VIRTIS PERFORMANCE BUDGET

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CONTENTS

1 SCOPE

This document gives the performance budget of the VIRTIS instrument, on the basis of the measurements performed on VIRTIS during its functional and calibration tests for the Rosetta Mission.

Section 4 gives the preliminary results of the post-processing of the VIRTIS-M data acquired during the VIRTIS-M on-ground calibration campaign (GA, July 2001). The analysis of the VIRTIS-M on-ground calibration sessions is now in progress, in order to obtain the overall set of Calibration Key Data Parameters.

Section 5 resumes the results of the VIRTIS-H calibration campaign, taking into account both the tests at channel and integrated instrument level.

2 DOCUMENTS

2.1 Applicable Documents

AD-1 VIRTIS-H: an infrared spectrometer for the ROSETTA mission –Calibration results SPIE 2002 (in press) VIR-DES-TN-1795
AD-2 VIRTIS-M Performance Test and Calibration: Preliminary Results Report" VIR-GAL-TR-181
AD-3 VIRTIS Requirements Document", VIR-GAL-RS-001, is. 1
AD-4 VIRTIS Verification Matrix VIR-GAL-LI-088, is. 1

3 VIRTIS-M Preliminary results

The preliminary results of the VIRTIS-M on ground calibration (Florence, July 2001), obtained by post-processing some of the raw data acquired during the measurement sessions, are shown in the following Table 3-1 and Fig. 3-1, Fig. 3-2, Fig. 3-3, Fig. 3-4.

Calibration Parameter		Measured Value (preliminary result)	Notes	Requirement
Spatial Width	**Along-slit**	IR: 1.2 pixel (46 µm) VIS: 1.0 pixel (38 µm)		IR: ≤1.5 pixel VIS: ≤1.5 pixel
	Across-slit	IR: 1.0 pixel (38 µm) VIS: 0.9 pixel (33 µm)	a gaussian fitting has been applied to the measured data	IR: 1.5 pixel VIS: 1.5 pixel
IFOV	**Along-slit**	248.6 µrad	**Spatial Sampling Interval**	250±5 µrad
	Across-slit	250.8 µrad		250±5 µrad
FOV	**Along-slit**	63.6 mrad		64±1 mrad
	Across-slit	64.2 mrad		64±1 mrad
Spectral Sampling Interval	**IR**	9.44 nm/pixel		≤10 nm/pixel
	VIS	1.88 nm/pixel		≤2 nm/pixel
Spectral Range	**IR**	1000.2 nm ≤λ≤ 5068.0 nm	IR FPA column #1 to #432	0.95 µm ≤λ≤ 5.0 µm
	VIS	231.3 nm ≤λ≤ 1043.3 nm	VIS FPA column #5 to #436	0.25 µm ≤λ≤ 1.0 µm
Instrument Transfer Function	**IR**	See Fig. 3-1	Post-processing in progress	SNR>100
	VIS	See Fig. 3-2	Post-processing in progress	SNR>100
In-flight Calibration Unit Characterisation	**IR**	See Fig. 3-3	Post-processing in progress	
	VIS	See Fig. 3-4	Post-processing in progress	

Table 3-1: Preliminary results of VIRTIS-M on-ground calibration.

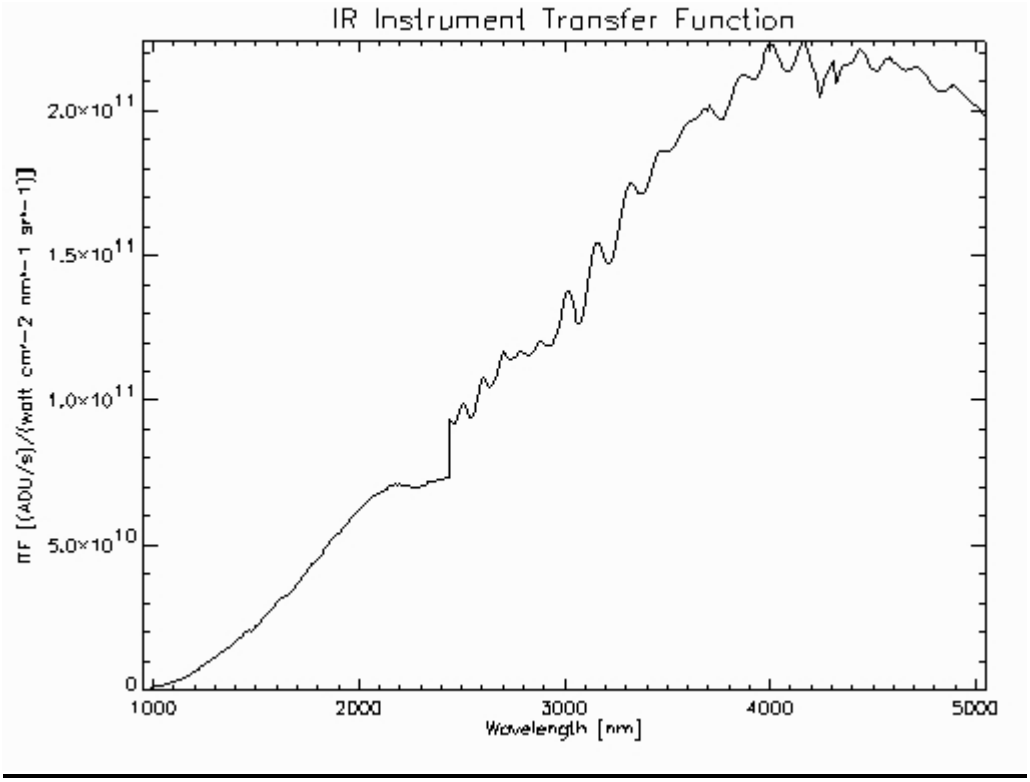

Fig. 3-1: Preliminary IR ITF $\left[\frac{ADU}{\sec \cdot \frac{watt}{cm^2 \cdot sr \cdot nm}}\right]$**, from VIRTIS-M on-ground calibration (Florence, July 2001).**

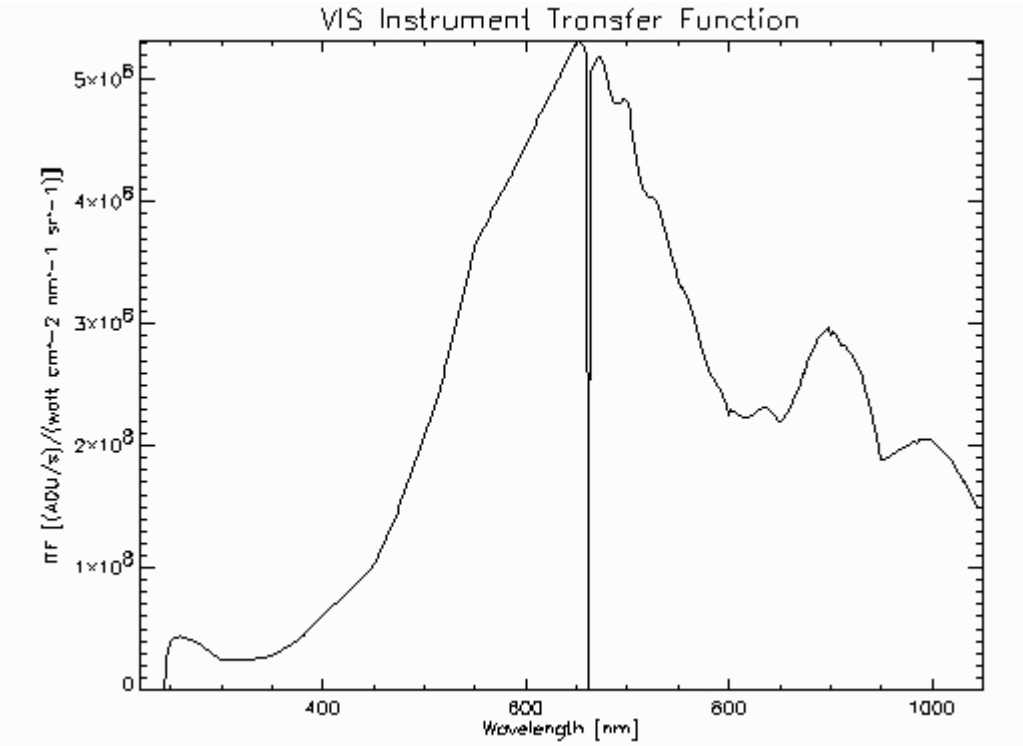

Fig. 3-2: Preliminary VIS ITF $\left[\frac{ADU}{\sec \cdot \frac{watt}{cm^2 \cdot sr \cdot nm}}\right]$, **from VIRTIS-M on-ground calibration (Florence, July 2001).**

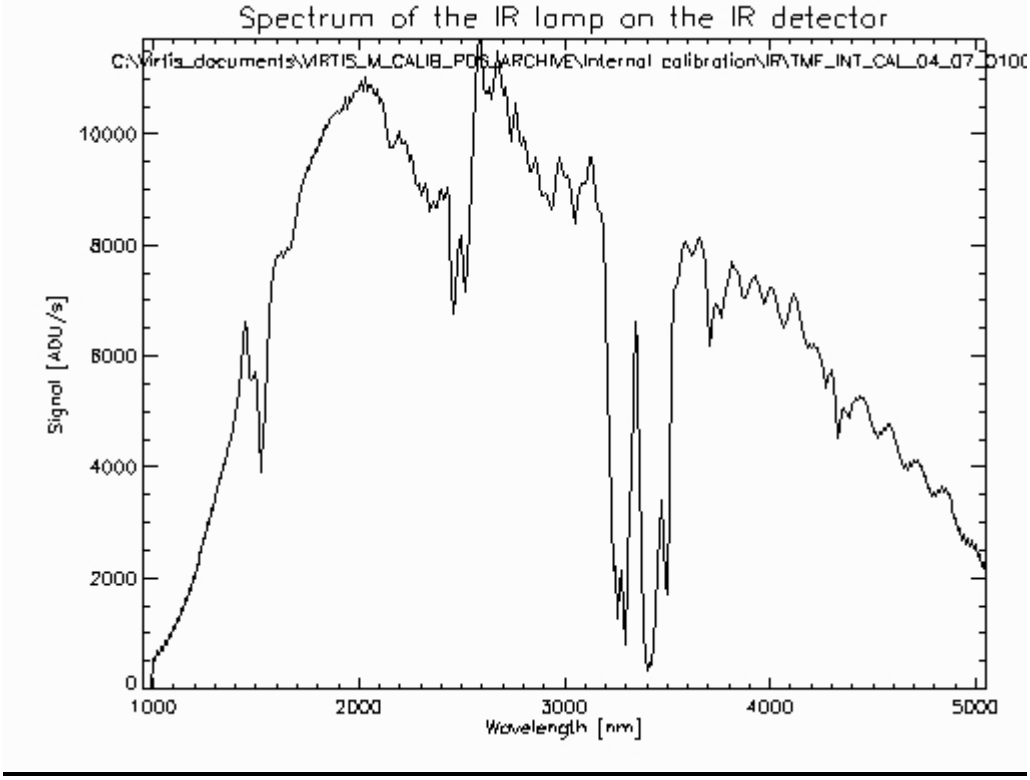

Fig. 3-3: Average spectrum [ADU/sec] of the IR in-flight calibration source, from VIRTIS-M on-ground calibration (Florence, July 2001).

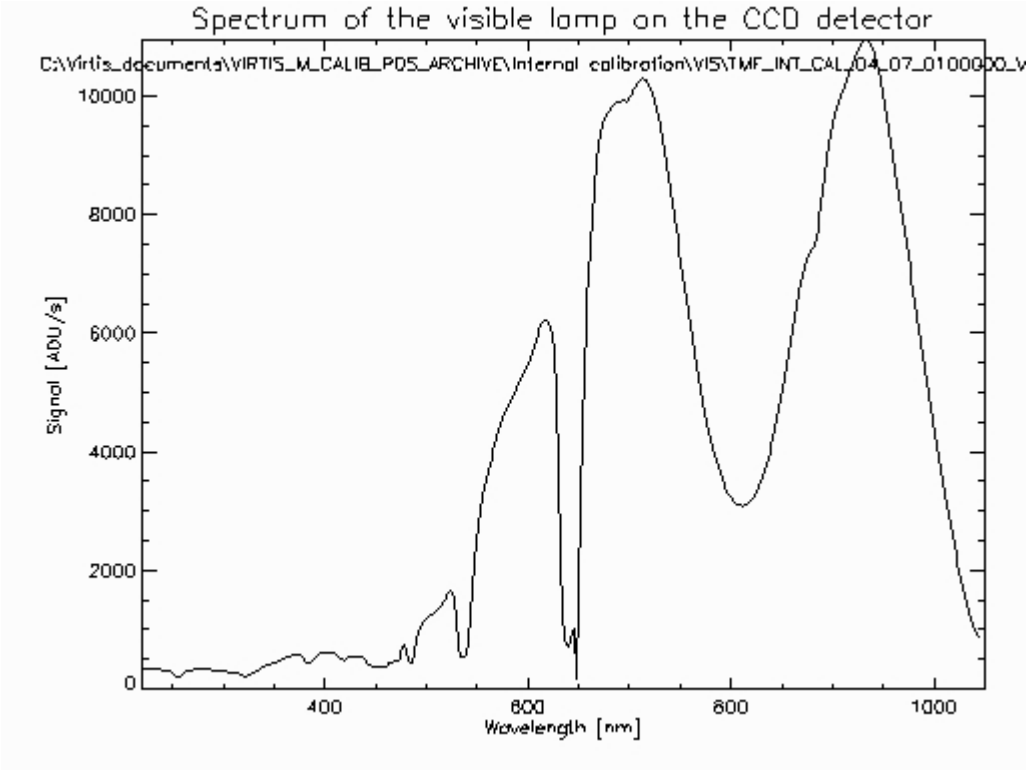

Fig. 3-4: **Average spectrum [ADU/sec] of the VIS in-flight calibration source, from VIRTIS-M on-ground calibration (Florence, July 2001).**

4 VIRTIS-H Preliminary results

Spectral resolution: λ/δλ
specified: 2000 qt 3 µm
measured: the spectral resolution varies within each order between 1500 and 3000

Pupil and IFOV:
Specified: 3 pixels across dispersion/ 1 pixel along dispersion
Measured: 1.74 mrad (across the dispersion), or about 3 pixels
and 0.58 mrad (along the dispersion), or about 1 pixel
Pupil diameter: specified 32 mm/ measured: 32 mm at 43% half maximum

Image quality
the PSF is measured to remain lower than a pixel size (38 µm)

Normalized relative responsivity:
Curves given in the reference show the optical transmission in each order, which varies along each order due to grating efficiency variations

Polarization: the polarization has been measured and the variation between two orthogonal polarization is measured to be lower than 0.4 (worst case)

Sensitivity:
The sensitivity is measured for blackbody variations of 0.5 K at 250 K, with an accuracy of 0.025 K at 250 K from 3.8µm and 4.7 µm