

Supplemental Material for “Observation of corona discharges and cloud microphysics at the top of thunderstorm cells in cyclone Fani”

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3. Movie S1: The cloud Top Blackbody Brightness temperature (TBB in K) in region α of Figure 1 provided by the Himawari-8 satellite every 10 minutes from 18:00:00 to 22:00:00 UTC. The region β is overpassed by both ASIM and CALIPSO within 12 minutes.

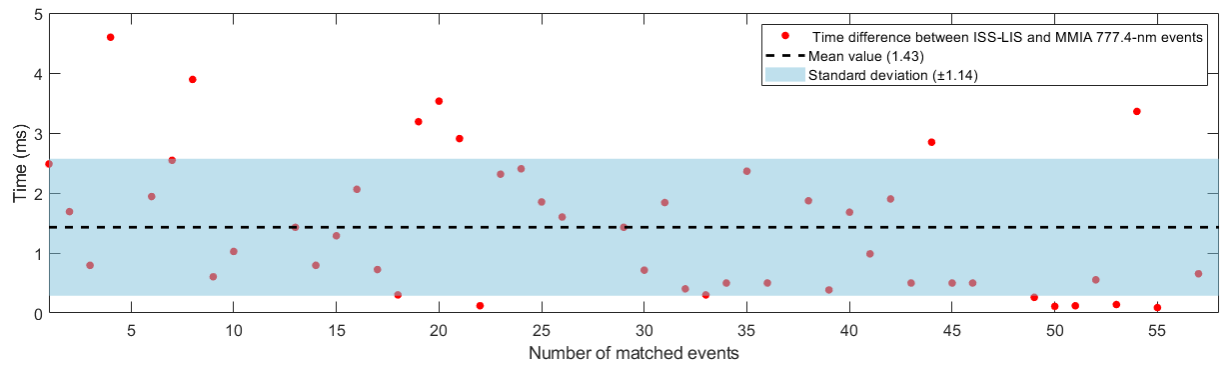


Figure S1. The time shift of MMIA with respect to the Lightning Imaging Sensor (LIS) on the International Space Station (ISS). The results are based on the 777.4-nm events detected by both MMIA and ISS-LIS.

Table S1: The detailed information for the detected blue corona discharges on April 30, 2019. In the fitting process, we only fit the corona discharges with the clear impulsive single pulse and considered as good fitting condition when the coefficient of determination $R^2 > 0.6$ and Pearson correlation coefficient $\rho < 0.5$ to exclude the effect of the multiple pulses. Rise time is the time taken for the amplitude of a fitting photometer signal to rise from 10% to 90%. Time duration is the time interval for the amplitude of a fitting photometer signal to rise from 10 % and fall to 10%.

ID	Hour (UTC)	Minute (UTC)	Second (UTC)	CH1_Lon (degree)	CH1_Lat (degree)	ISS_Lon (degree)	ISS_Lat (degree)	ISS_Alt (km)	Rise time (μ s)	Duration time (μ s)	337nm_Irradiance (μ W/m ²)
1	20	10	56.81	82.81	11.72	82.89	9.47	409.23	118	1462	6.07
2	20	10	56.51	82.82	11.76	82.89	9.47	409.23	-	-	3
3	20	11	1.42	83.23	11.6	83.05	9.68	409.23	78	1333	7.11
4	20	11	0.72	83.26	11.65	83.05	9.68	409.23	116	2223	4.02
5	20	11	2.08	82.77	11.79	83.1	9.74	409.23	101	1929	6.59
6	20	11	1.91	82.81	11.77	83.1	9.74	409.23	71	1725	5.04
7	20	11	1.89	82.81	11.77	83.1	9.74	409.23	-	-	3.51
8	20	11	4.26	83.26	11.63	83.15	9.82	409.23	237	3047	9.2
9	20	11	4.74	82.81	11.75	83.19	9.87	409.23	-	-	6.59
10	20	11	4.43	82.84	11.74	83.19	9.87	409.23	-	-	12.94
11	20	11	6.73	82.87	11.74	83.24	9.94	409.23	139	1687	8.67
12	20	11	6.69	82.87	11.74	83.24	9.94	409.23	107	2348	4.53
13	20	11	7.86	83.79	11.74	83.3	10.02	409.23	-	-	5.55
14	20	11	7.96	83.75	11.69	83.32	10.05	409.23	42	1154	7.11
15	20	11	9.58	83.94	11.7	83.34	10.08	409.23	81	1567	7.11
16	20	11	9.22	83.92	11.7	83.37	10.11	409.23	-	-	8.15
17	20	11	9.03	83.93	11.7	83.37	10.11	409.23	-	-	4.02
18	20	11	9.56	84.75	11.17	83.38	10.13	409.23	73	1311	14.02
19	20	11	9.83	83.91	11.71	83.39	10.14	409.23	104	2265	7.11
20	20	11	10.2	82.82	11.74	83.4	10.15	409.23	181	2902	4.53
21	20	11	10.06	82.82	11.73	83.4	10.15	409.23	18	384	12.4

22	20	11	10.95	82.84	11.72	83.41	10.17	409.23	23	506	22.98
23	20	11	11.6	82.84	11.7	83.46	10.24	409.23	48	1320	11.32
24	20	11	13.46	83.25	11.59	83.5	10.29	409.23	93	1890	11.32
25	20	11	14.16	82.91	11.68	83.55	10.36	409.23	-	-	3
26	20	11	15.25	82.84	11.7	83.57	10.38	409.23	-	-	5.04
27	20	11	14.56	82.83	11.71	83.57	10.38	409.23	30	732	14.02
28	20	11	15.22	83.76	11.74	83.59	10.41	409.23	28	627	9.73
29	20	11	15.06	83.76	11.73	83.59	10.41	409.23	16	153	15.11
30	20	11	15.91	83.91	11.69	83.62	10.45	409.23	-	-	5.04
31	20	11	16.98	82.84	11.69	83.64	10.49	409.23	522	6105	8.67
32	20	11	16.8	82.84	11.68	83.64	10.49	409.23	-	-	5.04
33	20	11	17.7	83.27	11.52	83.68	10.53	409.23	-	-	7.63
34	20	11	19.75	82.82	11.69	83.72	10.59	409.23	94	1773	8.67
35	20	11	19.39	82.82	11.69	83.72	10.59	409.23	-	-	4.53
36	20	11	21.35	84.77	11.15	83.78	10.67	409.23	103	6687	33.1
37	20	11	20.28	82.83	11.67	83.78	10.67	409.23	204	4011	5.55
38	20	11	21.48	83.46	11.58	83.81	10.7	409.23	-	-	8.67
39	20	11	22.89	83.94	11.65	83.85	10.77	409.23	79	2157	54.03
40	20	11	23.47	82.82	11.69	83.88	10.8	409.23	-	-	19
41	20	11	22.83	83.98	11.65	83.88	10.8	409.23	-	-	5.55
42	20	11	23.63	82.83	11.66	83.9	10.83	409.23	53	1397	6.59
43	20	11	23.35	83.94	11.64	83.9	10.83	409.23	-	-	4.53
44	20	11	24.19	82.83	11.65	83.93	10.86	409.23	22	445	9.73
45	20	11	24.16	82.83	11.65	83.93	10.86	409.23	138	2575	6.59
46	20	11	25.58	84.05	11.67	83.94	10.88	409.23	160	2561	9.2
47	20	11	25.39	84.05	11.66	83.94	10.88	409.23	-	-	13.48
48	20	11	27	83.97	11.69	84.04	11.01	409.23	-	-	5.04
49	20	11	28.44	83.3	11.56	84.06	11.05	409.23	75	2539	11.32
50	20	11	29.51	82.83	11.64	84.09	11.08	409.23	207	3591	9.73

51	20	11	29.14	83.27	11.49	84.09	11.08	409.23	34	6769	12.4
52	20	11	30.1	82.83	11.64	84.12	11.12	409.23	74	1980	6.59
53	20	11	29.93	82.81	11.63	84.12	11.12	409.23	45	1032	15.66
54	20	11	31.08	82.93	11.64	84.17	11.19	409.23	71	1919	7.11
55	20	11	30.59	82.89	11.65	84.17	11.19	409.23	-	-	5.55
56	20	11	31.88	84.78	11.15	84.19	11.22	409.23	-	-	5.04
57	20	11	31.71	83.98	11.64	84.19	11.22	409.23	65	1686	11.86
58	20	11	31.43	84.78	11.15	84.19	11.22	409.23	489	2370	21.26
59	20	11	32	84.83	11.13	84.22	11.26	409.23	231	1993	33.72
60	20	11	31.97	84.83	11.13	84.22	11.26	409.23	42	964	10.79
61	20	11	36.56	83.97	11.63	84.36	11.44	409.23	79	2317	8.67
62	20	11	36.38	84.01	11.65	84.36	11.44	409.23	570	4108	7.63
63	20	11	37.57	82.72	11.63	84.41	11.51	409.23	38	858	29.46
64	20	11	37.25	82.83	11.61	84.41	11.51	409.23	218	2711	8.67
65	20	11	38.56	82.86	11.62	84.44	11.55	409.23	211	2470	11.86
66	20	11	39.18	82.93	11.62	84.47	11.59	409.23	-	-	4.53
67	20	11	38.78	83.98	11.62	84.47	11.59	409.23	-	-	4.02
68	20	11	40.17	82.81	11.58	84.49	11.62	409.23	9	136	33.72
69	20	11	40.13	82.81	11.58	84.49	11.62	409.23	106	1494	24.72
70	20	11	39.48	83.27	11.48	84.49	11.62	409.23	53	1713	20.13
71	20	11	40.67	83.65	11.47	84.52	11.66	409.23	115	3161	9.73
72	20	11	39.98	83.98	11.62	84.52	11.66	409.23	34	619	19.56
73	20	11	40.63	84.07	11.67	84.55	11.69	409.24	256	3435	37.46
74	20	11	42.09	83.95	11.6	84.57	11.73	409.24	-	-	34.96
75	20	11	45.9	84.2	11.75	84.72	11.93	409.24	94	6790	22.41
76	20	11	47.2	82.84	11.56	84.79	12.01	409.24	397	4170	9.2
77	20	11	47.1	84.87	11.1	84.79	12.01	409.24	30	673	27.67
78	20	11	48.73	82.85	11.54	84.85	12.1	409.24	-	-	5.04
79	20	11	49.11	83.7	11.5	84.87	12.12	409.24	368	3303	6.59

80	20	11	50.15	83.33	11.46	84.87	12.12	409.24	17	101	47.21
81	20	11	50.02	83.32	11.46	84.87	12.12	409.24	323	6442	11.86
82	20	11	50.18	83.93	11.55	84.89	12.15	409.24	121	2088	7.63
83	20	11	51.05	82.85	11.6	84.94	12.21	409.24	77	1411	10.26
84	20	11	53.5	84.07	11.57	84.99	12.28	409.25	-	-	9.2
85	20	11	53.14	84.07	11.65	84.99	12.28	409.25	-	-	7.63
86	20	11	53.17	84.96	11.03	84.91	12.32	409.25	131	2056	24.14
87	20	11	54.73	82.84	11.53	85.08	12.4	409.25	69	1562	5.04
88	20	11	57.02	83.68	11.46	85.13	12.47	409.25	-	-	7.11
89	20	11	57.15	84.88	11.08	85.16	12.5	409.25	108	2258	20.13
90	20	11	59.95	84.05	11.6	85.24	12.61	409.25	59	1725	4.02
91	20	11	59.34	83.71	11.52	85.24	12.61	409.25	69	6782	11.32
92	20	12	4.85	84.01	11.55	85.46	12.9	409.26	584	3059	5.04