l'Observatoire de Paris | LESIA

Laboratoire d'Études Spatiales et d'Instrumentation en Astrophysique

Outline:

- Orbit parameters
- ACS behavior
- Temperature of the CCD and video-electronic boxes
- PSF on the two channel
- IR01 targets
- Measured-computed flux.
- On-board software.

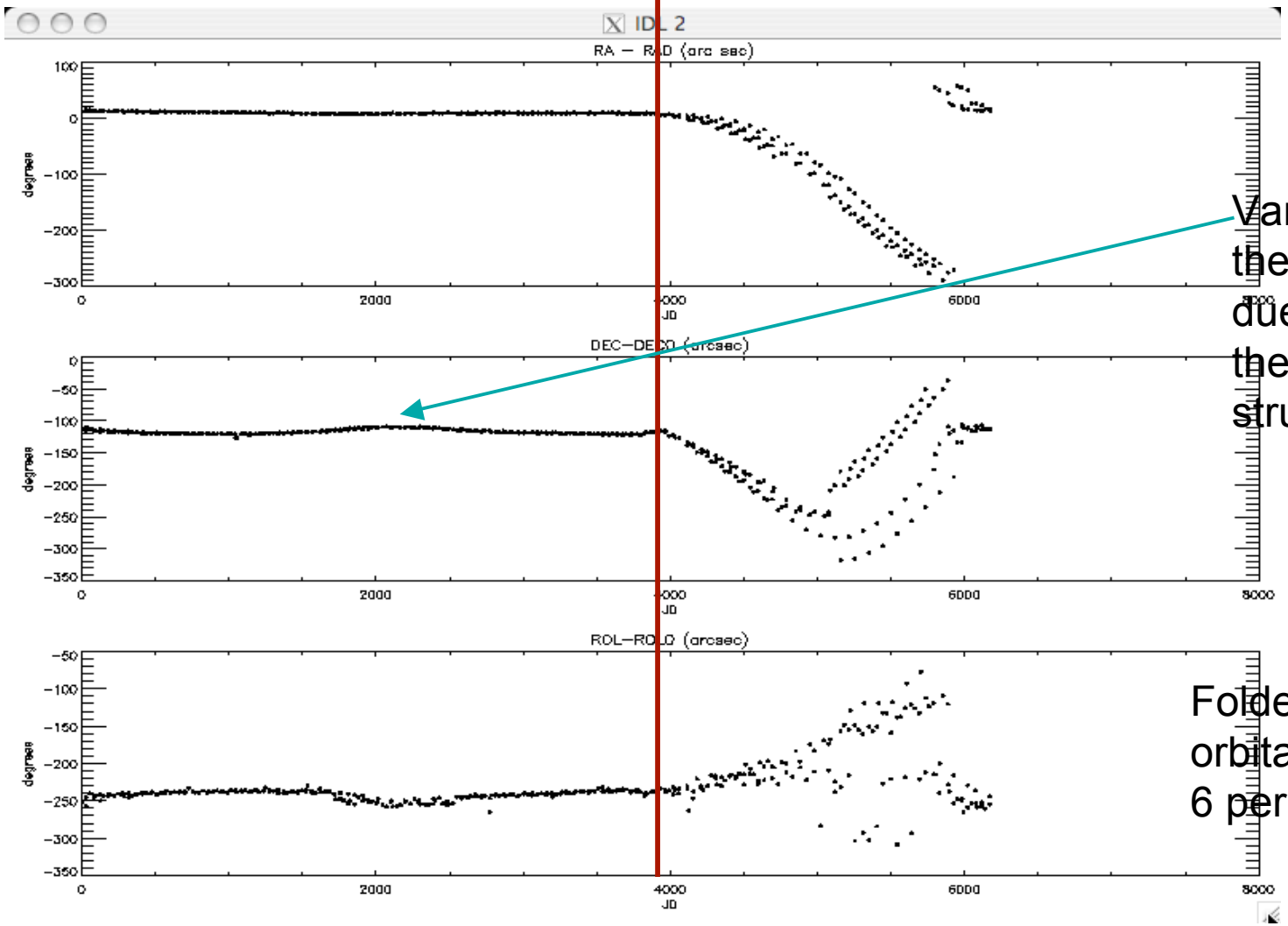
Orbit characteristics.

- Mean orbit radius 7275.7 km
- Excentricity 1.8 E-3
- Inclination 90.02 degrees -> drift of the orbit of 1 degree/year toward the
  the first center run.
- Omega: 14.54 degrees
- Orbital Period 6184 sec. with a decrease of 5 to 6 seconds on three years

ACS during the open loop mode

Star tracker ON

Star tracker OFF

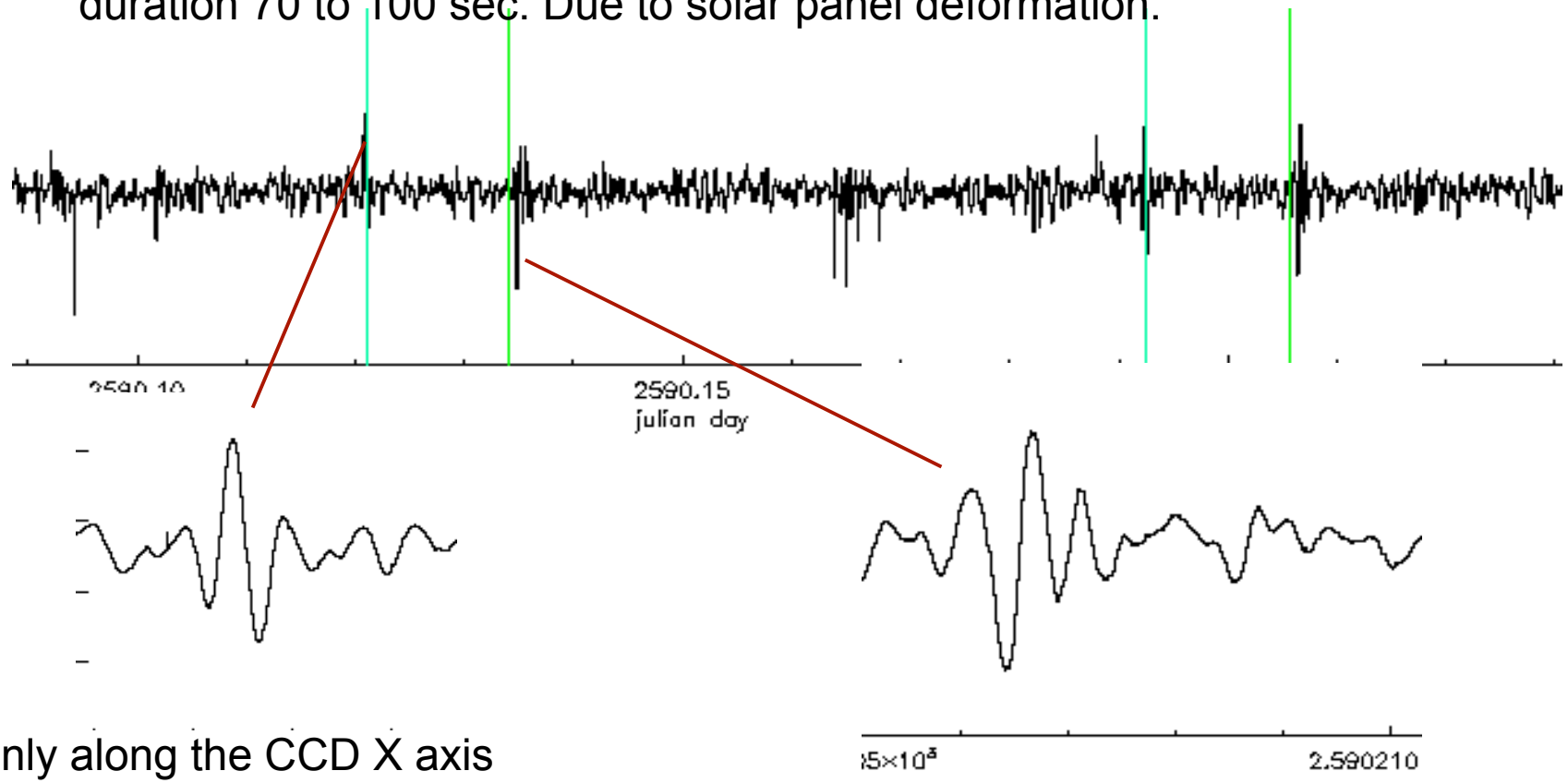


Variations of the line of sight due to thermo-mechanical structure deformation

Folded with the orbital period.
6 periods superposed

ACS

perturbations at the transition light to umbra and
umbra to light: amplitude 0.5 to 1 pixel,
duration 70 to 100 sec. Due to solar panel deformation.



Only along the CCD X axis
which is not very good for PF channel. To be corrected.

ACS

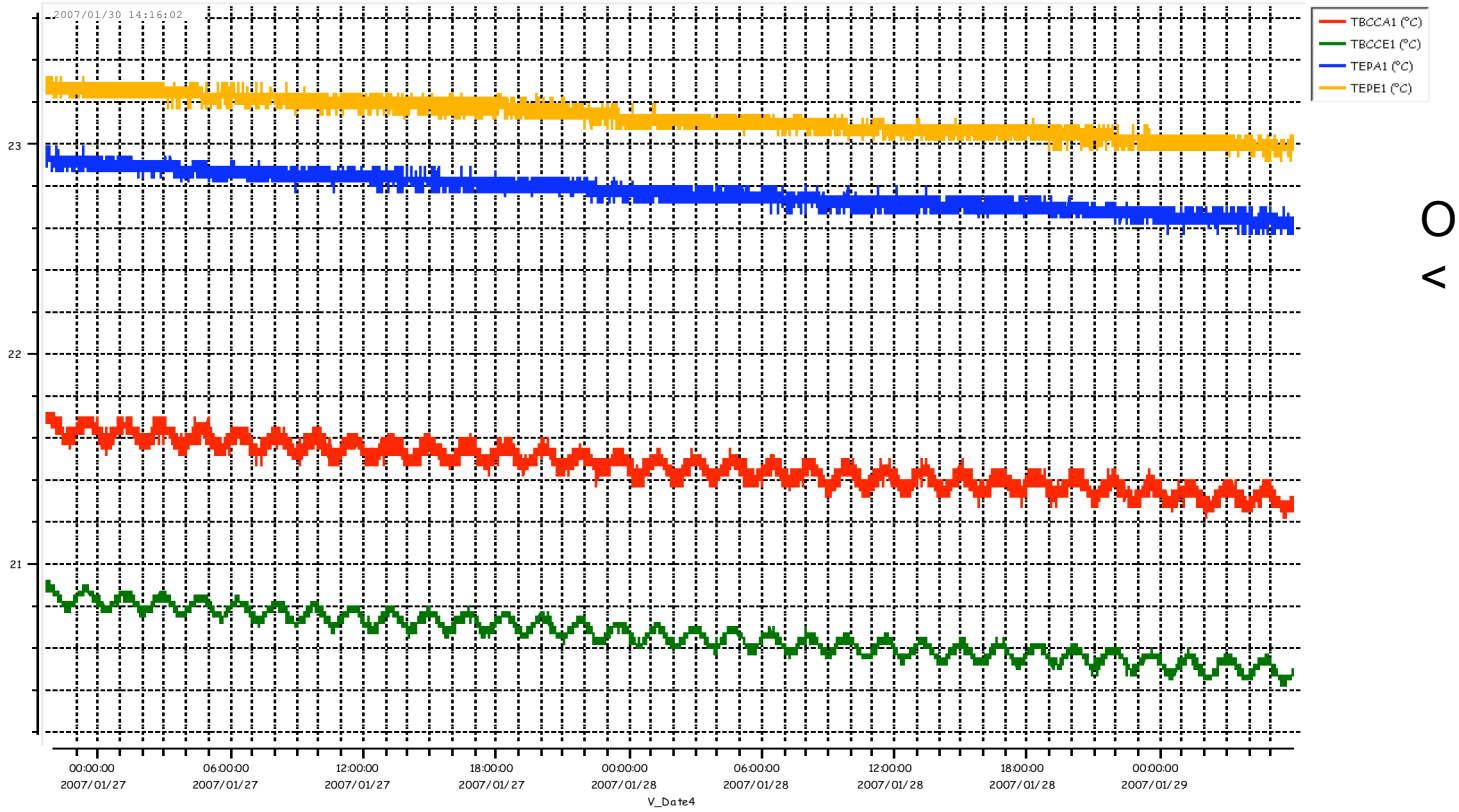
Performances without any correction:

rms on CCD: axe X 0.13 pixel
axe Y 0.15 pixel
peak to peak 2 pixels twice each orbit

The rms is better than specification (0.2 pixel) but not better than simulation.

The depointing correction are needed.

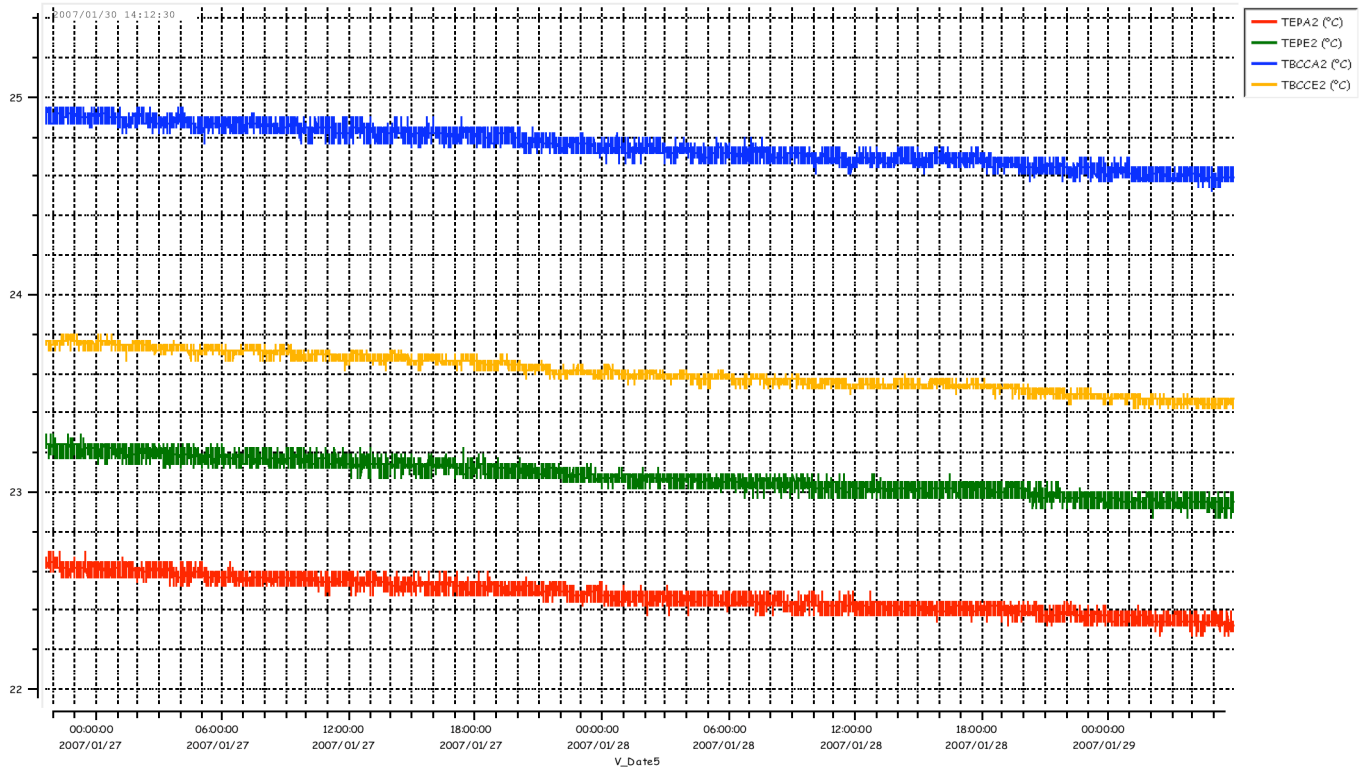
Temperature of electronical boxes, channel 1



Orbital amplitude:
< 0.2 K peak to peak

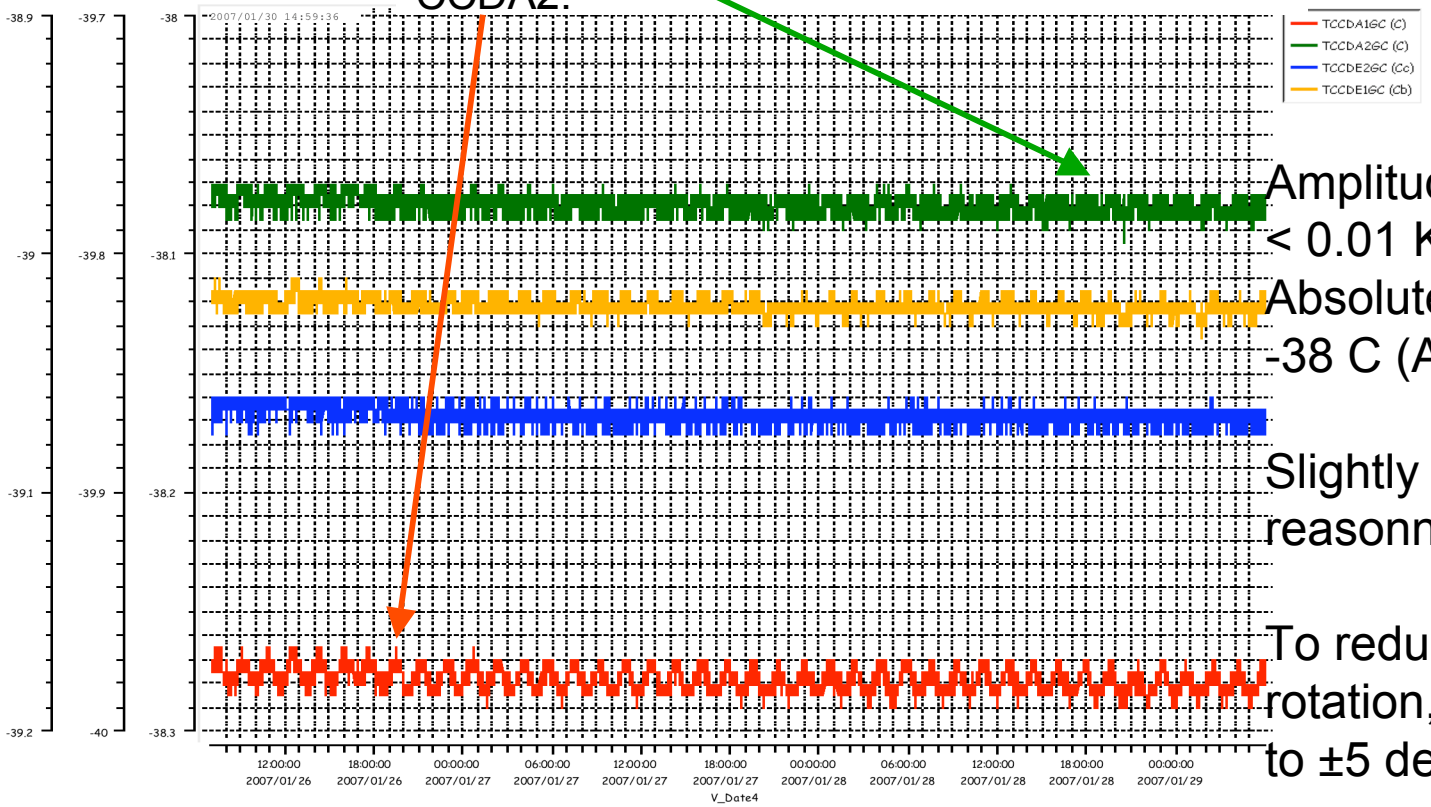
Temperature of electronical boxes, channel 2

The boxes of channel 2 are on the other satellite side, always in the shade -> no orbital variations.



CCD temperature

CCDA1 is closer to the regulation box ⇒ orbital variations are less smothed than on CCDA2.

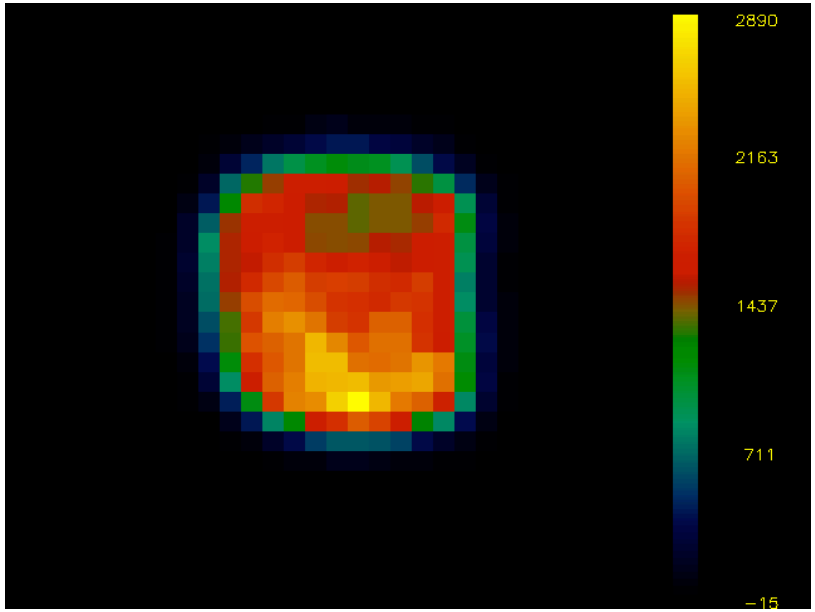


Amplitude:
< 0.01 K peak to peak
Absolute CCD temp
-38 C (AS) and -39 (PF)

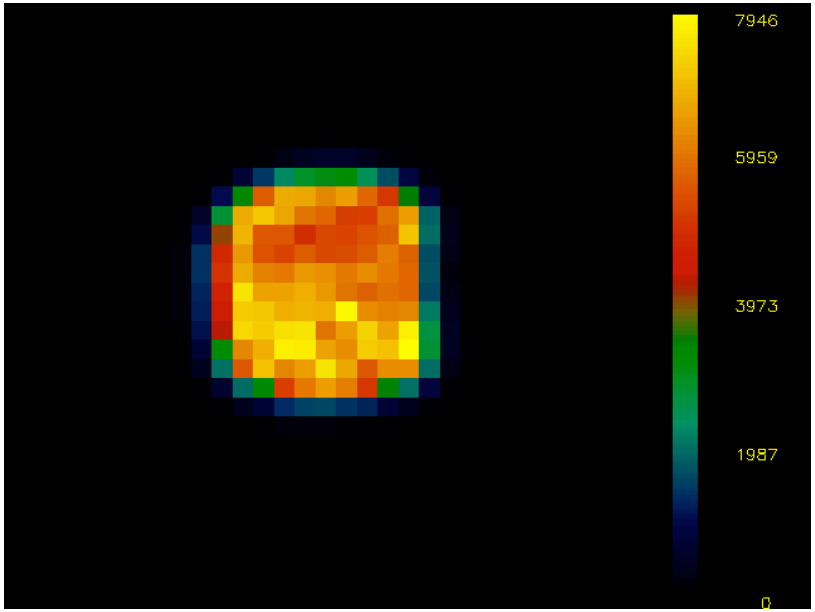
Slightly too hot for a reasonnable dark at EOL

To reduce Tccd reduce the rotation, should be close to ±5 degrees.

Seismology PSF



PSF measured



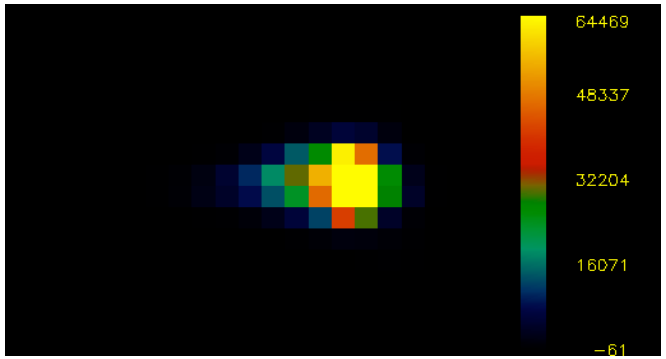
ZEMAX computation

Comparaison between measurements and simulations for 10 stars ⇒ defocus of ~ -20µm (tuning precision on ground of ± 20 µm)

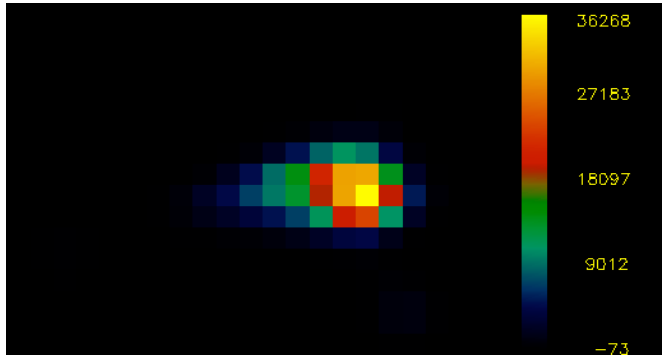
Compatible with HD 49933, mv = 5.77, brightest pixel at 55000 e-
for a focus tuning at 80000 e- at mv = 5.70

Planet PSF

CCD E1

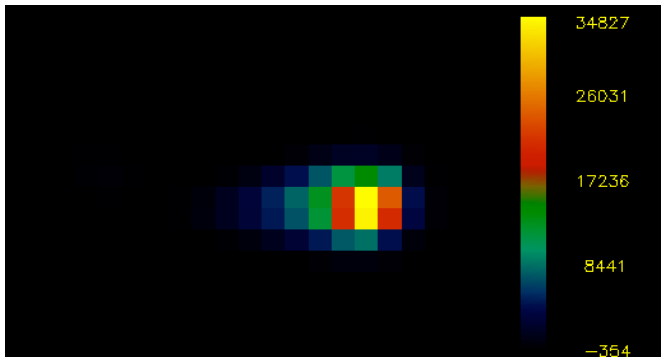


X=662, y=995

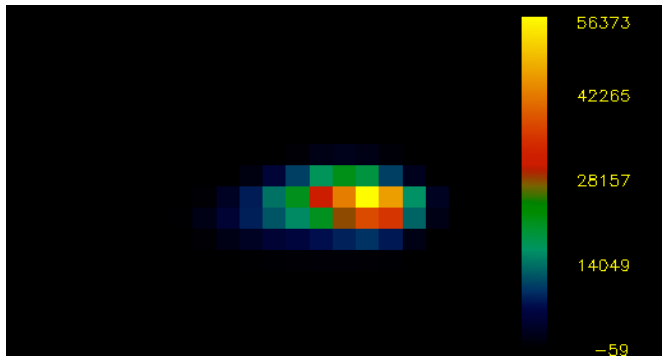


X=1537, y=100

CCD E2



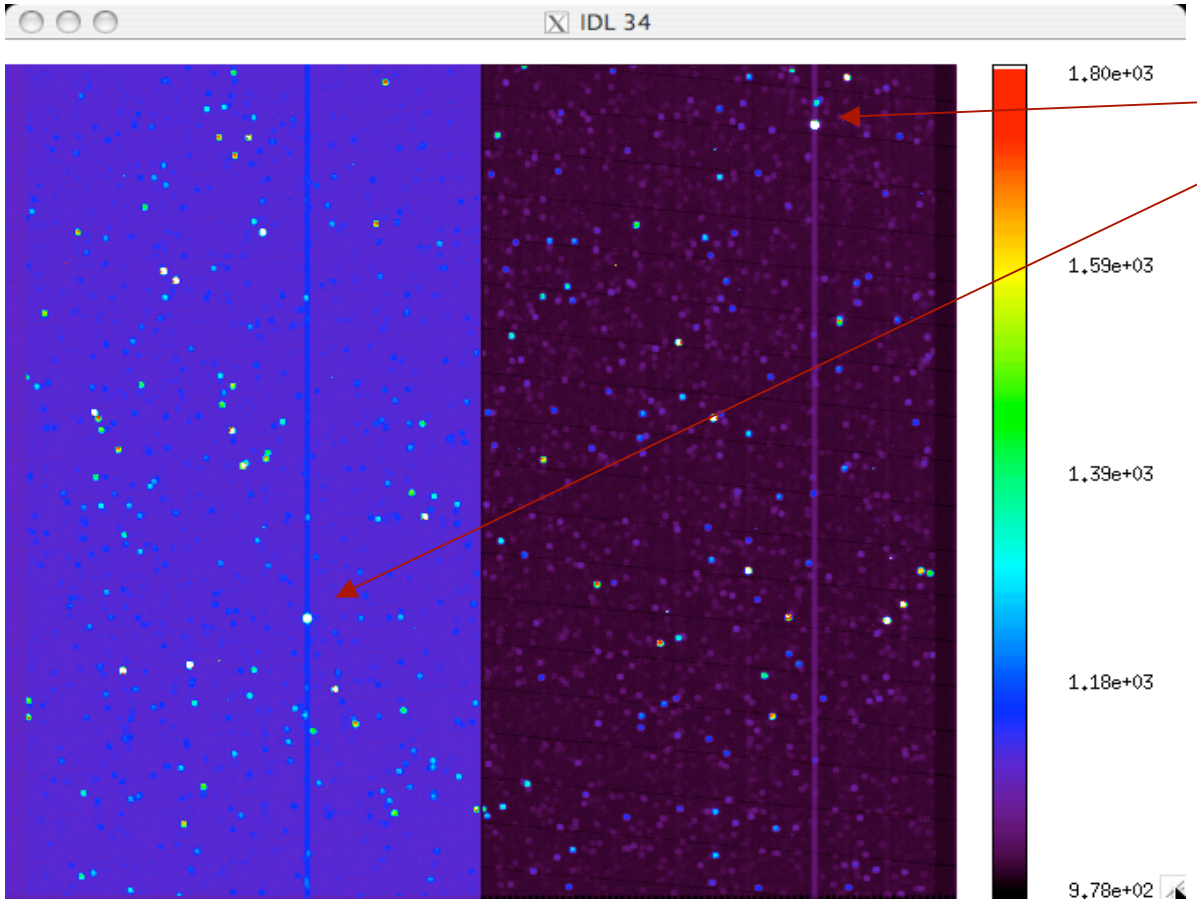
X=171, y=1779



X=1632, y=260

The red color is more focused than expected ⇒ compatible with the -20µm of defocus seen in the AS channel

AS field for IR01: CCD A1

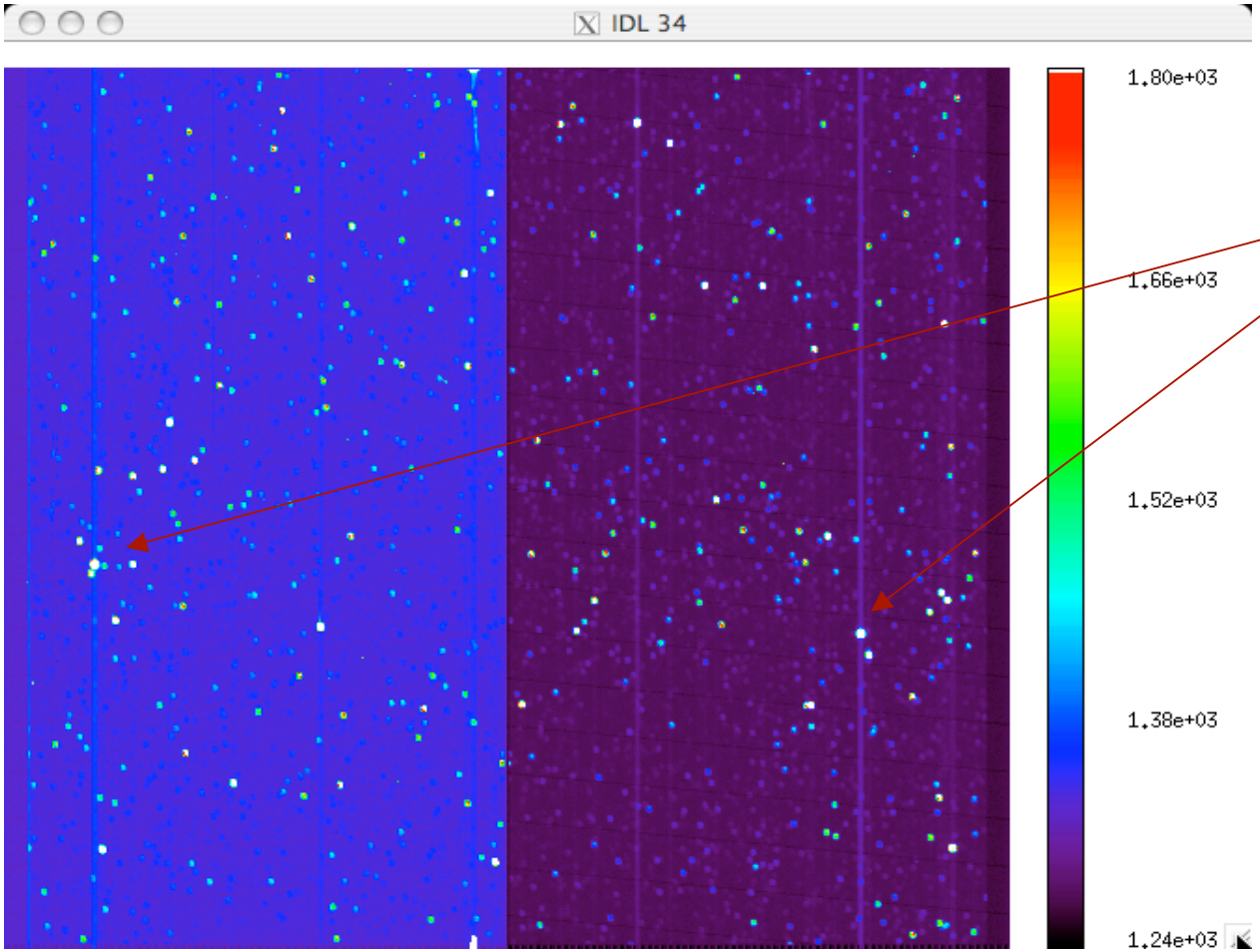


Stars for ACS

Brightest stars with good position on CCD

A1 is used for the closed loop mode. The angles estimation is better than with A2

AS field for IR01: CCD A2

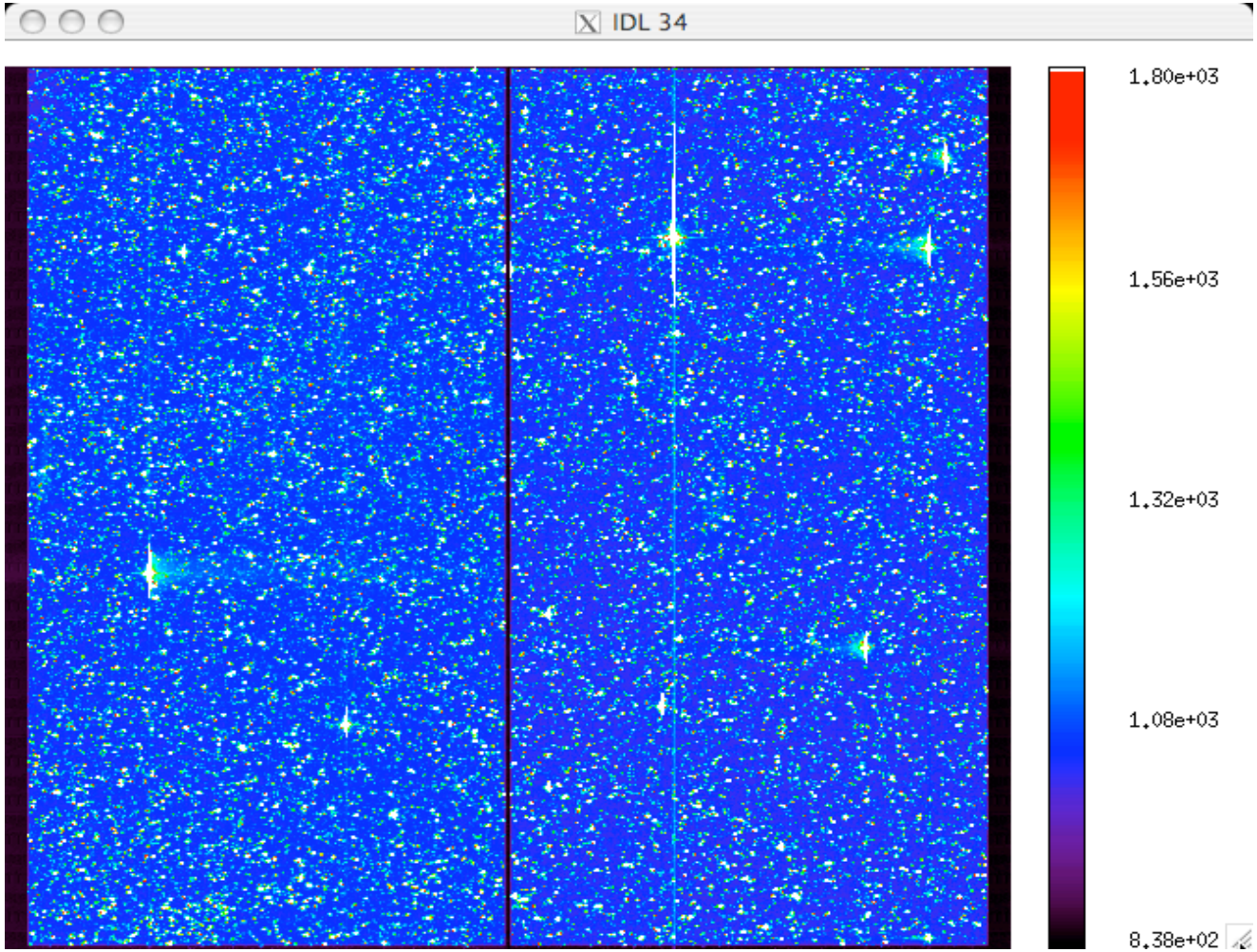


Selected stars on AS channel

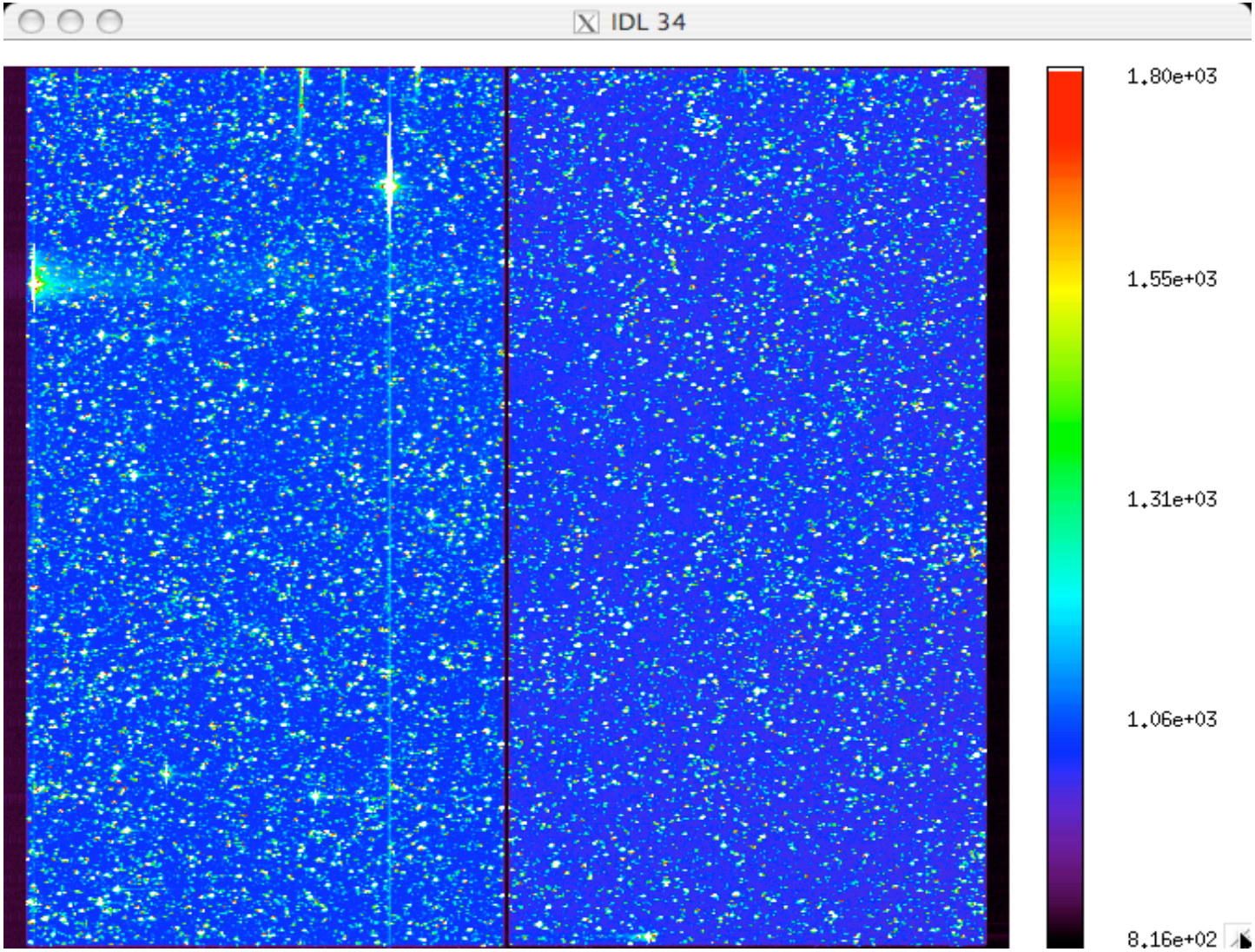
Current date: 2007-01-17 14:27:19
RA: 102.60 Dec: -1.70 Rot: 14.96
RA: 102.60416 Dec: -1.700 Rol: 9.59644398

Priority	Corot Id	Name	mv	log(Teff)	SCAO
CCD A1					
1	116	HD 50747	5.45	3.89	1
2	123	HD 50844	9.1	3.88	0
3	83	HD 50773	9.36	3.92	0
0	20	HD 49933	5.77	3.81	1
4	156	HD 50846	8.201	4.23	0
CCD A2					
3	223	HD 50170	6.82	3.81	1
2	400	HD 50890	6.04	3.66	0
0	214	HD 51106	7.36	3.90	1
1	263	HD 292790	9.48	3.81	0
4	187	HD 50405	9.32	4.01	0

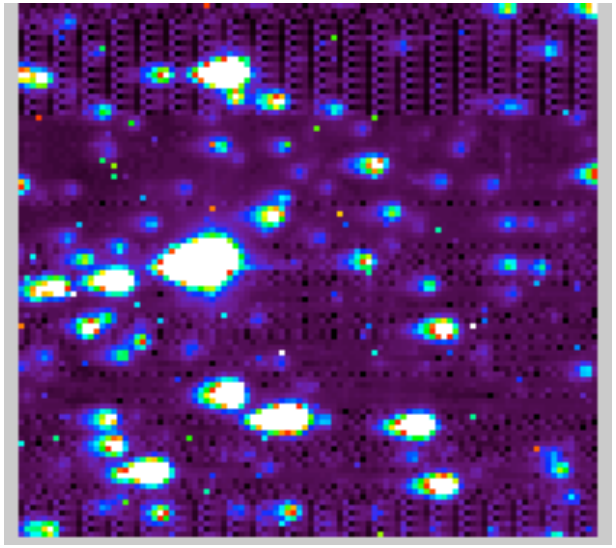
PF program: CCD E1

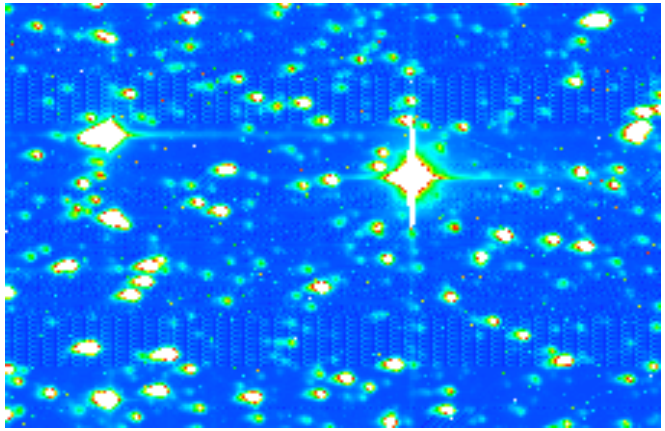


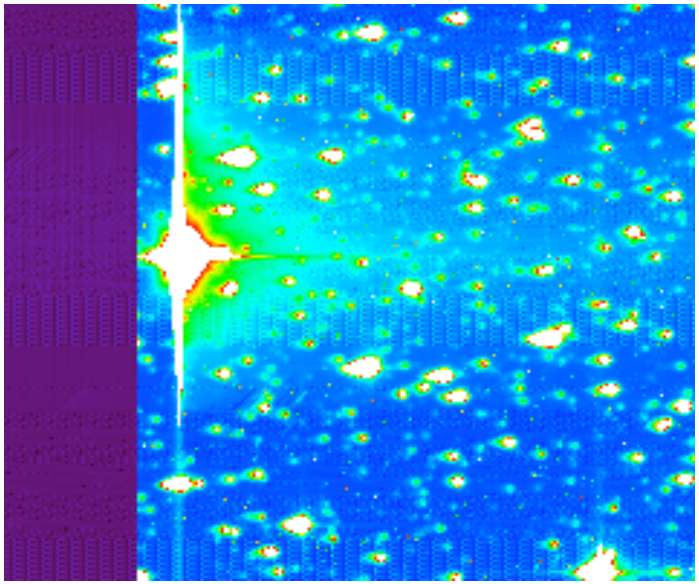
PF channel CCD E2



Images on PF channel



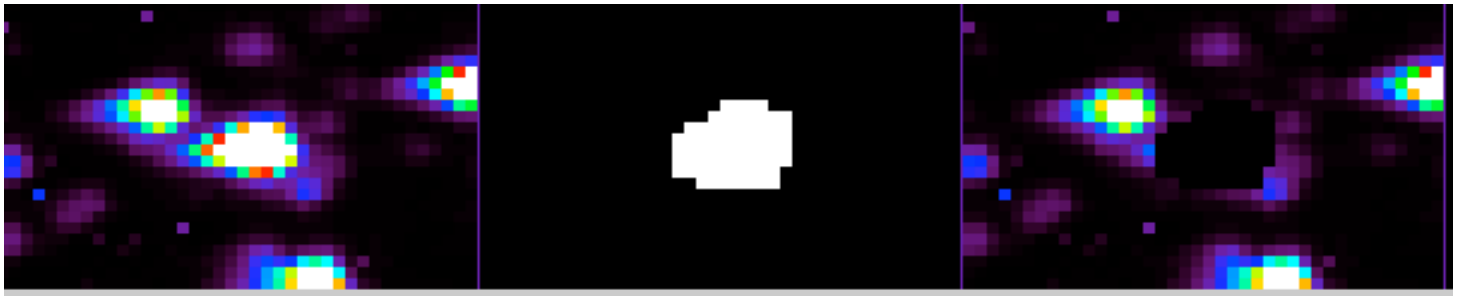




Diffusion of charge along the raw

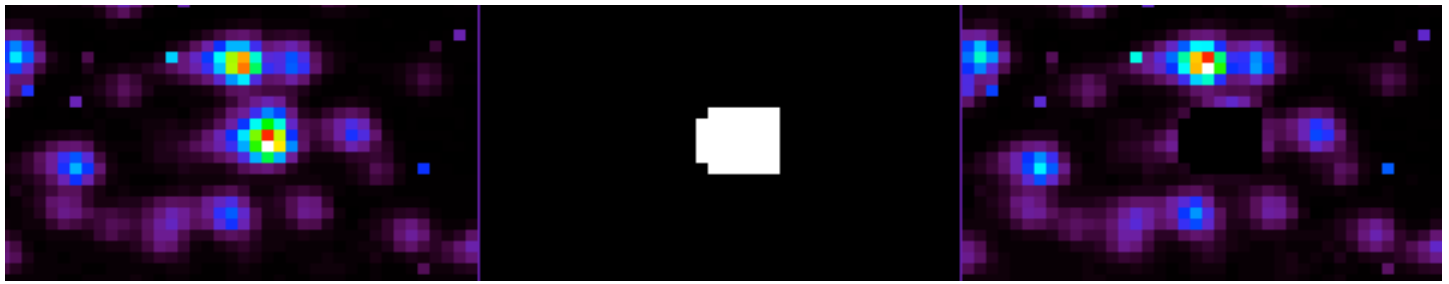
Aperture on PF channel

Mr = 12.65



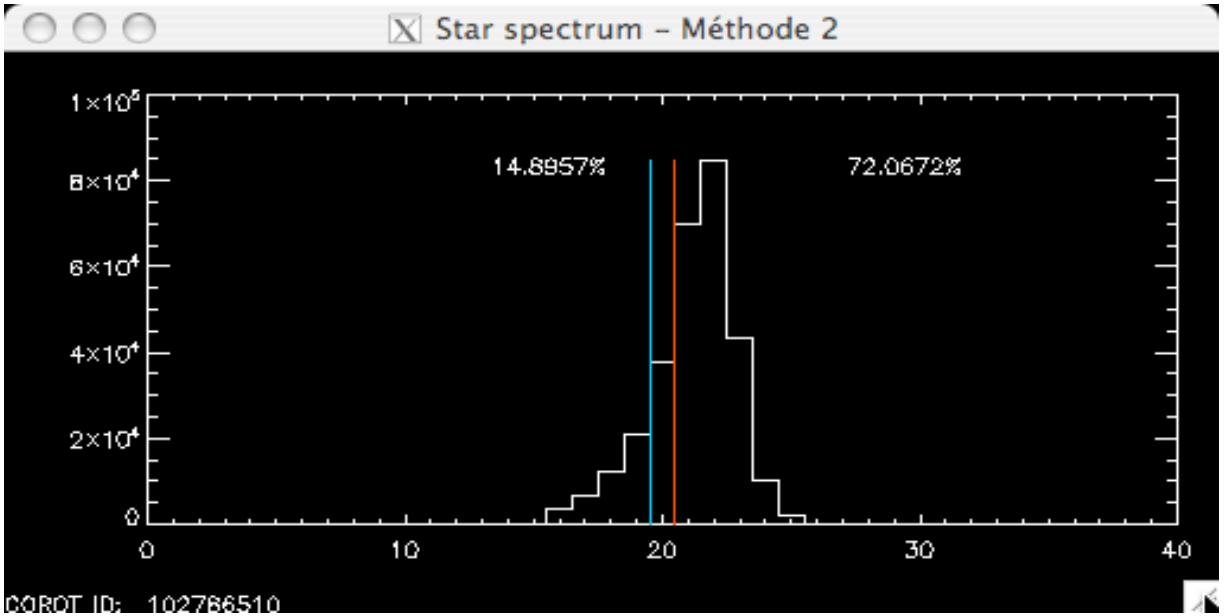
Mr = 14.9

Mr = 15.5



Colors on stars brighter than mr=15.

Example of chromatic frontiers

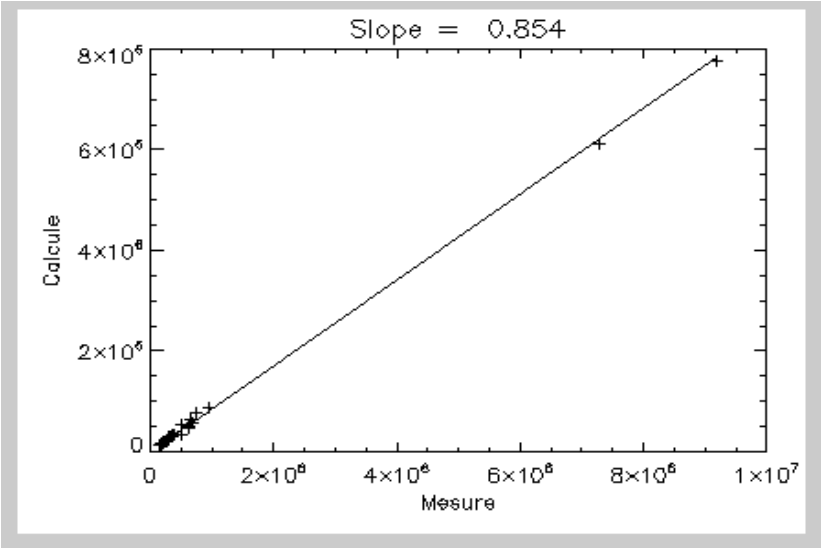


For an efficient correction of depointing, the red and blue limit must be in a monotone part of the spectra -> the proportion of flux in the « red » filter is larger than required and too small in the « blue » filter.

Relation measured-computed flux

With all identified and brightest stars

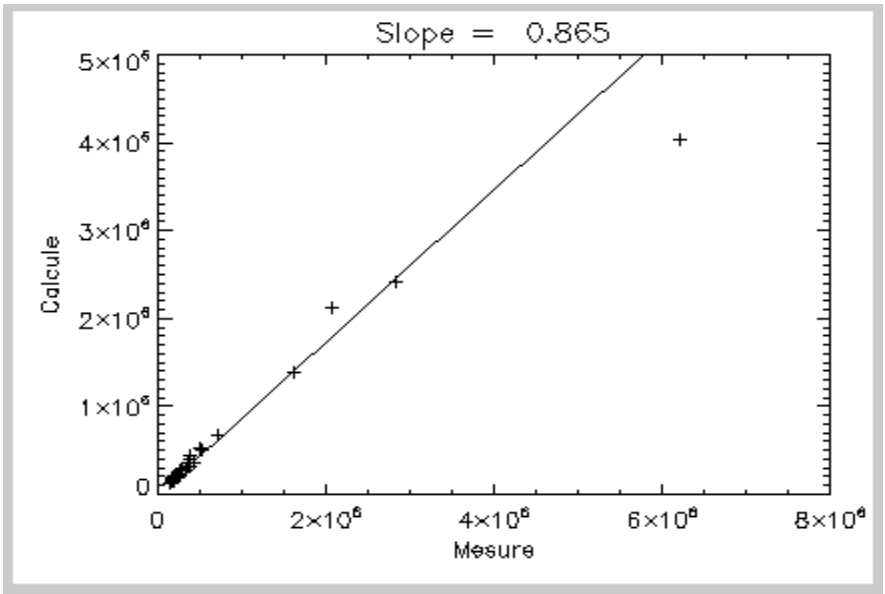
CCD A1



Computed from Tycho VT mag.
Use also the relation VT -> VJ
the e- number is computed with VJ and

Efficiency: Measured QE * measured transmission.

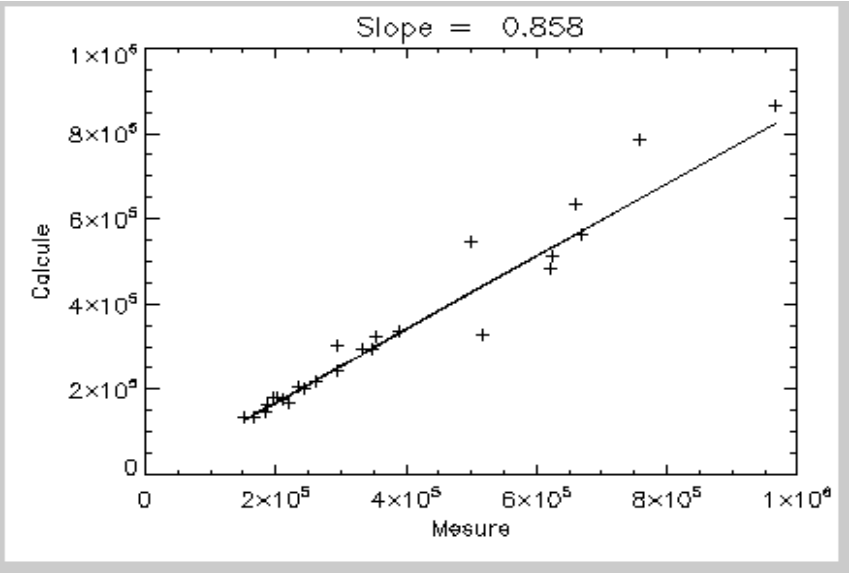
CCD A2



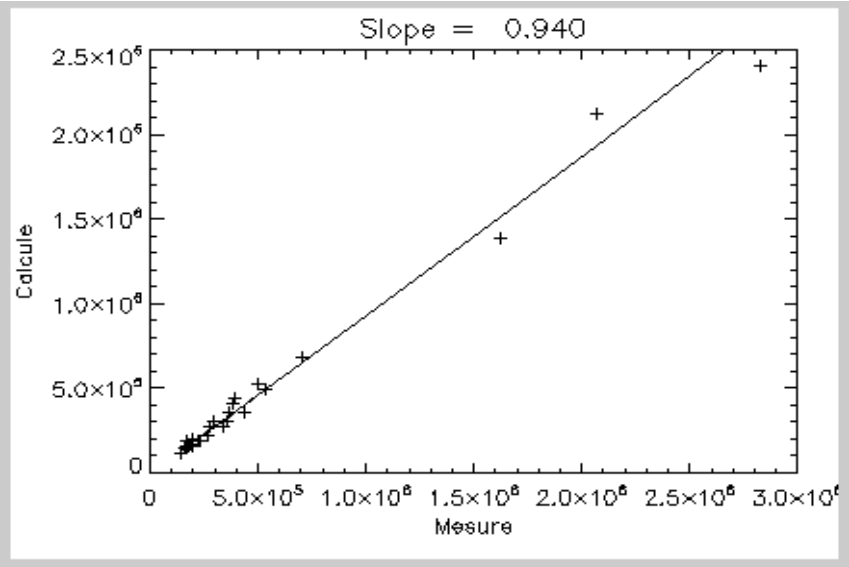
Relation measured-computed flux

Restricted to faintest stars of the same sample.

CCD A1



CCD A2



action: improve the flux computation
to be done on the PF channel

NO problems: all is OK

Conclusions

To day all instrument and satellite performances are slightly better or equal to the expected value.

Some others calibrations must be done to optimize several on-board software parameters.

Next « rendez-vous » for the first planet and the first mode.