



Centre National d'Etudes Spatiales



SCA_RAD_01
TRO-34-NT-
2780-CNES

**Activity : CAL/VAL
Scarab
Radiometric noise**

**Prepared by : A Rosak
Verified by : N Karouche**

Contents

1. OBJECTIVE	1
2. METHODS	1
2.1. OVERVIEW	1
2.2. CALCULATION	1
3. SUCCESS CRITERIA	2
4. PRODUCTS USED	2
5. RESULTS	2
6. CONCLUSION	3

1. OBJECTIVE

The objective of this study is to check that radiometric noises are within the specified requirements.

2. METHODS

2.1. OVERVIEW

Radiometric noise can be measured only on uniform datas.

For each scan, the Scarab instrument acquires 51 earth pixels, and 3 space pixels for calibration purpose.

These 3 space pixels per scan can be used to calculate radiometric noise.

This calculation is made only in MS mode (once a month). In this mode, channel 3 has a solar filter so thermal instability does not affect the result for this thermal channel.

2.2. CALCULATION

For each MS mode, for each channel:

Extract the 3 space pixels for each of the 500 scans.

Calculate the means and the standard deviation of the 1500 values, for each channels.

3. SUCCESS CRITERIA

Scarab requirements for radiometric noises are listed below :

R 7.2.1_010 For each channel, the noise should be inferior to the values :

<i>Channels</i>	<i>Noise</i>	<i>Noise (LSB)</i>
<i>Channel 1 – Visible channel</i>	$< 1 \text{ W.m}^{-2}.\text{sr}^{-1}$	<i>30 LSB</i>
<i>Channel 2 – Solar channel</i>	$< 0,5 \text{ W.m}^{-2}.\text{sr}^{-1}$	<i>15 LSB</i>
<i>Channel 3 – Total channel</i>	$< 0,5 \text{ W.m}^{-2}.\text{sr}^{-1}$	<i>15 LSB</i>
<i>Channel 4 – IR Window</i>	$< 0,5 \text{ W.m}^{-2}.\text{sr}^{-1}$	<i>100 LSB</i>

4. PRODUCTS USED

See in the table below.

5. RESULTS

Orbit number	Date	Channel 1 visible	Channel 2 solar	Channel 3 total	Channel 4 IR window	
Last on-ground value		4LSB	2.1LSB	1.8LSB	21LSB	
329	04/11/2011	4.1	1.9	1.7	26.1	
414	10/11/2011	5.2	2.4	1.9	23.6	
511	17/11/2011	4.1	2.5	2.1	22.1	
610	25/11/2011	4.0	2.0	1.6	21.7	
710	01/12/2011	3.9	1.7	1.5	19.8	
808	08/12/2011	3.8	1.8	1.5	20.0	
907	15/12/2011	4.0	1.8	1.5	19.6	
1006	22/12/2011	4.0	2.1	1.5	20.0	
1105	29/12/2011	4.1	1.9	1.6	19.6	

Here is a table to summarise these results:

		Channel 1 visible	Channel 2 solar	Channel 3 total	Channel 4 IR window
Max radiometric noise	LSB	6LSB	2.5LSB	2.1LSB	30LSB
Max radiometric noise	W/m ² /sr	0.2 W/m ² /sr	0.09 W/m ² /sr	0.07 W/m ² /sr	0.14 W/m ² /sr
Noise requirements	W/m ² /sr	1 W/m ² /sr	0.5 W/m ² /sr	0.5 W/m ² /sr	0.5 W/m ² /sr

6. CONCLUSION

Radiometric noises are better than required. The in-orbit values are equivalent to the last on-ground values, measured during thermal vacuum. These performances are very stable.