

Electronic Supplement 11

Etna 2008–2010 eruption: MODIS-derived time series data

Etna's 2008–2009 eruption began on 13 May 2008 and ended on 7 July 2009, thus lasting 420 days. During that time 372 MODIS images were identified as cloud-free and usable for time series construction. Pixels comprising the thermal anomaly associated with active lava flows were identified manually following the procedures laid out in Chapter 5, and the parameters used for time series construction extracted as follows.

Extraction of level zero parameters

Level zero parameters were extracted from the MODIS data using the thermal anomaly apparent in MODIS' TIR band (band 31, 10.78–11.28 μm). For each image, the band 31 pixel-integrated radiance for each anomalous pixel was logged, as were the minimum band 31 pixel-integrated radiances from all pixels surrounding the anomaly.

Maximum radiance spectral radiance and brightness temperature

The maximum radiance from within the anomaly ($M_{\text{max-31}}$) was logged, and converted to a brightness temperature (T_{max}) following Equation (2.5) of Chapter 2. To achieve this conversion the constants in the Planck function were set so as to work with spectral radiance units of $\text{W m}^{-2} \text{sr}^{-1} \mu\text{m}^{-1}$, these being the units of spectral radiance used by MODIS Level 1B data (MSCT Document, 2009). These data are given in columns 4 and 5 of Table S11.1, and are plotted in Figures S11.1 and S11.2.

Maximum volcanic radiance

Next, the minimum band 31 pixel-integrated radiances selected from all pixels immediately surrounding the hot spot in each image were used to describe the background value ($M_{\text{back-31}}$). For each image, this was subtracted from maximum anomalous band 31 pixel-integrated radiance ($M_{\text{max-31}}$) to isolate the maximum band 31 volcanic radiance ($M_{\text{volc-max-31}}$), i.e.,

$$M_{\text{volc-MAX-31}} = M_{\text{max-31}} - M_{\text{back-31}}$$

Table S11.1. *Level zero time series data extracted from cloud-free MODIS images acquired during Etna's 2008–2009 eruption. All spectral radiances are in units of $W m^{-2} sr^{-1} \mu m^{-1}$.*

No.	Date	Time (UT)	$M_{\max-31}$	$T_{\max}$ (°C)	$M_{\text{back-31}}$	$M_{\text{volc-MAX-31}}$	No. hot pixels	ΣM_{31}	$\Sigma M_{\text{volc-31}}$
1	13-May-08	9:50	6.3	1.1	17.4	0.5	3	18.3	0.9
2	14-May-08	1:10	12.5	46.9	46.2	6.8	8	62.3	16.1
3	14-May-08	10:35	7.9	14.6	27.6	1.0	4	30.6	3.1
4	14-May-08	21:40	8.3	17.5	120.2	1.6	18	137.5	17.3
5	15-May-08	20:45	13.5	52.9	146.6	6.6	20	198.7	52.1
6	19-May-08	1:25	8.6	19.8	69.8	1.6	10	78.8	9.0
7	20-May-08	0:30	8.4	18.8	60.1	1.7	9	69.5	9.3
8	20-May-08	21:00	7.9	15.1	24.6	1.8	4	28.8	4.2
9	21-May-08	1:15	7.6	12.1	43.4	1.4	7	49.8	6.4
10	22-May-08	20:50	7.8	13.7	37.7	1.5	6	42.5	4.8
11	23-May-08	1:05	7.7	13.0	18.3	1.6	3	20.7	2.4
12	23-May-08	21:30	7.3	10.0	13.6	0.5	2	14.4	0.8
13	25-May-08	0:50	7.2	8.7	19.3	0.8	3	22.3	3.0
14	26-May-08	20:25	8.0	15.8	49.7	0.9	7	55.6	5.9
15	27-May-08	0:40	8.7	21.1	43.2	1.5	6	49.5	6.3
16	27-May-08	21:05	8.4	18.6	26.4	1.8	4	30.3	3.9
17	28-May-08	1:20	8.0	15.9	28.4	0.9	4	31.4	3.0
18	30-May-08	1:10	8.0	15.8	45.2	1.6	7	52.6	7.5
19	31-May-08	20:45	7.6	12.2	52.8	1.0	8	58.0	5.2
20	1-Jun-08	0:55	7.5	11.7	69.8	0.5	10	73.7	3.9
21	3-Jun-08	0:45	7.7	13.3	46.9	1.0	7	52.0	5.1
22	5-Jun-08	0:30	7.1	8.5	44.1	0.8	7	48.0	3.9
23	6-Jun-08	1:15	6.8	5.3	12.1	0.7	2	13.3	1.2
24	7-Jun-08	0:20	7.1	8.3	25.1	0.8	4	27.6	2.5
25	7-Jun-08	20:50	7.7	13.0	44.1	1.4	8	49.5	5.4
26	8-Jun-08	1:05	8.2	17.4	31.3	2.0	5	36.6	5.3
27	8-Jun-08	21:30	7.5	11.1	39.0	1.0	6	42.9	3.9
28	9-Jun-08	20:35	8.0	15.2	86.5	1.3	13	97.8	11.3
29	10-Jun-08	0:50	9.5	27.0	51.2	3.1	8	64.8	13.6
30	11-Jun-08	1:35	7.6	12.5	20.0	0.9	3	22.6	2.5
31	12-Jun-08	0:40	7.8	13.8	19.1	1.4	3	22.3	3.3
32	12-Jun-08	21:05	9.7	27.8	48.9	2.7	7	58.4	9.5
33	13-Jun-08	1:20	9.9	29.5	61.0	3.1	9	72.5	11.4
34	14-Jun-08	0:25	8.7	21.2	108.8	1.9	16	124.7	15.9
35	14-Jun-08	20:55	9.8	29.2	73.7	3.1	11	92.2	18.5
36	15-Jun-08	1:10	10.5	33.4	74.8	3.7	11	99.1	24.3
37	15-Jun-08	21:40	7.5	11.4	40.1	0.8	6	44.2	4.1
38	16-Jun-08	0:15	8.7	20.6	188.5	1.7	27	212.0	23.6
39	16-Jun-08	20:45	11.8	42.1	111.8	4.3	15	138.4	26.6

Table S11.1. (*cont.*)

No.	Date	Time	$M_{\text{max-31}}$	$T_{\text{max}} (^{\circ}\text{C})$	$M_{\text{back-31}}$	$M_{\text{vole-MAX-31}}$	No. hot	ΣM_{31}	$\Sigma M_{\text{vole-31}}$
		(UT)					pixels		
40	17-Jun-08	0:55	12.0	43.7	81.6	5.2	12	116.1	34.5
41	17-Jun-08	21:25	10.1	30.9	113.4	2.5	15	135.7	22.3
42	18-Jun-08	1:40	8.8	21.6	99.8	1.1	13	108.8	9.0
43	18-Jun-08	20:30	10.2	32.0	169.0	2.6	22	192.2	23.2
44	19-Jun-08	0:45	11.0	37.2	87.4	3.7	12	108.5	21.1
45	19-Jun-08	21:15	10.7	35.3	110.7	3.4	15	130.4	19.7
46	20-Jun-08	1:30	9.5	27.0	91.7	2.5	13	107.9	16.2
47	20-Jun-08	20:20	9.2	24.6	149.0	1.8	20	168.8	19.8
48	21-Jun-08	0:30	11.2	38.5	108.5	3.5	14	130.0	21.5
49	21-Jun-08	21:00	13.5	52.4	72.5	6.2	10	98.2	25.7
50	22-Jun-08	1:15	11.4	40.0	75.7	4.6	11	98.2	22.5
51	23-Jun-08	0:20	10.5	33.9	159.5	3.3	22	190.3	30.8
52	23-Jun-08	20:50	11.5	40.1	97.5	4.0	13	116.6	19.1
53	24-Jun-08	1:05	11.7	41.7	93.6	4.5	13	115.8	22.2
54	24-Jun-08	21:40	8.5	19.4	82.5	1.0	11	90.7	8.2
55	25-Jun-08	0:10	8.9	22.7	71.5	1.8	10	81.3	9.8
56	27-Jun-08	20:25	8.6	20.3	66.2	1.3	9	75.2	9.1
57	28-Jun-08	0:40	9.4	26.4	96.2	2.0	13	111.2	15.0
58	28-Jun-08	21:05	10.6	34.5	64.4	3.5	9	79.8	15.5
59	29-Jun-08	1:20	9.4	26.0	62.0	2.5	9	72.0	10.0
60	30-Jun-08	0:25	9.0	23.4	100.5	1.9	14	115.2	14.6
61	30-Jun-08	20:55	10.3	32.3	76.8	3.3	11	95.9	19.2
62	1-Jul-08	1:10	9.7	27.9	62.8	2.7	9	77.6	14.8
63	2-Jul-08	20:45	8.6	20.2	61.0	1.8	9	71.6	10.5
64	3-Jul-08	0:55	11.5	40.1	59.4	4.9	9	81.3	21.9
65	3-Jul-08	21:25	8.2	16.7	34.5	1.3	5	39.4	4.9
66	4-Jul-08	1:40	8.1	16.3	14.6	0.8	1	16.0	1.5
67	4-Jul-08	20:30	9.3	25.0	91.2	1.7	12	102.8	11.6
68	5-Jul-08	0:45	11.5	40.0	74.6	4.7	11	101.5	26.9
69	5-Jul-08	21:15	11.5	40.4	105.8	4.0	14	125.4	19.6
70	6-Jul-08	1:30	9.5	27.1	43.8	2.2	6	53.0	9.2
71	6-Jul-08	20:20	8.8	21.6	85.1	1.1	11	92.9	7.8
72	7-Jul-08	0:35	10.1	31.0	68.0	2.6	9	81.8	13.8
73	7-Jul-08	21:00	10.9	36.6	107.5	3.3	14	128.4	20.8
74	8-Jul-08	1:15	10.0	30.5	51.4	2.7	7	64.7	13.4
75	8-Jul-08	21:45	8.7	20.9	89.3	0.6	11	93.6	4.3
76	9-Jul-08	0:20	10.0	30.1	47.0	2.1	6	55.4	8.3
77	9-Jul-08	20:50	11.1	37.5	113.4	3.5	15	136.0	22.6
78	10-Jul-08	1:05	12.0	43.5	58.0	4.7	8	77.0	19.0
79	10-Jul-08	21:30	9.0	23.0	103.3	1.6	14	117.6	14.3
80	11-Jul-08	20:35	11.0	36.8	88.4	3.6	12	110.9	22.4

Table S11.1. (*cont.*)

No.	Date	Time	$M_{\text{max-31}}$	$T_{\text{max}} (^{\circ}\text{C})$	$M_{\text{back-31}}$	$M_{\text{volc-MAX-31}}$	No. hot	ΣM_{31}	$\Sigma M_{\text{volc-31}}$
		(UT)					pixels		
81	12-Jul-08	0:55	14.2	56.8	67.9	6.7	9	89.8	22.0
82	13-Jul-08	1:35	9.4	25.8	14.6	2.1	2	18.2	3.7
83	13-Jul-08	21:05	10.7	34.9	86.9	2.8	11	102.7	15.8
84	14-Jul-08	0:40	11.2	38.5	81.4	3.8	11	106.1	24.7
85	15-Jul-08	1:20	10.2	31.8	46.1	2.5	6	52.4	6.3
86	16-Jul-08	0:25	10.4	32.8	34.6	3.4	5	42.5	7.9
87	16-Jul-08	20:55	11.4	39.7	88.3	4.0	12	106.3	18.0
88	17-Jul-08	1:10	11.3	38.8	66.6	3.9	9	80.9	14.3
89	17-Jul-08	21:40	8.3	17.8	95.9	0.9	13	105.0	9.1
90	18-Jul-08	0:15	9.5	26.6	39.0	1.7	5	42.9	4.0
91	18-Jul-08	20:45	9.3	25.0	57.3	2.1	8	66.8	9.5
92	19-Jul-08	0:55	11.8	42.1	67.1	4.3	9	81.8	14.7
93	19-Jul-08	21:25	9.4	25.7	58.1	2.1	8	66.7	8.7
94	20-Jul-08	1:40	7.9	14.6	14.8	0.5	2	15.7	0.9
95	20-Jul-08	20:30	9.2	24.6	118.4	1.8	16	136.1	17.7
96	21-Jul-08	0:45	11.3	39.3	81.0	4.0	11	100.3	19.4
97	21-Jul-08	21:15	9.8	28.8	78.5	1.9	10	91.0	12.5
98	22-Jul-08	20:20	8.5	19.6	68.2	0.9	9	72.7	4.5
99	23-Jul-08	0:35	10.4	32.7	27.1	3.6	4	36.0	8.9
100	23-Jul-08	21:00	10.5	33.6	66.0	3.9	10	82.9	16.9
101	24-Jul-08	1:15	10.0	30.6	40.7	3.3	6	48.5	7.8
102	25-Jul-08	0:20	8.7	20.7	29.5	1.3	4	32.7	3.2
103	25-Jul-08	20:50	10.3	32.1	102.2	3.0	14	122.3	20.1
104	26-Jul-08	1:05	12.6	47.0	59.4	5.1	8	75.1	15.8
105	26-Jul-08	21:30	8.9	22.5	59.2	1.5	8	65.7	6.5
106	27-Jul-08	0:10	8.5	19.6	15.2	0.9	2	17.0	1.8
107	27-Jul-08	20:35	9.7	27.9	96.2	2.3	13	109.2	13.0
108	28-Jul-08	0:50	10.9	36.3	67.6	4.1	10	89.8	22.2
109	28-Jul-08	21:20	9.5	26.8	22.4	2.1	3	27.0	4.7
110	29-Jul-08	20:25	8.7	20.9	21.8	1.4	3	25.0	3.2
111	30-Jul-08	21:05	10.0	30.3	43.9	2.7	6	53.5	9.6
112	31-Jul-08	1:20	9.0	23.3	20.2	2.3	3	25.0	4.8
113	1-Aug-08	0:25	8.6	20.2	36.0	1.4	5	41.9	5.9
114	1-Aug-08	20:55	10.2	31.5	53.9	2.5	7	62.0	8.1
115	2-Aug-08	1:10	9.7	28.2	54.0	2.0	7	60.9	6.9
116	3-Aug-08	0:15	8.3	17.9	22.7	0.8	3	24.2	1.5
117	3-Aug-08	20:45	9.6	27.6	31.0	1.9	4	35.3	4.3
118	4-Aug-08	1:00	9.9	29.5	63.2	2.0	8	71.4	8.2
119	4-Aug-08	21:25	8.5	19.6	29.4	1.2	4	32.9	3.6
120	5-Aug-08	20:30	9.2	24.3	46.4	1.4	6	52.0	5.6
121	6-Aug-08	0:45	10.6	34.6	61.4	2.9	8	74.2	12.8

Table S11.1. (*cont.*)

No.	Date	Time	$M_{\text{max-31}}$	$T_{\text{max}} (^{\circ}\text{C})$	$M_{\text{back-31}}$	$M_{\text{vole-MAX-31}}$	No. hot	ΣM_{31}	$\Sigma M_{\text{vole-31}}$
		(UT)					pixels		
122	6-Aug-08	21:15	9.5	27.1	37.4	2.1	5	44.9	7.5
123	7-Aug-08	1:30	8.6	20.4	21.8	1.4	3	24.9	3.1
124	8-Aug-08	0:35	10.0	30.6	48.1	2.0	6	53.4	5.3
125	8-Aug-08	21:00	11.1	37.9	65.2	3.0	8	73.6	8.4
126	9-Aug-08	1:15	9.9	29.3	33.8	1.4	4	36.6	2.8
127	10-Aug-08	0:20	8.5	19.0	21.8	1.2	3	24.8	2.9
128	10-Aug-08	20:50	9.4	26.3	37.0	2.0	5	43.1	6.1
129	11-Aug-08	1:05	10.2	31.5	36.8	2.8	5	44.6	7.8
130	12-Aug-08	20:35	9.0	23.2	30.0	1.5	4	34.1	4.1
131	13-Aug-08	0:50	9.8	29.1	50.5	2.6	7	61.3	10.8
132	13-Aug-08	21:21	10.1	31.0	39.0	2.3	5	43.9	5.0
133	14-Aug-08	1:35	8.6	20.4	15.1	1.1	2	17.3	2.2
134	14-Aug-08	20:25	9.2	24.3	31.3	1.3	4	35.0	3.7
135	15-Aug-08	0:40	10.6	34.1	38.6	2.8	5	47.1	8.5
136	15-Aug-08	21:05	9.9	29.4	62.3	2.1	8	72.5	10.2
137	16-Aug-08	1:20	9.0	22.9	37.1	1.6	5	42.6	5.5
138	17-Aug-08	0:24	8.2	17.2	28.7	1.1	4	32.3	3.6
139	17-Aug-08	20:55	11.2	38.2	36.8	3.8	5	44.9	8.2
140	18-Aug-08	1:10	10.8	35.5	39.0	3.0	5	43.4	4.4
141	19-Aug-08	20:45	10.6	34.3	58.3	3.3	8	68.4	10.1
142	20-Aug-08	1:00	10.3	32.2	60.1	3.6	9	76.9	16.8
143	20-Aug-08	21:25	9.1	23.5	28.7	1.9	4	33.5	4.8
144	21-Aug-08	20:30	8.4	18.9	36.4	1.2	5	41.4	5.0
145	22-Aug-08	0:45	10.6	34.2	43.4	3.8	6	53.0	9.6
146	22-Aug-08	21:15	10.4	33.2	21.0	3.4	3	28.3	7.3
147	23-Aug-08	1:20	8.4	18.8	15.4	0.7	2	16.7	1.3
148	24-Aug-08	0:35	9.7	28.4	38.5	2.6	5	44.7	6.2
149	25-Aug-08	1:15	8.4	18.6	27.5	1.5	4	33.3	5.8
150	26-Aug-08	0:20	8.2	17.4	14.0	1.2	2	15.9	1.9
151	26-Aug-08	20:50	9.6	27.7	21.0	2.6	3	25.5	4.5
152	27-Aug-08	0:10	10.7	35.0	33.4	4.0	5	42.4	9.0
153	28-Aug-08	0:50	9.1	23.7	27.0	2.3	4	32.8	5.8
154	28-Aug-08	21:20	8.2	17.4	12.5	2.0	2	15.7	3.3
155	29-Aug-08	1:35	7.5	11.5	13.4	0.8	2	14.7	1.3
156	29-Aug-08	20:25	7.9	15.0	13.3	1.3	2	15.6	2.3
157	30-Aug-08	0:40	8.2	16.8	27.1	1.4	4	32.1	5.0
158	30-Aug-08	21:05	8.9	22.6	28.4	1.8	4	33.6	5.2
159	1-Sep-08	1:20	8.2	17.0	19.7	1.6	3	23.6	3.9
160	4-Sep-08	0:45	9.7	27.9	36.4	2.4	5	42.1	5.8
161	5-Sep-08	1:00	10.5	33.6	38.1	2.9	5	44.2	6.1
162	5-Sep-08	20:30	8.4	18.3	29.2	1.1	4	32.8	3.6

Table S11.1. (*cont.*)

No.	Date	Time	$M_{\text{max-31}}$	$T_{\text{max}} (^{\circ}\text{C})$	$M_{\text{back-31}}$	$M_{\text{volc-MAX-31}}$	No. hot	ΣM_{31}	$\Sigma M_{\text{volc-31}}$
		(UT)					pixels		
163	6-Sep-08	21:15	10.1	31.1	28.3	3.0	4	36.0	7.7
164	7-Sep-08	0:45	9.4	25.8	36.3	2.1	5	43.6	7.3
165	9-Sep-08	0:35	9.7	28.4	42.8	2.6	6	51.8	9.0
166	9-Sep-08	21:00	11.4	39.8	38.8	4.9	6	56.9	18.1
167	10-Sep-08	1:15	10.5	33.6	15.7	2.6	2	19.5	3.8
168	11-Sep-08	0:20	9.4	26.1	22.4	2.0	3	27.1	4.7
169	11-Sep-08	20:50	11.1	37.9	35.4	4.0	5	49.5	14.1
170	12-Sep-08	1:05	12.6	47.3	36.8	5.3	5	46.5	9.7
171	14-Sep-08	21:20	8.3	17.8	6.8	1.5	1	8.3	1.5
172	16-Sep-08	0:40	8.6	19.9	32.8	2.0	5	39.5	6.7
173	16-Sep-08	21:05	8.5	19.5	18.8	2.3	3	23.6	4.8
174	17-Sep-08	1:25	7.5	11.7	12.4	1.3	2	14.5	2.1
175	18-Sep-08	20:55	9.0	23.2	20.4	2.2	3	24.9	4.5
176	19-Sep-08	1:10	8.0	15.6	25.8	1.6	4	30.4	4.6
177	20-Sep-08	20:45	7.0	6.9	12.1	0.9	2	13.8	1.7
178	21-Sep-08	1:00	8.7	21.1	22.3	3.2	4	30.9	8.5
179	30-Sep-08	0:50	8.7	21.0	26.2	2.0	4	31.0	4.8
180	2-Oct-08	21:05	8.3	17.7	19.9	1.7	3	22.6	2.7
181	3-Oct-08	1:25	7.0	7.1	12.1	0.9	2	13.9	1.8
182	5-Oct-08	1:10	7.4	11.0	18.2	1.4	3	20.7	2.5
183	6-Oct-08	20:45	8.6	19.9	31.6	2.2	5	36.8	5.2
184	7-Oct-08	1:00	8.7	20.7	29.8	2.7	5	38.0	8.2
185	7-Oct-08	21:25	7.5	11.5	26.0	1.0	4	28.7	2.7
186	9-Oct-08	0:45	7.4	11.0	11.6	1.6	2	13.9	2.3
187	9-Oct-08	21:15	8.5	19.1	24.1	2.4	4	29.8	5.7
188	10-Oct-08	1:30	7.0	7.3	18.0	1.0	3	20.4	2.4
189	11-Oct-08	0:35	7.8	14.1	30.6	1.7	5	35.6	5.0
190	11-Oct-08	21:00	8.2	17.4	24.1	2.2	4	30.1	6.0
191	12-Oct-08	1:15	8.1	16.4	42.5	2.8	7	50.6	8.0
192	13-Oct-08	0:20	7.6	12.5	31.6	1.3	5	35.8	4.2
193	13-Oct-08	20:50	8.3	17.8	39.5	1.7	6	46.6	7.1
194	14-Oct-08	1:05	9.4	26.2	32.1	3.0	5	38.8	6.7
195	14-Oct-08	21:30	7.2	8.6	19.2	0.8	3	21.3	2.2
196	15-Oct-08	20:35	7.6	12.4	32.5	1.1	5	35.9	3.5
197	16-Oct-08	0:50	8.2	17.0	39.0	1.7	6	46.3	7.3
198	16-Oct-08	21:20	7.7	13.5	32.1	1.3	5	36.1	4.0
199	18-Oct-08	0:40	7.1	8.3	12.8	0.7	2	14.2	1.4
200	20-Oct-08	20:55	8.6	19.9	36.5	2.5	6	46.0	9.5
201	21-Oct-08	1:10	8.9	11.6	30.0	1.8	5	35.0	5.0
202	23-Oct-08	1:00	8.7	20.8	38.8	1.9	6	44.3	5.5
203	27-Oct-08	0:35	7.5	11.1	31.9	1.1	5	35.5	3.6

Table S11.1. (*cont.*)

No.	Date	Time	$M_{\text{max-31}}$	$T_{\text{max}} (^{\circ}\text{C})$	$M_{\text{back-31}}$	$M_{\text{volc-MAX-31}}$	No. hot	ΣM_{31}	$\Sigma M_{\text{volc-31}}$
		(UT)					pixels		
204	27-Oct-08	21:00	8.5	19.4	26.2	2.0	4	30.4	4.2
205	28-Oct-08	1:15	7.5	11.7	19.5	1.0	3	22.0	2.5
206	30-Oct-08	1:05	8.1	16.5	13.2	1.5	2	15.8	2.6
207	1-Nov-08	0:55	8.2	17.4	25.6	1.5	4	30.9	5.2
208	2-Nov-08	20:25	8.0	15.6	14.0	1.0	2	15.9	2.0
209	3-Nov-08	0:40	8.9	22.4	26.9	2.2	4	32.6	5.8
210	8-Nov-08	1:00	7.0	7.2	23.5	1.1	4	27.1	3.6
211	10-Nov-08	21:15	6.8	5.4	11.7	0.9	2	13.4	1.6
212	12-Nov-08	0:35	7.1	8.4	17.2	1.4	3	20.0	2.8
213	12-Nov-08	21:00	8.3	17.9	23.9	2.3	4	28.5	4.7
214	17-Nov-08	21:20	6.6	4.3	22.1	1.1	4	25.5	3.4
215	19-Nov-08	0:40	7.0	7.0	21.5	1.6	4	25.9	4.4
216	19-Nov-08	21:05	7.9	14.8	22.8	2.2	4	27.2	4.4
217	20-Nov-08	1:25	6.6	4.2	22.1	1.1	4	25.3	3.2
218	21-Nov-08	0:30	6.8	5.9	5.7	1.2	1	6.8	1.2
219	21-Nov-08	20:55	8.1	15.9	23.4	2.2	4	28.0	4.6
220	23-Nov-08	20:45	7.0	7.7	16.5	1.6	3	19.0	2.5
221	26-Nov-08	0:45	7.2	8.9	23.5	1.3	4	26.8	3.3
222	26-Nov-08	21:15	6.6	4.1	11.3	1.0	2	13.2	1.9
223	28-Nov-08	21:00	7.4	11.0	22.9	1.7	4	26.9	4.0
224	30-Nov-08	20:50	6.9	6.4	16.9	1.3	3	20.6	3.7
225	1-Dec-08	1:05	7.3	10.0	11.4	1.6	2	14.1	2.8
226	4-Dec-08	20:25	6.2	0.4	15.5	1.0	3	18.2	2.6
227	5-Dec-08	0:40	7.4	10.9	15.9	2.1	3	19.8	3.8
228	5-Dec-08	21:05	6.6	3.7	15.3	1.5	3	19.3	4.0
229	7-Dec-08	20:55	7.8	13.6	20.5	2.6	4	26.1	5.6
230	8-Dec-08	1:10	7.2	9.4	10.3	2.1	2	13.6	3.3
231	9-Dec-08	0:15	6.1	-0.3	5.3	0.9	1	6.1	0.9
232	13-Dec-08	1:30	6.0	-1.4	4.7	1.3	1	6.0	1.3
233	16-Dec-08	20:50	7.1	8.2	11.2	1.5	2	14.0	2.8
234	17-Dec-08	1:05	7.6	12.1	11.5	1.8	2	13.7	2.2
235	19-Dec-08	0:55	6.8	6.0	21.4	1.5	4	24.9	3.5
236	21-Dec-08	0:40	6.8	5.4	9.7	1.7	2	12.0	2.4
237	22-Dec-08	1:25	6.1	-0.9	5.2	0.9	1	6.1	0.9
238	23-Dec-08	0:30	6.6	4.1	5.4	1.2	1	6.6	1.2
239	23-Dec-08	20:55	7.4	10.4	11.1	1.8	2	14.7	3.7
240	24-Dec-08	1:10	7.2	8.8	21.2	1.9	4	26.0	4.8
241	25-Dec-08	20:45	6.9	6.1	10.5	1.6	2	13.7	3.2
242	26-Dec-08	1:00	7.5	11.6	10.3	2.4	2	14.0	3.7
243	1-Jan-09	20:50	7.6	11.9	11.6	1.8	2	14.3	2.7
244	2-Jan-09	1:05	7.5	11.5	11.6	1.7	2	14.9	3.3

Table S11.1. (*cont.*)

No.	Date	Time	$M_{\text{max-31}}$	$T_{\text{max}} (^{\circ}\text{C})$	$M_{\text{back-31}}$	$M_{\text{volc-MAX-31}}$	No. hot	ΣM_{31}	$\Sigma M_{\text{volc-31}}$
		(UT)					pixels		
245	3-Jan-09	20:35	6.6	4.3	15.6	1.4	3	19.0	3.4
246	4-Jan-09	0:50	7.8	13.8	10.9	2.3	2	14.9	4.0
247	6-Jan-09	0:40	6.4	2.4	5.0	1.5	1	6.4	1.5
248	6-Jan-09	21:10	7.0	7.0	9.4	2.3	2	13.0	3.6
249	8-Jan-09	20:55	6.7	4.8	5.3	1.4	1	6.7	1.4
250	9-Jan-09	1:15	6.3	0.8	10.6	1.0	2	12.3	1.7
251	10-Jan-09	20:45	7.0	7.2	20.0	2.0	4	25.6	5.6
252	15-Jan-09	0:35	6.6	4.2	10.5	1.4	2	12.6	2.0
253	17-Jan-09	20:50	7.0	7.2	14.8	2.1	3	18.5	3.7
254	18-Jan-09	1:05	6.3	0.7	11.1	0.7	2	11.9	0.8
255	19-Jan-09	20:35	6.9	6.2	10.4	1.7	2	12.9	2.5
256	29-Jan-09	0:50	6.8	5.8	10.4	1.6	2	13.3	2.9
257	29-Jan-09	21:15	7.3	9.5	10.1	2.2	2	12.6	2.5
258	4-Feb-09	20:35	6.3	1.5	15.2	1.3	3	18.6	3.4
259	5-Feb-09	0:55	7.2	9.3	16.2	1.8	3	21.0	4.8
260	6-Feb-09	20:25	6.8	5.2	11.0	1.3	2	13.1	2.1
261	6-Feb-09	20:25	6.8	5.2	11.0	1.3	2	13.1	2.1
262	7-Feb-09	0:45	7.3	9.5	11.3	1.6	1	14.0	2.7
263	7-Feb-09	21:10	7.4	10.7	10.1	2.4	2	13.4	3.3
264	9-Feb-09	20:55	6.4	2.4	15.2	1.4	3	18.5	3.3
265	10-Feb-09	1:15	6.8	5.4	15.8	1.5	3	18.8	3.0
266	16-Feb-09	0:35	5.3	-8.5	8.9	0.8	2	10.6	1.6
267	18-Feb-09	0:25	5.7	-4.2	9.6	1.0	2	10.8	1.2
268	18-Feb-09	20:50	6.1	-0.6	14.4	1.3	3	17.8	3.4
269	19-Feb-09	1:05	7.1	8.5	9.7	2.3	2	12.8	3.1
270	20-Feb-09	20:35	6.4	2.1	13.5	1.9	3	17.4	3.9
271	21-Feb-09	0:55	7.1	8.2	14.0	2.5	3	18.1	4.1
272	26-Feb-09	1:15	6.4	1.7	9.3	1.7	2	12.0	2.7
273	27-Feb-09	20:45	6.5	3.1	15.6	1.3	3	18.9	3.3
274	28-Feb-09	1:00	8.3	18.0	15.5	3.1	3	20.2	4.7
275	2-Mar-09	21:15	6.8	5.9	11.0	1.3	2	13.4	2.4
276	7-Mar-09	1:10	6.9	6.7	4.9	2.1	1	6.9	2.1
277	8-Mar-09	20:35	6.4	2.4	10.5	1.2	2	12.5	2.0
278	9-Mar-09	0:55	6.7	4.3	20.6	1.5	4	25.7	5.1
279	9-Mar-09	21:20	6.8	5.2	9.9	1.8	2	12.4	2.5
280	10-Mar-09	20:25	6.8	5.4	10.3	1.6	2	13.3	3.0
281	11-Mar-09	0:45	7.2	8.7	19.8	2.2	4	25.0	5.2
282	11-Mar-09	21:10	7.8	13.6	10.2	2.7	2	13.8	3.6
283	12-Mar-09	1:25	6.5	2.7	14.8	1.5	3	18.5	3.7
284	13-Mar-09	0:30	5.2	-9.3	8.8	0.8	2	10.3	1.5
285	13-Mar-09	20:55	7.3	10.0	20.8	2.1	4	26.8	6.0

Table S11.1. (*cont.*)

No.	Date	Time	$M_{\text{max-31}}$	$T_{\text{max}} (^{\circ}\text{C})$	$M_{\text{back-31}}$	$M_{\text{vole-MAX-31}}$	No. hot	ΣM_{31}	$\Sigma M_{\text{vole-31}}$
		(UT)					pixels		
286	14-Mar-09	1:15	6.4	2.1	21.5	1.0	4	25.3	3.8
287	16-Mar-09	1:00	6.7	5.0	13.8	2.1	3	17.8	4.0
288	17-Mar-09	20:30	6.6	0.3	15.3	1.5	3	18.8	3.5
289	18-Mar-09	0:50	7.7	13.2	24.1	2.9	5	31.1	7.0
290	18-Mar-09	21:15	5.5	-6.3	4.1	1.4	1	5.5	1.4
291	20-Mar-09	21:00	6.7	5.1	13.6	2.2	3	17.1	3.5
292	24-Mar-09	20:35	7.1	7.9	11.0	1.6	2	13.6	2.6
293	25-Mar-09	21:20	6.8	5.2	9.9	1.8	2	12.1	2.2
294	26-Mar-09	20:25	6.1	-0.8	10.6	0.8	2	11.8	1.2
295	27-Mar-09	0:45	6.7	4.9	20.1	1.7	4	24.1	4.0
296	27-Mar-09	21:10	8.5	19.0	21.6	3.1	4	27.3	5.7
297	28-Mar-09	1:25	6.6	4.1	21.7	1.2	4	25.6	3.8
298	1-Apr-09	1:00	8.4	18.3	22.4	2.8	4	28.3	5.9
299	2-Apr-09	20:30	6.7	4.6	5.4	1.3	1	6.7	1.3
300	3-Apr-09	21:15	7.3	9.6	10.7	1.9	2	13.4	2.7
301	5-Apr-09	0:35	6.5	2.7	10.0	1.5	2	12.7	2.7
302	7-Apr-09	20:50	7.5	11.6	21.9	2.0	4	26.2	4.3
303	8-Apr-09	1:10	7.6	12.6	20.2	2.6	4	26.4	6.2
304	14-Apr-09	20:55	7.9	14.6	16.5	2.4	3	20.3	3.8
305	15-Apr-09	1:15	7.4	10.9	10.6	2.1	2	13.3	2.7
306	16-Apr-09	20:45	7.5	11.1	17.7	1.6	3	20.4	2.7
307	17-Apr-09	1:00	7.8	14.2	28.8	2.1	5	34.3	5.5
308	23-Apr-09	20:50	7.5	11.7	10.9	2.1	2	13.7	2.7
309	25-Apr-09	20:35	6.5	3.3	10.9	1.1	2	12.9	2.0
310	26-Apr-09	0:55	7.5	11.7	16.9	1.9	3	21.2	4.3
311	28-Apr-09	0:45	7.5	11.4	11.1	1.9	2	13.4	2.3
312	28-Apr-09	21:10	7.2	9.2	17.0	1.6	3	20.1	3.1
313	30-Apr-09	0:30	6.4	2.0	11.3	0.7	2	12.6	1.3
314	1-May-09	1:15	6.4	2.1	5.4	1.0	1	6.4	1.0
315	2-May-09	20:45	7.1	8.2	11.4	1.4	2	13.8	2.4
316	3-May-09	21:25	6.2	0.3	5.0	1.2	1	6.2	1.2
317	4-May-09	20:30	6.6	4.0	11.0	1.1	2	13.1	2.2
318	5-May-09	0:50	7.0	6.9	10.9	1.5	2	13.8	3.0
319	5-May-09	21:15	6.4	2.0	10.4	1.2	2	12.3	1.9
320	7-May-09	0:35	6.2	0.6	10.8	0.9	2	12.4	1.7
321	7-May-09	21:00	7.3	10.0	17.3	1.6	3	20.7	3.4
322	8-May-09	1:20	7.0	7.3	22.8	1.3	4	26.6	3.8
323	9-May-09	20:50	7.1	8.0	16.4	1.6	3	20.3	3.9
324	11-May-09	20:35	6.9	6.8	11.7	1.1	2	13.7	2.0
325	12-May-09	0:55	6.6	4.1	10.8	1.3	2	13.0	2.2
326	12-May-09	21:20	7.1	8.0	11.5	1.3	2	13.8	2.3

Table S11.1. (*cont.*)

No.	Date	Time	$M_{\max-31}$	$T_{\max}$ (°C)	$M_{\text{back-31}}$	$M_{\text{volc-MAX-31}}$	No. hot	ΣM_{31}	$\Sigma M_{\text{volc-31}}$
		(UT)					pixels		
327	13-May-09	1:40	6.5	3.0	11.4	0.8	2	13.0	1.6
328	14-May-09	0:45	7.1	8.0	11.6	1.3	2	14.1	2.5
329	16-May-09	20:55	6.9	6.2	5.7	1.2	1	6.9	1.2
330	17-May-09	1:15	7.0	6.9	11.9	1.0	2	13.9	2.0
331	19-May-09	1:00	8.2	17.1	12.2	2.1	2	14.8	2.6
332	21-May-09	0:50	7.1	8.1	17.6	1.2	3	21.0	3.5
333	21-May-09	21:15	7.8	13.8	13.1	1.2	2	15.1	2.0
334	22-May-09	1:30	7.1	8.4	11.9	1.2	2	14.1	2.2
335	23-May-09	0:35	7.5	11.5	25.0	1.3	4	29.5	4.5
336	23-May-09	21:00	8.7	20.6	19.1	2.3	3	24.1	4.9
337	24-May-09	1:20	7.8	13.5	25.6	1.4	4	30.5	4.9
338	25-May-09	20:50	7.8	13.6	19.5	1.3	3	22.4	2.9
339	26-May-09	1:05	7.9	14.5	24.6	1.7	4	28.3	3.7
340	27-May-09	20:35	7.2	9.2	12.5	1.0	2	14.2	1.7
341	28-May-09	0:55	7.2	8.9	11.9	1.3	2	13.5	1.7
342	30-May-09	0:45	7.1	8.3	11.8	1.2	2	13.2	1.4
343	1-Jun-09	20:55	7.7	13.0	12.4	1.5	2	14.7	2.3
344	2-Jun-09	1:15	7.2	9.3	24.2	1.2	4	27.9	3.7
345	3-Jun-09	20:45	7.3	9.5	11.9	1.3	2	13.9	2.0
346	4-Jun-09	1:00	7.0	7.7	11.7	1.2	2	14.1	2.4
347	4-Jun-09	21:25	6.9	6.0	12.2	0.8	2	13.6	1.4
348	5-Jun-09	20:30	7.5	11.2	6.5	0.9	1	7.5	0.9
349	6-Jun-09	0:50	7.6	12.2	24.2	1.5	4	27.8	3.6
350	8-Jun-09	1:30	7.7	13.1	12.8	1.3	2	14.6	1.8
351	8-Jun-09	21:00	7.9	14.5	25.7	1.5	4	30.0	4.3
352	9-Jun-09	1:20	7.7	13.4	13.5	1.0	2	15.4	1.9
353	9-Jun-09	20:50	7.8	14.3	21.0	0.8	3	23.4	2.4
354	10-Jun-09	1:05	8.2	16.8	13.5	1.4	2	16.0	2.6
355	11-Jun-09	20:35	7.8	13.9	13.9	0.9	2	15.3	1.4
356	12-Jun-09	21:20	7.5	11.6	19.0	1.2	3	22.3	3.2
357	14-Jun-09	0:40	7.5	11.2	12.8	1.1	2	14.8	2.0
358	14-Jun-09	21:05	7.9	14.6	19.6	1.4	3	23.6	4.0
359	16-Jun-09	0:30	7.5	11.2	13.2	0.9	2	14.7	1.6
360	16-Jun-09	20:55	8.1	15.9	13.1	1.5	2	15.9	2.8
361	17-Jun-09	1:15	6.9	6.7	6.1	0.8	1	6.9	0.8
362	19-Jun-09	1:00	7.5	11.1	12.4	1.3	2	14.4	2.0
363	21-Jun-09	21:15	6.7	4.8	11.5	0.9	2	13.3	1.8
364	23-Jun-09	0:35	6.3	1.3	5.7	0.6	1	6.3	0.6
365	23-Jun-09	21:00	6.7	4.9	11.8	0.8	2	13.2	1.4
366	24-Jun-09	1:20	6.2	0.4	11.6	0.4	2	12.4	0.8
367	27-Jun-09	20:35	6.9	6.6	12.3	0.8	2	13.7	1.4

Table S11.1. (*cont.*)

No.	Date	Time	$M_{\text{max-31}}$	$T_{\text{max}} (^{\circ}\text{C})$	$M_{\text{back-31}}$	$M_{\text{volc-MAX-31}}$	No. hot		
		(UT)					pixels	ΣM_{31}	$\Sigma M_{\text{volc-31}}$
368	1-Jul-09	0:40	6.9	6.2	12.3	0.7	2	13.6	1.3
369	1-Jul-09	21:05	7.1	8.4	13.1	0.6	2	14.2	1.2
370	2-Jul-09	1:25	6.9	6.3	12.5	0.6	2	13.7	1.1
371	3-Jul-09	20:55	7.4	10.6	6.4	1.0	1	7.4	1.0
372	4-Jul-09	1:15	7.3	9.9	12.7	0.9	2	14.3	1.6

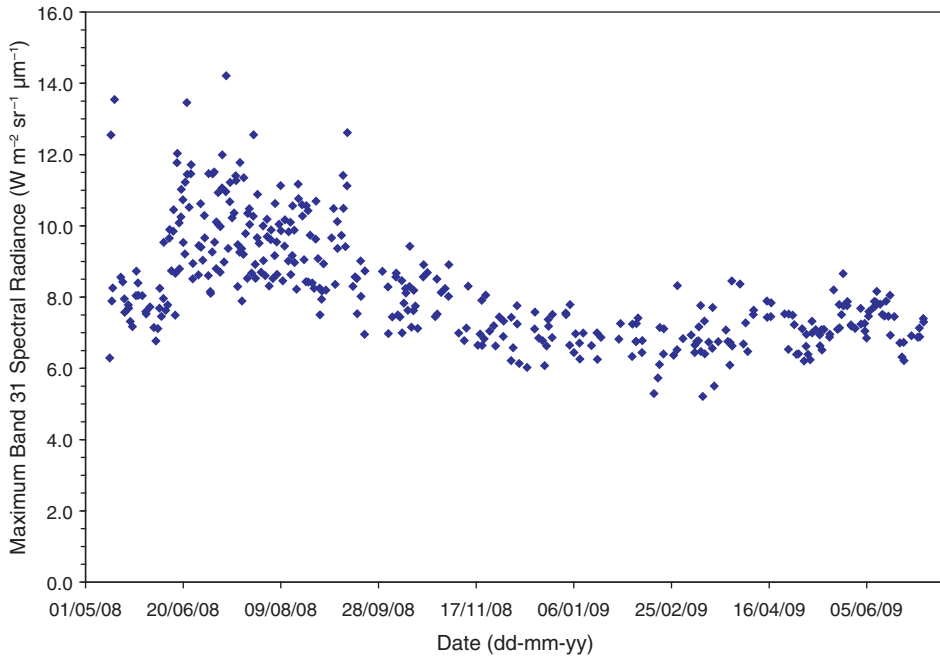


Figure S11.1 Maximum MODIS band 31 spectral radiances recorded from cloud-free images obtained during Etna's 2008–2009 eruption (database plotted here is given in Table S11.1).

The background radiance used is given in column 6 of Table S11.1; the resulting $M_{\text{int-max-31}}$ is given in column 7 and plotted in Figure S11.3.

Number of pixels

The number of anomalous pixels were counted. These results are entered in column 8 of Table S11.1 and plotted in Figure S11.4.

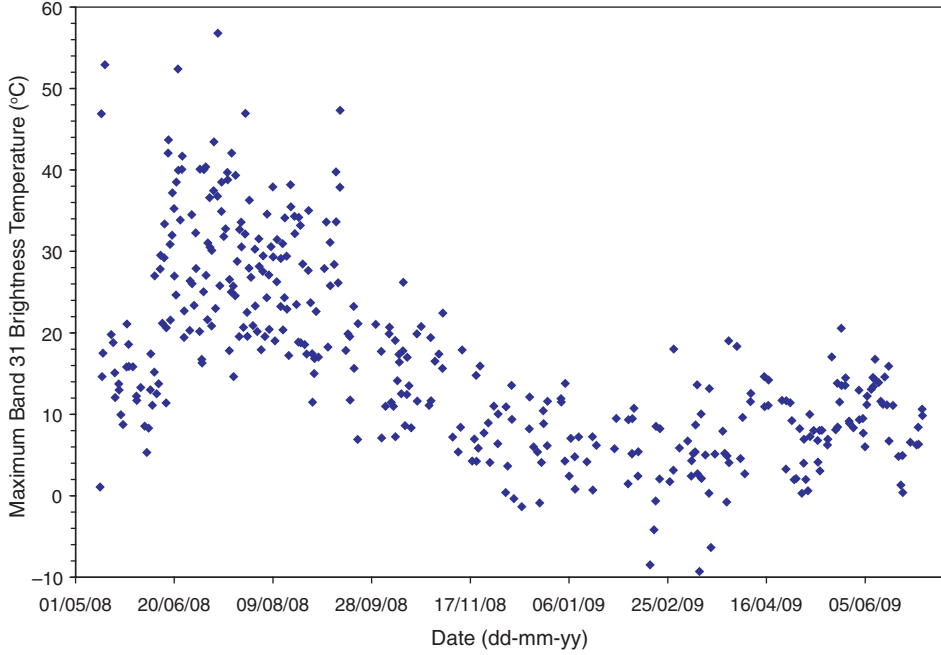


Figure S11.2 Maximum MODIS band 31 brightness temperatures obtained from hot spot pixels in cloud-free images of Etna's 2008–2009 eruption (database plotted here is given in Table S11.1). Note that, for a small hot spot (relative to the pixel size), and during cold conditions, the pixel-integrated temperature (even for the hot spot pixel) can be cold and negative. In this data base, coldest conditions were recorded on 13 March 2009 at 00:30Z when two hot spot pixels at integrated brightness temperatures of -9.3°C and -10.9°C were anomalous against a background at -18°C .

Summed spectral radiance

The band 31 radiance for all anomalous pixels was next summed, to yield $\sum M_{31}$. This is entered into column 9 of Table S11.1 and plotted in Figure S11.5.

Summed volcanic radiance

The background radiance ($M_{\text{back-31}}$) was subtracted from each anomalous band 31 radiance across the hot spot ($M_{\text{int-31}}$) to generate a volcanic radiance ($M_{\text{volc-31}}$) for each anomalous pixel, i.e.

$$M_{\text{int-31}} = M_{\text{int-31}} - M_{\text{back-31}}$$

These were then summed for all anomalous pixels in each image to yield a summed band 31 volcanic radiance ($\sum M_{\text{volc-31}}$). This is entered into column 10 of Table S11.1, and plotted in Figure S11.6.

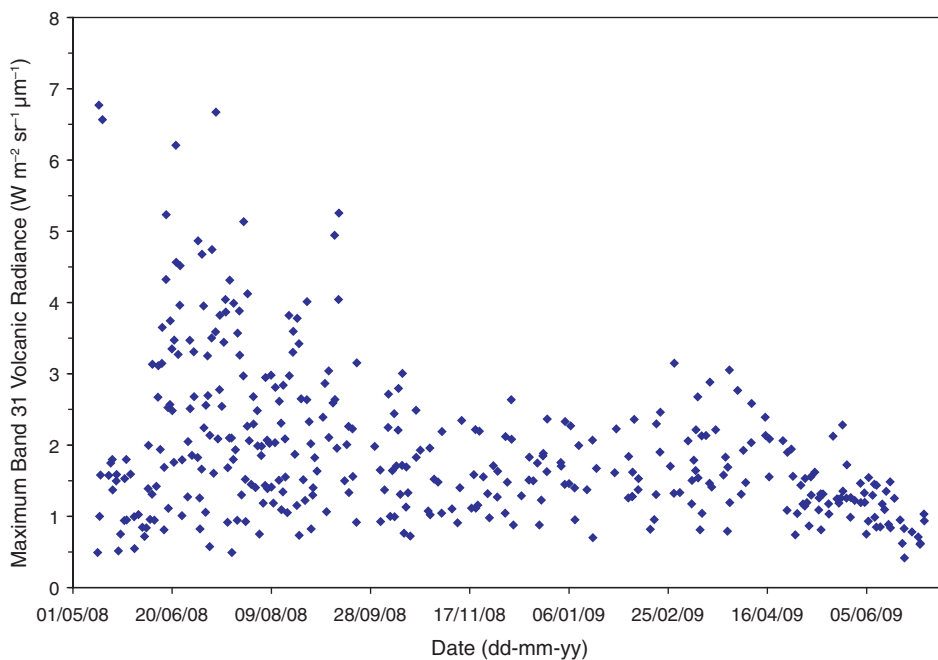


Figure S11.3 Maximum MODIS band 31 volcanic radiances recorded from cloud-free images obtained during Etna's 2008–2009 eruption (database plotted here is given in Table S11.1).

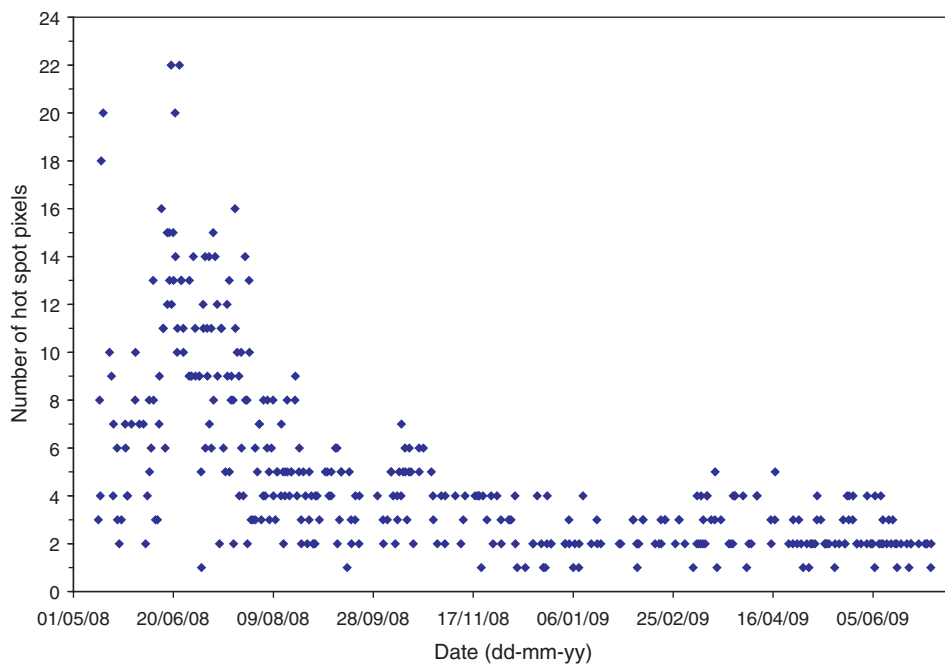


Figure S11.4 Number of MODIS band 31 hot spot pixels recorded in cloud-free images of Etna's 2008–2009 eruption (database plotted here is given in Table S11.1).

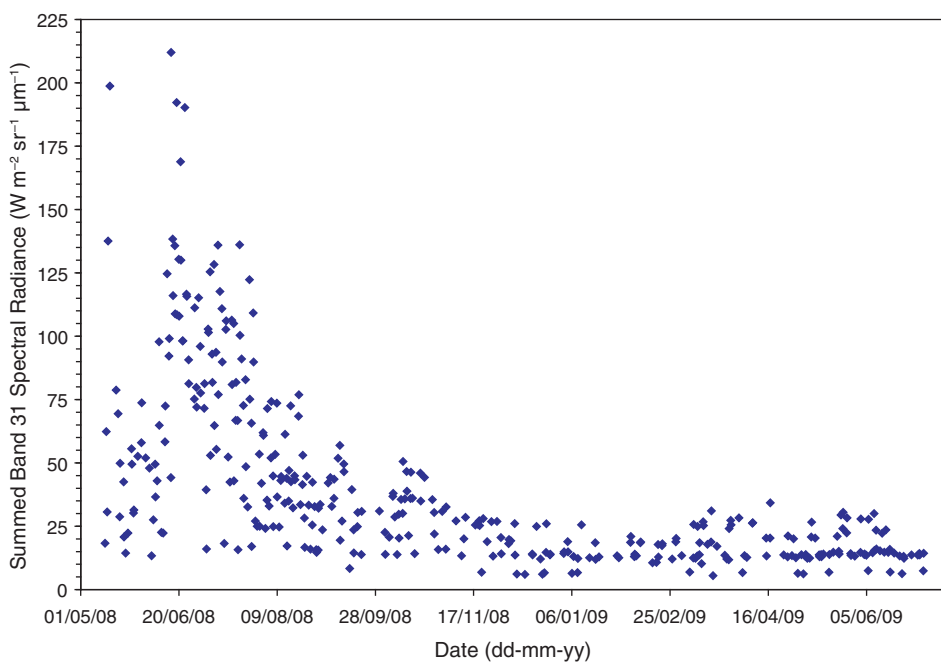


Figure S11.5 MODIS band 31 spectral radiance summed for all hot spot pixels recorded in each cloud-free image obtained for Etna's 2008–2009 eruption (database plotted here is given in Table S11.1).

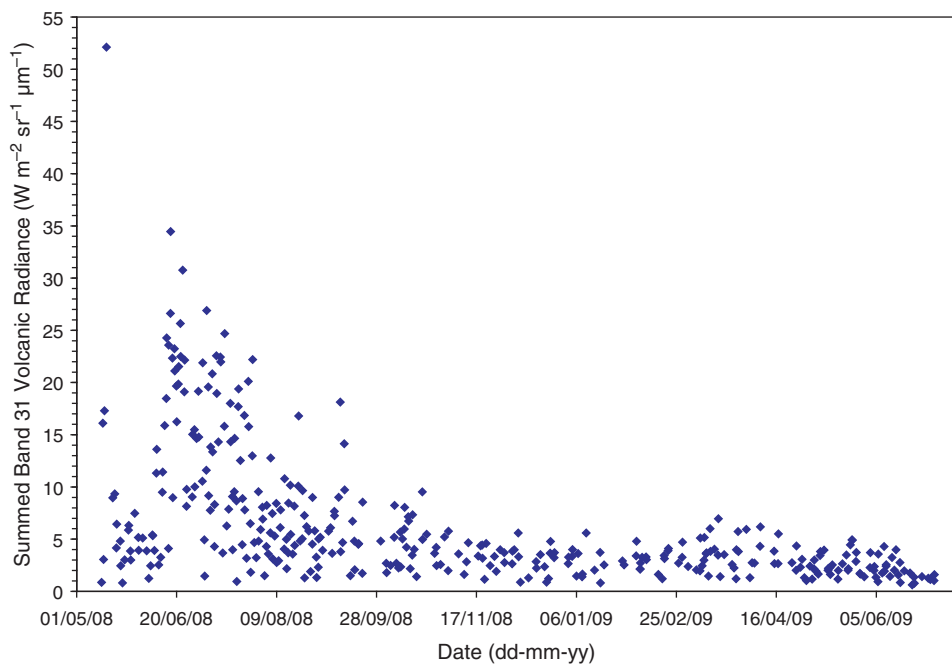


Figure S11.6 MODIS band 31 volcanic radiance summed for all hot spot pixels recorded in each cloud-free image obtained for Etna's 2008–2009 eruption (database plotted here is given in Table S11.1).

Extraction of first order parameters

The level zero parameters of Table S11.1 were converted to active lava areas and heat fluxes using the methodologies of Chapter 4 (Sections 2, 3 and 4). This involved first applying a pixel mixture model to obtain the pixel portion accounted for by hot active lava, and then multiplying by pixel area, to obtain lava area. This was then used to obtain the radiative and convective heat fluxes. This process is worked through in Electronic Supplement 7.

Area

To estimate hot spot area we applied the three component solution for a TIR pixel containing active lava (see Section 4.3.1.2 of Chapter 4). That is, we assumed that the high temperature component of the active lava body was of a sufficiently small area so as not to contribute to the integrated radiance in the thermal infrared. Now, radiance from the spatially dominant crusted component can be estimated using Equation (4.26c) of Chapter 4,

$$p_c = \frac{M(\lambda_{31}, T_{31}) - M(\lambda_{31}, T_a)}{M(\lambda_{31}, T_c) - M(\lambda_{31}, T_a)}$$

To solve this equation we first corrected the pixel-integrated temperature in band 31 (T_{31}) for atmospheric and emissivity effects (see Chapter 2 and Electronic Supplement 4), and then used the minimum temperature from lava-free pixels immediately surrounding the thermal anomaly to describe T_a . Finally, we assumed a range of T_c (between 100 °C and 600 °C). Pixel area was then estimated as a function of scan angle (see Chapter 3) and multiplied by p_c to yield active lava area. Results span a range between (i) a minimum bound, defined by the p_c obtained using the maximum (600 °C) lava temperature assumption (column 4 of Table S11.2), and (ii) a maximum bound, defined by the p_c obtained using the minimum (100 °C) lava temperature assumption (column 5 of Table S11.2). Results are plotted in Figure S11.7.

Total heat flux

Lava areas were next used to estimate the radiative and convective heat fluxes following the methodologies of Section 4 of Chapter 4. Radiative heat flux was obtained using Equation (4.37a) of Chapter 4,

$$\Phi_{\text{rad}} = A \sigma \varepsilon (T_s^4 - T_a^4)$$

and convective heat flux from Equation 4.39b of Chapter 4

$$\Phi_{\text{conv}} = A h_c (T_s - T_a)$$

A broadband emissivity for Etnean 'a'a of 0.97 was used (from Table 2.4 of Chapter 2), along a convective heat transfer coefficient of 7 W m⁻² K⁻¹ (for a surface at 100 °C) and

Table S11.2. Level one time series data extracted from cloud-free MODIS images acquired during Etna's 2008–2009 eruption. Areas are given in units of m^2 , and heat fluxes in Watts. The minimum and maximum bounds for each active lava flow area and Q_{tot} estimates are given, plus the mid-point value. This mid-point value is, for convenience and clarity of illustration, the value plotted in Figure 6.14.

No.	Date	Time (UT)	Area (min)	Area (max)	Q_{tot} (min)	Q_{tot} (max)	Area (mid)	Q_{tot} (mid)
1	13-May-08	9:50	5.14E+04	4.25E+03	7.50E+07	1.62E+08	2.78E+04	1.19E+08
2	14-May-08	1:10	9.50E+05	7.86E+04	1.38E+09	3.00E+09	5.14E+05	2.19E+09
3	14-May-08	10:35	1.93E+05	1.50E+04	2.81E+08	5.72E+08	1.04E+05	4.27E+08
4	14-May-08	21:40	1.08E+06	8.48E+04	1.57E+09	3.24E+09	5.81E+05	2.41E+09
5	15-May-08	20:45	3.31E+06	2.56E+05	4.55E+09	9.23E+09	1.78E+06	6.89E+09
6	19-May-08	1:25	5.69E+05	4.40E+04	8.30E+08	1.68E+09	3.07E+05	1.26E+09
7	20-May-08	0:30	5.82E+05	4.57E+04	8.48E+08	1.75E+09	3.14E+05	1.30E+09
8	20-May-08	21:00	2.51E+05	2.04E+04	3.66E+08	7.77E+08	1.36E+05	5.72E+08
9	21-May-08	1:15	3.90E+05	3.15E+04	5.68E+08	1.20E+09	2.11E+05	8.85E+08
10	22-May-08	20:50	2.92E+05	2.35E+04	4.26E+08	8.99E+08	1.58E+05	6.62E+08
11	23-May-08	1:05	1.47E+05	1.20E+04	2.14E+08	4.57E+08	7.95E+04	3.35E+08
12	23-May-08	21:30	5.08E+04	3.97E+03	7.41E+07	1.52E+08	2.74E+04	1.13E+08
13	25-May-08	0:50	1.10E+05	8.76E+03	1.60E+08	3.34E+08	5.92E+04	2.47E+08
14	26-May-08	20:25	3.76E+05	2.89E+04	5.48E+08	1.10E+09	2.02E+05	8.25E+08
15	27-May-08	0:40	4.07E+05	3.11E+04	5.94E+08	1.19E+09	2.19E+05	8.90E+08
16	27-May-08	21:05	2.39E+05	1.89E+04	3.49E+08	7.22E+08	1.29E+05	5.36E+08
17	28-May-08	1:20	1.92E+05	1.48E+04	2.80E+08	5.63E+08	1.03E+05	4.22E+08
18	30-May-08	1:10	4.59E+05	3.66E+04	6.69E+08	1.40E+09	2.48E+05	1.03E+09
19	31-May-08	20:45	3.20E+05	2.53E+04	4.67E+08	9.67E+08	1.73E+05	7.17E+08
20	1-Jun-08	0:55	2.50E+05	1.93E+04	3.64E+08	7.38E+08	1.35E+05	5.51E+08
21	3-Jun-08	0:45	3.19E+05	2.50E+04	4.64E+08	9.56E+08	1.72E+05	7.10E+08
22	5-Jun-08	0:30	2.36E+05	1.90E+04	3.44E+08	7.24E+08	1.27E+05	5.34E+08
23	6-Jun-08	1:15	7.42E+04	6.05E+03	1.08E+08	2.31E+08	4.01E+04	1.70E+08
24	7-Jun-08	0:20	1.49E+05	1.20E+04	2.17E+08	4.58E+08	8.05E+04	3.38E+08
25	7-Jun-08	20:50	3.29E+05	2.64E+04	4.79E+08	1.01E+09	1.78E+05	7.44E+08
26	8-Jun-08	1:05	3.24E+05	2.61E+04	4.72E+08	9.98E+08	1.75E+05	7.35E+08
27	8-Jun-08	21:30	2.42E+05	1.92E+04	3.52E+08	7.34E+08	1.31E+05	5.43E+08
28	9-Jun-08	20:35	7.04E+05	5.55E+04	1.03E+09	2.12E+09	3.80E+05	1.57E+09
29	10-Jun-08	0:50	8.33E+05	6.66E+04	1.21E+09	2.54E+09	4.50E+05	1.88E+09
30	11-Jun-08	1:35	1.58E+05	1.24E+04	2.30E+08	4.74E+08	8.51E+04	3.52E+08
31	12-Jun-08	0:40	1.99E+05	1.59E+04	2.90E+08	6.09E+08	1.07E+05	4.49E+08
32	12-Jun-08	21:05	6.03E+05	4.66E+04	8.78E+08	1.78E+09	3.25E+05	1.33E+09
33	13-Jun-08	1:20	7.17E+05	5.61E+04	1.04E+09	2.14E+09	3.86E+05	1.59E+09
34	14-Jun-08	0:25	9.97E+05	7.79E+04	1.45E+09	2.97E+09	5.37E+05	2.21E+09
35	14-Jun-08	20:55	1.15E+06	9.05E+04	1.68E+09	3.46E+09	6.21E+05	2.57E+09
36	15-Jun-08	1:10	1.52E+06	1.19E+05	2.22E+09	4.55E+09	8.21E+05	3.38E+09

Table S11.2. (*cont.*)

No.	Date	Time (UT)	Area (min)	Area (max)	Q _{tot} (min)	Q _{tot} (max)	Area (mid)	Q _{tot} (mid)
37	15-Jun-08	21:40	2.56E+05	2.02E+04	3.74E+08	7.70E+08	1.38E+05	5.72E+08
38	16-Jun-08	0:15	1.50E+06	1.16E+05	2.18E+09	4.42E+09	8.07E+05	3.30E+09
39	16-Jun-08	20:45	1.74E+06	1.31E+05	2.54E+09	5.00E+09	9.37E+05	3.77E+09
40	17-Jun-08	0:55	2.16E+06	1.69E+05	3.15E+09	6.45E+09	1.17E+06	4.80E+09
41	17-Jun-08	21:25	1.47E+06	1.10E+05	2.15E+09	4.20E+09	7.92E+05	3.17E+09
42	18-Jun-08	1:40	5.97E+05	4.43E+04	8.70E+08	1.69E+09	3.21E+05	1.28E+09
43	18-Jun-08	20:30	1.54E+06	1.14E+05	2.25E+09	4.37E+09	8.29E+05	3.31E+09
44	19-Jun-08	0:45	1.37E+06	1.04E+05	1.99E+09	3.96E+09	7.35E+05	2.98E+09
45	19-Jun-08	21:15	1.28E+06	9.67E+04	1.87E+09	3.69E+09	6.89E+05	2.78E+09
46	20-Jun-08	1:30	1.04E+06	7.98E+04	1.51E+09	3.05E+09	5.58E+05	2.28E+09
47	20-Jun-08	20:20	1.30E+06	9.77E+04	1.89E+09	3.73E+09	6.98E+05	2.81E+09
48	21-Jun-08	0:30	1.44E+06	1.06E+05	2.09E+09	4.05E+09	7.71E+05	3.07E+09
49	21-Jun-08	21:00	1.66E+06	1.26E+05	2.42E+09	4.82E+09	8.92E+05	3.62E+09
50	22-Jun-08	1:15	1.42E+06	1.10E+05	2.07E+09	4.21E+09	7.65E+05	3.14E+09
51	23-Jun-08	0:20	1.99E+06	1.51E+05	2.90E+09	5.77E+09	1.07E+06	4.34E+09
52	23-Jun-08	20:50	1.26E+06	9.41E+04	1.83E+09	3.59E+09	6.75E+05	2.71E+09
53	24-Jun-08	1:05	1.43E+06	1.09E+05	2.08E+09	4.16E+09	7.68E+05	3.12E+09
54	24-Jun-08	21:40	5.35E+05	4.01E+04	7.80E+08	1.53E+09	2.88E+05	1.16E+09
55	25-Jun-08	0:10	6.27E+05	4.80E+04	9.14E+08	1.83E+09	3.38E+05	1.37E+09
56	27-Jun-08	20:25	5.89E+05	4.45E+04	8.58E+08	1.70E+09	3.17E+05	1.28E+09
57	28-Jun-08	0:40	9.81E+05	7.40E+04	1.43E+09	2.82E+09	5.27E+05	2.13E+09
58	28-Jun-08	21:05	9.94E+05	7.61E+04	1.45E+09	2.91E+09	5.35E+05	2.18E+09
59	29-Jun-08	1:20	6.32E+05	4.92E+04	9.22E+08	1.88E+09	3.41E+05	1.40E+09
60	30-Jun-08	0:25	9.41E+05	7.19E+04	1.37E+09	2.75E+09	5.07E+05	2.06E+09
61	30-Jun-08	20:55	1.22E+06	9.41E+04	1.77E+09	3.59E+09	6.55E+05	2.68E+09
62	1-Jul-08	1:10	9.38E+05	7.26E+04	1.37E+09	2.77E+09	5.05E+05	2.07E+09
63	2-Jul-08	20:45	6.61E+05	5.17E+04	9.64E+08	1.98E+09	3.57E+05	1.47E+09
64	3-Jul-08	0:55	1.36E+06	1.07E+05	1.98E+09	4.10E+09	7.33E+05	3.04E+09
65	3-Jul-08	21:25	3.12E+05	2.42E+04	4.54E+08	9.25E+08	1.68E+05	6.89E+08
66	4-Jul-08	1:40	5.33E+04	4.05E+03	7.77E+07	1.55E+08	2.87E+04	1.16E+08
67	4-Jul-08	20:30	7.67E+05	5.71E+04	1.12E+09	2.18E+09	4.12E+05	1.65E+09
68	5-Jul-08	0:45	1.69E+06	1.32E+05	2.46E+09	5.04E+09	9.09E+05	3.75E+09
69	5-Jul-08	21:15	1.29E+06	9.64E+04	1.88E+09	3.68E+09	6.94E+05	2.78E+09
70	6-Jul-08	1:30	5.94E+05	4.50E+04	8.65E+08	1.72E+09	3.19E+05	1.29E+09
71	6-Jul-08	20:20	5.18E+05	3.83E+04	7.55E+08	1.46E+09	2.78E+05	1.11E+09
72	7-Jul-08	0:35	9.11E+05	6.81E+04	1.33E+09	2.60E+09	4.90E+05	1.96E+09
73	7-Jul-08	21:00	1.38E+06	1.03E+05	2.02E+09	3.92E+09	7.44E+05	2.97E+09
74	8-Jul-08	1:15	8.68E+05	6.57E+04	1.26E+09	2.51E+09	4.67E+05	1.89E+09
75	8-Jul-08	21:45	2.94E+05	2.12E+04	4.28E+08	8.09E+08	1.58E+05	6.19E+08
76	9-Jul-08	0:20	5.59E+05	4.10E+04	8.15E+08	1.57E+09	3.00E+05	1.19E+09
77	9-Jul-08	20:50	1.49E+06	1.11E+05	2.17E+09	4.24E+09	8.00E+05	3.21E+09

Table S11.2. (*cont.*)

No.	Date	Time (UT)	Area (min)	Area (max)	Q _{tot} (min)	Q _{tot} (max)	Area (mid)	Q _{tot} (mid)
78	10-Jul-08	1:05	1.23E+06	9.32E+04	1.79E+09	3.56E+09	6.59E+05	2.67E+09
79	10-Jul-08	21:30	9.32E+05	7.04E+04	1.36E+09	2.69E+09	5.01E+05	2.02E+09
80	11-Jul-08	20:35	1.46E+06	1.10E+05	2.13E+09	4.22E+09	7.86E+05	3.17E+09
81	12-Jul-08	0:55	1.45E+06	1.08E+05	2.11E+09	4.13E+09	7.78E+05	3.12E+09
82	13-Jul-08	1:35	2.38E+05	1.81E+04	3.47E+08	6.90E+08	1.28E+05	5.18E+08
83	13-Jul-08	21:05	1.07E+06	7.80E+04	1.55E+09	2.98E+09	5.72E+05	2.27E+09
84	14-Jul-08	0:40	1.61E+06	1.21E+05	2.35E+09	4.64E+09	8.66E+05	3.49E+09
85	15-Jul-08	1:20	4.17E+05	3.09E+04	6.08E+08	1.18E+09	2.24E+05	8.94E+08
86	16-Jul-08	0:25	4.98E+05	3.86E+04	7.26E+08	1.48E+09	2.68E+05	1.10E+09
87	16-Jul-08	20:55	1.17E+06	8.86E+04	1.71E+09	3.38E+09	6.30E+05	2.55E+09
88	17-Jul-08	1:10	9.35E+05	7.05E+04	1.36E+09	2.69E+09	5.03E+05	2.03E+09
89	17-Jul-08	21:40	5.92E+05	4.47E+04	8.62E+08	1.71E+09	3.18E+05	1.28E+09
90	18-Jul-08	0:15	2.67E+05	1.97E+04	3.89E+08	7.51E+08	1.43E+05	5.70E+08
91	18-Jul-08	20:45	6.13E+05	4.69E+04	8.94E+08	1.79E+09	3.30E+05	1.34E+09
92	19-Jul-08	0:55	9.60E+05	7.21E+04	1.40E+09	2.75E+09	5.16E+05	2.08E+09
93	19-Jul-08	21:25	5.60E+05	4.26E+04	8.16E+08	1.63E+09	3.01E+05	1.22E+09
94	20-Jul-08	1:40	6.14E+04	4.63E+03	8.96E+07	1.77E+08	3.30E+04	1.33E+08
95	20-Jul-08	20:30	1.15E+06	8.71E+04	1.68E+09	3.32E+09	6.21E+05	2.50E+09
96	21-Jul-08	0:45	1.26E+06	9.54E+04	1.84E+09	3.64E+09	6.79E+05	2.74E+09
97	21-Jul-08	21:15	8.42E+05	6.18E+04	1.23E+09	2.36E+09	4.52E+05	1.79E+09
98	22-Jul-08	20:20	2.95E+05	2.20E+04	4.30E+08	8.41E+08	1.59E+05	6.36E+08
99	23-Jul-08	0:35	5.57E+05	4.36E+04	8.12E+08	1.66E+09	3.00E+05	1.24E+09
100	23-Jul-08	21:00	1.04E+06	8.26E+04	1.52E+09	3.15E+09	5.64E+05	2.34E+09
101	24-Jul-08	1:15	4.90E+05	3.83E+04	7.14E+08	1.46E+09	2.64E+05	1.09E+09
102	25-Jul-08	0:20	2.07E+05	1.56E+04	3.02E+08	5.97E+08	1.11E+05	4.49E+08
103	25-Jul-08	20:50	1.30E+06	9.89E+04	1.90E+09	3.78E+09	7.01E+05	2.84E+09
104	26-Jul-08	1:05	1.03E+06	7.77E+04	1.50E+09	2.97E+09	5.54E+05	2.23E+09
105	26-Jul-08	21:30	4.24E+05	3.20E+04	6.18E+08	1.22E+09	2.28E+05	9.19E+08
106	27-Jul-08	0:10	1.22E+05	9.05E+03	1.77E+08	3.46E+08	6.53E+04	2.61E+08
107	27-Jul-08	20:35	8.47E+05	6.39E+04	1.23E+09	2.44E+09	4.55E+05	1.84E+09
108	28-Jul-08	0:50	1.39E+06	1.09E+05	2.03E+09	4.16E+09	7.50E+05	3.09E+09
109	28-Jul-08	21:20	3.06E+05	2.30E+04	4.46E+08	8.78E+08	1.64E+05	6.62E+08
110	29-Jul-08	20:25	2.09E+05	1.59E+04	3.04E+08	6.07E+08	1.12E+05	4.56E+08
111	30-Jul-08	21:05	6.20E+05	4.70E+04	9.04E+08	1.79E+09	3.33E+05	1.35E+09
112	31-Jul-08	1:20	3.01E+05	2.36E+04	4.38E+08	9.00E+08	1.62E+05	6.69E+08
113	1-Aug-08	0:25	3.81E+05	2.91E+04	5.55E+08	1.11E+09	2.05E+05	8.33E+08
114	1-Aug-08	20:55	5.37E+05	3.97E+04	7.82E+08	1.52E+09	2.88E+05	1.15E+09
115	2-Aug-08	1:10	4.61E+05	3.41E+04	6.71E+08	1.30E+09	2.47E+05	9.86E+08
116	3-Aug-08	0:15	9.93E+04	7.41E+03	1.45E+08	2.83E+08	5.33E+04	2.14E+08
117	3-Aug-08	20:45	2.87E+05	2.11E+04	4.18E+08	8.08E+08	1.54E+05	6.13E+08
118	4-Aug-08	1:00	5.56E+05	4.07E+04	8.10E+08	1.55E+09	2.98E+05	1.18E+09

Table S11.2. (*cont.*)

No.	Date	Time (UT)	Area (min)	Area (max)	Q _{tot} (min)	Q _{tot} (max)	Area (mid)	Q _{tot} (mid)
119	4-Aug-08	21:25	2.33E+05	1.76E+04	3.40E+08	6.74E+08	1.25E+05	5.07E+08
120	5-Aug-08	20:30	3.74E+05	2.77E+04	5.45E+08	1.06E+09	2.01E+05	8.01E+08
121	6-Aug-08	0:45	8.49E+05	6.30E+04	1.24E+09	2.40E+09	4.56E+05	1.82E+09
122	6-Aug-08	21:15	4.89E+05	3.67E+04	7.13E+08	1.40E+09	2.63E+05	1.06E+09
123	7-Aug-08	1:30	2.02E+05	1.54E+04	2.94E+08	5.86E+08	1.09E+05	4.40E+08
124	8-Aug-08	0:35	3.60E+05	2.61E+04	5.24E+08	9.97E+08	1.93E+05	7.61E+08
125	8-Aug-08	21:00	5.78E+05	4.16E+04	8.42E+08	1.59E+09	3.10E+05	1.21E+09
126	9-Aug-08	1:15	1.93E+05	1.36E+04	2.81E+08	5.20E+08	1.03E+05	4.01E+08
127	10-Aug-08	0:20	1.90E+05	1.45E+04	2.77E+08	5.52E+08	1.02E+05	4.15E+08
128	10-Aug-08	20:50	3.99E+05	3.01E+04	5.81E+08	1.15E+09	2.14E+05	8.65E+08
129	11-Aug-08	1:05	5.08E+05	3.84E+04	7.40E+08	1.47E+09	2.73E+05	1.10E+09
130	12-Aug-08	20:35	2.67E+05	2.00E+04	3.89E+08	7.64E+08	1.44E+05	5.77E+08
131	13-Aug-08	0:50	6.95E+05	5.30E+04	1.01E+09	2.02E+09	3.74E+05	1.52E+09
132	13-Aug-08	21:21	3.34E+05	2.46E+04	4.86E+08	9.38E+08	1.79E+05	7.12E+08
133	14-Aug-08	1:35	1.44E+05	1.07E+04	2.09E+08	4.10E+08	7.71E+04	3.10E+08
134	14-Aug-08	20:25	2.48E+05	1.82E+04	3.61E+08	6.96E+08	1.33E+05	5.28E+08
135	15-Aug-08	0:40	5.64E+05	4.17E+04	8.22E+08	1.59E+09	3.03E+05	1.21E+09
136	15-Aug-08	21:05	6.81E+05	5.02E+04	9.93E+08	1.92E+09	3.66E+05	1.45E+09
137	16-Aug-08	1:20	3.56E+05	2.68E+04	5.19E+08	1.02E+09	1.92E+05	7.72E+08
138	17-Aug-08	0:24	2.30E+05	1.76E+04	3.35E+08	6.72E+08	1.24E+05	5.04E+08
139	17-Aug-08	20:55	5.30E+05	4.01E+04	7.73E+08	1.53E+09	2.85E+05	1.15E+09
140	18-Aug-08	1:10	2.95E+05	2.17E+04	4.29E+08	8.28E+08	1.58E+05	6.29E+08
141	19-Aug-08	20:45	6.53E+05	4.96E+04	9.52E+08	1.89E+09	3.51E+05	1.42E+09
142	20-Aug-08	1:00	1.05E+06	8.24E+04	1.53E+09	3.15E+09	5.65E+05	2.34E+09
143	20-Aug-08	21:25	3.10E+05	2.37E+04	4.52E+08	9.06E+08	1.67E+05	6.79E+08
144	21-Aug-08	20:30	3.26E+05	2.48E+04	4.75E+08	9.45E+08	1.75E+05	7.10E+08
145	22-Aug-08	0:45	6.13E+05	4.73E+04	8.93E+08	1.81E+09	3.30E+05	1.35E+09
146	22-Aug-08	21:15	4.62E+05	3.57E+04	6.73E+08	1.36E+09	2.49E+05	1.02E+09
147	23-Aug-08	1:20	8.66E+04	6.42E+03	1.26E+08	2.45E+08	4.65E+04	1.86E+08
148	24-Aug-08	0:35	4.04E+05	3.05E+04	5.89E+08	1.16E+09	2.17E+05	8.76E+08
149	25-Aug-08	1:15	3.65E+05	2.84E+04	5.32E+08	1.08E+09	1.97E+05	8.09E+08
150	26-Aug-08	0:20	1.21E+05	9.34E+03	1.76E+08	3.56E+08	6.52E+04	2.66E+08
151	26-Aug-08	20:50	2.88E+05	2.22E+04	4.19E+08	8.49E+08	1.55E+05	6.34E+08
152	27-Aug-08	0:10	5.61E+05	4.41E+04	8.17E+08	1.68E+09	3.02E+05	1.25E+09
153	28-Aug-08	0:50	3.63E+05	2.85E+04	5.29E+08	1.09E+09	1.96E+05	8.08E+08
154	28-Aug-08	21:20	1.99E+05	1.61E+04	2.90E+08	6.13E+08	1.08E+05	4.52E+08
155	29-Aug-08	1:35	8.28E+04	6.51E+03	1.21E+08	2.49E+08	4.46E+04	1.85E+08
156	29-Aug-08	20:25	1.44E+05	1.13E+04	2.09E+08	4.33E+08	7.75E+04	3.21E+08
157	30-Aug-08	0:40	3.15E+05	2.46E+04	4.59E+08	9.40E+08	1.70E+05	6.99E+08
158	30-Aug-08	21:05	3.32E+05	2.55E+04	4.84E+08	9.73E+08	1.79E+05	7.28E+08
159	1-Sep-08	1:20	2.44E+05	1.93E+04	3.55E+08	7.37E+08	1.32E+05	5.46E+08

Table S11.2. (*cont.*)

No.	Date	Time (UT)	Area (min)	Area (max)	Q _{tot} (min)	Q _{tot} (max)	Area (mid)	Q _{tot} (mid)
160	4-Sep-08	0:45	3.73E+05	2.84E+04	5.44E+08	1.08E+09	2.01E+05	8.14E+08
161	5-Sep-08	1:00	4.03E+05	3.00E+04	5.88E+08	1.15E+09	2.17E+05	8.67E+08
162	5-Sep-08	20:30	2.36E+05	1.79E+04	3.44E+08	6.84E+08	1.27E+05	5.14E+08
163	6-Sep-08	21:15	4.90E+05	3.77E+04	7.14E+08	1.44E+09	2.64E+05	1.08E+09
164	7-Sep-08	0:45	4.69E+05	3.57E+04	6.84E+08	1.36E+09	2.52E+05	1.02E+09
165	9-Sep-08	0:35	5.78E+05	4.42E+04	8.42E+08	1.69E+09	3.11E+05	1.27E+09
166	9-Sep-08	21:00	1.11E+06	8.87E+04	1.62E+09	3.39E+09	6.02E+05	2.51E+09
167	10-Sep-08	1:15	2.55E+05	1.87E+04	3.71E+08	7.14E+08	1.37E+05	5.42E+08
168	11-Sep-08	0:20	3.07E+05	2.31E+04	4.47E+08	8.80E+08	1.65E+05	6.64E+08
169	11-Sep-08	20:50	9.04E+05	6.95E+04	1.32E+09	2.65E+09	4.87E+05	1.99E+09
170	12-Sep-08	1:05	6.32E+05	4.78E+04	9.21E+08	1.82E+09	3.40E+05	1.37E+09
171	14-Sep-08	21:20	9.41E+04	7.35E+03	1.37E+08	2.81E+08	5.07E+04	2.09E+08
172	16-Sep-08	0:40	4.15E+05	3.29E+04	6.05E+08	1.26E+09	2.24E+05	9.30E+08
173	16-Sep-08	21:05	2.92E+05	2.35E+04	4.26E+08	8.99E+08	1.58E+05	6.62E+08
174	17-Sep-08	1:25	1.25E+05	1.01E+04	1.82E+08	3.86E+08	6.76E+04	2.84E+08
175	18-Sep-08	20:55	2.83E+05	2.21E+04	4.12E+08	8.44E+08	1.52E+05	6.28E+08
176	19-Sep-08	1:10	2.81E+05	2.24E+04	4.10E+08	8.56E+08	1.52E+05	6.33E+08
177	20-Sep-08	20:45	1.04E+05	8.48E+03	1.51E+08	3.24E+08	5.62E+04	2.38E+08
178	21-Sep-08	1:00	4.98E+05	4.17E+04	7.26E+08	1.59E+09	2.70E+05	1.16E+09
179	30-Sep-08	0:50	2.98E+05	2.36E+04	4.34E+08	9.00E+08	1.61E+05	6.67E+08
180	2-Oct-08	21:05	1.68E+05	1.32E+04	2.45E+08	5.06E+08	9.06E+04	3.75E+08
181	3-Oct-08	1:25	1.08E+05	8.78E+03	1.57E+08	3.35E+08	5.83E+04	2.46E+08
182	5-Oct-08	1:10	1.50E+05	1.22E+04	2.18E+08	4.65E+08	8.09E+04	3.42E+08
183	6-Oct-08	20:45	3.15E+05	2.53E+04	4.60E+08	9.67E+08	1.70E+05	7.13E+08
184	7-Oct-08	1:00	4.91E+05	4.02E+04	7.15E+08	1.53E+09	2.65E+05	1.12E+09
185	7-Oct-08	21:25	1.66E+05	1.32E+04	2.41E+08	5.03E+08	8.94E+04	3.72E+08
186	9-Oct-08	0:45	1.33E+05	1.10E+04	1.94E+08	4.20E+08	7.20E+04	3.07E+08
187	9-Oct-08	21:15	3.40E+05	2.78E+04	4.96E+08	1.06E+09	1.84E+05	7.78E+08
188	10-Oct-08	1:30	1.41E+05	1.15E+04	2.05E+08	4.39E+08	7.61E+04	3.22E+08
189	11-Oct-08	0:35	3.02E+05	2.45E+04	4.41E+08	9.37E+08	1.63E+05	6.89E+08
190	11-Oct-08	21:00	3.58E+05	2.92E+04	5.21E+08	1.11E+09	1.93E+05	8.18E+08
191	12-Oct-08	1:15	4.77E+05	3.93E+04	6.95E+08	1.50E+09	2.58E+05	1.10E+09
192	13-Oct-08	0:20	2.58E+05	2.07E+04	3.76E+08	7.91E+08	1.39E+05	5.84E+08
193	13-Oct-08	20:50	4.43E+05	3.50E+04	6.45E+08	1.34E+09	2.39E+05	9.92E+08
194	14-Oct-08	1:05	4.13E+05	3.30E+04	6.02E+08	1.26E+09	2.23E+05	9.31E+08
195	14-Oct-08	21:30	1.33E+05	1.06E+04	1.94E+08	4.06E+08	7.17E+04	3.00E+08
196	15-Oct-08	20:35	2.14E+05	1.70E+04	3.12E+08	6.50E+08	1.16E+05	4.81E+08
197	16-Oct-08	0:50	4.52E+05	3.59E+04	6.59E+08	1.37E+09	2.44E+05	1.02E+09
198	16-Oct-08	21:20	2.46E+05	1.97E+04	3.59E+08	7.51E+08	1.33E+05	5.55E+08
199	18-Oct-08	0:40	8.68E+04	6.94E+03	1.26E+08	2.65E+08	4.69E+04	1.96E+08
200	20-Oct-08	20:55	5.72E+05	4.66E+04	8.34E+08	1.78E+09	3.09E+05	1.31E+09

Table S11.2. (*cont.*)

No.	Date	Time (UT)	Area (min)	Area (max)	Q _{tot} (min)	Q _{tot} (max)	Area (mid)	Q _{tot} (mid)
201	21-Oct-08	1:10	2.95E+05	2.43E+04	4.30E+08	9.26E+08	1.60E+05	6.78E+08
202	23-Oct-08	1:00	3.38E+05	2.68E+04	4.93E+08	1.02E+09	1.82E+05	7.58E+08
203	27-Oct-08	0:35	2.23E+05	1.79E+04	3.25E+08	6.82E+08	1.20E+05	5.03E+08
204	27-Oct-08	21:00	2.60E+05	2.06E+04	3.79E+08	7.88E+08	1.40E+05	5.84E+08
205	28-Oct-08	1:15	1.52E+05	1.21E+04	2.21E+08	4.60E+08	8.18E+04	3.41E+08
206	30-Oct-08	1:05	1.60E+05	1.26E+04	2.33E+08	4.81E+08	8.61E+04	3.57E+08
207	1-Nov-08	0:55	3.21E+05	2.56E+04	4.67E+08	9.76E+08	1.73E+05	7.22E+08
208	2-Nov-08	20:25	1.26E+05	9.72E+03	1.83E+08	3.71E+08	6.77E+04	2.77E+08
209	3-Nov-08	0:40	3.60E+05	2.83E+04	5.25E+08	1.08E+09	1.94E+05	8.03E+08
210	8-Nov-08	1:00	2.13E+05	1.75E+04	3.10E+08	6.68E+08	1.15E+05	4.89E+08
211	10-Nov-08	21:15	9.67E+04	7.96E+03	1.41E+08	3.04E+08	5.23E+04	2.22E+08
212	12-Nov-08	0:35	1.67E+05	1.38E+04	2.43E+08	5.29E+08	9.04E+04	3.86E+08
213	12-Nov-08	21:00	2.78E+05	2.28E+04	4.06E+08	8.71E+08	1.51E+05	6.38E+08
214	17-Nov-08	21:20	1.97E+05	1.65E+04	2.87E+08	6.31E+08	1.07E+05	4.59E+08
215	19-Nov-08	0:40	2.52E+05	2.13E+04	3.67E+08	8.12E+08	1.36E+05	5.89E+08
216	19-Nov-08	21:05	2.60E+05	2.16E+04	3.79E+08	8.26E+08	1.41E+05	6.02E+08
217	20-Nov-08	1:25	1.84E+05	1.55E+04	2.69E+08	5.90E+08	9.99E+04	4.29E+08
218	21-Nov-08	0:30	6.78E+04	5.64E+03	9.88E+07	2.15E+08	3.67E+04	1.57E+08
219	21-Nov-08	20:55	2.73E+05	2.25E+04	3.97E+08	8.58E+08	1.48E+05	6.28E+08
220	23-Nov-08	20:45	1.44E+05	1.21E+04	2.09E+08	4.61E+08	7.78E+04	3.35E+08
221	26-Nov-08	0:45	1.98E+05	1.63E+04	2.89E+08	6.23E+08	1.07E+05	4.56E+08
222	26-Nov-08	21:15	1.12E+05	9.31E+03	1.63E+08	3.56E+08	6.05E+04	2.59E+08
223	28-Nov-08	21:00	2.35E+05	1.95E+04	3.43E+08	7.44E+08	1.27E+05	5.44E+08
224	30-Nov-08	20:50	2.17E+05	1.81E+04	3.16E+08	6.90E+08	1.17E+05	5.03E+08
225	1-Dec-08	1:05	1.62E+05	1.34E+04	2.36E+08	5.13E+08	8.76E+04	3.75E+08
226	4-Dec-08	20:25	1.50E+05	1.29E+04	2.19E+08	4.91E+08	8.17E+04	3.55E+08
227	5-Dec-08	0:40	2.21E+05	1.87E+04	3.22E+08	7.15E+08	1.20E+05	5.19E+08
228	5-Dec-08	21:05	2.26E+05	1.94E+04	3.29E+08	7.39E+08	1.23E+05	5.34E+08
229	7-Dec-08	20:55	3.17E+05	2.72E+04	4.63E+08	1.04E+09	1.72E+05	7.50E+08
230	8-Dec-08	1:10	1.89E+05	1.61E+04	2.75E+08	6.17E+08	1.03E+05	4.46E+08
231	9-Dec-08	0:15	5.04E+04	4.28E+03	7.34E+07	1.64E+08	2.73E+04	1.18E+08
232	13-Dec-08	1:30	7.16E+04	6.26E+03	1.04E+08	2.39E+08	3.89E+04	1.72E+08
233	16-Dec-08	20:50	1.66E+05	1.39E+04	2.42E+08	5.31E+08	9.01E+04	3.87E+08
234	17-Dec-08	1:05	1.32E+05	1.09E+04	1.92E+08	4.17E+08	7.13E+04	3.04E+08
235	19-Dec-08	0:55	2.03E+05	1.72E+04	2.96E+08	6.56E+08	1.10E+05	4.76E+08
236	21-Dec-08	0:40	1.33E+05	1.15E+04	1.94E+08	4.40E+08	7.23E+04	3.17E+08
237	22-Dec-08	1:25	5.01E+04	4.27E+03	7.30E+07	1.63E+08	2.72E+04	1.18E+08
238	23-Dec-08	0:30	7.09E+04	5.98E+03	1.03E+08	2.28E+08	3.84E+04	1.66E+08
239	23-Dec-08	20:55	2.13E+05	1.78E+04	3.10E+08	6.81E+08	1.15E+05	4.96E+08
240	24-Dec-08	1:10	2.74E+05	2.33E+04	4.00E+08	8.89E+08	1.49E+05	6.45E+08
241	25-Dec-08	20:45	1.85E+05	1.57E+04	2.69E+08	6.00E+08	1.00E+05	4.35E+08

Table S11.2. (cont.)

No.	Date	Time (UT)	Area (min)	Area (max)	Q _{tot} (min)	Q _{tot} (max)	Area (mid)	Q _{tot} (mid)
242	26-Dec-08	1:00	2.11E+05	1.81E+04	3.08E+08	6.91E+08	1.15E+05	4.99E+08
243	1-Jan-09	20:50	1.58E+05	1.30E+04	2.30E+08	4.97E+08	8.53E+04	3.63E+08
244	2-Jan-09	1:05	1.93E+05	1.60E+04	2.82E+08	6.10E+08	1.05E+05	4.46E+08
245	3-Jan-09	20:35	1.92E+05	1.63E+04	2.79E+08	6.24E+08	1.04E+05	4.52E+08
246	4-Jan-09	0:50	2.32E+05	1.95E+04	3.38E+08	7.46E+08	1.26E+05	5.42E+08
247	6-Jan-09	0:40	8.22E+04	7.10E+03	1.20E+08	2.71E+08	4.47E+04	1.95E+08
248	6-Jan-09	21:10	2.02E+05	1.76E+04	2.94E+08	6.74E+08	1.10E+05	4.84E+08
249	8-Jan-09	20:55	8.03E+04	6.81E+03	1.17E+08	2.60E+08	4.36E+04	1.89E+08
250	9-Jan-09	1:15	9.49E+04	8.05E+03	1.38E+08	3.07E+08	5.15E+04	2.23E+08
251	10-Jan-09	20:45	3.15E+05	2.72E+04	4.59E+08	1.04E+09	1.71E+05	7.48E+08
252	15-Jan-09	0:35	1.17E+05	9.94E+03	1.70E+08	3.80E+08	6.34E+04	2.75E+08
253	17-Jan-09	20:50	2.09E+05	1.81E+04	3.05E+08	6.91E+08	1.14E+05	4.98E+08
254	18-Jan-09	1:05	4.73E+04	3.96E+03	6.89E+07	1.51E+08	2.56E+04	1.10E+08
255	19-Jan-09	20:35	1.45E+05	1.23E+04	2.11E+08	4.71E+08	7.84E+04	3.41E+08
256	29-Jan-09	0:50	1.67E+05	1.42E+04	2.43E+08	5.43E+08	9.06E+04	3.93E+08
257	29-Jan-09	21:15	1.43E+05	1.23E+04	2.09E+08	4.71E+08	7.79E+04	3.40E+08
258	4-Feb-09	20:35	1.93E+05	1.66E+04	2.82E+08	6.33E+08	1.05E+05	4.57E+08
259	5-Feb-09	0:55	2.77E+05	2.33E+04	4.03E+08	8.92E+08	1.50E+05	6.47E+08
260	6-Feb-09	20:25	1.24E+05	1.05E+04	1.81E+08	3.99E+08	6.74E+04	2.90E+08
261	6-Feb-09	20:25	1.24E+05	1.05E+04	1.81E+08	3.99E+08	6.74E+04	2.90E+08
262	7-Feb-09	0:45	6.47E+04	5.40E+03	9.44E+07	2.06E+08	3.51E+04	1.50E+08
263	7-Feb-09	21:10	1.85E+05	1.59E+04	2.70E+08	6.07E+08	1.00E+05	4.38E+08
264	9-Feb-09	20:55	1.86E+05	1.60E+04	2.71E+08	6.11E+08	1.01E+05	4.41E+08
265	10-Feb-09	1:15	1.74E+05	1.48E+04	2.54E+08	5.66E+08	9.45E+04	4.10E+08
266	16-Feb-09	0:35	8.86E+04	7.84E+03	1.29E+08	2.99E+08	4.82E+04	2.14E+08
267	18-Feb-09	0:25	6.78E+04	5.91E+03	9.87E+07	2.26E+08	3.68E+04	1.62E+08
268	18-Feb-09	20:50	1.91E+05	1.67E+04	2.79E+08	6.36E+08	1.04E+05	4.58E+08
269	19-Feb-09	1:05	1.75E+05	1.52E+04	2.55E+08	5.81E+08	9.53E+04	4.18E+08
270	20-Feb-09	20:35	2.14E+05	1.89E+04	3.12E+08	7.23E+08	1.17E+05	5.17E+08
271	21-Feb-09	0:55	2.27E+05	1.99E+04	3.31E+08	7.60E+08	1.23E+05	5.45E+08
272	26-Feb-09	1:15	1.50E+05	1.32E+04	2.19E+08	5.03E+08	8.17E+04	3.61E+08
273	27-Feb-09	20:45	1.86E+05	1.59E+04	2.71E+08	6.07E+08	1.01E+05	4.39E+08
274	28-Feb-09	1:00	2.68E+05	2.29E+04	3.91E+08	8.74E+08	1.45E+05	6.33E+08
275	2-Mar-09	21:15	1.38E+05	1.16E+04	2.02E+08	4.44E+08	7.50E+04	3.23E+08
276	7-Mar-09	1:10	1.15E+05	1.00E+04	1.68E+08	3.82E+08	6.26E+04	2.75E+08
277	8-Mar-09	20:35	1.13E+05	9.59E+03	1.64E+08	3.66E+08	6.12E+04	2.65E+08
278	9-Mar-09	0:55	2.90E+05	2.48E+04	4.23E+08	9.49E+08	1.58E+05	6.86E+08
279	9-Mar-09	21:20	1.38E+05	1.19E+04	2.02E+08	4.56E+08	7.52E+04	3.29E+08
280	10-Mar-09	20:25	1.70E+05	1.45E+04	2.48E+08	5.55E+08	9.22E+04	4.01E+08
281	11-Mar-09	0:45	2.90E+05	2.51E+04	4.23E+08	9.58E+08	1.58E+05	6.91E+08
282	11-Mar-09	21:10	2.05E+05	1.76E+04	2.99E+08	6.71E+08	1.11E+05	4.85E+08

Table S11.2. (*cont.*)

No.	Date	Time (UT)	Area (min)	Area (max)	Q _{tot} (min)	Q _{tot} (max)	Area (mid)	Q _{tot} (mid)
283	12-Mar-09	1:25	2.08E+05	1.80E+04	3.02E+08	6.85E+08	1.13E+05	4.94E+08
284	13-Mar-09	0:30	8.02E+04	7.12E+03	1.17E+08	2.72E+08	4.36E+04	1.94E+08
285	13-Mar-09	20:55	3.43E+05	2.92E+04	4.99E+08	1.12E+09	1.86E+05	8.08E+08
286	14-Mar-09	1:15	2.20E+05	1.86E+04	3.21E+08	7.12E+08	1.20E+05	5.16E+08
287	16-Mar-09	1:00	2.23E+05	1.96E+04	3.25E+08	7.48E+08	1.21E+05	5.37E+08
288	17-Mar-09	20:30	1.97E+05	1.69E+04	2.87E+08	6.45E+08	1.07E+05	4.66E+08
289	18-Mar-09	0:50	3.88E+05	3.38E+04	5.66E+08	1.29E+09	2.11E+05	9.28E+08
290	18-Mar-09	21:15	7.57E+04	6.83E+03	1.10E+08	2.61E+08	4.13E+04	1.86E+08
291	20-Mar-09	21:00	1.93E+05	1.71E+04	2.82E+08	6.52E+08	1.05E+05	4.67E+08
292	24-Mar-09	20:35	1.49E+05	1.25E+04	2.17E+08	4.78E+08	8.08E+04	3.48E+08
293	25-Mar-09	21:20	1.26E+05	1.09E+04	1.84E+08	4.16E+08	6.84E+04	3.00E+08
294	26-Mar-09	20:25	6.97E+04	5.92E+03	1.02E+08	2.26E+08	3.78E+04	1.64E+08
295	27-Mar-09	0:45	2.25E+05	1.94E+04	3.28E+08	7.39E+08	1.22E+05	5.34E+08
296	27-Mar-09	21:10	3.31E+05	2.79E+04	4.83E+08	1.07E+09	1.80E+05	7.75E+08
297	28-Mar-09	1:25	2.21E+05	1.86E+04	3.22E+08	7.11E+08	1.20E+05	5.16E+08
298	1-Apr-09	1:00	3.47E+05	2.90E+04	5.06E+08	1.11E+09	1.88E+05	8.06E+08
299	2-Apr-09	20:30	7.55E+04	6.38E+03	1.10E+08	2.44E+08	4.09E+04	1.77E+08
300	3-Apr-09	21:15	1.58E+05	1.34E+04	2.30E+08	5.11E+08	8.57E+04	3.70E+08
301	5-Apr-09	0:35	1.53E+05	1.32E+04	2.23E+08	5.05E+08	8.33E+04	3.64E+08
302	7-Apr-09	20:50	2.50E+05	2.11E+04	3.65E+08	8.04E+08	1.36E+05	5.84E+08
303	8-Apr-09	1:10	3.50E+05	3.01E+04	5.10E+08	1.15E+09	1.90E+05	8.29E+08
304	14-Apr-09	20:55	2.23E+05	1.87E+04	3.25E+08	7.15E+08	1.21E+05	5.20E+08
305	15-Apr-09	1:15	1.52E+05	1.29E+04	2.22E+08	4.94E+08	8.27E+04	3.58E+08
306	16-Apr-09	20:45	1.58E+05	1.30E+04	2.30E+08	4.96E+08	8.56E+04	3.63E+08
307	17-Apr-09	1:00	3.24E+05	2.69E+04	4.73E+08	1.03E+09	1.76E+05	7.49E+08
308	23-Apr-09	20:50	1.59E+05	1.34E+04	2.32E+08	5.11E+08	8.63E+04	3.72E+08
309	25-Apr-09	20:35	1.17E+05	9.88E+03	1.71E+08	3.77E+08	6.36E+04	2.74E+08
310	26-Apr-09	0:55	2.54E+05	2.12E+04	3.70E+08	8.09E+08	1.38E+05	5.90E+08
311	28-Apr-09	0:45	1.35E+05	1.13E+04	1.96E+08	4.31E+08	7.30E+04	3.14E+08
312	28-Apr-09	21:10	1.80E+05	1.50E+04	2.63E+08	5.73E+08	9.77E+04	4.18E+08
313	30-Apr-09	0:30	7.65E+04	6.37E+03	1.11E+08	2.43E+08	4.14E+04	1.77E+08
314	1-May-09	1:15	5.99E+04	5.07E+03	8.74E+07	1.94E+08	3.25E+04	1.40E+08
315	2-May-09	20:45	1.42E+05	1.18E+04	2.06E+08	4.50E+08	7.66E+04	3.28E+08
316	3-May-09	21:25	6.63E+04	5.71E+03	9.66E+07	2.18E+08	3.60E+04	1.57E+08
317	4-May-09	20:30	1.25E+05	1.05E+04	1.82E+08	4.02E+08	6.78E+04	2.92E+08
318	5-May-09	0:50	1.73E+05	1.46E+04	2.52E+08	5.57E+08	9.39E+04	4.05E+08
319	5-May-09	21:15	1.10E+05	9.38E+03	1.60E+08	3.58E+08	5.97E+04	2.59E+08
320	7-May-09	0:35	9.54E+04	8.07E+03	1.39E+08	3.08E+08	5.17E+04	2.24E+08
321	7-May-09	21:00	2.03E+05	1.68E+04	2.95E+08	6.41E+08	1.10E+05	4.68E+08
322	8-May-09	1:20	2.24E+05	1.86E+04	3.27E+08	7.11E+08	1.21E+05	5.19E+08
323	9-May-09	20:50	2.29E+05	1.92E+04	3.33E+08	7.35E+08	1.24E+05	5.34E+08

Table S11.2. (cont.)

No.	Date	Time (UT)	Area (min)	Area (max)	Q _{tot} (min)	Q _{tot} (max)	Area (mid)	Q _{tot} (mid)
324	11-May-09	20:35	1.20E+05	9.88E+03	1.75E+08	3.77E+08	6.49E+04	2.76E+08
325	12-May-09	0:55	1.28E+05	1.08E+04	1.86E+08	4.12E+08	6.93E+04	2.99E+08
326	12-May-09	21:20	1.34E+05	1.11E+04	1.96E+08	4.24E+08	7.27E+04	3.10E+08
327	13-May-09	1:40	9.53E+04	7.91E+03	1.39E+08	3.02E+08	5.16E+04	2.21E+08
328	14-May-09	0:45	1.49E+05	1.24E+04	2.18E+08	4.72E+08	8.09E+04	3.45E+08
329	16-May-09	20:55	6.90E+04	5.73E+03	1.01E+08	2.19E+08	3.74E+04	1.60E+08
330	17-May-09	1:15	1.20E+05	9.81E+03	1.74E+08	3.75E+08	6.47E+04	2.74E+08
331	19-May-09	1:00	1.58E+05	1.29E+04	2.31E+08	4.92E+08	8.56E+04	3.61E+08
332	21-May-09	0:50	2.07E+05	1.70E+04	3.01E+08	6.51E+08	1.12E+05	4.76E+08
333	21-May-09	21:15	1.25E+05	9.94E+03	1.83E+08	3.79E+08	6.76E+04	2.81E+08
334	22-May-09	1:30	1.29E+05	1.06E+04	1.89E+08	4.05E+08	7.00E+04	2.97E+08
335	23-May-09	0:35	2.70E+05	2.18E+04	3.94E+08	8.32E+08	1.46E+05	6.13E+08
336	23-May-09	21:00	3.01E+05	2.41E+04	4.39E+08	9.22E+08	1.63E+05	6.80E+08
337	24-May-09	1:20	3.00E+05	2.40E+04	4.37E+08	9.16E+08	1.62E+05	6.76E+08
338	25-May-09	20:50	1.76E+05	1.40E+04	2.57E+08	5.36E+08	9.53E+04	3.96E+08
339	26-May-09	1:05	2.25E+05	1.82E+04	3.28E+08	6.97E+08	1.22E+05	5.12E+08
340	27-May-09	20:35	1.05E+05	8.44E+03	1.52E+08	3.22E+08	5.65E+04	2.37E+08
341	28-May-09	0:55	9.85E+04	8.09E+03	1.44E+08	3.09E+08	5.33E+04	2.26E+08
342	30-May-09	0:45	8.34E+04	6.85E+03	1.22E+08	2.62E+08	4.51E+04	1.92E+08
343	1-Jun-09	20:55	1.38E+05	1.12E+04	2.01E+08	4.26E+08	7.46E+04	3.14E+08
344	2-Jun-09	1:15	2.22E+05	1.81E+04	3.24E+08	6.92E+08	1.20E+05	5.08E+08
345	3-Jun-09	20:45	1.19E+05	9.77E+03	1.74E+08	3.73E+08	6.45E+04	2.73E+08
346	4-Jun-09	1:00	1.41E+05	1.16E+04	2.05E+08	4.44E+08	7.63E+04	3.25E+08
347	4-Jun-09	21:25	8.14E+04	6.62E+03	1.19E+08	2.53E+08	4.40E+04	1.86E+08
348	5-Jun-09	20:30	5.75E+04	4.56E+03	8.38E+07	1.74E+08	3.10E+04	1.29E+08
349	6-Jun-09	0:50	2.15E+05	1.75E+04	3.13E+08	6.68E+08	1.16E+05	4.90E+08
350	8-Jun-09	1:30	1.08E+05	8.65E+03	1.58E+08	3.30E+08	5.84E+04	2.44E+08
351	8-Jun-09	21:00	2.64E+05	2.11E+04	3.84E+08	8.04E+08	1.42E+05	5.94E+08
352	9-Jun-09	1:20	1.21E+05	9.49E+03	1.77E+08	3.62E+08	6.53E+04	2.69E+08
353	9-Jun-09	20:50	1.54E+05	1.19E+04	2.24E+08	4.54E+08	8.29E+04	3.39E+08
354	10-Jun-09	1:05	1.60E+05	1.25E+04	2.33E+08	4.78E+08	8.60E+04	3.55E+08
355	11-Jun-09	20:35	9.05E+04	7.01E+03	1.32E+08	2.68E+08	4.88E+04	2.00E+08
356	12-Jun-09	21:20	1.98E+05	1.59E+04	2.88E+08	6.06E+08	1.07E+05	4.47E+08
357	14-Jun-09	0:40	1.25E+05	1.00E+04	1.82E+08	3.82E+08	6.74E+04	2.82E+08
358	14-Jun-09	21:05	2.47E+05	1.96E+04	3.59E+08	7.47E+08	1.33E+05	5.53E+08
359	16-Jun-09	0:30	9.70E+04	7.68E+03	1.41E+08	2.93E+08	5.23E+04	2.17E+08
360	16-Jun-09	20:55	1.71E+05	1.35E+04	2.49E+08	5.16E+08	9.22E+04	3.83E+08
361	17-Jun-09	1:15	5.04E+04	4.10E+03	7.35E+07	1.57E+08	2.73E+04	1.15E+08
362	19-Jun-09	1:00	1.20E+05	9.66E+03	1.74E+08	3.69E+08	6.46E+04	2.72E+08
363	21-Jun-09	21:15	1.04E+05	8.62E+03	1.52E+08	3.29E+08	5.64E+04	2.41E+08
364	23-Jun-09	0:35	3.64E+04	3.03E+03	5.31E+07	1.16E+08	1.97E+04	8.43E+07
365	23-Jun-09	21:00	8.11E+04	6.67E+03	1.18E+08	2.55E+08	4.39E+04	1.86E+08

Table S11.2. (cont.)

No.	Date	Time	Area (min)	Area (max)	Q_{tot} (min)	Q_{tot} (max)	Area (mid)	Q_{tot} (mid)
		(UT)						
366	24-Jun-09	1:20	4.62E+04	3.82E+03	6.73E+07	1.46E+08	2.50E+04	1.07E+08
367	27-Jun-09	20:35	8.57E+04	6.96E+03	1.25E+08	2.66E+08	4.63E+04	1.95E+08
368	1-Jul-09	0:40	7.63E+04	6.18E+03	1.11E+08	2.36E+08	4.12E+04	1.73E+08
369	1-Jul-09	21:05	7.31E+04	5.80E+03	1.07E+08	2.22E+08	3.95E+04	1.64E+08
370	2-Jul-09	1:25	6.96E+04	5.61E+03	1.01E+08	2.14E+08	3.76E+04	1.58E+08
371	3-Jul-09	20:55	6.31E+04	5.05E+03	9.19E+07	1.93E+08	3.41E+04	1.42E+08
372	4-Jul-09	1:15	9.80E+04	7.85E+03	1.43E+08	3.00E+08	5.29E+04	2.21E+08

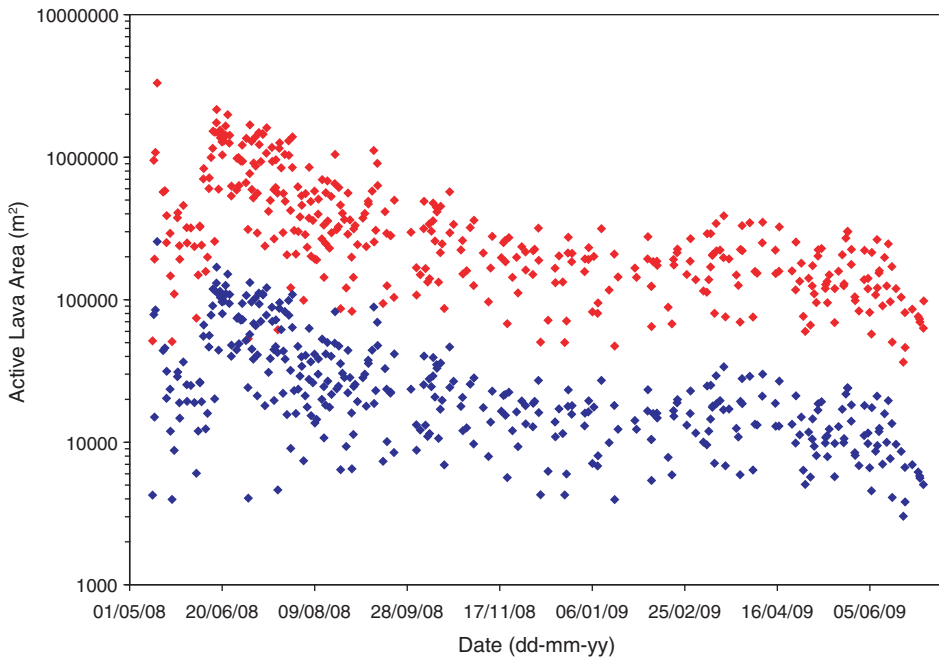


Figure S11.7 End-member solutions for lava area obtained by applying a two-component mixture model that assumes (for end member 1) that lava surface is at 100 °C (red diamonds) or (for end member 2) at 600 °C (blue diamonds) (database plotted here is given in Table S11.2).

$10 \text{ W m}^{-2} \text{ K}^{-1}$ (for a surface at 600 °C) (see Table 4.5 of Chapter 4). Now two end-member radiative and convective heat fluxes were obtained:

- one using the 100 °C assumption in the mixture model and the resulting area for A in the two heat flux equations;
- a second using the 600 °C assumption in the mixture model and its resulting area.

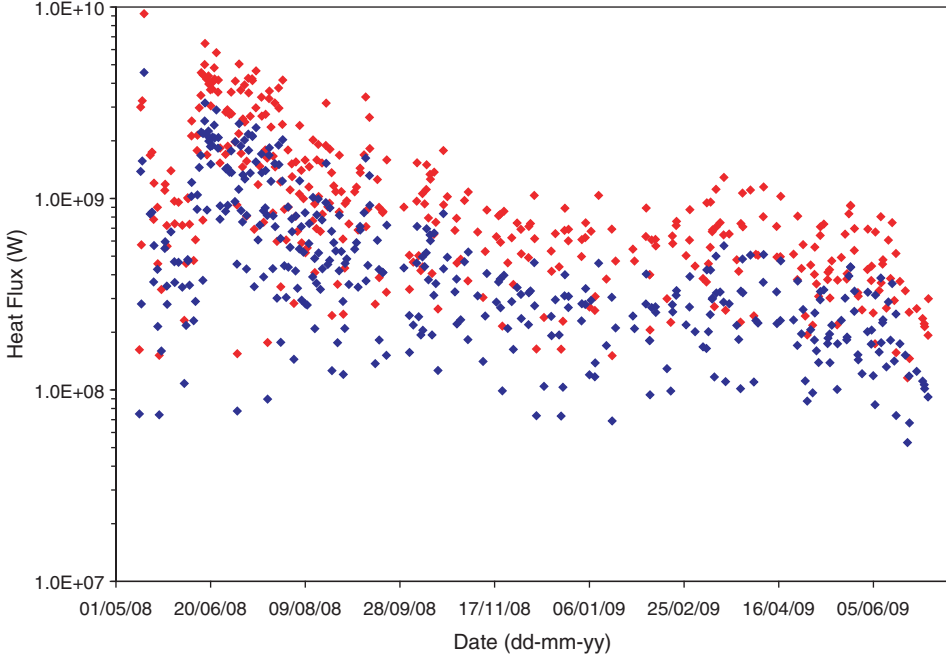


Figure S11.8 End-member heat flux solutions based on lava areas obtained from the two-component mixture model. End member 1 (red diamonds) is built on the 600 °C mixture model, and end member 2 (blue diamonds) is built on the 100 °C mixture model (database plotted here is given in Table S11.2).

Calculations were carried out on a pixel-by-pixel basis, and summed for all pixels to yield a total radiative or convective heat flux for each image. The two fluxes were then added together to give a total heat flux ($\Phi_{\text{rad}} + \Phi_{\text{conv}} = \Phi_{\text{tot}}$). These are entered into columns 6 and 7 of Table S11.2 and plotted in Figure S11.8.

Extraction of second order parameters

The first order parameters of Table S11.2 were next converted to lava volume and mass fluxes. This was achieved using the methodologies of Chapter 4 (Section 5), and the process is again worked through in Electronic Supplement 7.

Volume flux

To convert our total heat fluxes to volume fluxes we used the method of Section 4.5.1.4 of Chapter 4, and applied the following equation,

$$TADR = \frac{\Phi_{\text{tot}}}{\rho(c_p \Delta T + L \Delta \phi)}$$

For this Etnean case, a good fit with field data is found using $\rho = 2100 \text{ kg m}^{-3}$, $c_p = 880 \text{ J kg}^{-1} \text{ K}^{-1}$, $\Delta T = 100 \text{ K}$, $L = 3.5 \times 10^5 \text{ J kg}^{-1}$ and $\Delta\phi = 0.1$, so that we can simplify the conversion to:

$$TADR = \frac{\Phi_{tot}}{2.583 \times 10^8 \text{ Jm}^3}$$

Use of the end member Φ_{tot} values gave two end-member TADR values,

- one using the 100 °C mixture model, area and heat flux;
- a second using the 600 °C mixture model, area and heat flux.

Because we use two fixed values for the lava surface temperature, and ambient temperatures of between 0 °C and 25 °C, the conversion can be reduced further to the following two relations:

- (1) The conversion for the 100 °C mixture model is approximated by

$$\begin{aligned} TADR &= \frac{A[\varepsilon\sigma(T_s^4 - T_a^4) + h_c(T_s - T_a)]}{2.583 \times 10^8 \text{ Jm}^3} = A \frac{1460 \text{ Wm}^{-2}}{2.583 \times 10^8 \text{ Jm}^3} \\ &= 5.649 \times 10^{-6} \text{ ms}^{-1} \cdot \text{A m}^2 \end{aligned}$$

- (2) The conversion for the 600 °C mixture model is approximated by

$$\begin{aligned} TADR &= \frac{A[\varepsilon\sigma(T_s^4 - T_a^4) + h_c(T_s - T_a)]}{2.583 \times 10^8 \text{ Jm}^3} = A \frac{37640 \text{ Wm}^{-2}}{2.583 \times 10^8 \text{ Jm}^3} \\ &= 1.457 \times 10^{-4} \text{ ms}^{-1} \cdot \text{A m}^2 \end{aligned}$$

These results are entered into columns 4 and 5 of Table S11.3, and plotted in Figure S11.9.

Mass flux

Mass flux can be estimated in the same way as TADR, but by dropping the density term from the conversion, i.e.,

$$m = \frac{\Phi_{tot}}{c_p \Delta T + L \Delta\phi}$$

or by multiplying the TADR results of Table S11.3 by ρ . These results are given in Figure S11.10.

Cumulative volume

Finally, trapezium rule was applied (see Equation 4.100 of Chapter 4) to obtain the volume erupted over each time period spanning each consecutive set of measurements. These values are entered into column 8 of Table S11.3. Summing these values down the table, as done in column 9 of Table S11.3, gives cumulative volume as plotted in Figure S11.11.

Table S11.3. *Level two time series data extracted from cloud-free MODIS images acquired during Etna's 2008–2009 eruption. TADRs are given in units of $\text{m}^3 \text{s}^{-1}$, mass fluxes in kg s^{-1} , and volumes in m^3 . The minimum and maximum bounds for each TADR estimate are given, plus the mid-point values for the calculated mass flux (M_R), partial volume and cumulative volume (as plotted in Figure 6.14).*

No.	Date	Time (UT)	TADR (min)	TADR (max)	TADR (mid)	M_R (mid)	Partial Volume (mid)	Cumulative Volume (mid)
1	13-May-08	9:50	0.3	0.6	0.5	1.24E+03	—	0.00E+00
2	14-May-08	1:10	5.3	11.6	8.5	2.28E+04	2.46E+05	2.46E+05
3	14-May-08	10:35	1.1	2.2	1.6	4.44E+03	1.71E+05	4.17E+05
4	14-May-08	21:40	6.1	12.5	9.3	2.50E+04	2.18E+05	6.35E+05
5	15-May-08	20:45	18.6	37.7	28.1	7.60E+04	1.55E+06	2.19E+06
6	19-May-08	1:25	3.2	6.5	4.8	1.31E+04	4.55E+06	6.74E+06
7	20-May-08	0:30	3.3	6.7	5.0	1.35E+04	4.09E+05	7.15E+06
8	20-May-08	21:00	1.4	3.0	2.2	5.95E+03	2.66E+05	7.42E+06
9	21-May-08	1:15	2.2	4.6	3.4	9.21E+03	4.30E+04	7.46E+06
10	22-May-08	20:50	1.6	3.5	2.6	6.90E+03	4.68E+05	7.93E+06
11	23-May-08	1:05	0.8	1.8	1.3	3.49E+03	2.94E+04	7.96E+06
12	23-May-08	21:30	0.6	1.3	1.0	2.67E+03	8.39E+04	8.04E+06
13	25-May-08	0:50	0.6	1.3	1.0	2.57E+03	9.55E+04	8.14E+06
14	26-May-08	20:25	2.1	4.2	3.2	8.59E+03	3.24E+05	8.46E+06
15	27-May-08	0:40	2.3	4.6	3.4	9.27E+03	5.06E+04	8.51E+06
16	27-May-08	21:05	1.3	2.8	2.1	5.58E+03	2.02E+05	8.71E+06
17	28-May-08	1:20	1.1	2.2	1.6	4.39E+03	2.82E+04	8.74E+06
18	30-May-08	1:10	2.6	5.4	4.0	1.08E+04	4.83E+05	9.22E+06
19	31-May-08	20:45	1.8	3.7	2.8	7.47E+03	5.30E+05	9.75E+06
20	1-Jun-08	0:55	1.4	2.8	2.1	5.74E+03	3.67E+04	9.79E+06
21	3-Jun-08	0:45	1.8	3.7	2.7	7.39E+03	4.19E+05	1.02E+07
22	5-Jun-08	0:30	1.3	2.8	2.1	5.56E+03	4.12E+05	1.06E+07
23	6-Jun-08	1:15	0.4	0.9	0.7	1.77E+03	1.21E+05	1.07E+07
24	7-Jun-08	0:20	0.8	1.8	1.3	3.51E+03	8.12E+04	1.08E+07
25	7-Jun-08	20:50	1.8	3.9	2.9	7.75E+03	1.54E+05	1.10E+07
26	8-Jun-08	1:05	1.8	3.8	2.8	7.65E+03	4.36E+04	1.10E+07
27	8-Jun-08	21:30	1.4	2.8	2.1	5.66E+03	1.81E+05	1.12E+07
28	9-Jun-08	20:35	4.0	8.2	6.1	1.64E+04	3.39E+05	1.15E+07
29	10-Jun-08	0:50	4.7	9.8	7.2	1.96E+04	1.02E+05	1.16E+07
30	11-Jun-08	1:35	0.9	1.8	1.4	3.66E+03	3.83E+05	1.20E+07
31	12-Jun-08	0:40	1.1	2.3	1.7	4.68E+03	1.28E+05	1.22E+07
32	12-Jun-08	21:05	3.4	6.9	5.1	1.38E+04	2.52E+05	1.24E+07
33	13-Jun-08	1:20	4.0	8.3	6.1	1.66E+04	8.62E+04	1.25E+07
34	14-Jun-08	0:25	5.6	11.5	8.5	2.31E+04	6.10E+05	1.31E+07
35	14-Jun-08	20:55	6.5	13.3	9.9	2.67E+04	6.80E+05	1.38E+07

Table S11.3. (*cont.*)

No.	Date	Time (UT)	TADR (min)	TADR (max)	TADR (mid)	M _R (mid)	Partial Volume (mid)	Cumulative Volume (mid)
36	15-Jun-08	1:10	8.6	17.5	13.0	3.52E+04	1.76E+05	1.40E+07
37	15-Jun-08	21:40	1.4	3.0	2.2	5.96E+03	5.63E+05	1.45E+07
38	16-Jun-08	0:15	8.4	17.0	12.7	3.44E+04	6.95E+04	1.46E+07
39	16-Jun-08	20:45	9.8	19.3	14.5	3.93E+04	1.01E+06	1.56E+07
40	17-Jun-08	0:55	12.2	24.9	18.5	5.00E+04	2.48E+05	1.58E+07
41	17-Jun-08	21:25	8.3	16.2	12.2	3.30E+04	1.14E+06	1.70E+07
42	18-Jun-08	1:40	3.4	6.5	4.9	1.33E+04	1.31E+05	1.71E+07
43	18-Jun-08	20:30	8.7	16.9	12.8	3.45E+04	6.00E+05	1.77E+07
44	19-Jun-08	0:45	7.7	15.3	11.5	3.10E+04	1.86E+05	1.79E+07
45	19-Jun-08	21:15	7.2	14.2	10.7	2.89E+04	8.19E+05	1.87E+07
46	20-Jun-08	1:30	5.8	11.7	8.8	2.37E+04	1.49E+05	1.89E+07
47	20-Jun-08	20:20	7.3	14.4	10.8	2.93E+04	6.65E+05	1.95E+07
48	21-Jun-08	0:30	8.1	15.6	11.8	3.20E+04	1.70E+05	1.97E+07
49	21-Jun-08	21:00	9.3	18.6	13.9	3.76E+04	9.52E+05	2.07E+07
50	22-Jun-08	1:15	8.0	16.3	12.1	3.27E+04	1.99E+05	2.09E+07
51	23-Jun-08	0:20	11.2	22.3	16.7	4.51E+04	1.20E+06	2.21E+07
52	23-Jun-08	20:50	7.1	13.9	10.5	2.82E+04	1.00E+06	2.31E+07
53	24-Jun-08	1:05	8.0	16.0	12.0	3.25E+04	1.72E+05	2.32E+07
54	24-Jun-08	21:40	3.0	5.9	4.5	1.20E+04	6.11E+05	2.38E+07
55	25-Jun-08	0:10	3.5	7.1	5.3	1.43E+04	4.39E+04	2.39E+07
56	27-Jun-08	20:25	3.3	6.6	4.9	1.33E+04	1.26E+06	2.51E+07
57	28-Jun-08	0:40	5.5	10.9	8.2	2.21E+04	1.00E+05	2.52E+07
58	28-Jun-08	21:05	5.6	11.2	8.4	2.27E+04	6.10E+05	2.58E+07
59	29-Jun-08	1:20	3.6	7.2	5.4	1.46E+04	1.05E+05	2.60E+07
60	30-Jun-08	0:25	5.3	10.6	7.9	2.14E+04	5.54E+05	2.65E+07
61	30-Jun-08	20:55	6.8	13.9	10.3	2.79E+04	6.75E+05	2.72E+07
62	1-Jul-08	1:10	5.3	10.7	8.0	2.15E+04	1.40E+05	2.73E+07
63	2-Jul-08	20:45	3.7	7.6	5.7	1.53E+04	1.07E+06	2.84E+07
64	3-Jul-08	0:55	7.6	15.8	11.7	3.16E+04	1.30E+05	2.85E+07
65	3-Jul-08	21:25	1.8	3.6	2.7	7.18E+03	5.30E+05	2.91E+07
66	4-Jul-08	1:40	0.5	1.1	0.8	2.16E+03	2.65E+04	2.91E+07
67	4-Jul-08	20:30	4.3	8.4	6.4	1.72E+04	2.43E+05	2.93E+07
68	5-Jul-08	0:45	9.5	19.4	14.4	3.90E+04	1.59E+05	2.95E+07
69	5-Jul-08	21:15	7.3	14.2	10.7	2.90E+04	9.29E+05	3.04E+07
70	6-Jul-08	1:30	3.3	6.6	5.0	1.35E+04	1.20E+05	3.05E+07
71	6-Jul-08	20:20	2.9	5.6	4.3	1.15E+04	3.14E+05	3.08E+07
72	7-Jul-08	0:35	5.1	10.0	7.6	2.04E+04	9.06E+04	3.09E+07
73	7-Jul-08	21:00	7.8	15.1	11.4	3.09E+04	6.99E+05	3.16E+07
74	8-Jul-08	1:15	4.9	9.7	7.3	1.96E+04	1.43E+05	3.18E+07
75	8-Jul-08	21:45	1.7	3.1	2.4	6.44E+03	3.56E+05	3.21E+07

Table S11.3. (cont.)

No.	Date	Time (UT)	TADR (min)	TADR (max)	TADR (mid)	M _R (mid)	Partial Volume (mid)	Cumulative Volume (mid)
76	9-Jul-08	0:20	3.1	6.0	4.6	1.24E+04	3.24E+04	3.22E+07
77	9-Jul-08	20:50	8.4	16.4	12.4	3.34E+04	6.26E+05	3.28E+07
78	10-Jul-08	1:05	6.9	13.7	10.3	2.78E+04	1.73E+05	3.30E+07
79	10-Jul-08	21:30	5.2	10.4	7.8	2.11E+04	6.65E+05	3.36E+07
80	11-Jul-08	20:35	8.2	16.3	12.2	3.30E+04	8.32E+05	3.45E+07
81	12-Jul-08	0:55	8.1	15.9	12.0	3.25E+04	1.89E+05	3.47E+07
82	13-Jul-08	1:35	1.3	2.7	2.0	5.40E+03	6.23E+05	3.53E+07
83	13-Jul-08	21:05	6.0	11.5	8.7	2.36E+04	3.77E+05	3.57E+07
84	14-Jul-08	0:40	9.1	17.9	13.5	3.64E+04	1.43E+05	3.58E+07
85	15-Jul-08	1:20	2.3	4.6	3.4	9.31E+03	7.51E+05	3.65E+07
86	16-Jul-08	0:25	2.8	5.7	4.2	1.15E+04	3.20E+05	3.69E+07
87	16-Jul-08	20:55	6.6	13.0	9.8	2.65E+04	5.19E+05	3.74E+07
88	17-Jul-08	1:10	5.3	10.4	7.8	2.11E+04	1.35E+05	3.75E+07
89	17-Jul-08	21:40	3.3	6.6	5.0	1.34E+04	4.71E+05	3.80E+07
90	18-Jul-08	0:15	1.5	2.9	2.2	5.93E+03	3.32E+04	3.80E+07
91	18-Jul-08	20:45	3.4	6.9	5.2	1.40E+04	2.72E+05	3.83E+07
92	19-Jul-08	0:55	5.4	10.6	8.0	2.16E+04	9.89E+04	3.84E+07
93	19-Jul-08	21:25	3.1	6.3	4.7	1.27E+04	4.69E+05	3.89E+07
94	20-Jul-08	1:40	0.3	0.7	0.5	1.39E+03	3.99E+04	3.89E+07
95	20-Jul-08	20:30	6.5	12.8	9.7	2.61E+04	3.45E+05	3.92E+07
96	21-Jul-08	0:45	7.1	14.0	10.6	2.85E+04	1.55E+05	3.94E+07
97	21-Jul-08	21:15	4.7	9.1	6.9	1.87E+04	6.45E+05	4.00E+07
98	22-Jul-08	20:20	1.7	3.2	2.5	6.62E+03	3.89E+05	4.04E+07
99	23-Jul-08	0:35	3.1	6.4	4.8	1.29E+04	5.53E+04	4.05E+07
100	23-Jul-08	21:00	5.9	12.2	9.0	2.43E+04	5.07E+05	4.10E+07
101	24-Jul-08	1:15	2.8	5.6	4.2	1.13E+04	1.01E+05	4.11E+07
102	25-Jul-08	0:20	1.2	2.3	1.7	4.68E+03	2.46E+05	4.13E+07
103	25-Jul-08	20:50	7.3	14.6	10.9	2.96E+04	4.68E+05	4.18E+07
104	26-Jul-08	1:05	5.8	11.4	8.6	2.33E+04	1.50E+05	4.20E+07
105	26-Jul-08	21:30	2.4	4.7	3.5	9.57E+03	4.47E+05	4.24E+07
106	27-Jul-08	0:10	0.7	1.3	1.0	2.72E+03	2.18E+04	4.24E+07
107	27-Jul-08	20:35	4.8	9.4	7.1	1.91E+04	2.97E+05	4.27E+07
108	28-Jul-08	0:50	7.8	16.0	11.9	3.22E+04	1.45E+05	4.29E+07
109	28-Jul-08	21:20	1.7	3.4	2.6	6.89E+03	5.34E+05	4.34E+07
110	29-Jul-08	20:25	1.2	2.3	1.8	4.74E+03	1.79E+05	4.36E+07
111	30-Jul-08	21:05	3.5	6.9	5.2	1.40E+04	3.09E+05	4.39E+07
112	31-Jul-08	1:20	1.7	3.5	2.6	6.97E+03	5.95E+04	4.40E+07
113	1-Aug-08	0:25	2.1	4.3	3.2	8.67E+03	2.41E+05	4.42E+07
114	1-Aug-08	20:55	3.0	5.9	4.4	1.20E+04	2.82E+05	4.45E+07
115	2-Aug-08	1:10	2.6	5.0	3.8	1.03E+04	6.30E+04	4.45E+07

Table S11.3. (*cont.*)

No.	Date	Time (UT)	TADR (min)	TADR (max)	TADR (mid)	M _R (mid)	Partial Volume (mid)	Cumulative Volume (mid)
116	3-Aug-08	0:15	0.6	1.1	0.8	2.23E+03	1.92E+05	4.47E+07
117	3-Aug-08	20:45	1.6	3.1	2.4	6.38E+03	1.18E+05	4.49E+07
118	4-Aug-08	1:00	3.1	6.0	4.6	1.23E+04	5.29E+04	4.49E+07
119	4-Aug-08	21:25	1.3	2.6	2.0	5.27E+03	2.39E+05	4.51E+07
120	5-Aug-08	20:30	2.1	4.1	3.1	8.34E+03	2.09E+05	4.54E+07
121	6-Aug-08	0:45	4.8	9.3	7.0	1.90E+04	7.73E+04	4.54E+07
122	6-Aug-08	21:15	2.7	5.4	4.1	1.10E+04	4.10E+05	4.58E+07
123	7-Aug-08	1:30	1.1	2.3	1.7	4.58E+03	4.42E+04	4.59E+07
124	8-Aug-08	0:35	2.0	3.8	2.9	7.92E+03	1.92E+05	4.61E+07
125	8-Aug-08	21:00	3.2	6.1	4.7	1.26E+04	2.80E+05	4.64E+07
126	9-Aug-08	1:15	1.1	2.0	1.5	4.17E+03	4.77E+04	4.64E+07
127	10-Aug-08	0:20	1.1	2.1	1.6	4.32E+03	1.31E+05	4.65E+07
128	10-Aug-08	20:50	2.2	4.4	3.3	9.00E+03	1.82E+05	4.67E+07
129	11-Aug-08	1:05	2.9	5.7	4.3	1.15E+04	5.80E+04	4.68E+07
130	12-Aug-08	20:35	1.5	2.9	2.2	6.01E+03	5.07E+05	4.73E+07
131	13-Aug-08	0:50	3.9	7.8	5.9	1.58E+04	6.18E+04	4.73E+07
132	13-Aug-08	21:21	1.9	3.6	2.7	7.41E+03	3.18E+05	4.77E+07
133	14-Aug-08	1:35	0.8	1.6	1.2	3.22E+03	3.00E+04	4.77E+07
134	14-Aug-08	20:25	1.4	2.7	2.0	5.50E+03	1.10E+05	4.78E+07
135	15-Aug-08	0:40	3.2	6.1	4.7	1.26E+04	5.12E+04	4.79E+07
136	15-Aug-08	21:05	3.8	7.4	5.6	1.51E+04	3.77E+05	4.82E+07
137	16-Aug-08	1:20	2.0	4.0	3.0	8.04E+03	6.57E+04	4.83E+07
138	17-Aug-08	0:24	1.3	2.6	1.9	5.25E+03	2.04E+05	4.85E+07
139	17-Aug-08	20:55	3.0	5.9	4.4	1.20E+04	2.36E+05	4.87E+07
140	18-Aug-08	1:10	1.7	3.2	2.4	6.55E+03	5.26E+04	4.88E+07
141	19-Aug-08	20:45	3.7	7.3	5.5	1.48E+04	6.21E+05	4.94E+07
142	20-Aug-08	1:00	5.9	12.1	9.0	2.43E+04	1.11E+05	4.95E+07
143	20-Aug-08	21:25	1.7	3.5	2.6	7.07E+03	4.27E+05	4.99E+07
144	21-Aug-08	20:30	1.8	3.6	2.7	7.39E+03	2.23E+05	5.02E+07
145	22-Aug-08	0:45	3.4	7.0	5.2	1.41E+04	6.08E+04	5.02E+07
146	22-Aug-08	21:15	2.6	5.3	3.9	1.06E+04	3.37E+05	5.06E+07
147	23-Aug-08	1:20	0.5	0.9	0.7	1.93E+03	3.41E+04	5.06E+07
148	24-Aug-08	0:35	2.3	4.5	3.4	9.12E+03	1.71E+05	5.08E+07
149	25-Aug-08	1:15	2.1	4.2	3.1	8.42E+03	2.88E+05	5.11E+07
150	26-Aug-08	0:20	0.7	1.4	1.0	2.77E+03	1.72E+05	5.12E+07
151	26-Aug-08	20:50	1.6	3.3	2.4	6.60E+03	1.28E+05	5.14E+07
152	27-Aug-08	0:10	3.2	6.5	4.8	1.30E+04	4.36E+04	5.14E+07
153	28-Aug-08	0:50	2.0	4.2	3.1	8.41E+03	3.52E+05	5.18E+07
154	28-Aug-08	21:20	1.1	2.4	1.7	4.70E+03	1.79E+05	5.19E+07
155	29-Aug-08	1:35	0.5	1.0	0.7	1.92E+03	1.88E+04	5.20E+07

Table S11.3. (cont.)

No.	Date	Time (UT)	TADR (min)	TADR (max)	TADR (mid)	M _R (mid)	Partial Volume (mid)	Cumulative Volume (mid)
156	29-Aug-08	20:25	0.8	1.7	1.2	3.34E+03	6.61E+04	5.20E+07
157	30-Aug-08	0:40	1.8	3.6	2.7	7.28E+03	3.01E+04	5.21E+07
158	30-Aug-08	21:05	1.9	3.8	2.8	7.58E+03	2.02E+05	5.23E+07
159	1-Sep-08	1:20	1.4	2.8	2.1	5.69E+03	2.50E+05	5.25E+07
160	4-Sep-08	0:45	2.1	4.2	3.1	8.47E+03	6.74E+05	5.32E+07
161	5-Sep-08	1:00	2.3	4.4	3.3	9.02E+03	2.83E+05	5.35E+07
162	5-Sep-08	20:30	1.3	2.6	2.0	5.35E+03	1.87E+05	5.36E+07
163	6-Sep-08	21:15	2.8	5.5	4.2	1.12E+04	2.73E+05	5.39E+07
164	7-Sep-08	0:45	2.6	5.3	3.9	1.07E+04	5.10E+04	5.40E+07
165	9-Sep-08	0:35	3.2	6.5	4.9	1.32E+04	7.60E+05	5.47E+07
166	9-Sep-08	21:00	6.3	13.1	9.7	2.61E+04	5.35E+05	5.53E+07
167	10-Sep-08	1:15	1.4	2.8	2.1	5.65E+03	8.99E+04	5.54E+07
168	11-Sep-08	0:20	1.7	3.4	2.6	6.91E+03	1.93E+05	5.56E+07
169	11-Sep-08	20:50	5.1	10.2	7.7	2.07E+04	3.77E+05	5.59E+07
170	12-Sep-08	1:05	3.6	7.0	5.3	1.43E+04	9.91E+04	5.60E+07
171	14-Sep-08	21:20	0.5	1.1	0.8	2.18E+03	7.49E+05	5.68E+07
172	16-Sep-08	0:40	2.3	4.8	3.6	9.68E+03	2.16E+05	5.70E+07
173	16-Sep-08	21:05	1.6	3.5	2.6	6.89E+03	2.26E+05	5.72E+07
174	17-Sep-08	1:25	0.7	1.5	1.1	2.96E+03	2.85E+04	5.72E+07
175	18-Sep-08	20:55	1.6	3.3	2.4	6.54E+03	2.75E+05	5.75E+07
176	19-Sep-08	1:10	1.6	3.3	2.4	6.59E+03	3.72E+04	5.76E+07
177	20-Sep-08	20:45	0.6	1.2	0.9	2.47E+03	2.63E+05	5.78E+07
178	21-Sep-08	1:00	2.8	6.1	4.5	1.21E+04	4.12E+04	5.79E+07
179	30-Sep-08	0:50	1.7	3.5	2.6	6.95E+03	2.74E+06	6.06E+07
180	2-Oct-08	21:05	0.9	1.9	1.4	3.91E+03	4.94E+05	6.11E+07
181	3-Oct-08	1:25	0.6	1.3	0.9	2.56E+03	1.87E+04	6.11E+07
182	5-Oct-08	1:10	0.8	1.8	1.3	3.56E+03	1.95E+05	6.13E+07
183	6-Oct-08	20:45	1.8	3.7	2.8	7.43E+03	3.19E+05	6.16E+07
184	7-Oct-08	1:00	2.8	5.9	4.3	1.17E+04	5.42E+04	6.17E+07
185	7-Oct-08	21:25	0.9	1.9	1.4	3.87E+03	2.12E+05	6.19E+07
186	9-Oct-08	0:45	0.7	1.6	1.2	3.20E+03	1.29E+05	6.20E+07
187	9-Oct-08	21:15	1.9	4.1	3.0	8.10E+03	1.54E+05	6.22E+07
188	10-Oct-08	1:30	0.8	1.7	1.2	3.35E+03	3.25E+04	6.22E+07
189	11-Oct-08	0:35	1.7	3.6	2.7	7.17E+03	1.62E+05	6.24E+07
190	11-Oct-08	21:00	2.0	4.3	3.2	8.51E+03	2.13E+05	6.26E+07
191	12-Oct-08	1:15	2.7	5.8	4.2	1.14E+04	5.65E+04	6.26E+07
192	13-Oct-08	0:20	1.5	3.1	2.3	6.08E+03	2.69E+05	6.29E+07
193	13-Oct-08	20:50	2.5	5.2	3.8	1.03E+04	2.24E+05	6.31E+07
194	14-Oct-08	1:05	2.3	4.9	3.6	9.70E+03	5.67E+04	6.32E+07
195	14-Oct-08	21:30	0.7	1.6	1.2	3.12E+03	1.74E+05	6.34E+07

Table S11.3. (*cont.*)

No.	Date	Time (UT)	TADR (min)	TADR (max)	TADR (mid)	M _R (mid)	Partial Volume (mid)	Cumulative Volume (mid)
196	15-Oct-08	20:35	1.2	2.5	1.9	5.01E+03	1.25E+05	6.35E+07
197	16-Oct-08	0:50	2.5	5.3	3.9	1.06E+04	4.42E+04	6.35E+07
198	16-Oct-08	21:20	1.4	2.9	2.1	5.78E+03	2.24E+05	6.38E+07
199	18-Oct-08	0:40	0.5	1.0	0.8	2.04E+03	1.42E+05	6.39E+07
200	20-Oct-08	20:55	3.2	6.9	5.0	1.36E+04	7.11E+05	6.46E+07
201	21-Oct-08	1:10	1.7	3.6	2.6	7.06E+03	5.85E+04	6.47E+07
202	23-Oct-08	1:00	1.9	3.9	2.9	7.89E+03	4.77E+05	6.51E+07
203	27-Oct-08	0:35	1.3	2.6	1.9	5.24E+03	8.37E+05	6.60E+07
204	27-Oct-08	21:00	1.5	3.0	2.3	6.08E+03	1.54E+05	6.61E+07
205	28-Oct-08	1:15	0.9	1.8	1.3	3.55E+03	2.73E+04	6.62E+07
206	30-Oct-08	1:05	0.9	1.9	1.4	3.72E+03	2.32E+05	6.64E+07
207	1-Nov-08	0:55	1.8	3.8	2.8	7.52E+03	3.58E+05	6.68E+07
208	2-Nov-08	20:25	0.7	1.4	1.1	2.89E+03	3.02E+05	6.71E+07
209	3-Nov-08	0:40	2.0	4.2	3.1	8.36E+03	3.19E+04	6.71E+07
210	8-Nov-08	1:00	1.2	2.6	1.9	5.09E+03	1.08E+06	6.82E+07
211	10-Nov-08	21:15	1.0	2.2	1.6	4.30E+03	4.27E+05	6.86E+07
212	12-Nov-08	0:35	1.2	2.6	1.9	5.09E+03	1.71E+05	6.88E+07
213	12-Nov-08	21:00	1.6	3.4	2.5	6.65E+03	1.60E+05	6.89E+07
214	17-Nov-08	21:20	1.1	2.4	1.8	4.78E+03	9.17E+05	6.98E+07
215	19-Nov-08	0:40	1.4	3.1	2.3	6.14E+03	1.99E+05	7.00E+07
216	19-Nov-08	21:05	1.5	3.2	2.3	6.27E+03	1.69E+05	7.02E+07
217	20-Nov-08	1:25	1.0	2.3	1.7	4.47E+03	3.10E+04	7.02E+07
218	21-Nov-08	0:30	0.4	0.8	0.6	1.64E+03	9.40E+04	7.03E+07
219	21-Nov-08	20:55	1.5	3.3	2.4	6.53E+03	1.11E+05	7.04E+07
220	23-Nov-08	20:45	0.8	1.8	1.3	3.49E+03	3.20E+05	7.08E+07
221	26-Nov-08	0:45	1.1	2.4	1.8	4.75E+03	2.86E+05	7.11E+07
222	26-Nov-08	21:15	0.6	1.4	1.0	2.70E+03	1.02E+05	7.12E+07
223	28-Nov-08	21:00	1.3	2.9	2.1	5.66E+03	2.66E+05	7.14E+07
224	30-Nov-08	20:50	1.2	2.7	1.9	5.24E+03	3.47E+05	7.18E+07
225	1-Dec-08	1:05	0.9	2.0	1.4	3.90E+03	2.59E+04	7.18E+07
226	4-Dec-08	20:25	0.8	1.9	1.4	3.70E+03	4.63E+05	7.23E+07
227	5-Dec-08	0:40	1.2	2.8	2.0	5.40E+03	2.58E+04	7.23E+07
228	5-Dec-08	21:05	1.3	2.9	2.1	5.56E+03	1.49E+05	7.24E+07
229	7-Dec-08	20:55	1.8	4.0	2.9	7.81E+03	4.27E+05	7.29E+07
230	8-Dec-08	1:10	1.1	2.4	1.7	4.64E+03	3.53E+04	7.29E+07
231	9-Dec-08	0:15	0.3	0.6	0.5	1.23E+03	9.04E+04	7.30E+07
232	13-Dec-08	1:30	0.4	0.9	0.7	1.79E+03	1.96E+05	7.32E+07
233	16-Dec-08	20:50	0.9	2.0	1.5	4.02E+03	3.54E+05	7.35E+07
234	17-Dec-08	1:05	0.7	1.6	1.2	3.17E+03	2.04E+04	7.36E+07
235	19-Dec-08	0:55	1.1	2.5	1.8	4.95E+03	2.59E+05	7.38E+07

Table S11.3. (cont.)

No.	Date	Time (UT)	TADR (min)	TADR (max)	TADR (mid)	M _R (mid)	Partial Volume (mid)	Cumulative Volume (mid)
236	21-Dec-08	0:40	0.7	1.7	1.2	3.30E+03	2.63E+05	7.41E+07
237	22-Dec-08	1:25	0.3	0.6	0.5	1.23E+03	7.47E+04	7.41E+07
238	23-Dec-08	0:30	0.4	0.9	0.6	1.73E+03	4.55E+04	7.42E+07
239	23-Dec-08	20:55	1.2	2.6	1.9	5.16E+03	9.37E+04	7.43E+07
240	24-Dec-08	1:10	1.5	3.4	2.5	6.71E+03	3.36E+04	7.43E+07
241	25-Dec-08	20:45	1.0	2.3	1.7	4.53E+03	3.26E+05	7.46E+07
242	26-Dec-08	1:00	1.2	2.7	1.9	5.20E+03	2.76E+04	7.47E+07
243	1-Jan-09	20:50	0.7	1.6	1.2	3.15E+03	9.12E+05	7.56E+07
244	2-Jan-09	1:05	0.9	2.0	1.4	3.86E+03	1.99E+04	7.56E+07
245	3-Jan-09	20:35	0.9	2.0	1.4	3.91E+03	2.25E+05	7.58E+07
246	4-Jan-09	0:50	1.1	2.4	1.7	4.70E+03	2.44E+04	7.59E+07
247	6-Jan-09	0:40	0.4	0.9	0.6	1.69E+03	2.04E+05	7.61E+07
248	6-Jan-09	21:10	0.9	2.2	1.6	4.19E+03	8.04E+04	7.61E+07
249	8-Jan-09	20:55	0.4	0.8	0.6	1.63E+03	1.85E+05	7.63E+07
250	9-Jan-09	1:15	0.4	1.0	0.7	1.93E+03	1.03E+04	7.63E+07
251	10-Jan-09	20:45	1.4	3.1	2.2	6.02E+03	2.30E+05	7.66E+07
252	15-Jan-09	0:35	0.5	1.2	0.9	2.38E+03	5.59E+05	7.71E+07
253	17-Jan-09	20:50	1.0	2.2	1.6	4.31E+03	3.05E+05	7.74E+07
254	18-Jan-09	1:05	0.2	0.5	0.4	9.53E+02	1.49E+04	7.74E+07
255	19-Jan-09	20:35	0.7	1.5	1.1	2.95E+03	1.13E+05	7.76E+07
256	29-Jan-09	0:50	0.8	1.7	1.3	3.41E+03	9.34E+05	7.85E+07
257	29-Jan-09	21:15	0.7	1.5	1.1	2.95E+03	8.65E+04	7.86E+07
258	4-Feb-09	20:35	0.9	2.0	1.5	3.96E+03	6.60E+05	7.92E+07
259	5-Feb-09	0:55	1.3	2.9	2.1	5.61E+03	2.76E+04	7.93E+07
260	6-Feb-09	20:25	0.6	1.3	0.9	2.51E+03	2.36E+05	7.95E+07
261	6-Feb-09	20:25	0.6	1.3	0.9	2.51E+03	0.00E+00	7.95E+07
262	7-Feb-09	0:45	0.3	0.7	0.5	1.30E+03	1.10E+04	7.95E+07
263	7-Feb-09	21:10	0.9	1.9	1.4	3.80E+03	6.94E+04	7.96E+07
264	9-Feb-09	20:55	0.9	2.0	1.4	3.82E+03	2.43E+05	7.98E+07
265	10-Feb-09	1:15	0.8	1.8	1.3	3.55E+03	2.13E+04	7.98E+07
266	16-Feb-09	0:35	0.4	1.0	0.7	1.86E+03	5.17E+05	8.04E+07
267	18-Feb-09	0:25	0.3	0.7	0.5	1.40E+03	1.04E+05	8.05E+07
268	18-Feb-09	20:50	0.9	2.0	1.5	3.96E+03	7.31E+04	8.05E+07
269	19-Feb-09	1:05	0.8	1.9	1.3	3.63E+03	2.15E+04	8.06E+07
270	20-Feb-09	20:35	1.0	2.3	1.7	4.48E+03	2.35E+05	8.08E+07
271	21-Feb-09	0:55	1.1	2.4	1.7	4.72E+03	2.66E+04	8.08E+07
272	26-Feb-09	1:15	0.7	1.6	1.2	3.13E+03	6.30E+05	8.15E+07
273	27-Feb-09	20:45	0.9	1.9	1.4	3.80E+03	2.01E+05	8.17E+07
274	28-Feb-09	1:00	1.3	2.8	2.0	5.48E+03	2.63E+04	8.17E+07
275	2-Mar-09	21:15	0.6	1.4	1.0	2.79E+03	3.76E+05	8.21E+07

Table S11.3. (*cont.*)

No.	Date	Time (UT)	TADR (min)	TADR (max)	TADR (mid)	M _R (mid)	Partial Volume (mid)	Cumulative Volume (mid)
276	7-Mar-09	1:10	0.5	1.2	0.9	2.38E+03	3.45E+05	8.24E+07
277	8-Mar-09	20:35	0.5	1.2	0.9	2.30E+03	1.35E+05	8.25E+07
278	9-Mar-09	0:55	1.4	3.0	2.2	5.94E+03	2.38E+04	8.26E+07
279	9-Mar-09	21:20	0.6	1.5	1.1	2.85E+03	1.20E+05	8.27E+07
280	10-Mar-09	20:25	0.8	1.8	1.3	3.48E+03	9.74E+04	8.28E+07
281	11-Mar-09	0:45	1.4	3.1	2.2	5.98E+03	2.73E+04	8.28E+07
282	11-Mar-09	21:10	1.0	2.2	1.6	4.20E+03	1.39E+05	8.29E+07
283	12-Mar-09	1:25	1.0	2.2	1.6	4.28E+03	2.40E+04	8.30E+07
284	13-Mar-09	0:30	0.4	0.9	0.6	1.68E+03	9.18E+04	8.31E+07
285	13-Mar-09	20:55	1.3	2.9	2.1	5.70E+03	1.00E+05	8.32E+07
286	14-Mar-09	1:15	0.7	1.7	1.2	3.25E+03	2.59E+04	8.32E+07
287	16-Mar-09	1:00	1.0	2.4	1.7	4.65E+03	2.52E+05	8.34E+07
288	17-Mar-09	20:30	0.9	2.1	1.5	4.04E+03	2.52E+05	8.37E+07
289	18-Mar-09	0:50	1.8	4.1	3.0	8.04E+03	3.49E+04	8.37E+07
290	18-Mar-09	21:15	0.4	0.8	0.6	1.61E+03	1.31E+05	8.39E+07
291	20-Mar-09	21:00	0.9	2.1	1.5	4.05E+03	1.80E+05	8.40E+07
292	24-Mar-09	20:35	0.7	1.5	1.1	3.01E+03	4.50E+05	8.45E+07
293	25-Mar-09	21:20	0.6	1.3	1.0	2.60E+03	9.25E+04	8.46E+07
294	26-Mar-09	20:25	0.3	0.7	0.5	1.42E+03	6.18E+04	8.46E+07
295	27-Mar-09	0:45	1.1	2.4	1.7	4.62E+03	1.75E+04	8.47E+07
296	27-Mar-09	21:10	1.5	3.4	2.5	6.71E+03	1.54E+05	8.48E+07
297	28-Mar-09	1:25	1.0	2.3	1.7	4.47E+03	3.17E+04	8.48E+07
298	1-Apr-09	1:00	1.6	3.6	2.6	6.98E+03	7.30E+05	8.56E+07
299	2-Apr-09	20:30	0.9	1.9	1.4	3.78E+03	3.12E+05	8.59E+07
300	3-Apr-09	21:15	1.1	2.5	1.8	4.92E+03	1.44E+05	8.60E+07
301	5-Apr-09	0:35	0.7	1.6	1.2	3.15E+03	1.47E+05	8.62E+07
302	7-Apr-09	20:50	1.2	2.6	1.9	5.06E+03	3.74E+05	8.65E+07
303	8-Apr-09	1:10	1.6	3.7	2.7	7.18E+03	3.54E+04	8.66E+07
304	14-Apr-09	20:55	1.0	2.3	1.7	4.51E+03	1.28E+06	8.79E+07
305	15-Apr-09	1:15	0.7	1.6	1.1	3.10E+03	2.20E+04	8.79E+07
306	16-Apr-09	20:45	0.7	1.6	1.2	3.15E+03	1.81E+05	8.81E+07
307	17-Apr-09	1:00	1.5	3.3	2.4	6.49E+03	2.73E+04	8.81E+07
308	23-Apr-09	20:50	0.7	1.6	1.2	3.22E+03	1.06E+06	8.92E+07
309	25-Apr-09	20:35	0.5	1.2	0.9	2.37E+03	1.78E+05	8.93E+07
310	26-Apr-09	0:55	1.2	2.6	1.9	5.11E+03	2.16E+04	8.94E+07
311	28-Apr-09	0:45	0.6	1.4	1.0	2.72E+03	2.49E+05	8.96E+07
312	28-Apr-09	21:10	0.8	1.8	1.3	3.62E+03	8.63E+04	8.97E+07
313	30-Apr-09	0:30	0.4	0.8	0.6	1.54E+03	9.40E+04	8.98E+07
314	1-May-09	1:15	0.3	0.6	0.5	1.22E+03	4.54E+04	8.98E+07
315	2-May-09	20:45	0.7	1.4	1.1	2.84E+03	1.18E+05	8.99E+07

Table S11.3. (*cont.*)

No.	Date	Time (UT)	TADR (min)	TADR (max)	TADR (mid)	M _R (mid)	Partial Volume (mid)	Cumulative Volume (mid)
316	3-May-09	21:25	0.3	0.7	0.5	1.36E+03	6.91E+04	9.00E+07
317	4-May-09	20:30	0.6	1.3	0.9	2.53E+03	5.99E+04	9.01E+07
318	5-May-09	0:50	0.8	1.8	1.3	3.51E+03	1.74E+04	9.01E+07
319	5-May-09	21:15	0.5	1.1	0.8	2.24E+03	7.83E+04	9.02E+07
320	7-May-09	0:35	0.4	1.0	0.7	1.94E+03	7.62E+04	9.02E+07
321	7-May-09	21:00	0.9	2.1	1.5	4.05E+03	8.15E+04	9.03E+07
322	8-May-09	1:20	1.0	2.3	1.7	4.49E+03	2.47E+04	9.04E+07
323	9-May-09	20:50	1.1	2.4	1.7	4.62E+03	2.64E+05	9.06E+07
324	11-May-09	20:35	0.6	1.2	0.9	2.39E+03	2.23E+05	9.08E+07
325	12-May-09	0:55	0.6	1.3	1.0	2.59E+03	1.44E+04	9.09E+07
326	12-May-09	21:20	0.6	1.4	1.0	2.69E+03	7.18E+04	9.09E+07
327	13-May-09	1:40	0.4	1.0	0.7	1.91E+03	1.33E+04	9.09E+07
328	14-May-09	0:45	0.7	1.5	1.1	2.99E+03	7.54E+04	9.10E+07
329	16-May-09	20:55	0.3	0.7	0.5	1.38E+03	1.99E+05	9.12E+07
330	17-May-09	1:15	0.6	1.2	0.9	2.38E+03	1.09E+04	9.12E+07
331	19-May-09	1:00	0.7	1.6	1.2	3.13E+03	1.75E+05	9.14E+07
332	21-May-09	0:50	1.0	2.1	1.5	4.13E+03	2.31E+05	9.16E+07
333	21-May-09	21:15	0.6	1.2	0.9	2.43E+03	8.93E+04	9.17E+07
334	22-May-09	1:30	0.6	1.3	1.0	2.57E+03	1.42E+04	9.17E+07
335	23-May-09	0:35	1.3	2.7	2.0	5.31E+03	1.21E+05	9.19E+07
336	23-May-09	21:00	1.4	3.0	2.2	5.89E+03	1.52E+05	9.20E+07
337	24-May-09	1:20	1.4	2.9	2.2	5.86E+03	3.40E+04	9.20E+07
338	25-May-09	20:50	0.8	1.7	1.3	3.43E+03	2.70E+05	9.23E+07
339	26-May-09	1:05	1.1	2.2	1.6	4.44E+03	2.23E+04	9.23E+07
340	27-May-09	20:35	0.5	1.0	0.8	2.06E+03	1.88E+05	9.25E+07
341	28-May-09	0:55	0.5	1.0	0.7	1.96E+03	1.16E+04	9.25E+07
342	30-May-09	0:45	0.4	0.8	0.6	1.66E+03	1.15E+05	9.26E+07
343	1-Jun-09	20:55	0.6	1.4	1.0	2.72E+03	1.99E+05	9.28E+07
344	2-Jun-09	1:15	1.0	2.2	1.6	4.40E+03	2.06E+04	9.29E+07
345	3-Jun-09	20:45	0.6	1.2	0.9	2.37E+03	1.96E+05	9.31E+07
346	4-Jun-09	1:00	0.7	1.4	1.0	2.81E+03	1.47E+04	9.31E+07
347	4-Jun-09	21:25	0.4	0.8	0.6	1.61E+03	6.02E+04	9.31E+07
348	5-Jun-09	20:30	0.3	0.6	0.4	1.12E+03	4.19E+04	9.32E+07
349	6-Jun-09	0:50	1.0	2.1	1.6	4.25E+03	1.55E+04	9.32E+07
350	8-Jun-09	1:30	0.5	1.1	0.8	2.11E+03	2.06E+05	9.34E+07
351	8-Jun-09	21:00	1.2	2.6	1.9	5.15E+03	9.44E+04	9.35E+07
352	9-Jun-09	1:20	0.6	1.2	0.9	2.33E+03	2.16E+04	9.35E+07
353	9-Jun-09	20:50	0.7	1.5	1.1	2.94E+03	6.85E+04	9.36E+07
354	10-Jun-09	1:05	0.7	1.5	1.1	3.08E+03	1.70E+04	9.36E+07
355	11-Jun-09	20:35	0.4	0.9	0.6	1.73E+03	1.39E+05	9.37E+07

Table S11.3. (cont.)

No.	Date	Time (UT)	TADR (min)	TADR (max)	TADR (mid)	M_R (mid)	Partial Volume (mid)	Cumulative Volume (mid)
356	12-Jun-09	21:20	0.9	1.9	1.4	3.87E+03	9.25E+04	9.38E+07
357	14-Jun-09	0:40	0.6	1.2	0.9	2.44E+03	1.15E+05	9.40E+07
358	14-Jun-09	21:05	1.2	2.4	1.8	4.79E+03	9.85E+04	9.40E+07
359	16-Jun-09	0:30	0.5	0.9	0.7	1.88E+03	1.22E+05	9.42E+07
360	16-Jun-09	20:55	0.8	1.7	1.2	3.31E+03	7.07E+04	9.42E+07
361	17-Jun-09	1:15	0.2	0.5	0.4	9.97E+02	1.25E+04	9.43E+07
362	19-Jun-09	1:00	0.6	1.2	0.9	2.35E+03	1.07E+05	9.44E+07
363	21-Jun-09	21:15	0.5	1.1	0.8	2.08E+03	2.02E+05	9.46E+07
364	23-Jun-09	0:35	0.2	0.4	0.3	7.30E+02	5.13E+04	9.46E+07
365	23-Jun-09	21:00	0.4	0.8	0.6	1.61E+03	3.19E+04	9.46E+07
366	24-Jun-09	1:20	0.2	0.5	0.3	9.23E+02	7.33E+03	9.47E+07
367	27-Jun-09	20:35	0.4	0.9	0.6	1.69E+03	1.59E+05	9.48E+07
368	1-Jul-09	0:40	0.4	0.8	0.6	1.50E+03	1.62E+05	9.50E+07
369	1-Jul-09	21:05	0.3	0.7	0.5	1.42E+03	3.98E+04	9.50E+07
370	2-Jul-09	1:25	0.3	0.7	0.5	1.37E+03	8.05E+03	9.50E+07
371	3-Jul-09	20:55	0.3	0.6	0.5	1.23E+03	7.54E+04	9.51E+07
372	4-Jul-09	1:15	0.5	1.0	0.7	1.92E+03	9.10E+03	9.51E+07

Summation

First and second order parameters are extracted on the basis of a single assumption: that lava surfaces fall between two end-member ranges. This allows application of a two-component mixture model that gives lava area: a value on which all following derivations depend. Thereafter all parameters are given over a range of values, defined by the two end-member surface temperature assumptions used to apply the mixture model. The true value for active lava area, thus also heat, volume and mass flux, is expected to fall somewhere within the range. The validity of this “expectation” can be assessed through comparison with independent measurements of any of the extracted parameters.

We find that the final lava volume, obtained from integrating all TADRs through the entire eruption, lies between a lower bound of $62 \times 10^6 \text{ m}^3$, as defined by the 100 °C mixture model, and an upper bound of $128 \times 10^6 \text{ m}^3$, as defined by the 600 °C mixture model (Figure S11.11). This compares with a field-based estimate of $68 \times 10^6 \text{ m}^3$. The field measurement could thus be used to fine-tune, or narrow down, the range of TADRs that go into creating the two volume curves by adjusting the best fit coefficients used in the lava area to TADR conversion given above (see Section 4.5.1.5 of Chapter 4), as well as the surface

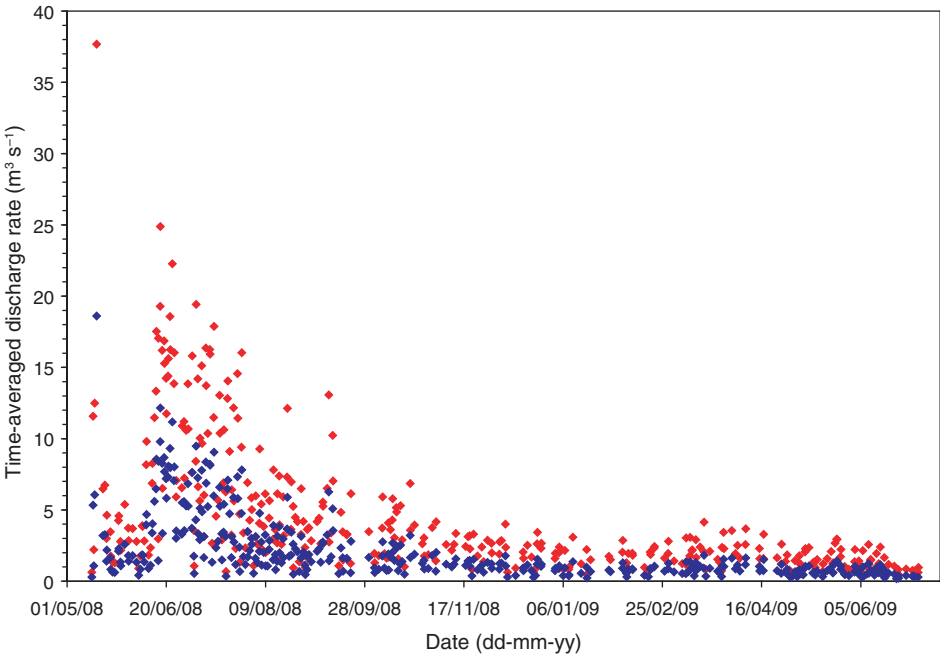


Figure S11.9 End-member TADR extractions obtained from the two-component mixture model. End member 1 (red diamonds) is built on the 600 °C mixture model, and end member 2 (blue diamonds) is built on the 100 °C mixture model (database plotted here is given in Table S11.3).

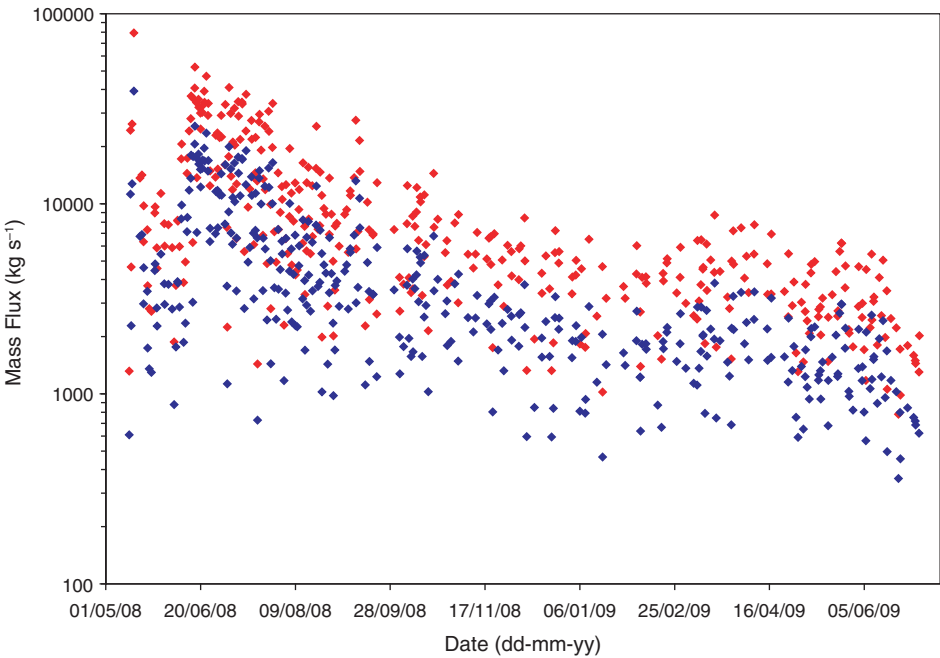


Figure S11.10 End-member mass flux conversions obtained from the two-component mixture model. End member 1 (red diamonds) is built on the 600 °C mixture model, and end member 2 (blue diamonds) is built on the 100 °C mixture model (database plotted here is given in Table S11.3).

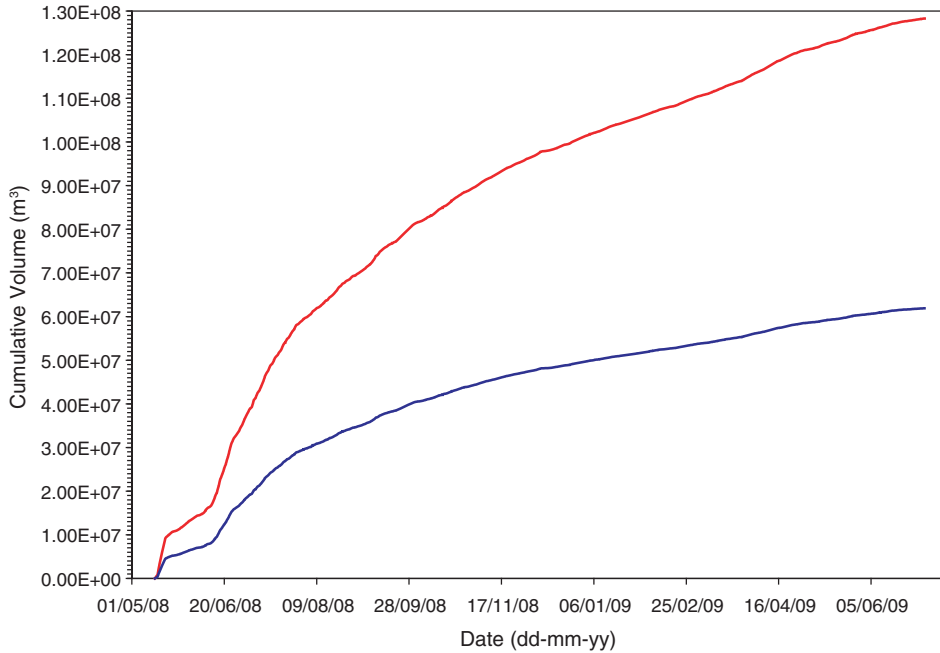


Figure S11.11 Upper (red) and lower (blue) bounds on cumulative volume obtained from through the end-member TADR extractions of Figure S11.9 (database plotted here is given in Table S11.3). True volume is assumed to lie between the two end member curves.

temperatures used in the mixture model to solve for lava area. For now, the comparison suggests that the lower-bound TADRs, that integrate to give the lower bound volume estimate and are obtained using the 100 °C mixture model, are likely the more appropriate values for this case.

However, adjusting the values input into the mixture model, or conversion factors used to arrive at TADRs, will just alter the absolute value of all points in the time series by the same amount, not affecting any trends apparent in the resulting parameter plots. Thus, what we see is that the trends are the same in all plots, but are particularly well expressed in the plots of summed band 21 volcanic radiance (Figure 11.6) and TADR (Figure 11.9). This should not be a surprise, because mostly we have just applied a unit conversion between spectral radiance (at the lowest level) and cubic meters per second (at the highest level).

The plotted trends show high values during the opening months. Values decayed through September-October 2008, to reach low levels by November 2008. Low levels then persisted through the end of the eruption, with one or two small pulses being apparent, for example from around March – April 2009 to June 2009, during which levels increased a little for periods of a few weeks.

These conversions are based on the following studies:

- Harris, A. J. L., Favalli, M., Steffke, A., Fornaciai, A. and Boschi, E. (2010). A relation between lava discharge rate, thermal insulation, and flow area set using lidar data. *Geophysical Research. Letters*, **37**, L20308. DOI: 10.1029/2010GL044683.
- Harris, A., A. Steffke, S. Calvari and Spampinato, L. (2011). Thirty years of satellite-derived lava discharge rates at Etna: Implications for steady volumetric output. *Journal of Geophysical Research*, **116**, B08204. DOI: 10.1029/2011JB008237.
- MCST Document (2009). MODIS Level 1B Product User's Guide: For Level 1B Version 6.1.0 (Terra) and Version 6.1.1 (Aqua). NASA/Goddard Space Flight Center Greenbelt, MD 20771, February 27, 2009, *MCST Document # PUB-01-U-0202-REV C*.