

Data Reduction Procedures

The VIMS instrument acquires spectra at 352 wavelengths between 0.35 and 5.2 μm for an array of up to 64×64 spatial pixels to produce an “image cube” giving the spatially-resolved spectral properties of a scene²². For this analysis, we focus exclusively on data from the VIMS IR channel, which measures spectra at 256 wavelengths between 0.85 and 5.2 μm with a typical spectral resolution of 0.016 μm . Furthermore, we only considered 252 image cubes where the instrument could both resolve the plume and detect it with adequate signal to noise.

When operated in its highest-resolution mode, the VIMS IR channel has a pixel size (instantaneous field of view) of 0.25×0.5 mrad. The scale height of the plume is of order 100 km^{6,7}, so the spacecraft must be within 400,000 km of Enceladus in order for VIMS to obtain useful information about the plume’s brightness as a function of altitude. Furthermore, this analysis only considers observations where the main axis of the plume is aligned with VIMS’ high-resolution scan direction because these measurements can be most easily processed to produce well-sampled vertical profiles of the plume’s brightness (see below). This orientation also minimizes potential contamination from Enceladus’ bright limb (Light from bright sources is observed to couple into adjacent pixels in the low-resolution direction at about the 1% level).

The small particles that populate the plume are strongly forward-scattering⁶, so the plume is brightest when observed at high phase angles. However, even at high phase angles the plume’s low optical depth makes it rather faint, so VIMS can only measure the plume’s brightness with decent signal-to-noise when the exposure duration is sufficiently long. Hence, this study only includes VIMS observations made at phase angles above 145° and IR-channel exposure durations exceeding 400 ms/pixel. Furthermore, we excluded any observations where the plume was too close to one edge of the field of view to permit interpolation of the background signal level behind the plume, or where there was no part of Enceladus itself in the field of view to act as a navigation reference. Finally, we did not consider observations where the plume was superimposed on either the main rings or the planet. Note these criteria excluded all plume images obtained in 2006-2008.

Using the appropriate SPICE kernels, we computed the relevant geometric parameters for each of the remaining 252 observations. These include not only the phase angle α and Enceladus’ orbital phase f , but also the range (distance between the spacecraft and the moon’s center), and the sub-spacecraft latitude and longitude on Enceladus. These parameters are also tabulated for each image cube in Table S1 (along with the observation time), while Figure S1 illustrates the distribution of phase angles and Enceladus orbital phases.

Each image cube was calibrated using the standard routines to apply flat fields, remove backgrounds and convert the raw data numbers into I/F , a standard measure of reflectance that is unity for a Lambertian surface illuminated and viewed at normal incidence (the specific calibration curve used here is RC17²⁴). In addition, we navigated each image cube using the appropriate SPICE kernels and verified these geometry calculations by comparing the predicted and observed positions of Enceladus’ limb. The predicted and observed limb positions usually matched to the level of about 1 VIMS pixel, and we applied small corrections

to the spacecraft pointing as needed to bring the predicted and observed limbs into alignment. Given the low resolution of the VIMS observations, these corrections were made “by eye”.

After navigating each image cube, we re-projected the brightness data onto the plane containing the moon’s spin axis whose normal makes the smallest angle with the line joining the moon’s center to the spacecraft’s position (see Figure S2). The point in this plane observed by each pixel is expressed in terms of the cartesian coordinates $[x, y]$, which are defined such that $[0, 0]$ corresponds to the center of Enceladus and the positive y -axis is aligned with Enceladus’ north pole. Since the plume is a diffuse, low optical depth feature, the brightness at a given value of x and y is actually the integrated brightness along a particular line of sight. Fortunately, the observations considered for this analysis were all obtained at low sub-spacecraft latitudes (less than $\pm 10^\circ$, most being below $\pm 1^\circ$) and large ranges ($> 40,000$ km, most being above $100,000$ km), so these lines of sight will be nearly perpendicular to the xy plane. Thus we may approximate the re-projected brightness data as measures of the plume’s total integrated brightness along a line of constant x and y .

In our previous analysis of VIMS plume observations⁷, we had to co-add data from multiple cubes in order to obtain plume spectra with the desired signal-to-noise. However, the primary goal of this analysis is to examine variations in the plume’s brightness, so combining data from multiple cubes taken at different phase angles, orbital phases, or times would not be appropriate. Instead, we must derive estimates of the plume’s brightness from individual cubes. The typical signal-to-noise of an individual spectral channel in a single cube is too low to yield useful brightness estimates at a given altitude. Hence we must sacrifice spectral resolution by combining data from multiple spectral channels. After some experimentation, we found that we could obtain reasonably robust brightness estimates by co-adding sets of 40 spectral channels (excluding those channels that have high background levels or are near filter gaps, where the calibration is less reliable). Thus each cube yields a series of six images which provide the average brightness in the following wavelength ranges: 0.88–1.56, 1.57–2.27, 2.28–2.93, 2.95–3.68, 3.70–4.43 and 4.45–5.11 μm . Each pixel in all of these images represents the weighted average brightness among the relevant spectral channels, where the weights are derived from the *rms* signal variations in regions more than 300 km from Enceladus’ center and more than 200 km from the plume axis (i.e. regions in the field of view far from the moon or the plume). The images derived from the 0.88–1.56 μm data have the best signal-to-noise and thus are the primary focus of this analysis.

We quantify the plume’s brightness at different altitudes in these spectrally-averaged images in terms of an equivalent width. Recall that the images considered here have the plume aligned with the y -axis (see Figure S2). Hence rows and columns in the image correspond roughly to lines of constant x and y (parallel and perpendicular to the plume) respectively. Thus by integrating the plume signal (above any instrumental or E-ring backgrounds) over a single column of pixels (i.e. over all values of x), we can obtain the equivalent width EW of the plume at a given value of y :

$$EW(y) = \int I/F dx. \quad (1)$$

For this analysis, the total background signal as a function of x at a given y is estimated by fitting the data more than 200 km from the plume’s axis to a quadratic, and then interpolating the resulting background model under the plume. The background-subtracted

I/F is then integrated over all x within 200 km of the plume's axis. Note that EW has units of kilometers and represents the total integrated brightness of all the material in the plume at a given y , and thus should be insensitive to the image resolution. Furthermore, since the plume has such a low optical depth, this integrated quantity should not depend on whether the fissures are viewed end-on or face-on. This makes EW a very useful quantity for comparing images taken in different viewing geometries.

The y -coordinate for each value of EW is directly related to the minimum altitude of the plume above Enceladus' south pole $z = y - r_E$ (r_E being the moon's radius). This effective altitude is then used to calculate the parameter $Z = \sqrt{z/(r_E + z)}$. As discussed in the main text, we fit the observed equivalent width at 0.88-1.56 microns versus Z derived from each cube to a linear function:

$$EW = EW_{85} \left(\frac{Z_{max} - Z}{Z_{max} - 0.5} \right) \quad (2)$$

where EW_{85} corresponds to the equivalent width where $z = 85$ km ($Z = 0.5$), and Z_{max} is the x -intercept of this linear trend. As mentioned in the main text, we only fit the data between altitudes of 50 km and 450 km (i.e. $Z = 0.4$ and $Z = 0.8$), thereby avoiding regions where the moon's limb might corrupt the data or the plume's brightness might be too low to be securely detected. Since the uncertainties in the individual estimates of EW are dominated by systematic uncertainties in the background subtraction rather than statistical errors, these linear fits are unweighted, and the errors on the fit parameters are derived from the scatter of the data points around the best-fit trend. Table S1 provides both these parameters and their errors for the 0.88-1.56 micron data from each cube.

Supplemental References

- 24 Clark, R. N. *et al.* The surface composition of Iapetus: Mapping results from Cassini VIMS. *Icarus* **218**, 831–860 (2012).

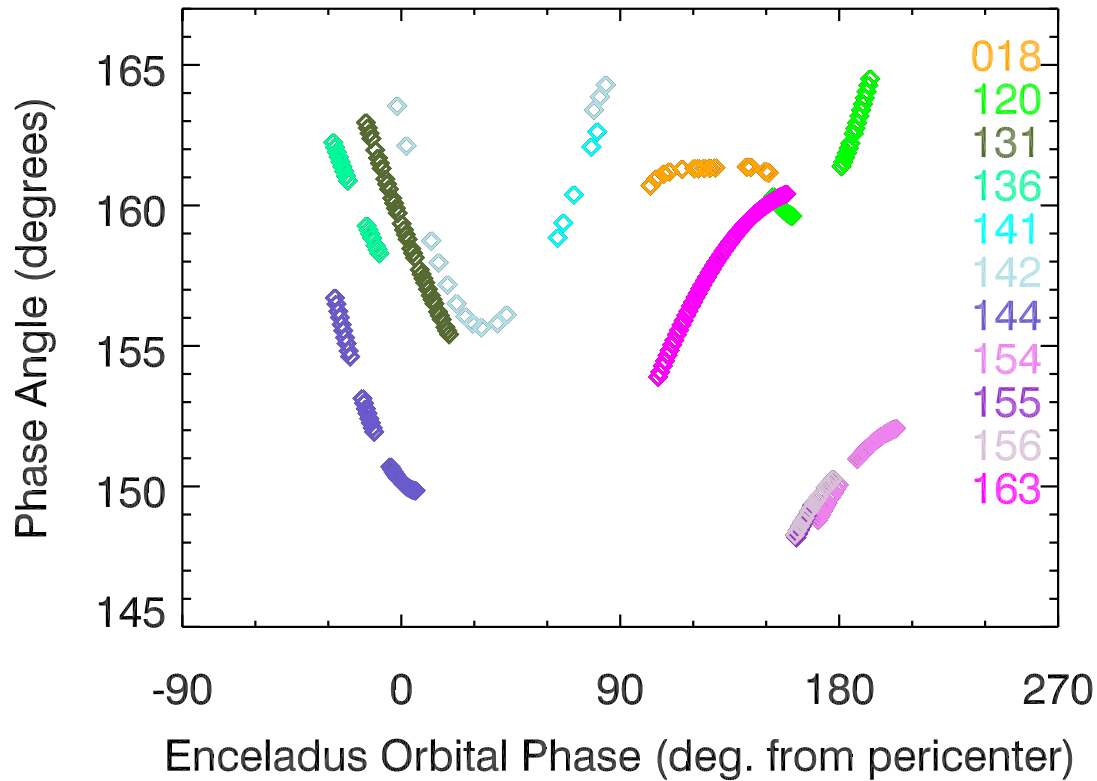


Figure S1: Overview of the observation geometry for the VIMS observations of the Enceladus plume considered in this study. Each data point indicates the phase angle and orbital phase of Enceladus for a single image cube, and the data points are color coded by Cassini Rev number (orbit around Saturn). Note that the available data cover a range of phase angles both when Enceladus is near its orbital pericenter (0° on the x -axis) and its orbital apocenter (180° on the x -axis).

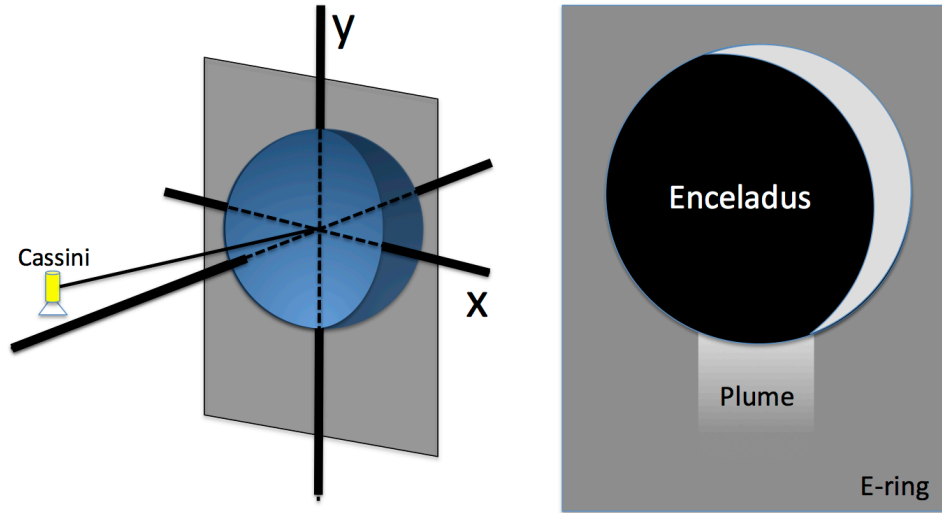


Figure S2: The image geometry associated with a given Enceladus observation. The brightness data from each image cube is re-projected onto a plane containing Enceladus' spin axis like the one shown in the left-hand diagram (note that this diagram is not to scale). Note that the chosen plane is also the one whose normal makes the smallest angle to the line joining the moon's center to the spacecraft. In this plane, we define the cartesian coordinates x and y such that the origin is at Enceladus' center and y increases northwards along Enceladus' spin axis. The right-hand diagram shows how Enceladus and its plume should appear in this coordinate system, (compare with the actual images shown in Figure 1).

Table S1: Summary of VIMS image cubes used in this analysis

Filename	UTC	Range (km)	Sub-S/C Lat. (deg)	Sub-S/C Lon. (deg)	Phase (deg)	Orb. Phase (deg)	EW_{85} (km) ^a	Z_{max}^b
V1511794087	2005-331T14:26:00	126874.	+0.75	105.7	160.7	102.5	0.1814±0.0029	0.8315±0.0321
V1511794976	2005-331T14:39:05	128375.	+0.77	107.2	160.9	104.8	0.1805±0.0041	0.8286±0.0455
V1511795992	2005-331T14:56:01	130071.	+0.79	109.2	161.1	107.9	0.1863±0.0034	0.8267±0.0354
V1511796659	2005-331T15:08:52	131177.	+0.81	110.6	161.2	110.2	0.1857±0.0034	0.8384±0.0367
V1511798376	2005-331T15:37:29	134019.	+0.84	114.5	161.3	115.4	0.1919±0.0042	0.8401±0.0420
V1511800181	2005-331T16:04:58	137068.	+0.87	119.1	161.3	120.4	0.1833±0.0026	0.7967±0.0398
V1511800741	2005-331T16:14:18	138045.	+0.88	120.6	161.3	122.1	0.1911±0.0032	0.8097±0.0480
V1511801493	2005-331T16:27:40	139392.	+0.89	122.8	161.3	124.6	0.2164±0.0036	0.8051±0.0340
V1511802247	2005-331T16:40:14	140794.	+0.90	125.0	161.3	126.8	0.2225±0.0041	0.8010±0.0363
V1511803001	2005-331T16:52:48	142262.	+0.91	127.3	161.3	129.1	0.2356±0.0053	0.8016±0.0429
V1511807379	2005-331T18:03:55	152790.	+0.93	142.2	161.4	142.0	0.3218±0.0104	0.7980±0.0575
V1511807805	2005-331T18:13:00	154064.	+0.93	143.8	161.4	143.6	0.3329±0.0104	0.7942±0.0537
V1511809910	2005-331T18:46:06	161222.	+0.93	151.6	161.2	149.6	0.3643±0.0083	0.7966±0.0424
V1511810387	2005-331T18:53:27	163065.	+0.92	153.5	161.2	150.9	0.3461±0.0104	0.7636±0.0565
V1511810387	2005-331T18:53:27	163065.	+0.92	153.5	161.2	150.9	0.3461±0.0104	0.7636±0.0565
V1635804522	2009-305T21:27:26	209658.	-0.33	251.7	160.3	153.0	0.2279±0.0062	0.7978±0.0381
V1635804766	2009-305T21:30:56	209343.	-0.34	252.6	160.2	153.6	0.2103±0.0069	0.7877±0.0449
V1635804941	2009-305T21:33:51	209117.	-0.34	253.2	160.2	154.1	0.2080±0.0099	0.7885±0.0651
V1635805116	2009-305T21:36:46	208890.	-0.34	253.8	160.1	154.6	0.2017±0.0097	0.7913±0.0666
V1635805443	2009-305T21:42:28	208462.	-0.35	254.9	160.0	155.7	0.1953±0.0104	0.7843±0.0702
V1635805657	2009-305T21:46:02	208179.	-0.35	255.6	159.9	156.3	0.1985±0.0102	0.7911±0.0692
V1635805909	2009-305T21:49:59	207843.	-0.35	256.4	159.8	157.0	0.1590±0.0102	0.7779±0.0847
V1635806084	2009-305T21:52:54	207607.	-0.36	257.0	159.8	157.5	0.1697±0.0126	0.7870±0.1019
V1635806259	2009-305T21:55:49	207369.	-0.36	257.5	159.8	158.1	0.1591±0.0099	0.7754±0.0814
V1635806434	2009-305T21:58:44	207128.	-0.36	258.1	159.7	158.6	0.1605±0.0096	0.7706±0.0771
V1635806609	2009-305T22:01:39	206884.	-0.37	258.7	159.7	159.1	0.1776±0.0098	0.7805±0.0736
V1635806784	2009-305T22:04:34	206637.	-0.37	259.2	159.7	159.7	0.1588±0.0091	0.7682±0.0735
V1635806959	2009-305T22:07:29	206387.	-0.37	259.8	159.6	160.2	0.1707±0.0147	0.7701±0.1111
V1635807134	2009-305T22:10:24	206133.	-0.37	260.3	159.6	160.7	0.1644±0.0110	0.7753±0.0884
V1635813829	2009-306T00:02:33	191731.	-0.48	278.7	161.4	180.9	0.3257±0.0077	0.7929±0.0326
V1635814073	2009-306T00:06:37	190968.	-0.48	279.3	161.5	181.7	0.3144±0.0115	0.7915±0.0506
V1635814317	2009-306T00:10:41	190186.	-0.48	279.9	161.7	182.4	0.3318±0.0180	0.7931±0.0734
V1635814561	2009-306T00:14:45	189382.	-0.49	280.4	161.9	183.1	0.3101±0.0110	0.8104±0.0512
V1635814805	2009-306T00:18:49	188558.	-0.49	281.0	162.0	183.9	0.3228±0.0084	0.7987±0.0361
V1635815049	2009-306T00:22:53	187712.	-0.50	281.6	162.2	184.6	0.3250±0.0150	0.8138±0.0681
V1635815493	2009-306T00:30:17	186117.	-0.50	282.6	162.6	185.9	0.4139±0.0164	0.8001±0.0560
V1635815737	2009-306T00:34:21	185209.	-0.51	283.1	162.7	186.7	0.3913±0.0146	0.8012±0.0532
V1635815981	2009-306T00:38:25	184279.	-0.51	283.6	162.9	187.4	0.4355±0.0173	0.7838±0.0534
V1635816274	2009-306T00:43:18	183133.	-0.52	284.3	163.2	188.3	0.3756±0.0170	0.8084±0.0659
V1635816518	2009-306T00:47:22	182153.	-0.52	284.8	163.4	189.0	0.4105±0.0154	0.8004±0.0536
V1635816762	2009-306T00:51:26	181150.	-0.53	285.3	163.6	189.8	0.3929±0.0101	0.8096±0.0363
V1635817006	2009-306T00:55:30	180123.	-0.53	285.8	163.8	190.5	0.4209±0.0152	0.8108±0.0519
V1635817250	2009-306T00:59:34	179074.	-0.54	286.4	164.0	191.2	0.4442±0.0154	0.7991±0.0478
V1635817494	2009-306T01:03:38	178001.	-0.54	286.9	164.3	192.0	0.4284±0.0256	0.7887±0.0802
V1635817738	2009-306T01:07:42	176904.	-0.55	287.4	164.5	192.7	0.4482±0.0172	0.7981±0.0536
V1652819528	2010-137T19:48:51	401576.	+0.22	109.4	163.0	345.5	0.0605±0.0081	1.4425±0.8566
V1652819772	2010-137T19:52:55	397646.	+0.22	109.9	162.8	346.2	0.0749±0.0074	0.8720±0.1706
V1652820016	2010-137T19:56:59	393728.	+0.22	110.5	162.6	347.0	0.0729±0.0065	1.1231±0.3096
V1652820260	2010-137T20:01:03	389821.	+0.22	111.0	162.4	347.7	0.0578±0.0025	1.2409±0.1960
V1652820783	2010-137T20:09:46	381486.	+0.23	112.2	162.0	349.3	0.0712±0.0073	1.1208±0.3473
V1652821148	2010-137T20:15:51	375701.	+0.23	113.0	161.7	350.4	0.0936±0.0053	0.9706±0.1481
V1652821392	2010-137T20:19:55	371850.	+0.23	113.6	161.5	351.2	0.0679±0.0035	2.1926±1.0264
V1652821636	2010-137T20:23:59	368011.	+0.23	114.2	161.3	351.9	0.0518±0.0057	2.4847±2.5796
V1652822130	2010-137T20:32:13	360278.	+0.23	115.3	160.9	353.4	0.0702±0.0027	1.0123±0.1079
V1652822374	2010-137T20:36:17	356479.	+0.23	115.9	160.8	354.2	0.0564±0.0042	1.2008±0.3368
V1652822618	2010-137T20:40:21	352693.	+0.23	116.4	160.6	354.9	0.0688±0.0028	1.0891±0.1264
V1652823056	2010-137T20:47:39	345931.	+0.23	117.4	160.3	356.3	0.0400±0.0081	1.2814±1.0776
V1652823300	2010-137T20:51:43	342183.	+0.23	118.0	160.1	357.0	0.0488±0.0033	1.0615±0.1978

^a Estimated EW at 0.88–1.56 microns and $Z = 0.5$ (i.e. altitude of 85 km) based on linear fit to the data between $Z = 0.4$ and 0.8.

^b Value of Z corresponding to the x -intercept of the linear fit to the 0.88–1.56-micron data between $Z = 0.4$ and 0.8.

V1652823544	2010-137T20:55:47	338450.	+0.23	118.6	159.9	357.8	0.1281±0.0042	3.2454±1.3638
V1652823788	2010-137T20:59:51	334731.	+0.23	119.1	159.7	358.5	0.0364±0.0015	0.8410±0.0663
V1652824319	2010-137T21:08:42	326688.	+0.24	120.4	159.3	0.2	0.0333±0.0037	0.8646±0.1993
V1652824626	2010-137T21:13:49	322070.	+0.24	121.1	159.1	1.1	0.0307±0.0044	0.7839±0.1975
V1652824870	2010-137T21:17:53	318417.	+0.24	121.7	159.0	1.8	0.0328±0.0023	0.8307±0.1175
V1652825114	2010-137T21:21:57	314779.	+0.24	122.3	158.8	2.6	0.0343±0.0045	0.8117±0.2062
V1652825597	2010-137T21:30:00	307624.	+0.24	123.4	158.5	4.1	0.0319±0.0046	0.7728±0.1923
V1652825841	2010-137T21:34:04	304033.	+0.24	124.0	158.3	4.8	0.0306±0.0041	0.9095±0.2823
V1652826085	2010-137T21:38:08	300458.	+0.24	124.6	158.1	5.6	0.0349±0.0024	0.8083±0.1041
V1652826740	2010-137T21:49:03	290944.	+0.24	126.1	157.7	7.6	0.0425±0.0025	0.8319±0.0920
V1652826984	2010-137T21:53:07	287430.	+0.24	126.7	157.6	8.3	0.0399±0.0044	0.7918±0.1489
V1652827228	2010-137T21:57:11	283933.	+0.24	127.3	157.4	9.1	0.0474±0.0062	0.8232±0.1993
V1652827472	2010-137T22:01:15	280453.	+0.24	127.9	157.2	9.8	0.0403±0.0045	0.8126±0.1652
V1652827842	2010-137T22:07:25	275210.	+0.24	128.8	157.0	11.0	0.0378±0.0124	0.8310±0.5255
V1652828212	2010-137T22:13:35	270006.	+0.25	129.7	156.8	12.1	0.0398±0.0021	0.8515±0.0917
V1652828456	2010-137T22:17:39	266597.	+0.25	130.3	156.6	12.8	0.0315±0.0038	0.8498±0.2123
V1652828700	2010-137T22:21:43	263206.	+0.25	130.9	156.5	13.6	0.0398±0.0095	0.7831±0.3317
V1652829196	2010-137T22:29:59	256368.	+0.25	132.1	156.2	15.1	0.0271±0.0051	0.7244±0.2052
V1652829440	2010-137T22:34:03	253032.	+0.25	132.8	156.1	15.9	0.0520±0.0063	0.8536±0.2133
V1652829684	2010-137T22:38:07	249715.	+0.25	133.4	155.9	16.6	0.0694±0.0057	0.8522±0.1365
V1652830180	2010-137T22:46:23	243029.	+0.25	134.6	155.7	18.1	0.0737±0.0040	0.8193±0.0844
V1652830424	2010-137T22:50:27	239769.	+0.25	135.2	155.5	18.9	0.0907±0.0067	0.7882±0.0991
V1652830668	2010-137T22:54:31	236528.	+0.25	135.8	155.4	19.6	0.0605±0.0073	0.9114±0.2460
V1660401755	2010-225T13:58:24	314820.	-6.67	121.7	162.2	332.0	0.0544±0.0057	0.8698±0.1819
V1660401999	2010-225T14:02:28	311196.	-6.70	122.3	162.1	332.8	0.0662±0.0017	0.8208±0.0382
V1660402243	2010-225T14:06:32	307588.	-6.74	122.8	161.9	333.5	0.0429±0.0066	0.8527±0.2581
V1660402487	2010-225T14:10:36	303996.	-6.79	123.4	161.7	334.3	0.0624±0.0032	0.8518±0.0862
V1660402731	2010-225T14:14:40	300419.	-6.83	124.0	161.5	335.0	0.0519±0.0024	0.8495±0.0785
V1660402975	2010-225T14:18:44	296859.	-6.87	124.6	161.4	335.8	0.0579±0.0018	0.8075±0.0447
V1660403219	2010-225T14:22:48	293314.	-6.91	125.2	161.2	336.5	0.0636±0.0047	0.7830±0.0999
V1660403463	2010-225T14:26:52	289786.	-6.95	125.7	161.0	337.3	0.0521±0.0023	0.8818±0.0850
V1660403707	2010-225T14:30:56	286275.	-6.99	126.3	160.9	338.0	0.0536±0.0087	0.8156±0.2373
V1660406223	2010-225T15:12:52	251068.	-7.47	132.4	159.3	345.7	0.0445±0.0042	0.8048±0.1364
V1660406467	2010-225T15:16:56	247755.	-7.51	133.1	159.1	346.5	0.0432±0.0054	0.7993±0.1799
V1660406711	2010-225T15:21:00	244460.	-7.56	133.7	159.0	347.2	0.0410±0.0050	0.8191±0.1790
V1660406955	2010-225T15:25:04	241183.	-7.61	134.3	158.8	348.0	0.0418±0.0031	0.8171±0.1083
V1660407443	2010-225T15:33:12	234686.	-7.72	135.5	158.6	349.5	0.0406±0.0021	0.8060±0.0753
V1660407687	2010-225T15:37:16	231466.	-7.77	136.1	158.4	350.2	0.0440±0.0019	0.8207±0.0658
V1660407931	2010-225T15:41:20	228265.	-7.82	136.7	158.3	351.0	0.0393±0.0040	0.8039±0.1522
V1669796401	2010-334T07:39:31	94604.	-0.07	284.7	158.8	64.2	0.1039±0.0091	0.7796±0.1159
V1669797182	2010-334T07:52:32	90649.	-0.06	286.5	159.4	66.6	0.0993±0.0112	0.8053±0.1609
V1669798601	2010-334T08:16:11	83076.	-0.04	289.8	160.4	70.9	0.0860±0.0158	0.7852±0.2453
V1669800961	2010-334T08:55:31	69537.	+0.00	295.1	162.1	78.1	0.1157±0.0223	0.8063±0.2799
V1669801742	2010-334T09:08:31	64847.	+0.02	296.9	162.6	80.5	0.1655±0.0259	0.7805±0.2057
V1671579308	2010-354T22:53:39	52753.	+0.13	300.5	163.4	79.1	0.1789±0.0203	0.7561±0.1370
V1671580116	2010-354T23:07:07	47732.	+0.17	302.4	163.9	81.6	0.1760±0.0327	0.7336±0.2067
V1671580920	2010-354T23:20:31	42702.	+0.21	304.4	164.3	84.0	0.1120±0.0278	0.7739±0.3206
V1671552668	2010-354T15:32:37	156808.	-0.14	219.0	163.5	358.3	0.0505±0.0038	0.8579±0.1265
V1671553901	2010-354T15:53:10	152410.	-0.13	224.3	162.1	2.1	0.0575±0.0054	0.8068±0.1369
V1671557277	2010-354T16:48:53	142390.	-0.12	238.3	158.7	12.3	0.0569±0.0037	0.8562±0.1132
V1671558253	2010-354T17:05:08	139839.	-0.11	242.1	158.0	15.3	0.0582±0.0058	0.8353±0.1579
V1671559411	2010-354T17:25:00	136893.	-0.11	246.5	157.2	19.0	0.0760±0.0038	0.8436±0.0810
V1671560658	2010-354T17:45:47	133738.	-0.10	251.1	156.5	22.8	0.0626±0.0042	0.8066±0.0977
V1671561876	2010-354T18:05:32	130589.	-0.10	255.3	156.0	26.4	0.0679±0.0054	0.8470±0.1319
V1671562852	2010-354T18:21:47	127967.	-0.09	258.5	155.8	29.4	0.0828±0.0065	0.8313±0.1232
V1671564000	2010-354T18:40:56	124715.	-0.08	262.2	155.7	32.9	0.0886±0.0051	0.7930±0.0800

V1671566150	2010-354T19:17:19	117983.	-0.07	268.6	155.8	39.6	0.0753±0.0044	0.8296±0.0916
V1671567368	2010-354T19:37:37	113717.	-0.06	272.0	156.1	43.3	0.0878±0.0059	0.8255±0.1033
V1675101079	2011-030T17:05:29	226523.	+0.31	214.7	156.7	332.7	0.0358±0.0081	0.7619±0.2726
V1675101287	2011-030T17:08:57	225850.	+0.31	215.6	156.5	333.4	0.0578±0.0071	0.7635±0.1575
V1675101532	2011-030T17:13:02	225081.	+0.30	216.6	156.2	334.1	0.0430±0.0042	0.8680±0.1797
V1675101740	2011-030T17:16:30	224450.	+0.30	217.5	156.0	334.7	0.0407±0.0081	0.9012±0.4115
V1675101985	2011-030T17:20:35	223730.	+0.30	218.5	155.8	335.5	0.0437±0.0055	0.7929±0.1810
V1675102193	2011-030T17:24:03	223139.	+0.30	219.4	155.5	336.1	0.0397±0.0031	0.8386±0.1323
V1675102438	2011-030T17:28:08	222465.	+0.29	220.4	155.3	336.9	0.0462±0.0027	0.8835±0.1060
V1675102646	2011-030T17:31:36	221913.	+0.29	221.3	155.1	337.5	0.0365±0.0039	0.7266±0.1135
V1675102916	2011-030T17:36:06	221221.	+0.29	222.4	154.8	338.3	0.0295±0.0032	0.8053±0.1605
V1675103124	2011-030T17:39:34	220707.	+0.28	223.3	154.6	339.0	0.0352±0.0030	0.8656±0.1529
V1675104776	2011-030T18:07:06	217154.	+0.26	229.9	153.1	344.0	0.0275±0.0037	0.7940±0.1855
V1675104984	2011-030T18:10:34	216767.	+0.25	230.7	153.0	344.7	0.0283±0.0027	0.8793±0.1730
V1675105229	2011-030T18:14:39	216326.	+0.25	231.7	152.8	345.4	0.0336±0.0047	0.8427±0.2267
V1675105437	2011-030T18:18:07	215965.	+0.25	232.5	152.6	346.1	0.0183±0.0031	1.1460±0.6373
V1675105682	2011-030T18:22:12	215552.	+0.24	233.4	152.4	346.8	0.0239±0.0026	0.9208±0.2291
V1675105890	2011-030T18:25:40	215214.	+0.24	234.2	152.3	347.5	0.0273±0.0039	0.8365±0.2280
V1675106135	2011-030T18:29:45	214827.	+0.23	235.2	152.1	348.2	0.0273±0.0029	0.8131±0.1575
V1675106343	2011-030T18:33:13	214510.	+0.23	236.0	151.9	348.9	0.0282±0.0052	0.8279±0.2872
V1675108515	2011-030T19:09:25	211636.	+0.19	244.0	150.7	355.5	0.0254±0.0017	0.8288±0.1087
V1675108723	2011-030T19:12:53	211393.	+0.19	244.7	150.6	356.2	0.0273±0.0024	0.7914±0.1272
V1675108968	2011-030T19:16:58	211111.	+0.18	245.5	150.5	356.9	0.0292±0.0018	0.8134±0.0978
V1675109176	2011-030T19:20:26	210875.	+0.18	246.3	150.4	357.5	0.0259±0.0037	0.8504±0.2542
V1675109421	2011-030T19:24:31	210600.	+0.17	247.1	150.3	358.3	0.0283±0.0054	0.8148±0.3024
V1675109629	2011-030T19:27:59	210369.	+0.17	247.8	150.3	358.9	0.0247±0.0029	0.9568±0.2976
V1675110253	2011-030T19:38:23	209685.	+0.16	249.9	150.1	0.8	0.0391±0.0044	0.8003±0.1789
V1675110461	2011-030T19:41:51	209459.	+0.15	250.6	150.0	1.5	0.0288±0.0039	0.8691±0.2780
V1675110706	2011-030T19:45:56	209193.	+0.15	251.4	150.0	2.2	0.0335±0.0046	0.8038±0.2217
V1675110914	2011-030T19:49:24	208966.	+0.15	252.1	150.0	2.9	0.0315±0.0042	0.8050±0.2157
V1675111228	2011-030T19:54:38	208622.	+0.14	253.1	149.9	3.8	0.0389±0.0035	0.8476±0.1597
V1675111436	2011-030T19:58:06	208393.	+0.14	253.8	149.9	4.5	0.0270±0.0033	0.7849±0.1777
V1675111681	2011-030T20:02:11	208121.	+0.13	254.6	149.9	5.2	0.0315±0.0022	0.7822±0.0973
V1675111889	2011-030T20:05:39	207888.	+0.13	255.2	149.9	5.9	0.0390±0.0044	0.7974±0.1700
V1696147993	2011-274T07:25:10	228708.	+0.26	135.8	148.8	171.3	0.0993±0.0066	0.7967±0.0965
V1696148201	2011-274T07:28:38	225939.	+0.26	136.4	148.9	172.0	0.1086±0.0037	0.8075±0.0488
V1696148409	2011-274T07:32:05	223184.	+0.26	136.9	149.0	172.6	0.1071±0.0074	0.7847±0.0922
V1696148616	2011-274T07:35:33	220447.	+0.26	137.4	149.1	173.2	0.0881±0.0047	0.8188±0.0788
V1696148824	2011-274T07:39:00	217719.	+0.26	137.9	149.2	173.8	0.0965±0.0071	0.8095±0.1065
V1696149032	2011-274T07:42:28	215005.	+0.26	138.4	149.3	174.5	0.0933±0.0058	0.8154±0.0918
V1696149239	2011-274T07:45:56	212309.	+0.26	138.9	149.4	175.1	0.0990±0.0070	0.8034±0.1017
V1696149723	2011-274T07:55:03	206078.	+0.26	140.2	149.6	176.7	0.1094±0.0059	0.7924±0.0754
V1696150058	2011-274T08:00:38	201804.	+0.26	141.0	149.8	177.7	0.1043±0.0052	0.7816±0.0677
V1696150393	2011-274T08:06:13	197568.	+0.26	141.9	149.9	178.8	0.0974±0.0043	0.7784±0.0579
V1696150728	2011-274T08:11:48	193367.	+0.26	142.7	150.0	179.8	0.0957±0.0055	0.7738±0.0750
V1696153294	2011-274T08:54:30	162435.	+0.26	149.4	151.0	187.5	0.0956±0.0042	0.7679±0.0556
V1696153619	2011-274T08:59:55	158675.	+0.26	150.3	151.1	188.5	0.1066±0.0079	0.8128±0.1089
V1696153945	2011-274T09:05:20	154946.	+0.26	151.2	151.2	189.4	0.1188±0.0054	0.7849±0.0620
V1696154270	2011-274T09:10:45	151258.	+0.26	152.1	151.3	190.4	0.1094±0.0059	0.8022±0.0770
V1696154595	2011-274T09:16:10	147606.	+0.26	152.9	151.3	191.4	0.1034±0.0055	0.7968±0.0757
V1696155274	2011-274T09:27:30	140087.	+0.26	154.8	151.5	193.4	0.1165±0.0056	0.7707±0.0610
V1696155599	2011-274T09:32:55	136546.	+0.25	155.7	151.6	194.4	0.1133±0.0088	0.7722±0.0984
V1696155925	2011-274T09:38:20	133035.	+0.25	156.6	151.7	195.4	0.1014±0.0046	0.7603±0.0561

V1696156250	2011-274T09:43:45	129565.	+0.25	157.5	151.7	196.4	0.1067±0.0054	0.7595±0.0622
V1696156575	2011-274T09:49:10	126130.	+0.25	158.4	151.8	197.4	0.1059±0.0064	0.8106±0.0882
V1696157252	2011-274T10:00:28	119085.	+0.24	160.4	151.9	199.4	0.1195±0.0056	0.8043±0.0665
V1696157577	2011-274T10:05:53	115759.	+0.24	161.3	151.9	200.4	0.1118±0.0032	0.7676±0.0364
V1696157903	2011-274T10:11:18	112463.	+0.24	162.2	152.0	201.4	0.1012±0.0038	0.8070±0.0545
V1696158228	2011-274T10:16:43	109206.	+0.24	163.1	152.0	202.3	0.1170±0.0064	0.8107±0.0820
V1696158553	2011-274T10:22:08	105983.	+0.23	164.1	152.1	203.3	0.1062±0.0045	0.7729±0.0551
V1697685856	2011-292T02:36:03	245611.	+0.23	132.4	148.2	162.4	0.0739±0.0080	0.8388±0.1766
V1697686101	2011-292T02:40:08	242252.	+0.23	133.0	148.3	163.1	0.0779±0.0018	0.7967±0.0334
V1697686346	2011-292T02:44:13	238911.	+0.23	133.6	148.5	163.9	0.0899±0.0029	0.8108±0.0487
V1697686591	2011-292T02:48:18	235588.	+0.23	134.2	148.6	164.6	0.0692±0.0048	0.7999±0.0982
V1697686836	2011-292T02:52:23	232283.	+0.23	134.8	148.7	165.4	0.0642±0.0038	0.8197±0.0853
V1697687081	2011-292T02:56:28	228996.	+0.23	135.4	148.8	166.1	0.0788±0.0044	0.8166±0.0820
V1697687326	2011-292T03:00:33	225729.	+0.23	136.0	149.0	166.8	0.0816±0.0052	0.8452±0.1041
V1697688040	2011-292T03:12:27	216312.	+0.23	137.8	149.3	169.0	0.0650±0.0043	0.8066±0.0971
V1699226646	2011-309T22:36:23	223820.	+0.23	137.1	148.3	161.8	0.0643±0.0046	0.7864±0.0941
V1699226984	2011-309T22:42:01	219369.	+0.23	137.9	148.4	162.8	0.0751±0.0061	0.7909±0.1100
V1699227322	2011-309T22:47:39	214954.	+0.23	138.7	148.6	163.9	0.0615±0.0044	0.8166±0.1080
V1699227660	2011-309T22:53:17	210576.	+0.23	139.6	148.7	164.9	0.0659±0.0041	0.7805±0.0808
V1699227998	2011-309T22:58:55	206234.	+0.23	140.5	148.9	165.9	0.0738±0.0035	0.8008±0.0663
V1699228542	2011-309T23:07:59	199325.	+0.23	141.8	149.1	167.5	0.0818±0.0080	0.7639±0.1203
V1699228880	2011-309T23:13:37	195081.	+0.22	142.7	149.2	168.5	0.0848±0.0039	0.7827±0.0611
V1699229218	2011-309T23:19:15	190875.	+0.22	143.6	149.4	169.6	0.0799±0.0064	0.7927±0.1084
V1699229556	2011-309T23:24:53	186706.	+0.22	144.5	149.5	170.6	0.0956±0.0063	0.8154±0.0983
V1699229894	2011-309T23:30:31	182576.	+0.22	145.4	149.6	171.6	0.0755±0.0030	0.7757±0.0518
V1699230860	2011-309T23:46:37	170984.	+0.22	147.9	150.0	174.5	0.0878±0.0067	0.8113±0.1108
V1699231198	2011-309T23:52:15	167002.	+0.22	148.8	150.1	175.5	0.0911±0.0043	0.7509±0.0563
V1699231536	2011-309T23:57:53	163059.	+0.22	149.7	150.2	176.5	0.0964±0.0067	0.7924±0.0980
V1699231874	2011-310T00:03:31	159155.	+0.22	150.6	150.3	177.5	0.0855±0.0060	0.7824±0.0910
V1711536135	2012-087T09:53:14	343540.	+0.44	117.2	153.9	105.6	0.0554±0.0030	0.8138±0.0824
V1711536423	2012-087T09:58:02	339078.	+0.44	117.9	154.1	106.4	0.0455±0.0023	0.8436±0.0842
V1711536777	2012-087T10:03:56	333603.	+0.45	118.7	154.3	107.5	0.0408±0.0006	0.8561±0.0261
V1711537065	2012-087T10:08:44	329184.	+0.45	119.3	154.5	108.4	0.0419±0.0030	0.8450±0.1262
V1711537413	2012-087T10:14:32	323855.	+0.45	120.1	154.7	109.4	0.0534±0.0023	0.8186±0.0609
V1711537701	2012-087T10:19:20	319480.	+0.45	120.8	154.8	110.3	0.0441±0.0035	0.7914±0.1029
V1711538046	2012-087T10:25:05	314250.	+0.45	121.6	155.0	111.4	0.0384±0.0034	0.7971±0.1179
V1711538334	2012-087T10:29:53	309921.	+0.46	122.3	155.2	112.2	0.0530±0.0070	0.8103±0.1881
V1711538684	2012-087T10:35:43	304672.	+0.46	123.1	155.4	113.3	0.0559±0.0042	0.8273±0.1166
V1711538972	2012-087T10:40:31	300389.	+0.46	123.8	155.6	114.2	0.0494±0.0016	0.7758±0.0428
V1711539317	2012-087T10:46:16	295273.	+0.46	124.6	155.7	115.2	0.0554±0.0015	0.7885±0.0360
V1711539605	2012-087T10:51:04	291038.	+0.46	125.2	155.9	116.1	0.0766±0.0049	0.8171±0.0943
V1711539953	2012-087T10:56:52	285936.	+0.47	126.1	156.1	117.1	0.0679±0.0059	0.8159±0.1304
V1711540241	2012-087T11:01:40	281752.	+0.47	126.7	156.2	118.0	0.0765±0.0053	0.8178±0.1061
V1711540588	2012-087T11:07:27	276725.	+0.47	127.6	156.4	119.0	0.0734±0.0112	0.8196±0.2236
V1711540876	2012-087T11:12:15	272591.	+0.47	128.3	156.6	119.9	0.0726±0.0016	0.7838±0.0291
V1711541224	2012-087T11:18:03	267612.	+0.48	129.1	156.7	121.0	0.0771±0.0053	0.8522±0.1095
V1711541512	2012-087T11:22:51	263531.	+0.48	129.8	156.9	121.8	0.0735±0.0035	0.8235±0.0709
V1711541857	2012-087T11:28:36	258658.	+0.48	130.6	157.0	122.9	0.0857±0.0059	0.8224±0.1042
V1711542145	2012-087T11:33:24	254629.	+0.48	131.3	157.2	123.8	0.0814±0.0015	0.7920±0.0261
V1711542490	2012-087T11:39:09	249821.	+0.48	132.2	157.3	124.8	0.0999±0.0031	0.8134±0.0474
V1711542778	2012-087T11:43:57	245847.	+0.49	132.9	157.5	125.7	0.1024±0.0028	0.8106±0.0389
V1711543130	2012-087T11:49:49	241009.	+0.49	133.7	157.6	126.7	0.0858±0.0054	0.8145±0.0949
V1711543418	2012-087T11:54:37	237090.	+0.49	134.4	157.7	127.6	0.0883±0.0034	0.7973±0.0515
V1711543762	2012-087T12:00:21	232429.	+0.49	135.3	157.9	128.6	0.1111±0.0065	0.7881±0.0783

V1711544050	2012-087T12:05:09	228567.	+0.49	136.0	158.0	129.5	0.1184±0.0069	0.7992±0.0817
V1711544399	2012-087T12:10:58	223907.	+0.50	136.9	158.1	130.6	0.1064±0.0022	0.8167±0.0311
V1711544687	2012-087T12:15:46	220102.	+0.50	137.6	158.2	131.4	0.1143±0.0041	0.7887±0.0504
V1711545033	2012-087T12:21:32	215552.	+0.50	138.4	158.4	132.5	0.1178±0.0080	0.7882±0.0940
V1711545321	2012-087T12:26:20	211806.	+0.50	139.2	158.5	133.3	0.1108±0.0077	0.7823±0.0911
V1711545666	2012-087T12:32:05	207339.	+0.50	140.0	158.6	134.4	0.1190±0.0044	0.7861±0.0499
V1711545954	2012-087T12:36:53	203651.	+0.51	140.8	158.7	135.3	0.1143±0.0051	0.7757±0.0587
V1711546301	2012-087T12:42:40	199231.	+0.51	141.7	158.8	136.3	0.1306±0.0056	0.7680±0.0564
V1711546589	2012-087T12:47:28	195603.	+0.51	142.4	158.9	137.2	0.1317±0.0056	0.7777±0.0557
V1711546939	2012-087T12:53:18	191217.	+0.51	143.3	159.0	138.2	0.1263±0.0068	0.7782±0.0705
V1711547227	2012-087T12:58:06	187650.	+0.51	144.0	159.1	139.1	0.1268±0.0066	0.7632±0.0655
V1711547571	2012-087T13:03:50	183413.	+0.52	144.9	159.2	140.1	0.1326±0.0047	0.7767±0.0473
V1711547859	2012-087T13:08:38	179906.	+0.52	145.7	159.3	141.0	0.1243±0.0065	0.7762±0.0663
V1711548206	2012-087T13:14:25	175705.	+0.52	146.6	159.4	142.1	0.1339±0.0068	0.7811±0.0663
V1711548494	2012-087T13:19:13	172260.	+0.52	147.4	159.5	142.9	0.1329±0.0068	0.7696±0.0653
V1711548846	2012-087T13:25:05	168075.	+0.52	148.3	159.6	144.0	0.1486±0.0064	0.7724±0.0559
V1711549134	2012-087T13:29:53	164692.	+0.52	149.1	159.6	144.9	0.1421±0.0098	0.7802±0.0893
V1711549477	2012-087T13:35:36	160688.	+0.53	150.0	159.7	145.9	0.1372±0.0069	0.8047±0.0710
V1711549765	2012-087T13:40:24	157367.	+0.53	150.8	159.8	146.8	0.1514±0.0057	0.7678±0.0473
V1711550111	2012-087T13:46:10	153402.	+0.53	151.7	159.9	147.8	0.1749±0.0083	0.7899±0.0640
V1711550399	2012-087T13:50:58	150143.	+0.53	152.5	159.9	148.7	0.1730±0.0088	0.7664±0.0644
V1711550750	2012-087T13:56:49	146197.	+0.53	153.4	160.0	149.7	0.1684±0.0087	0.7741±0.0667
V1711551038	2012-087T14:01:36	143000.	+0.53	154.2	160.1	150.6	0.1800±0.0084	0.7980±0.0651
V1711551375	2012-087T14:07:14	139284.	+0.53	155.1	160.1	151.6	0.1886±0.0076	0.7620±0.0503
V1711551663	2012-087T14:12:01	136148.	+0.53	155.9	160.2	152.5	0.1531±0.0096	0.7698±0.0776
V1711552021	2012-087T14:18:00	132278.	+0.53	156.9	160.2	153.6	0.1568±0.0088	0.7756±0.0718
V1711552309	2012-087T14:22:47	129206.	+0.53	157.7	160.3	154.4	0.1701±0.0082	0.7697±0.0614
V1711552654	2012-087T14:28:33	125550.	+0.54	158.7	160.3	155.5	0.1686±0.0085	0.7824±0.0673
V1711552942	2012-087T14:33:20	122538.	+0.54	159.5	160.3	156.3	0.1705±0.0105	0.7617±0.0754
V1711553290	2012-087T14:39:09	118925.	+0.54	160.5	160.4	157.4	0.1833±0.0074	0.7671±0.0506
V1711553578	2012-087T14:43:56	115974.	+0.53	161.3	160.4	158.2	0.1821±0.0061	0.7700±0.0435