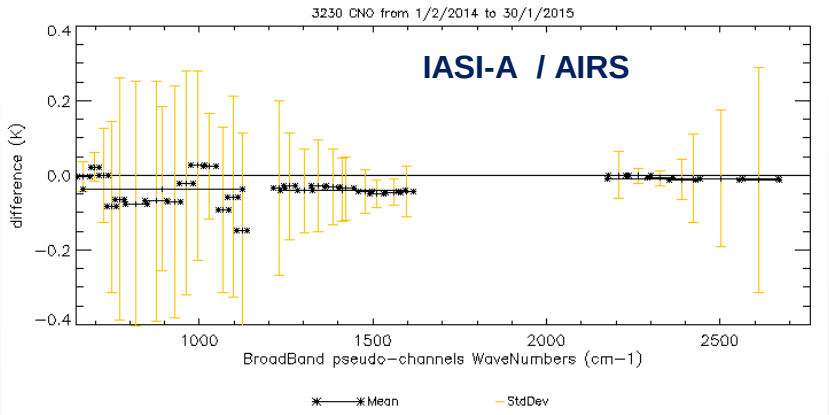


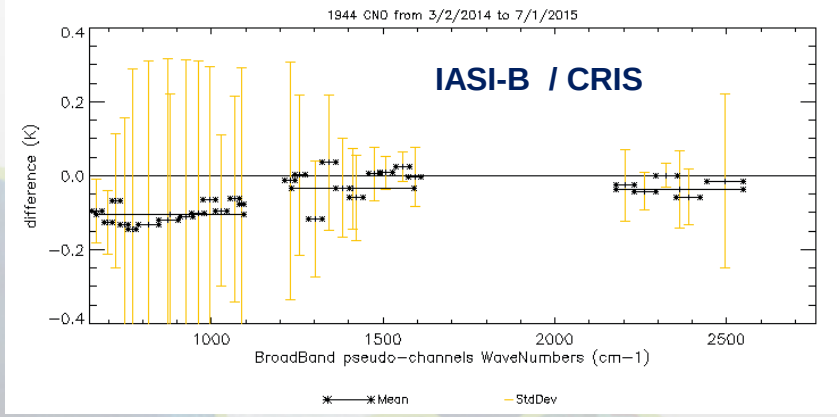


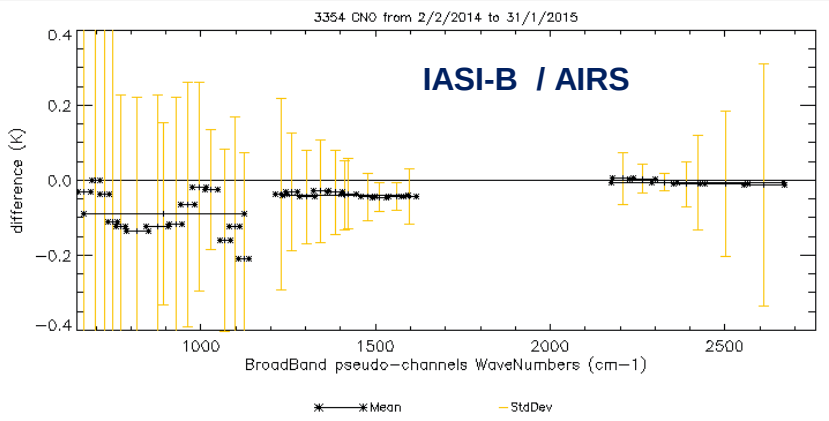


IASI-B cross calibration with AIRS and CRIS









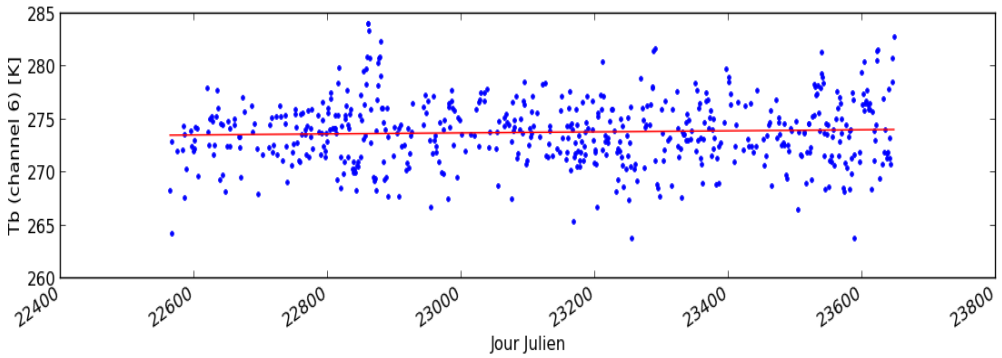
- Biases < ~0.2K ➔ Very well cross calibrated
- Same shape, always a bias in B1, stronger for IASI-B.
- CRIS and AIRS technologies are very different
- NB: the datasets are similar (and colder than for IASI-B / IASI-A)

} Due to IASI ?

Monitoring of Saphir channel 6 brightness temperature using ground targets

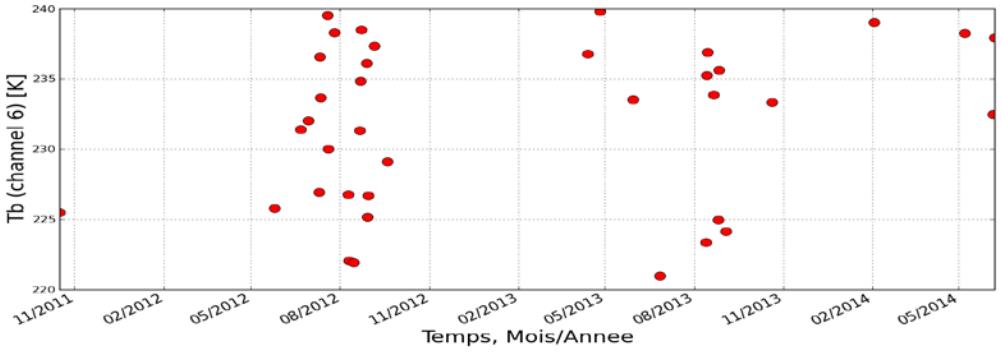
- Over a warm site (Amazonia)

  Good stability

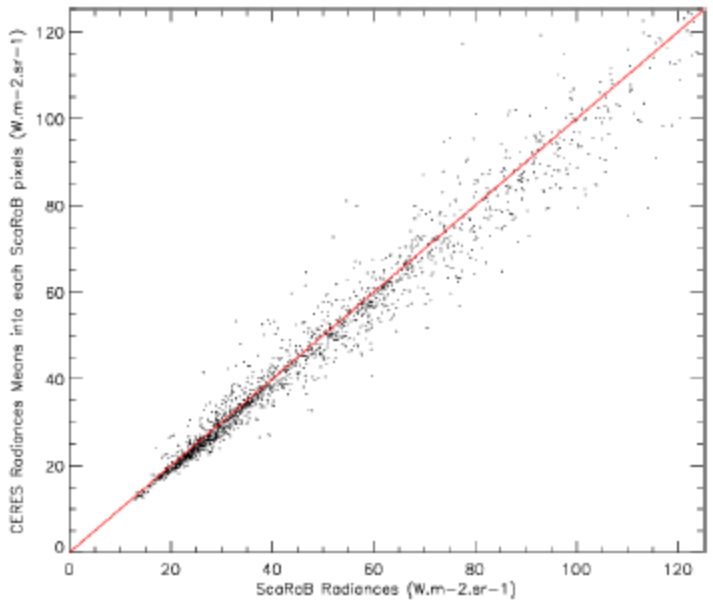


- Over a cold site (Titicaca)

  too “noisy” results

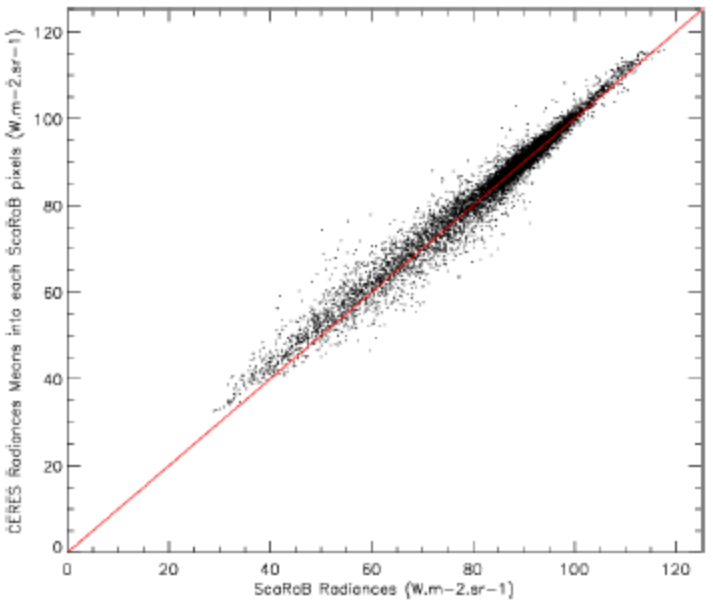


Scarab / CERES cross calibration (day time only)



SW Radiances – 51 days – 5° 5' 80%.

# collocated pixels	$\frac{ScaRaB - CERES}{mean(CERES)}$ (in %)
2085	1.88 ± 9.78



LW Radiances – 51 days – 5° 5' 80%.

# collocated pixels	$\frac{ScaRaB - CERES}{mean(CERES)}$ (in %)
10769	-0.74 ± 2.88

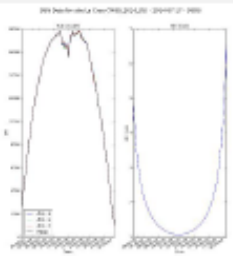
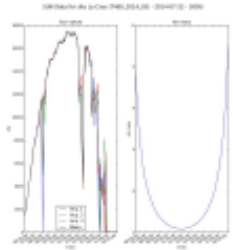
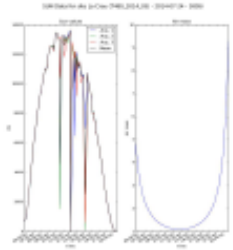
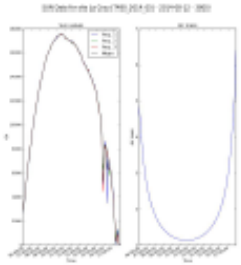
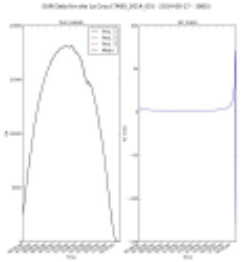
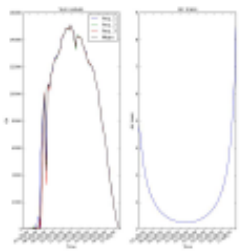
CALIBRATION MONITORING OF IN-FLIGHT MISSIONS (2)

- Absolute calibration of high resolution sensors over La Crau in 2014
  - SPOT-6: 5 calibration results - May to August 2014
  - Landsat-8: 4 calibration results - May to August 2014
  - SPOT-7 (Azersky): 8 calibration results – July to October 2014
  - SPOT-5: 2 calibration results in December 2014

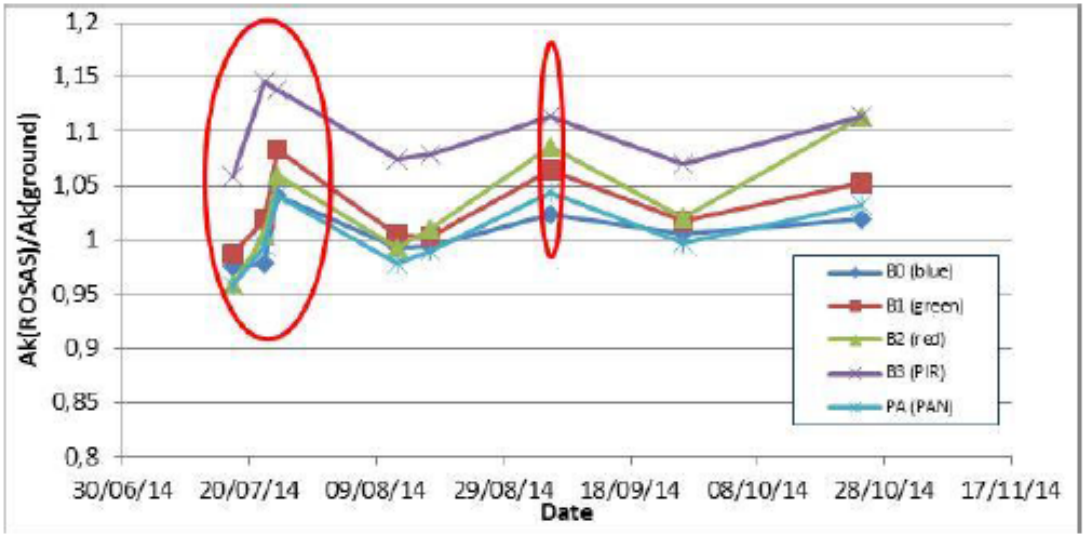
  Some other attempts for SPOT-5 and Landsat-8 in 2015 not yet processed

- Support to ESA in the framework of Racalnet

SPOT-7 acquisitions over La Crau

Acquisition date	Comments	Sun irradiance & air mass	Quicklook
17/07/2014	Cloud free image but solar irradiance measurement was perturbed by cloud around noon		
22/07/2014	Field campaign in parallel. Clear sky over photometer but presence of cirrus in north and east directions. Noisy solar irradiance		
24/07/2014	Fractional clouds close to photometer, but not on top of it. Noisy solar irradiance		
12/08/2014	Cloud free image Photometer data OK		
17/08/2014	Cloud free image Photometer data OK		
05/09/2014	Clouds, north east. Noisy solar irradiance		

SPOT-7 calibration results over La Crau



Bad quality data are highlighted with red circles

	B0	B1	B2	B3	PAN
Δak	1,00	1,02	1,03	1,08	1
Standard deviation	0,01	0,02	0,05	0,03	0,03

Mean ΔAk obtained using La crau images after removing bad quality dates.

PREPARATION OF CALIBRATION ACTIVITIES FOR FUTURE MISSIONS

- Sentinel 2A – June 2015
  - CNES in charge for ESA of the geometric and radiometric calibration during the commissionning phase
- Sentinel 3A – November 2015
  - Support to ESA for radiometric calibration validation and monitoring
- Venμs – Summer 2016
  - Whole responsability of the cal/val activities
- And later on: Sentinel 2B & 3B, CFOSAT, IASI-C, IASI-NG, MERLIN…