

Supporting Information for "Spectral Observations of Optical Emissions Associated with Terrestrial Gamma-Ray Flashes"

Matthias Heumesser¹, Olivier Chanrion¹, Torsten Neubert¹, Hugh Christian²,
Christoph Köhn¹, Krystallia Dimitriadou¹, Francisco J. Gordillo-Vazquez³,
Alejandro Luque³, Francisco Javier Prez-Invernón^{3,4}, Richard J. Blakeslee⁵,
Andrey Mezentsev⁶, Nikolai Østgaard⁶ and Victor Reglero⁷.

¹National Space Institute, Technical University of Denmark (DTU Space), Denmark

²Earth System Science Center, University of Alabama in Huntsville, Alabama, USA

³Instituto de Astrofísica de Andalucía (IAA - CSIC), Granada, Spain

⁴Deutsches Zentrum für Luft- und Raumfahrt (DLR), Oberpfaffenhofen, Germany

⁵NASA Marshall Space Flight Center, Huntsville, Alabama, USA

⁶Birkeland Centre for Space Science, University of Bergen, Norway

⁷Image Processing Laboratory, University of Valencia, Spain

Corresponding author: M. Heumesser, DTU SPACE, Technical University of Denmark, Elektrovej, Building 328, 2800 Kgs. Lyngby, Denmark. (heumat@space.dtu.dk)

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Introduction

This supporting information contains two more figures as well as tables for the main pulse and pre-activity parameters to make it easier to extract values for them. The description of how the data was collected and processed is given in section 2, Measurements and Analysis, of the main manuscript.

Following the sequence of the main manuscript, we start with the main peak parameters in Table S1. Mean, median, standard deviation, the 25th and 75th percentile are given there for every attribute. Next, we present a boxplot purely for the pre-activity, giving start times, durations and intensities. The shape and structure follows Figure 3 from the main text. Table S3 gives the respective values in the same form as Table S1. Last, we include a scatter plot showing how the fit parameter τ and the FWHM in the 337 nm band correlate for the main pulses associated to TGFs. The respective fit we give in the manuscript is shown too.

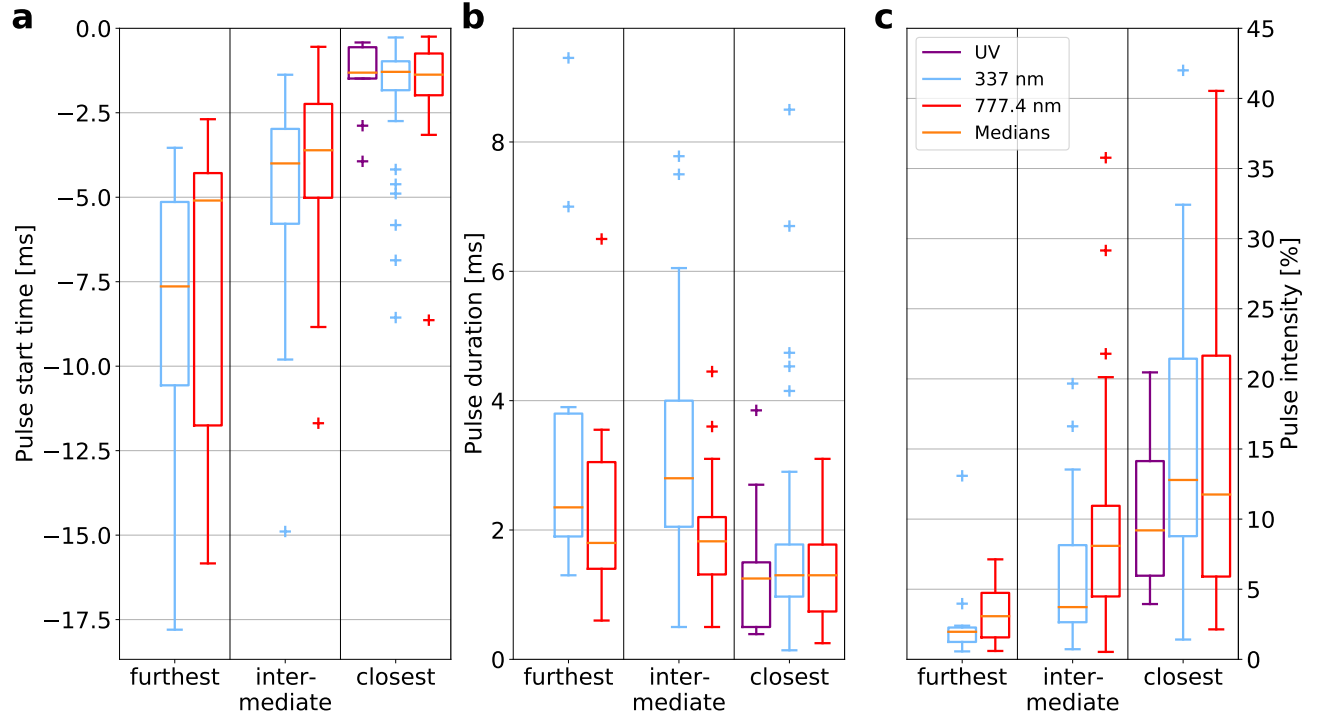


Figure S2. Characteristics of the pre-activity. The start times are relative to the start of the main optical pulse, while intensities are given in percent of the main peak maximum. The box definitions are as for Figure 3. Panel (a) repeats the start time, panel (b) shows the pulse durations and panel (c) the intensity development.

Table S1. Values for the main peak parameters presented in Figure 3 of the main text. All attributes are given as mean μ , standard deviation σ of the sample, 25th quartile, median and 75th quartile. The source time is relative to the first TGF photon, taken as 0 ms and was only determined in the 337 nm band.

	337 nm					777.4 nm					F/MUV				
	μ	σ	25Q	Median	75Q	μ	σ	25Q	Median	75Q	μ	σ	25Q	Median	75Q
Source start [ms]	0.38	1.05	-0.11	-0.01	0.21										
Rise time [ms]	0.39	0.17	0.29	0.37	0.44	0.33	0.14	0.24	0.29	0.39	0.29	0.10	0.23	0.26	0.33
FWHM [ms]	1.39	0.51	0.97	1.26	1.76	0.93	0.29	0.75	0.88	1.14	0.91	0.25	0.64	0.90	1.13
Peak value [$\mu\text{W}/\text{m}^2$]	60.03	36.87	24.77	58.51	77.67	21.76	19.17	7.08	17.27	32.47	60.54 ^a	29.08 ^a	39.09 ^a	55.59 ^a	70.50 ^a
Linear ratio 337/777 [1]	3.77	1.85	2.52	3.18	4.12										
Log10 ratio 337/777 [1]	0.58	0.19	0.40	0.50	0.61										

^aF/MUV values have to be multiplied by 10^{-3}

Table S3. Values for the optical pre-activity before the main peak presented in Figure S2. All attributes are given as mean μ , standard deviation σ of the sample, 25th quartile, median and 75th quartile. The pulses are sorted relative to the start of the main peak in reverse chronological order. The intensity values for the pulses are relative to the associated main peak maximum, independently calculated before the summary statistics of the whole sample are determined.

		337 nm				777.4 nm				F/MUV			
		μ	σ	25Q	Median	75Q	μ	σ	25Q	Median	75Q	μ	σ
closest	start [ms]	-1.79	1.65	-1.83	-1.29	-0.98	-1.62	1.31	-1.98	-1.37	-0.75	-1.49	1.12
pulse	duration[ms]	1.71	1.54	0.97	1.30	1.78	1.37	0.74	0.74	1.30	1.78	1.44	1.09
	intensity [%]	15.47	10.76	8.78	12.79	21.44	17.17	15.95	5.90	11.75	21.65	39.98	85.62
intermediate	start [ms]	-5.00	3.06	-5.79	-4.00	-2.98	-4.13	2.50	-5.02	-3.61	-2.24	-	-
pulse	duration [ms]	3.34	1.82	2.05	2.80	4.00	1.87	0.96	1.31	1.82	2.20	-	-
	intensity [%]	6.05	4.97	2.65	3.72	8.14	10.12	8.55	4.48	8.09	10.95	-	-
furthest	start [ms]	-8.63	4.56	-10.57	-7.64	-5.14	-7.79	4.61	-11.75	-5.10	-4.29	-	-
pulse	duration [ms]	3.34	2.24	1.90	2.35	3.80	2.39	1.61	1.40	1.80	3.05	-	-
	intensity [%]	2.63	3.14	1.24	1.96	2.27	7.68	14.79	1.57	3.07	4.74	-	-

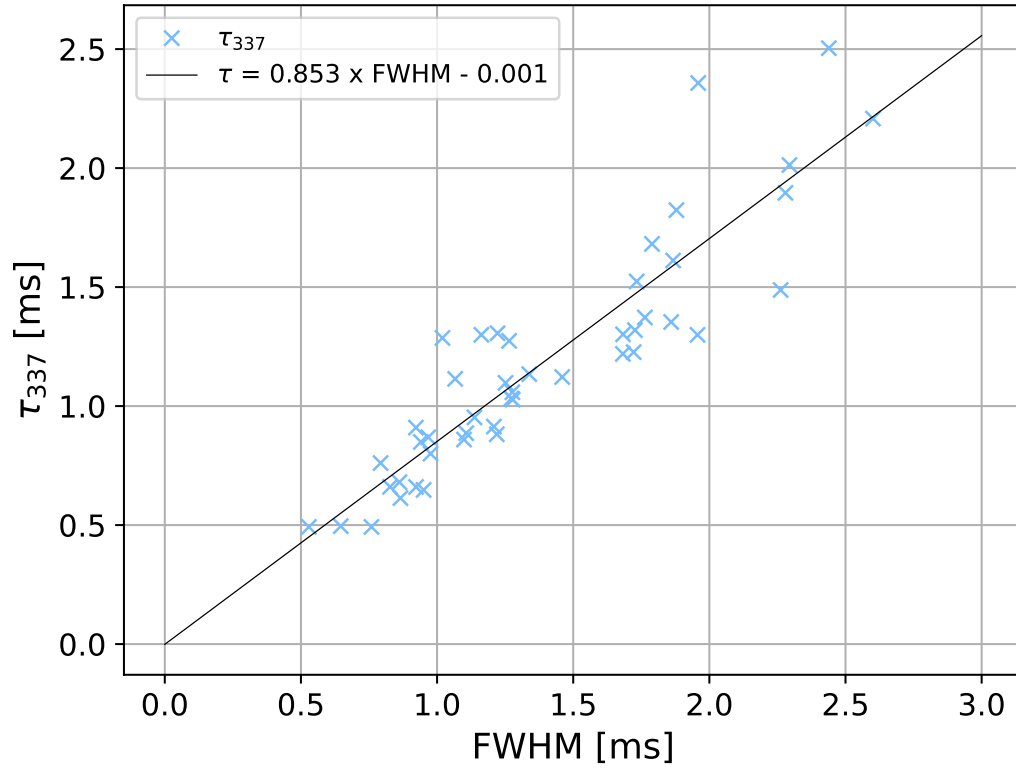


Figure S4. Fit parameter τ compared to the FWHM, both in the 337 nm band. The plot shows the data points for τ and the FWHM as well as the linear fit quantifying their correlation we give in the manuscript. Its equation is repeated in the legend of the plot.