

ALTIKA RADIOMETER

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SOMMAIRE

- INTRODUCTION
- THERMAL ASPECTS
- PERFORMANCES

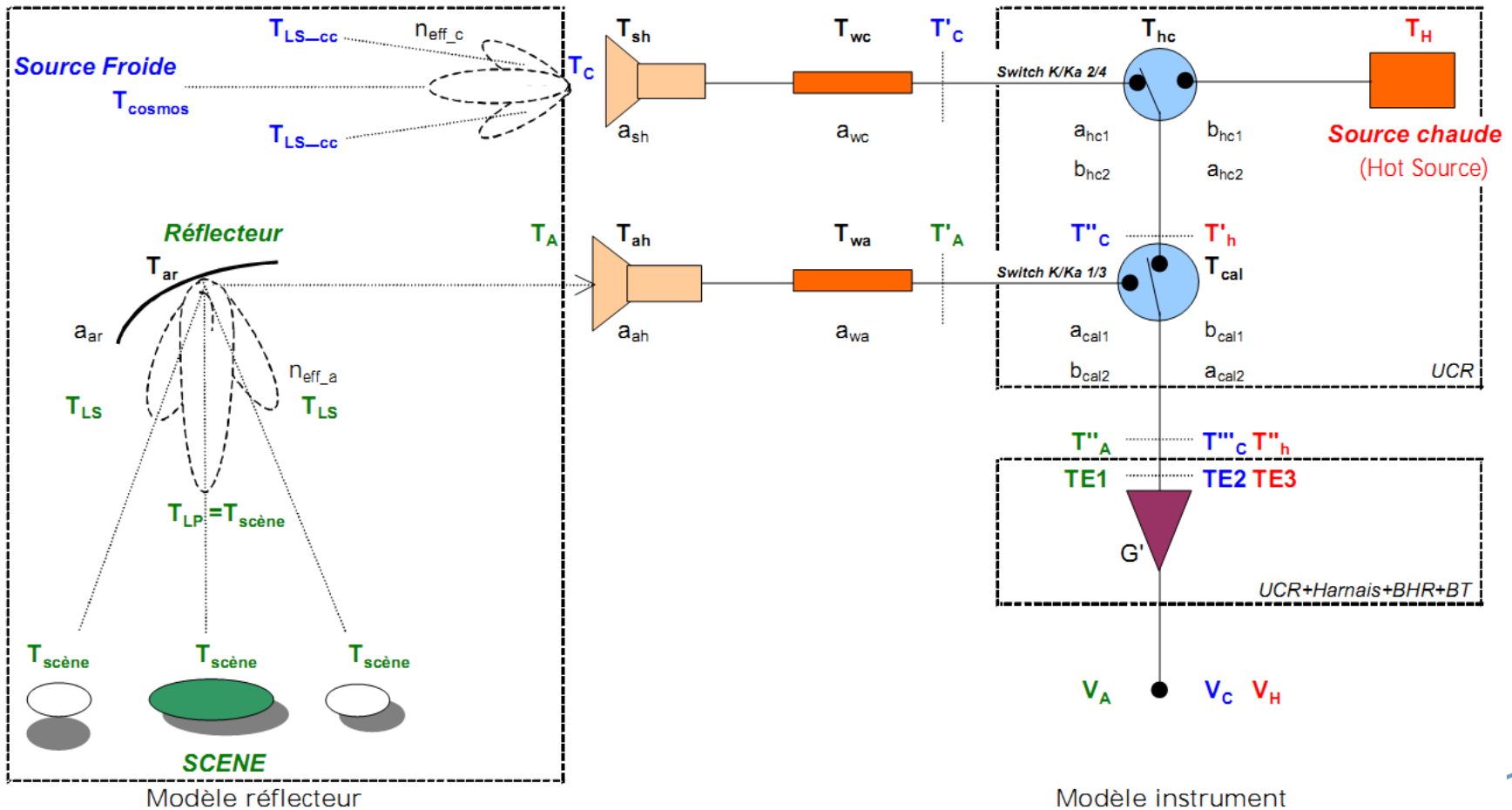
INTRODUCTION

Radiometer is embedded within the altimeter

- ❑ Antenna and processing units are shared between altimeter and radiometer.
- ❑ Radiometer : dual frequency, in K (23,8 GHz) and Ka bands (37 GHz)
- ❑ Footprint size (half-power beam width) has a diameter of 8 kms for Ka band and 12 kms for Ku band. Expected good performance in coastal area.
- ❑ The radiometer is operational in all altimeter modes except init mode
- ❑ Assessment phase
 - No particular operations, it has been working since Altika switch ON
 - ◆ 1 measurement every 200 ms
 - ◆ Calibrations are done continuously
 - » 2 sources for calibration : 1 cold (sky horn) and 1 hot (internal load)
 - » 1 calibration every 3 seconds : we have so Hot calibration, followed by cold calibration, followed by 13 measurements

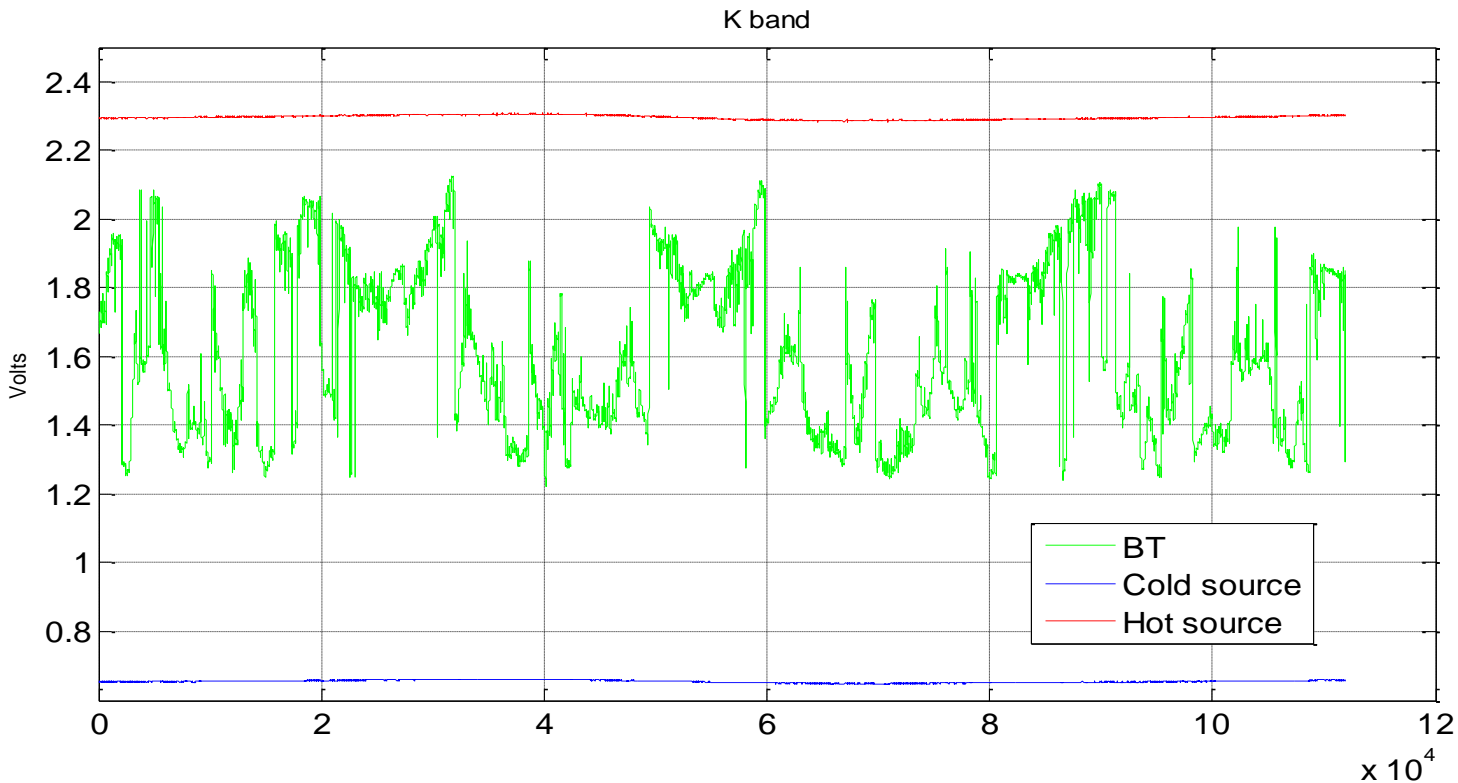
RADIOMETRIC MODEL FOR GROUND PROCESSING

This model has been implemented in the ground processing and also in a dedicated prototype to allow in depth analysis of the sensitivity of each thermistance



COUNTS DYNAMIC

All the counts are in the expected voltage range 0 – 2,5 V
No tuning was needed (voltage offset can be adjusted in RDB if needed)

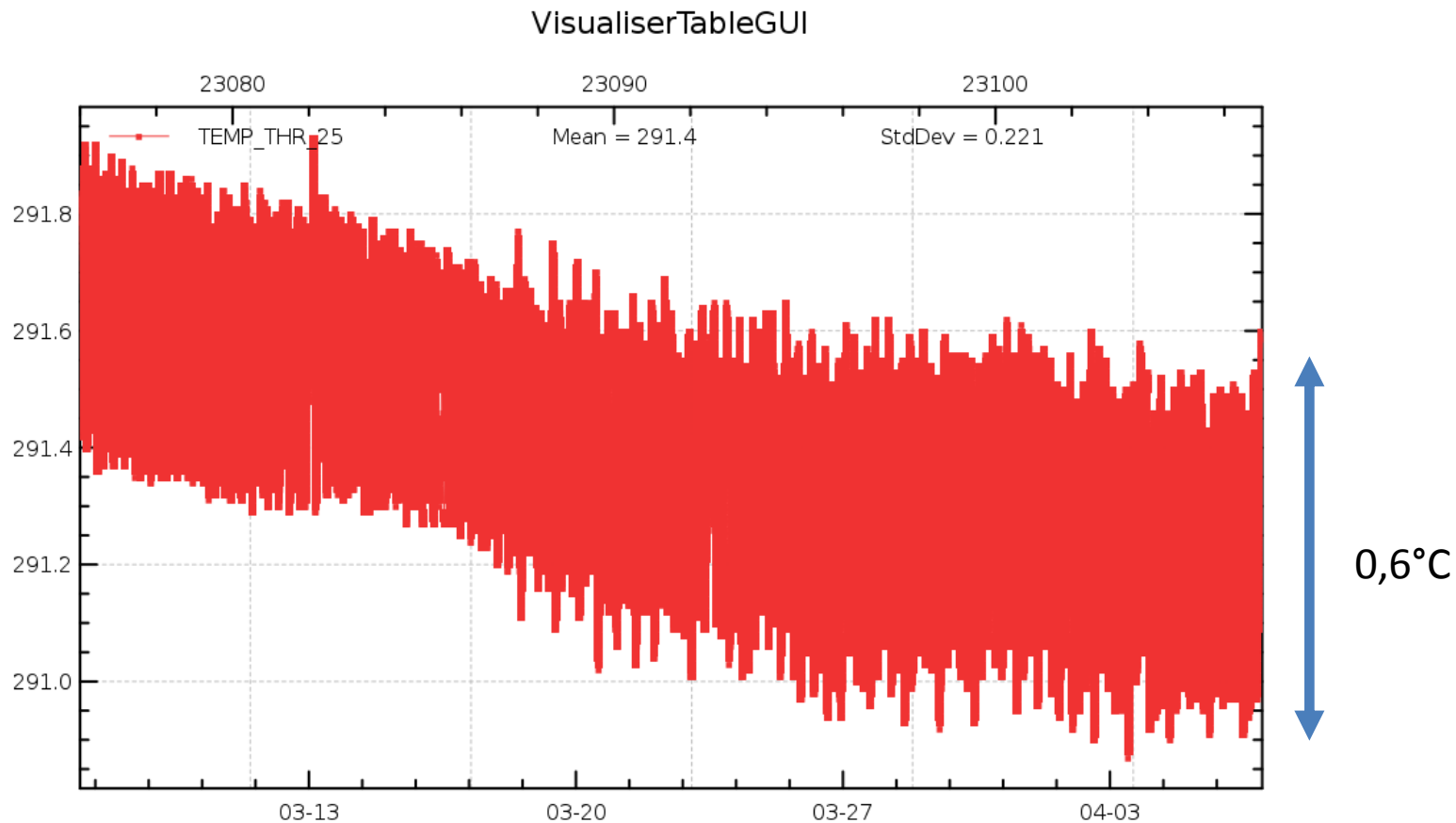


BT = Brightness Temperature (scene)

THERMAL STABILITY

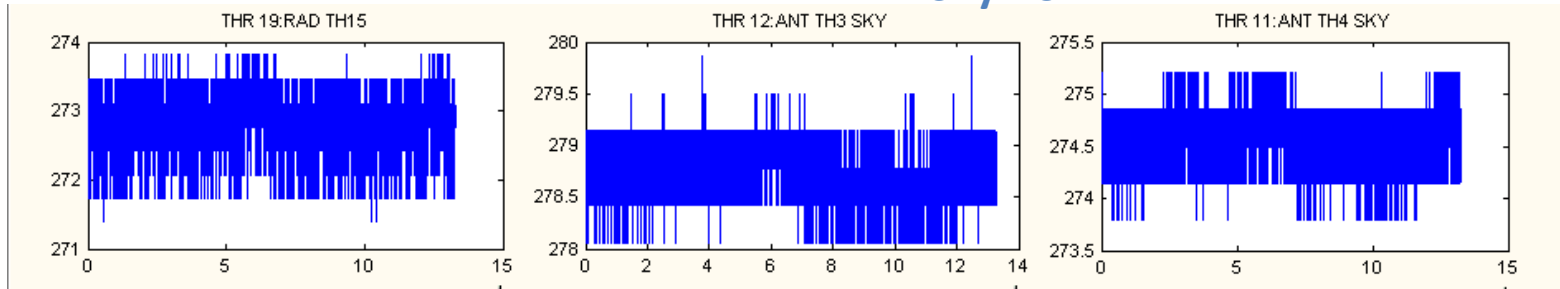
Very good thermal on-board stability

Example : hot load temperature (measured) over 1 month



THERMAL STABILITY (≈ 7 HOURS DATA)

Sky horn

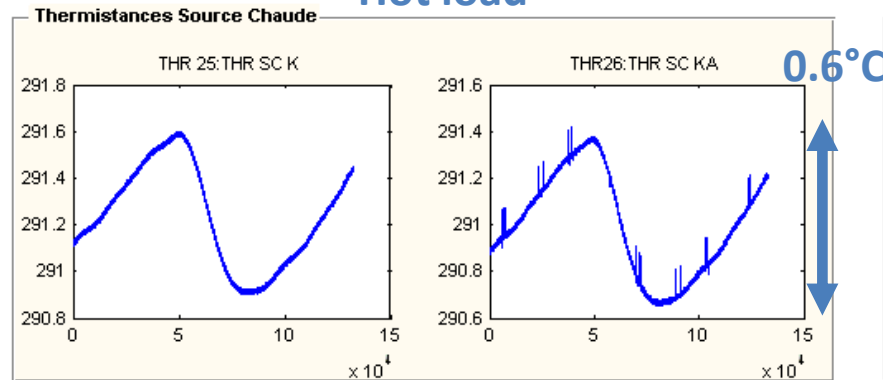


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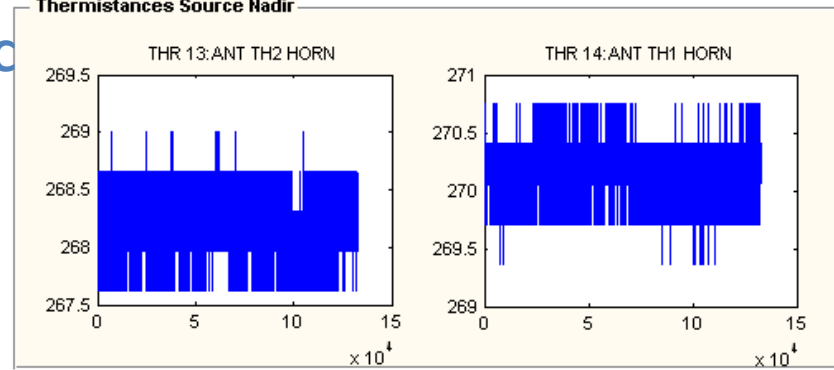


CLOSE

Hot load

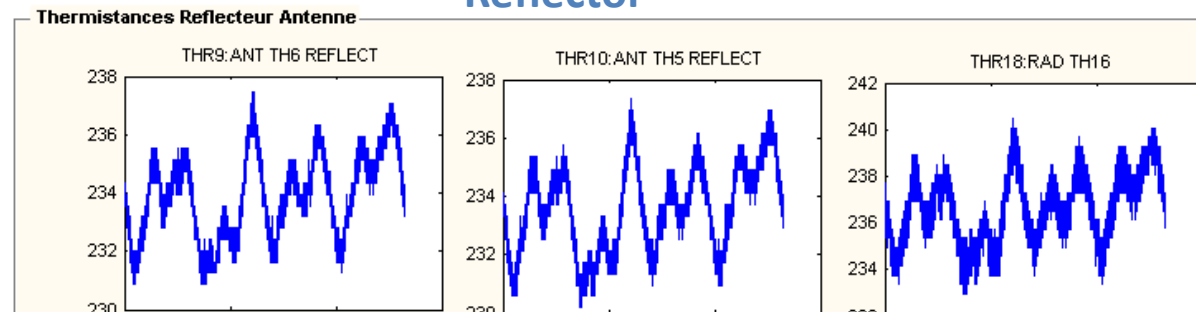


Thermistances Source Nadir

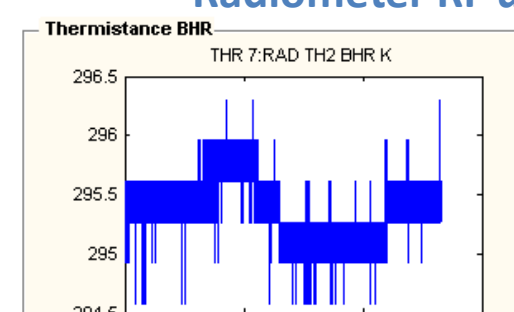


Nadir horn

Reflector

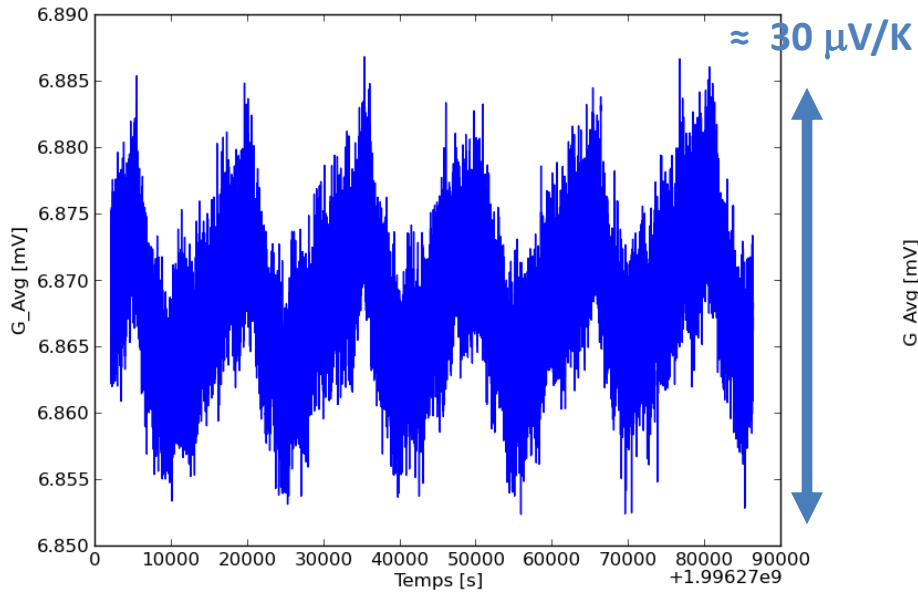


Radiometer RF unit

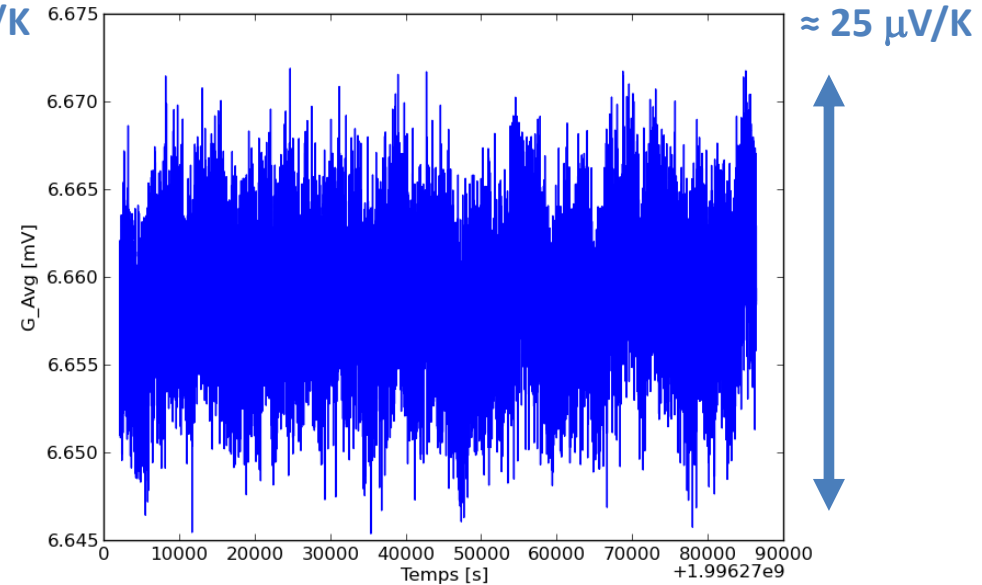


RADIOMETER GAIN

Radiometer gain variation : 1 day data



K-band



Ka-band

→ Very good stability of the gain (Oscillations due to thermal control)

STABILITY AND PERFORMANCE ASSESSMENT

- Radiometer performances : sensitivity and absolute accuracy
 - ❑ Not so easy to evaluate in flight !
 - ❑ Comparison of some figures between ground tests and in flight measurements
 - Standard deviation on calibration counts and gain

Parameter	Ground test	Flight data
Gain in K band	0,169 mV/K	0,004 mV/K
Gain in Ka band	0,156 mV/K	0,004 mV/K
Vc in K band (cold)	0,99 mV	0,565 mV
Vc in Ka band	1,163 mV	0,801 mV
VH in K band (hot)	0,951 mV	0,995 mV
VH in Ka band	1,159 mV	1,107 mV

STABILITY AND PERFORMANCE ASSESSMENT

Radiometer performances : sensitivity estimation

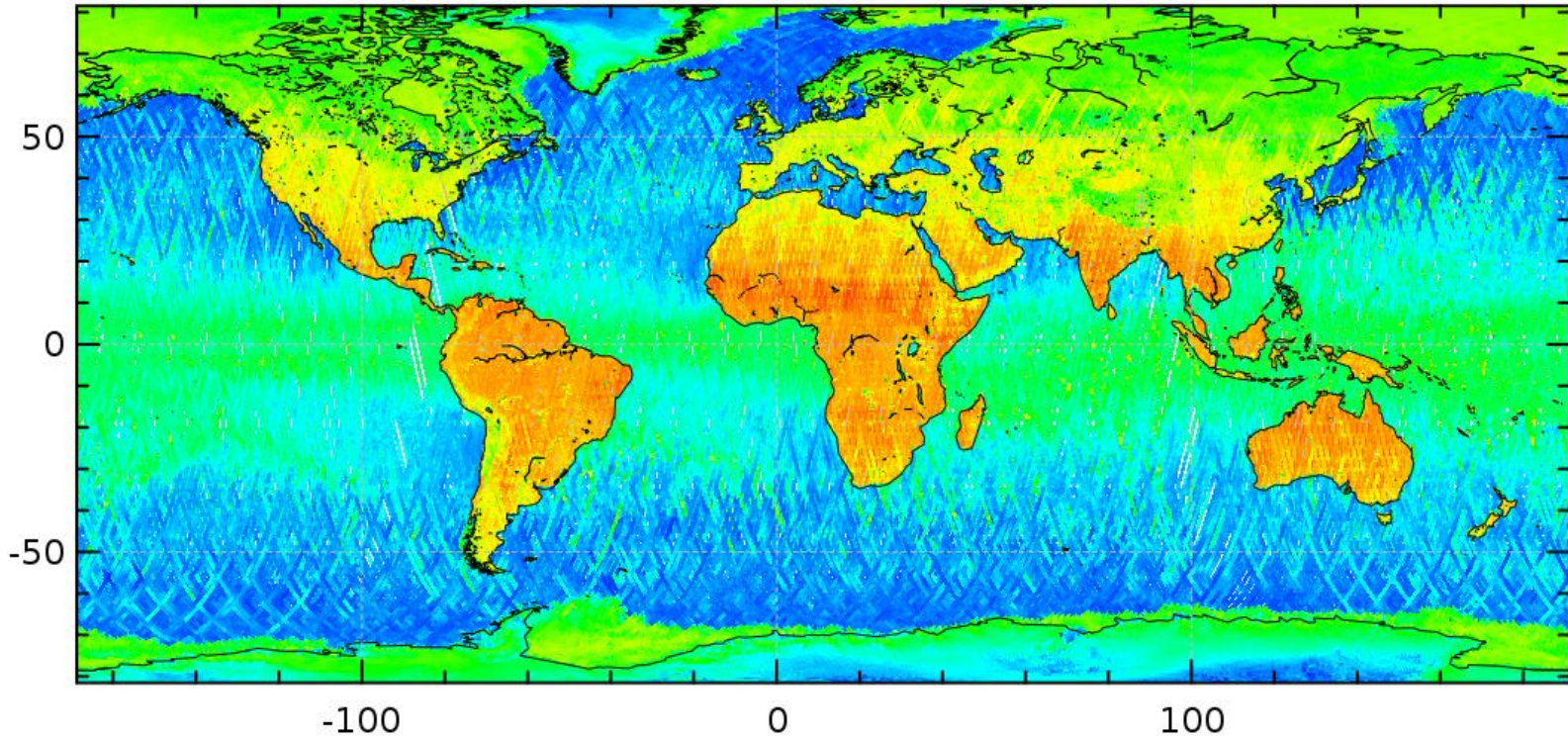
- , G : radiometer gain estimated through calibrations, expressed in V/K

Parameter	Flight data
Sensitivity on cold source in K band	0,072 K
Sensitivity on cold source in Ka band	0,101 K
Sensitivity on hot source in K band	0,125 K
Sensitivity on hot source in Ka band	0,139 K

- During ground assessment tests, sensitivity was estimated
 - ✓ Between 0,12 and 0,16 K in Ka band for TB between 125 and 300 K
 - ✓ Between 0,1 and 0,14 K in K band for TB between 125 and 300 K
- Instrument performance in term of sensitivity is the same as in ground test, even better as external conditions are more stable
- Absolute accuracy is evaluated through CalVal (cf. “AltiKa Level2 products Validation” presentation)

BRIGHTNESS TEMPERATURES 23,8 GHZ

VisualiserTableGUI



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<i>Nbr :</i>	12267018	<i>Std Dev :</i>	42.815218	<i>Min :</i>	126.89
<i>Mean :</i>	201.7738	<i>Median :</i>	192.56	<i>Max :</i>	317.29

CONCLUSION

- ✓ The radiometer is working properly
- ✓ The instrument stability is very good
- ✓ No perturbation has been detected
- ✓ The model that has been tuned from ground test results is used in ground processing (L1) and no tuning has been made on the parameters
- ✓ CalVal is on going