

Near-Earth Interplanetary Coronal Mass Ejections Since January 1996

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Note added February 1, 2024: This catalog is now also available at the DOI [10.7910/DVN/C2MHTH](#). Please include the DOI when referring to the catalog in a publication or other presentation.

Note added May 18, 2016: The dates in the table have been reformatted so that the year is now included for every time. Previously, the year was indicated only at the start of the list of events in that year, and only month and day were indicated in the event times. This change should make it easier to convert the list into another format, such as text or a spreadsheet. Currently, we don't maintain text or spreadsheet versions of the list, but these can be made by, for example, downloading and opening the file in a spreadsheet program such as Excel. Each box in the list should appear as a spreadsheet cell. Note that the contents of each box in the list are not necessarily uniform, so some editing (e.g., removing letters from some times in the first column) may be required. The list can then be saved in the desired format. A text version can also be made by converting the file to pdf and extracting the text from the pdf version.

Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)	Comp. Start, End (Hrs wrt. Plasma/ Field) (c)	MC Start, End (Hrs wrt. Plasma/ Field) (d)	BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)	
1996/05/27 1500	1996/05/27 1500	1996/05/29 0300	0	+4	N	...	2	0	370	400
1996/07/01 1320	1996/07/01 1800	1996/07/02 1100	0	0	N	...	3	40	360	370
1996/08/07 0600	1996/08/07 1200	1996/08/08 1000	0	0	N	...	2	10	350	380
1996/12/23 1600	1996/12/23 1700	1996/12/25 1100	+10	0	N	...	2	20	360	420
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)	Comp. Start, End (Hrs wrt. Plasma/ Field) (c)	MC Start, End (Hrs wrt. Plasma/ Field) (d)	BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)	
1997/01/10 0104	1997/01/10 0400	1997/01/11 0200	0	0	Y	...	1	100 S	450	460
1997/02/09 1321	1997/02/10 0200	1997/02/10 1900	0	0	Y	...	2	90 S	450	600
1997/04/10 1745	1997/04/11 0600	1997/04/11 1900	0	0	Y	...	1	150	460	470
1997/04/21 0600	1997/04/21 1000	1997/04/23 0400	+4	+2	Y	...	2	40	360	420
1997/05/15 0159	1997/05/15 0900	1997/05/16 0000	0	0	N	Y	1	150 S	450	480
1997/05/26 0957	1997/05/26 1600	1997/05/27 1000	0	+9	Y	...	2	70 S	340	350
1997/06/08 1636	1997/06/08 1800	1997/06/10 0000	+8	0	Y	...	3	30	380	400
1997/06/19 0032	1997/06/19 0700	1997/06/20 2300	-2	-31	Y	Y	2	60	360	390
1997/07/15 0311	1997/07/15 0800	1997/07/16 1100	0	-11	Y	Y	2	80	350	360
1997/08/03 1042	1997/08/03 1300	1997/08/04 0300	0	0	Y	...	1	80	400	480
1997/08/17 0200	1997/08/17 0600	1997/08/17 2000	N	...	2W	60	390	410
1997/09/03 0800	1997/09/03 1300	1997/09/03 2100	Y	N	3W	40 S	410	430
1997/09/21 1651	1997/09/21 2100	1997/09/22 1600	+3	0	N	...	1	110	440	470
1997/10/01 0059	1997/10/01 1600	1997/10/02 2300	0	0	Y	N	1	60 S	450	470
1997/10/10 0300	1997/10/10 1100	1997/10/10 2200	Y	...	2	30	430	460
1997/10/10 1612	1997/10/10 2200	1997/10/12 0000	0	0	Y	Y	1	40 S	400	450
1997/10/26 1200	1997/10/27 0000	1997/10/28 0700	Y	...	2	40	500	520
1997/11/06 2248	1997/11/07 0400	1997/11/09 1200	+11	-21 (2 MCs)	Y	N	2	140 S	400	460
1997/11/22 0949	1997/11/22 1900	1997/11/23 1400	0	-2	Y	...	1	170 S	510	520
1997/11/23 1900	1997/11/24 0000	1997/11/25 0000	Y	...	2	100	530	590

Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
1997/12/10 0526	1997/12/10 1800	1997/12/12 0000	2	50 S	350	380	12	0
1997/12/30 0209	1997/12/30 1000	1997/12/31 1100	Y	...	3	50 S	370	410	12	1
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
1998/01/06 1416	1998/01/07 0100	1998/01/08 2200	+2	0 (2 MCs)	Y	..	2	80 S	400	410	16	2
1998/01/09 0700	1998/01/09 0700	1998/01/10 0800	N	...	2	0	450	500	6	1
1998/01/20 0000	1998/01/20 1700	1998/01/21 0400	Y	...	3W	50	430	450	5	1
1998/01/21 0400	1998/01/21 0600	1998/01/22 1300	N	...	3W	0	380	400	13	0
1998/01/28 1600(A)	1998/01/29 2000	1998/01/31 0100	Y	N	2	30 S	380	410	7	0
1998/02/04 0000	1998/02/04 0400	1998/02/05 2300	0	0	Y	...	1	50	320	390	11	2
1998/02/17 0400	1998/02/17 1000	1998/02/17 2100	ns	ns	0	+7	Y	...	2W	30	400	420	12	2H
1998/02/18 0750(A)	1998/02/19 0100	1998/02/20 0000	-3	N	...	2	20 S	440	460	9	1
1998/03/04 1156	1998/03/04 1300	1998/03/06 0900	0	-9	0	-3	N	...	1	30 S	350	380	12	2
1998/03/25 1000	1998/03/25 1300	1998/03/26 1000	Y	Y	1	20	400	400	10	1
1998/03/30 2200	1998/03/31 1100	1998/04/03 0200	-6	0	N	Y	1	30	360	430	7	0
1998/04/11 2300	1998/04/11 2300	1998/04/13 1800	ns	ns	N	...	3W	20	390	390	8	0
1998/05/01 2156	1998/05/02 0500	1998/05/04 0200	-2	-24	+7	-9	Y	Y	1	150 S	520	650	11	2
1998/05/04 0215(A)	1998/05/04 1000	1998/05/07 2300	-7	0	Y	...	2	250 Wv	550	830	10	0
1998/06/02 0800	1998/06/02 1000	1998/06/02 1800	0	0	N	...	2	10	390	400	9	2
1998/06/13 1925	1998/06/14 0400	1998/06/15 0600	Y	N	3	80 S	340	380	10	1
1998/06/24 1000	1998/06/24 1600	1998/06/25 2300	0	0	0	0	Y	...	2	80	450	540	12	2
1998/06/25 1636	1998/06/26 0400	1998/06/26 1900	0	0	Y	...	2	30 S	470	490	11	0
1998/07/05 0315(A)	1998/07/06 0600	1998/07/09 0700	0	N	...	1	50 S	450	630	5	0
1998/07/10 2300	1998/07/11 0000	1998/07/13 1500	Y	Y	3W	20	400	430	10	0
1998/08/01 0400	1998/08/01 0400	1998/08/03 1000	0	N	Y	3	30	410	450	7	1
1998/08/05 1300	1998/08/05 1300	1998/08/06 1200	Y	Y	2W	0	360	390	8	1
1998/08/07 1100	1998/08/07 2300	1998/08/09 2300	N	Y	2	0	450	500	7	0
1998/08/10 0046	1998/08/10 1100	1998/08/10 2200	ns	ns	Y	N	3W	100 S	450	500	7	0
1998/08/11 2300	1998/08/12 0100	1998/08/13 1400	ns	ns	Y	...	3W	20	370	420	8	1
1998/08/19 1847	1998/08/20 0600	1998/08/21 2000	0	0	+4	0	Y	Y	1	50 S	320	340	13	2
1998/08/26 0651	1998/08/26 2200	1998/08/28 0000	0	+18	Y	...	2	200 S	650	860	14	0
1998/09/23 0200	1998/09/23 0400	1998/09/23 1800	ns	ns	Y	N	2	80	420	490	7	1
1998/09/24 2345	1998/09/25 0600	1998/09/26 1600	-2	+4	+4	-3	Y	Y	1	300 S	640	820	13	2
1998/10/18 1952	1998/10/19 0400	1998/10/20 0700	0	0	0	-17	Y	Y	1	50 S	390	430	18	2
1998/10/23 1230(A)	1998/10/23 1500	1998/10/24 1600	0	0	N	Y	3	50 S	520	600	7	0
1998/11/07 0815	1998/11/07 2200	1998/11/09 0100	0	0	Y	...	2	130 S	450	530	15	1
1998/11/08 0451	1998/11/09 0100	1998/11/11 0100	+8	+17	0	-24	Y	...	2	200 S	450	640	12	2
1998/11/13 0143	1998/11/13 0200	1998/11/14 1200	ns	ns	0	-6	Y	N	3	50	390	400	17	2H

Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
1998/11/30 0507	1998/11/30 2100	1998/12/01 0400	0	0	Y	...	2	100 S	470	480	9	0
1998/12/28 1826	1998/12/29 1800	1998/12/31 0200	0	0	N	...	2	30 S	400	410	8	0
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
1999/01/04 0000	1999/01/04 0400	1999/01/04 2200	ns	ns	Y	...	3W	20	350	360	8	0
1999/01/13 1054	1999/01/13 1500	1999/01/13 2300	0	0	N	...	2	70 S	420	430	18	0
1999/01/22 1950(A)	1999/01/23 0900	1999/01/23 1800	nc	0	Y	...	3	120 S	570	660	12	0
1999/02/13 1900	1999/02/13 1900	1999/02/14 1500	0	-3	N	...	3W	20	440	470	9	0
1999/02/16 1500	1999/02/16 1500	1999/02/17 1100	0	0	N	...	3	0	460	470	6	1
1999/02/17 0709	1999/02/17 1600	1999/02/18 1000	0	0	Y	...	3	30 S	410	490	8	0
1999/02/18 0246	1999/02/18 1000	1999/02/20 1700	0	0	+4	-29	Y	...	2	250 S	540	680	9	2
1999/03/10 0130	1999/03/10 1700	1999/03/12 0200	0	0	Y	Y	2	30 S	410	460	7	0
1999/03/19 1000	1999/03/19 1100	1999/03/20 1200	0	0	Y	...	3W	10	340	380	5	1
1999/04/16 1125	1999/04/16 1800	1999/04/17 1900	-6	+8	+2	+2	Y	...	1	50 S	410	460	18	2
1999/04/20 1600	1999/04/21 0400	1999/04/22 1400	0	+10	+8	0	Y	...	1	120	490	620	8	2H
1999/05/15 1600	1999/05/15 1600	1999/05/18 0000	ns	0	N	...	3	0	390	400	5	0
1999/06/02 2000	1999/06/02 2300	1999/06/03 2200	nc	0	Y	Y	3	40	430	470	9	1
1999/06/26 2016	1999/06/27 2200	1999/06/29 0400	0	Y	Y	3	100 S	670	860	7	0
1999/07/02 0059	1999/07/03 0500	1999/07/06 0600	-26	ns	2	100 S	440	680	4	0
1999/07/06 1509	1999/07/06 2100	1999/07/07 0200	ns	N	...	2	50 S	460	500	10	1
1999/07/07 0600	1999/07/07 0700	1999/07/08 0400	nc	nc	Y	...	3	70	450	480	4	0
1999/07/26 2333(A)	1999/07/27 1700	1999/07/29 1200	+26	+2	Y	...	3	30 S	390	460	6	0
1999/07/30 1600	1999/07/30 2000	1999/07/31 0800	0	0	Y	...	3	90	620	660	9	0
1999/07/31 1837	1999/07/31 1900	1999/08/02 0600	0	ns	N	...	3	100	480	650	5	1
1999/08/02 1100	1999/08/02 1500	1999/08/03 1500	+2	+6	N	Y	3	20	370	440	4	0
1999/08/08 1841	1999/08/08 2000	1999/08/10 1700	0	0	+25	0	Y	Y	2	20 S	360	410	9	2
1999/08/11 2300	1999/08/12 0300	1999/08/14 0000	+16	0	Y	...	3	40	380	420	6	0
1999/08/20 2300	1999/08/20 2300	1999/08/23 1100	+31	+6	Y	...	2	0	460	570	7	1
1999/09/21 1200	1999/09/21 1200	1999/09/22 1200	-3	-4	+9	-7	Y	N	3	0	360	380	9	2
1999/09/22 1222	1999/09/22 1900	1999/09/24 0300	0	0	Y	Y	1	120 S	530	600	11	0
1999/10/21 0225	1999/10/21 0800	1999/10/22 0700	+14	0	Y	N	2	30 S	480	550	20	0
1999/11/11 1900	1999/11/12 1000	1999/11/13 1800	-10	nc	N	...	2	50	450	680	5	0
1999/11/13 1200	1999/11/13 2000	1999/11/15 0000	nc	nc	+4	-15	N	...	3W	50 S	440	480	7	2H
1999/11/22 0000	1999/11/22 0300	1999/11/24 0400	-8	+6	Y	...	3	40	450	490	9	0
1999/12/12 1551	1999/12/12 1900	1999/12/13 1600	...	0	Y	Y	2	300 S	520	700	12	0
1999/12/13 2300	1999/12/14 0400	1999/12/14 2000	Y	...	2	20	440	480	12	0
1999/12/26 2130(A)	1999/12/27 1100	1999/12/28 0400	-9	+23	Y	...	3	50 S	430	450	8	1

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Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)	MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)	
2000/01/22 0023(A)	2000/01/22 1700	2000/01/23 0200	0	0	Y	...	2	30 S	380	400	16	1
2000/02/11 0258	2000/02/11 1600	2000/02/11 2000	0	0	Y	N	1	60 S	420	510	7	0
2000/02/11 2352	2000/02/12 1200	2000/02/13 0000	-3	0	+5	0	Y	N	2	180 S	540	590	13	2
2000/02/14 0731	2000/02/14 1200	2000/02/16 0800	0	0	N	N	3	100 S	520	680	5	0
2000/02/20 2139	2000/02/21 0500	2000/02/22 1200	0	0	+5	0	Y	...	2	120 S	380	460	15	2
2000/03/01 0130	2000/03/01 0300	2000/03/02 0300	0	0	Y	...	1	20	480	530	8	0
2000/03/18 2200	2000/03/19 0200	2000/03/19 1200	ns	ns	Y	Y	2	20	380	390	9	0
2000/03/29 1100	2000/03/29 1900	2000/04/01 0000	0	+15	N	Y	2	280	420	590	7	0
2000/04/06 1639	2000/04/07 0600	2000/04/08 0600	-7	-15	Y	...	2	220 S	560	620	6	1
2000/04/18 2000	2000/04/18 2000	2000/04/19 1400	+8	0	N	...	3	30	460	470	10	1
2000/04/24 0400	2000/04/24 0400	2000/04/24 1300	0	0	N	...	3W	60	500	520	13	0
2000/05/02 1045(A)	2000/05/02 2000	2000/05/05 1000	nc	ns	Y	...	3	150 S	500	860	6	0
2000/05/07 0000	2000/05/07 0000	2000/05/08 0000	+8	0	Y	Y	3W	10	400	420	8	0
2000/05/13 1700	2000/05/13 1700	2000/05/14 1800	0	ns	N	...	2	100	500	600	8	0
2000/05/15 1900	2000/05/15 1900	2000/05/16 1400	-2	0	N	...	3	20	430	450	8	0
2000/05/16 2300	2000/05/16 2300	2000/05/17 0700	0	0	N	...	2	130	550	580	9	1
2000/05/22 1700	2000/05/23 0900	2000/05/23 2100	0	nc	Y	Y	2	70	570	610	8	0
2000/05/23 2342(W)	2000/05/24 1200	2000/05/27 1000	nc	0	Y	N	2	50 S	530	690	5	1
2000/06/04 1502	2000/06/04 2200	2000/06/06 2200	-8	+6	Y	Y	3	130 S	470	560	9	0
2000/06/08 0910	2000/06/08 1200	2000/06/10 1700	+24	+7	Y	Y	2	260 S	610	770	11	0
2000/06/11 0801	2000/06/11 0900	2000/06/11 1800	0	+6	Y	...	2	40 S	510	530	11	1
2000/06/12 2208	2000/06/13 1200	2000/06/14 0600	nc	ns	N	N	2	60	440	550	4	0
2000/06/18 0900	2000/06/18 0900	2000/06/18 1700	-3	+5	N	Y	3W	10	380	400	5	1
2000/06/23 1303	2000/06/24 0000	2000/06/26 0800	0	nc	+3	-12	Y	Y	1	120 S	500	590	10	2
2000/06/26 0000	2000/06/26 1000	2000/06/27 0000	0	+6	Y	Y	2	60	520	560	10	0
2000/07/01 0100	2000/07/01 0900	2000/07/03 1700	+9	+4	0	-38	N	N	2	20	390	440	7	2
2000/07/10 0638	2000/07/11 0200	2000/07/11 1400	0	+6	Y	Y	2	90 S	440	490	13	0
2000/07/11 1123(A)	2000/07/11 2200	2000/07/13 0300	0	0	0	0	Y	Y	1	30 S	520	540	10	2H
2000/07/13 0942	2000/07/13 1300	2000/07/14 1500	0	-15	Y	N	3	200 S	610	670	7	2H
2000/07/14 1532	2000/07/14 1700	2000/07/15 1400	0	0	+14	0	Y	N	2	150 S	780	800	9	2
2000/07/15 1437	2000/07/15 1900	2000/07/17 0800	0	+28	+2	-22	Y	N	2	350 S	740	1040	20	2
2000/07/19 1527	2000/07/20 0100	2000/07/21 0800	0	Y	N	2	100 S	530	630	8	0
2000/07/23 1041	2000/07/23 1500	2000/07/26 0500	0	0	N	N	3	20	360	430	9	0
2000/07/26 1857	2000/07/27 0200	2000/07/28 0200	0	-4	Y	Y	2	50 S	360	400	6	1
2000/07/28 0634	2000/07/28 1200	2000/07/30 1300	+2	+30	+9	-27	Y	...	2	70 S	440	480	9	2
2000/08/10 0501	2000/08/10 1900	2000/08/11 2100	0	nc	0	-13	Y	...	1	50 S	430	480	12	2H

Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2000/08/11 1845	2000/08/12 0500	2000/08/13 2200	-3	0	0	-17	Y	Y	1	120 S	580	670	18	2
2000/09/02 2200	2000/09/02 2200	2000/09/03 1300	0	0	N	...	1	40	420	450	8	0
2000/09/08 1200	2000/09/08 1200	2000/09/10 1000	0	-18	Y	N	3	50	450	500	5	0
2000/09/17 1657(A)	2000/09/17 2100	2000/09/21 0000	0	+12	+5	-54	Y	N	2	250 S	600	840	10	2
2000/10/03 0054	2000/10/03 1000	2000/10/05 0300	0	+3	+7	-13	Y	Y	1	60 S	400	460	14	2
2000/10/05 0326	2000/10/05 1300	2000/10/07 1100	0	ns	Y	...	2	110 S	450	530	6	1
2000/10/12 2228	2000/10/13 1600	2000/10/14 1700	-4	+3	+2	0	Y	...	1	120 S	400	460	12	2
2000/10/28 0954	2000/10/28 2100	2000/10/29 2200	-9	+12	0	0	Y	Y	1	50 S	380	420	14	2
2000/11/06 0948	2000/11/06 1700	2000/11/08 0300	0	0	+5	-9	Y	...	2	110 S	510	610	20	2
2000/11/08 1200	2000/11/08 1300	2000/11/09 1500	0	0	Y	...	2	50	440	500	7	1
2000/11/11 0400(A)	2000/11/11 0800	2000/11/12 0000	0	-14	N	Y	2	110 S	790	910	7	0
2000/11/26 1158	2000/11/27 0800	2000/11/28 0300	0	+8	Y	...	2	150 S	560	630	10	0
2000/11/28 0530	2000/11/28 1100	2000/11/29 2200	+11	0	Y	N	2	50 S	540	580	9	1
2000/12/21 1200	2000/12/22 0300	2000/12/22 2000	0	+4	Y	...	3W	40	290	330	4	0
2000/12/22 1925	2000/12/23 0000	2000/12/23 1200	ns	ns	Y	...	3	50	320	330	12	0
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2001/01/23 1048	2001/01/24 0900	2001/01/26 0700	0	ns	Y	...	2	140 S	400	550	4	1
2001/03/03 1121	2001/03/04 0400	2001/03/05 0200	+12	0	+12	0	N	...	2	50 S	440	520	8	2H
2001/03/19 1114	2001/03/19 1700	2001/03/22 0000	0	+12	+6	+15 (2 MCs)	Y	Y	1	100 S	360	490	15	2
2001/03/27 0110(A)	2001/03/27 2000	2001/03/28 1700	0	0	0	-12	Y	...	2	80 S	610	650	12	2H
2001/03/27 1747	2001/03/28 1700	2001/03/30 1800	+11	0	Y	Y	3	200 S	480	560	3	0
2001/03/31 0052	2001/03/31 0500	2001/03/31 2200	0	nc	Y	N	3	200 S	640	710	33	1
2001/03/31 2200	2001/04/01 0400	2001/04/03 1500	nc	0	Y	Y	2	200	600	820	5	1
2001/04/04 1455	2001/04/04 1800	2001/04/05 1200	0	+6	0	-4	Y	N	2	90 S	650	780	9	2
2001/04/08 1101	2001/04/08 1400	2001/04/09 0400	0	0	Y	...	3	100 S	740	780	13	0
2001/04/11 1343	2001/04/11 2200	2001/04/13 0700	0	0	+10	-13	Y	Y	2	230 S	640	740	14	2
2001/04/13 0734	2001/04/13 0900	2001/04/14 1200	0	-6	Y	Y	1	200 S	730	830	9	0
2001/04/15 1700	2001/04/15 1700	2001/04/16 0100	ns	ns	SEP	N	2W	0	500	510	4	0
2001/04/18 0046	2001/04/18 1200	2001/04/20 1100	ns	ns	Y	...	2	140 S	430	520	8	0
2001/04/21 1601	2001/04/21 2300	2001/04/23 0300	ns	ns	0	-2	N	N	1	50 S	350	390	11	2
2001/04/28 0501	2001/04/28 1400	2001/05/01 0200	0	+32	+12	-37	N	Y	2	400 S	550	730	8	2
2001/05/03 1100	2001/05/03 1100	2001/05/04 1000	0	0	Y	...	2W	0	380	390	8	0
2001/05/07 0800	2001/05/07 1900	2001/05/08 0700	0	+12	Y	Y	2	30	360	410	8	1
2001/05/08 1101	2001/05/09 1200	2001/05/10 2200	0	nc	N	N	2	50 S	430	560	8	1
2001/05/11 1300	2001/05/11 1300	2001/05/12 0000	N	N	2W	0	430	430	8	0
2001/05/27 1459	2001/05/28 0300	2001/05/31 1400	+8	0	+9	-52	N	N	2	100 S	420	590	7	2
2001/06/07 0852(A)	2001/06/07 1800	2001/06/08 0700	ns	ns	N	N	1	50 S	390	430	9	1

Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2001/06/27 0300	2001/06/27 0300	2001/06/28 1700	0	ns	N	...	1	20	420	490	3	1
2001/07/08 1200	2001/07/09 0200	2001/07/11 0400	0	-12	+39	+29	Y	...	2	30	400	460	5	2
2001/07/13 1700	2001/07/13 1700	2001/07/14 0100	0	0	N	...	2	20	400	420	8	1
2001/08/03 0716	2001/08/03 1100	2001/08/03 1400	0	+20	Y	...	3	60 S	420	440	10	0
2001/08/15 0500	2001/08/15 0500	2001/08/16 1400	ns	ns	N	...	3W	0	390	450	5	0
2001/08/17 1103	2001/08/17 2000	2001/08/19 1600	0	0	Y	...	2	150 S	500	600	11	0
2001/08/30 1411	2001/08/30 1700	2001/08/31 1000	0	0	Y	...	3W	50 S	420	500	6	1
2001/09/01 1300	2001/09/01 1300	2001/09/02 2200	0	0	N	...	2	0	360	410	5	1
2001/09/13 0231(W)	2001/09/13 1800	2001/09/14 2200	0	4	Y	...	2	30 S	410	440	10	1
2001/09/23 2000	2001/09/24 0000	2001/09/24 2200	+8	-4	N	...	3W	30	440	530	7	1
2001/09/25 0000	2001/09/25 0600	2001/09/25 2000	0	0	SEP	...	2	30	380	400	5	0
2001/09/29 0940	2001/09/29 1100	2001/10/01 0000	+10	0	Y	...	2	180 S	560	700	12	1
2001/09/30 1924	2001/10/01 0800	2001/10/02 0000	ns	ns	Y	...	2	80 S	490	550	9	0
2001/10/01 2115(S)	2001/10/02 0400	2001/10/02 1200	0	0	Y	...	2	40	490	520	8	0
2001/10/02 1200	2001/10/02 1400	2001/10/03 1600	0	+8	+11	0	Y	...	2	30	500	530	12	2H
2001/10/04 1400	2001/10/04 1400	2001/10/05 1900	nc	nc	N	...	3	0	420	470	3	0
2001/10/11 1701	2001/10/12 0400	2001/10/12 0900	-7	0	Y	...	2	180 S	560	570	22	1
2001/10/21 1648	2001/10/21 2000	2001/10/25 1000	0	0	Y	...	1	250 S	460	680	9	0
2001/10/26 2200	2001/10/27 0300	2001/10/28 1200	0	nc	Y	...	3	20	420	500	10	0
2001/10/28 0319	2001/10/29 2200	2001/10/31 1300	-6	+7	N	...	2	150 S	360	510	5	0
2001/10/31 1348	2001/10/31 2000	2001/11/02 1200	ns	ns	0	-2	Y	...	2	60 S	330	390	11	2
2001/11/05 1000	2001/11/05 1900	2001/11/06 0600	0	0	SEP	...	2	30	420	430	18	1
2001/11/06 0152	2001/11/06 1200	2001/11/09 0300	0	-39	Y	...	2	300 S	600	750	7	1
2001/11/19 1815	2001/11/19 2200	2001/11/21 1300	0	0	Y	...	3W	130 S	430	570	6	1
2001/11/24 0656	2001/11/24 1400	2001/11/25 2000	0	-6	0	-6	Y	...	2	550 S	720	1040	14	2
2001/12/28 0000	2001/12/28 0000	2001/12/29 1200	+5	-6	Y	...	2	10	360	370	8	0
2001/12/29 0538	2001/12/30 0000	2001/12/30 1800	-14	-6	N	...	3	90 S	400	460	16	1
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2002/02/28 0451	2002/02/28 1700	2002/03/02 0000	0	+16	0	-14	Y	N	2	80 S	390	410	11	2H
2002/03/18 1322	2002/03/19 0500	2002/03/20 1600	0	0	+18	0	Y	N	2	160 S	380	470	15	2
2002/03/20 1328	2002/03/21 1400	2002/03/22 0600	0	-8	Y	...	3	210 S	440	580	8	0
2002/03/23 1137	2002/03/24 1200	2002/03/25 2000	0	+4	0	+2	Y	...	2	70 S	450	500	15	2
2002/04/12 0100	2002/04/12 0100	2002/04/13 1300	0	0	N	N	3W	0	420	450	8	1
2002/04/17 1107	2002/04/17 1600	2002/04/19 1500	0	0	+11	-13	Y	...	1	150 S	480	610	14	2
2002/04/19 0835	2002/04/20 0000	2002/04/21 1800	0	-6	+12	0	Y	...	1	200 S	500	640	8	2
2002/05/11 1014	2002/05/11 1500	2002/05/12 0000	0	0	N	...	2	90 S	430	440	15	1
2002/05/20 0340	2002/05/20 1000	2002/05/21 2200	-7	-8	Y	Y	3	70 S	420	510	7	1

Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2002/05/23 1050	2002/05/23 2000	2002/05/25 1800	+3	-25	Y	...	2	400 S	590	920	11	2
2002/07/17 1603	2002/07/18 1200	2002/07/19 0900	0	nc	Y	N	3	100 S	460	520	6	1
2002/07/19 1450(A)	2002/07/20 0200	2002/07/22 0600	0	0	Y	...	2	650 S	650	930	7	0
2002/07/31 1100	2002/07/31 2200	2002/08/01 0900	0	nc	Y	...	3	40	410	460	10	0
2002/08/01 0510	2002/08/01 0900	2002/08/01 2300	+2	+5	+3	0	N	...	2	70 S	450	460	12	2
2002/08/01 2309	2002/08/02 0600	2002/08/04 0200	0	0	+3	-29	Y	...	2	60 S	460	520	10	2
2002/08/18 1846	2002/08/19 1200	2002/08/21 1400	-7	+38	Y	...	2	160 S	460	580	8	1
2002/08/29 2100	2002/08/29 2100	2002/08/30 0600	+6	nc	N	...	2W	0	400	420	8	1
2002/09/07 1200	2002/09/07 1200	2002/09/08 0400	0	0	Y	N	2	0	380	400	8	1
2002/09/07 1636	2002/09/08 0400	2002/09/08 2000	nc	0	Y	...	2	170 S	470	550	11	0
2002/09/08 2000	2002/09/08 2200	2002/09/10 2100	+18	+15	N	...	2	50	440	520	9	1
2002/09/19 0600	2002/09/19 2000	2002/09/20 2100	0	ns	Y	Y	2	80	520	750	5	0
2002/09/30 0815	2002/09/30 2000	2002/10/01 1500	0	+12	+2	-2	Y	...	2	70 S	390	410	23	2
2002/10/02 2210(A)	2002/10/03 0100	2002/10/04 1800	0	+6	N	...	2	80 S	430	520	11	1
2002/11/16 2305(A)	2002/11/17 1000	2002/11/19 1200	0	nc	Y	...	2	20 S	380	500	10	1
2002/12/17 1800	2002/12/17 1800	2002/12/19 1200	0	0	Y	N	2	0	380	430	14	0
2002/12/20 1700	2002/12/21 0300	2002/12/22 1900	0	0	N	Y	2	30	440	540	11	0
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2003/01/26 0000	2003/01/27 0100	2003/01/28 1400	-4	+7	0	-23	Y	...	2	60	500	720	9	2H
2003/02/01 1305(A)	2003/02/01 1900	2003/02/03 0700	...	0	Y	...	2	340 S	510	760	11	0
2003/02/17 2150(A)	2003/02/18 0400	2003/02/19 1600	0	0	Y	...	1	70 S	600	700	8	0
2003/03/20 0440	2003/03/20 1200	2003/03/20 2200	0	0	0	0	Y	...	1	100 S	650	810	11	2
2003/05/09 0455(A)	2003/05/09 0700	2003/05/11 0000	0	+12	N	...	2	100 S	680	900	8	1
2003/05/29 1224	2003/05/29 1300	2003/05/29 1800	0	nc	Y	...	3	70 S	650	680	10	1
2003/05/29 1825(A)	2003/05/30 0200	2003/05/30 1600	nc	0	Y	...	3	120 S	600	760	20	1
2003/05/30 1600(A)	2003/05/30 2200	2003/06/01 0100	-3	-19	Y	...	3	220 S	680	780	7	0
2003/06/15 1500	2003/06/15 2000	2003/06/16 2100	+6	0	Y	...	3	80	510	590	10	1
2003/06/16 1800	2003/06/17 1000	2003/06/18 0800	0	0	+8	0	N	...	3	80	480	540	10	2
2003/07/23 1400	2003/07/23 1400	2003/07/24 1600	0	0	N	...	2	90	430	500	6	1
2003/08/04 1700	2003/08/04 2200	2003/08/06 0200	+5	0	Y	...	2	0	440	500	9	1
2003/08/15 1200	2003/08/16 0200	2003/08/17 1600	-9	0	N	...	2	70	490	620	7	1
2003/08/17 1421	2003/08/18 0100	2003/08/19 1500	0	+18	+10	-10	Y	...	1	80 S	450	530	18	2
2003/10/21 2200	2003/10/22 0200	2003/10/24 1500	0	nc	Y	...	2	100	520	740	9	1
2003/10/24 1524	2003/10/24 2100	2003/10/25 1200	nc	nc	Y	Y	2	140 S	560	600	21	1
2003/10/25 1100	2003/10/25 1400	2003/10/26 0400	nc	Y	...	3	40	490	610	13	0
2003/10/26 1908	2003/10/26 2200	2003/10/28 0000	0	0	Y	...	2	90 S	470	540	10	1
2003/10/28 0206	2003/10/28 0230	2003/10/28 0900	ns	ns	Y	N	1	130 S	610	620	19	0

Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2003/10/29 0611	2003/10/29 1100	2003/10/30 0300	0	nc	0	0	Y	Y	2	900 S	1300	1900	32	2H
2003/10/30 1619(A)	2003/10/31 0200	2003/11/02 0000	0	+24	Y	...	2	750 S	800	1700	9	1
2003/11/20 0803	2003/11/20 1000	2003/11/21 0800	0	+8	0	-6	Y	N	2	240 S	580	700	28	2
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2004/01/09 1500	2004/01/10 0600	2004/01/11 0500	-12	0	N	N	2	60	560	620	10	1
2004/01/22 0137	2004/01/22 0800	2004/01/23 1700	0	-5	Y	Y	2	200 S	560	680	12	0
2004/01/23 1425(A)	2004/01/23 2300	2004/01/25 0400	0	+2	Y	Y	2	60 S	490	550	10	1
2004/02/17 1800	2004/02/17 1800	2004/02/18 1600	...	0	N	N	2	0	440	460	8	0
2004/04/03 0900(A)	2004/04/03 1400	2004/04/05 1800	0	0	+12	-3	Y	N	1	40 S	440	520	15	2
2004/04/26 1604	2004/04/26 1700	2004/04/27 2000	N	...	2	50	460	500	6	1
2004/04/30 1300	2004/05/01 0000	2004/05/01 1200	ns	ns	N	...	2	40	430	450	9	0
2004/05/01 1200	2004/05/01 1500	2004/05/02 2100	0	0	Y	...	2	30	400	430	9	1
2004/07/22 1036	2004/07/22 1800	2004/07/24 0800	0	...	-3	-35	Y	...	2	90 S	560	670	11	2
2004/07/24 0613	2004/07/24 1400	2004/07/25 1500	...	nc	0	0	Y	N	2	90 S	560	610	20	2
2004/07/25 1500	2004/07/25 2000	2004/07/26 2200	nc	Y	Y	2	110	640	680	6	1
2004/07/26 2249	2004/07/27 0200	2004/07/27 2200	0	+10	0	-10	Y	...	1	300 S	870	1000	16	2
2004/08/01 0100	2004/08/01 0900	2004/08/02 0400	0	0	N	...	3	40	440	520	6	1
2004/08/29 0909(W)	2004/08/29 1900	2004/08/30 2200	ns	+10	0	0	N	...	1	40 S	390	440	12	2
2004/09/13 2003	2004/09/14 1500	2004/09/16 1200	-6	0	Y	...	3W	110 S	550	600	6	1
2004/09/17 2100	2004/09/18 1200	2004/09/20 0000	0	0	N	Y	3	20	400	500	6	1
2004/11/07 1827	2004/11/07 2200	2004/11/09 1000	0	nc	+4	-17	Y	Y	1	140 S	630	720	18	2
2004/11/09 1825(W)	2004/11/09 2000	2004/11/11 2300	0	0	0	-36 (2 MCs)	SEP	...	1	170 S	640	810	14	2
2004/11/11 1710	2004/11/12 0800	2004/11/13 2300	0	0	Y	...	2	60	520	670	7	1
2004/12/11 1340	2004/12/12 2200	2004/12/13 1900	0	0	Y	...	2	60	400	580	13	1
2004/12/27 0500	2004/12/27 1600	2004/12/29 0200	+24	0	Y	N	3	80	440	560	7	1
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2005/01/07 0922	2005/01/07 1500	2005/01/08 1200	0	0	N	N	2	60	520	570	17	1
2005/01/08 1700	2005/01/08 2100	2005/01/09 1800	0	-10	N	Y	2	40	460	520	9	1
2005/01/16 1100	2005/01/16 1400	2005/01/17 0700	0	0	Y	N	3	80	520	580	8	1
2005/01/18 2100	2005/01/18 2300	2005/01/20 0300	-2	+10	Y	Y	1	...	800	960	12	0
2005/01/21 1711	2005/01/21 1900	2005/01/22 1700	0	-5	Y	N	2	340 S	810	960	19	0
2005/01/31 0900	2005/01/31 1400	2005/02/02 0900	ns	ns	N	N	2	120	560	660	8	0
2005/02/17 2200(S)	2005/02/18 1400	2005/02/19 0600	0	0	Y	...	1	50	530	580	6	0
2005/02/20 1200	2005/02/20 1200	2005/02/22 0700	ns	ns	N	...	3	0	410	440	5	1
2005/02/22 1000	2005/02/22 1400	2005/02/23 1900	ns	0	N	N	3	30	380	400	9	0
2005/05/15 0238	2005/05/15 0600	2005/05/19 0000	0	0	0	-74	Y	N	2	400 S	630	950	15	2

Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2005/05/20 0300	2005/05/20 0300	2005/05/22 0200	0	+20	+4	-21	N	...	2	30	430	480	10	2
2005/05/28 0436	2005/05/29 0300	2005/05/29 1500	+3	nc	N	...	2	60 S	400	490	11	1
2005/05/29 0952	2005/05/30 0100	2005/05/30 2300	nc	nc	N	...	2	130 S	460	540	15	1
2005/05/30 2300	2005/05/31 0400	2005/06/01 0300	nc	0	N	...	3	30	460	490	4	0
2005/06/12 0745	2005/06/12 1500	2005/06/13 1300	0	0	0	-6	N	...	2	80	480	510	14	2
2005/06/14 1835	2005/06/15 0500	2005/06/16 0900	nc	0	0	0	Y	N	2	100 S	480	560	9	2
2005/06/16 0847	2005/06/16 1700	2005/06/17 1900	0	0	Y	Y	3	230 S	600	680	7	1
2005/07/10 0337	2005/07/10 1000	2005/07/12 0400	0	+28	Y	...	2	80 S	430	480	12	1
2005/07/17 0134	2005/07/17 1400	2005/07/18 2300	ns	ns	0	-19	N	...	2	50 S	420	500	8	2
2005/08/09 0000	2005/08/09 0000	2005/08/09 1900	0	0	Y	...	2	40	480	520	6	1
2005/08/10 0600	2005/08/10 0600	2005/08/10 1100	0	0	N	...	2	20	440	460	8	1
2005/08/23 2000	2005/08/24 0000	2005/08/24 1100	0	0	N	N	3	30	440	460	20	1
2005/08/24 0613	2005/08/24 1400	2005/08/24 2300	0	0	Y	N	3	100 S	660	710	20	1
2005/09/02 1419	2005/09/02 1800	2005/09/03 0400	0	nc	Y	Y	2	110 S	650	680	10	1
2005/09/11 0114	2005/09/11 0500	2005/09/12 0700	0	nc	Y	...	2	300 S	900	1100	10	0
2005/09/12 0605(A)	2005/09/12 2000	2005/09/13 1300	-6	0	Y	...	2	230 S	750	980	7	0
2005/09/13 0900	2005/09/13 1600	2005/09/14 0800	0	ns	Y	...	3	60	630	740	5	0
2005/09/15 0600	2005/09/15 0600	2005/09/16 1800	0	0	Y	...	3	0	680	860	7	1
2005/09/20 1800	2005/09/20 1800	2005/09/21 1800	...	ns	N	N	2W	0	350	390	6	0
2005/10/31 0200	2005/10/31 0200	2005/10/31 1900	ns	ns	0	0	N	...	2	20	360	400	11	2
2005/12/31 0000	2005/12/31 0400	2006/01/01 1700	0	+4	+9	-6	Y	...	2	30	480	580	8	2
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2006/02/05 2000	2006/02/05 2000	2006/02/06 1200	ns	+3	0	0	N	...	2	30	340	360	10	2
2006/04/13 1141(S)	2006/04/13 1500	2006/04/14 0700	0	0	0	+2 (2 MCs)	Y	...	2	120	520	550	18	2
2006/04/14 1300	2006/04/14 1300	2006/04/14 2100	0	0	N	...	2	20	500	540	9	0
2006/07/09 2136	2006/07/10 2100	2006/07/11 1900	0	0	N	...	1	100 S	380	430	8	0
2006/08/19 1131	2006/08/20 1300	2006/08/21 1600	-7	+14	N	...	2	90 S	400	470	8	0
2006/08/30 2000	2006/08/30 2000	2006/09/01 0700	...	ns	0	-16	Y	...	3	0	400	440	8	2
2006/09/30 0300	2006/09/30 0800	2006/09/30 2000	ns	ns	0	0	N	...	3	90	400	440	15	2
2006/11/01 1700	2006/11/01 1700	2006/11/02 1400	ns	ns	Y	...	3W	0	380	410	5	0
2006/11/18 1000	2006/11/18 1000	2006/11/20 0200	N	...	3W	30	400	430	9	0
2006/11/28 1300	2006/11/29 0500	2006/11/30 1000	0	0	N	...	3	20	420	500	12	2
2006/12/14 1414	2006/12/14 2200	2006/12/15 1300	0	+7	0	+7	Y	...	1	320 S	740	900	13	2
2006/12/15 2000	2006/12/15 2000	2006/12/16 1900	0	N	...	2	90	620	650	3	0
2006/12/16 1755	2006/12/17 0000	2006/12/17 1700	...	+24	N	...	3	70 S	580	680	4	0
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)

Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2007/01/14 1248	2007/01/14 1200	2007/01/15 0700	ns	ns	N	...	1	60	360	380	12	2
2007/11/19 1811	2007/11/19 2300	2007/11/20 1200	-4	0	0	0	Y	...	1	30	460	480	18	2
2008/09/17 0000	2008/09/17 0400	2008/09/18 0800	0	0	Y	...	2	10	400	490	6	1
2008/12/04 0400	2008/12/04 1200	2008/12/05 1100	N	...	3	40	390	510	7	1
2008/12/16 1159	2008/12/17 0300	2008/12/17 1400	ns	ns	N	...	3	30	350	380	9	2
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2009/01/18 2100	2009/01/19 0200	2009/01/19 0500	0	0	N	...	2	40	430	450	12	1
2009/01/25 2224	2009/01/26 1000	2009/01/26 1500	Y?	...	3W	50	340	380	10	1
2009/02/03 2000	2009/02/04 0000	2009/02/04 1600	0	+5	2	40	360	380	10	2
2009/06/03 1600	2009/06/04 0200	2009/06/05 1600	ns	ns	Y	...	3W	20	310	330	5	1
2009/06/27 1400	2009/06/27 1600	2009/06/28 1600	ns	ns	Y	...	2	30	390	420	7	1
2009/07/20 1400	2009/07/21 0100	2009/07/22 0400	ns	ns	Y	...	2	20	330	350	8	1
2009/09/30 0100	2009/09/30 0600	2009/10/01 0000	ns	ns	Y	...	3	50	340	360	7	1
2009/10/29 0500	2009/10/29 0500	2009/10/29 2300	ns	ns	Y	...	3	20	370	390	11	2
2009/11/13 2000	2009/11/14 1000	2009/11/15 0000	ns	ns	Y	...	2	20	310	330	7	1
2009/12/12 0651	2009/12/12 2000	2009/12/13 2200	ns	ns	Y	...	2	30	270	300	6	1
2009/12/19 1000	2009/12/19 1300	2009/12/20 1700	ns	ns	Y	...	3W	20	380	430	4	0
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2010/01/01 2200	2010/01/01 2200	2010/01/03 1000	...	ns	Y	...	1	10	290	310	7	1
2010/02/07 1700	2010/02/07 1800	2010/02/08 2200	...	ns	Y	...	1	20	370	410	9	2
2010/02/11 0000	2010/02/11 0800	2010/02/12 0300	ns	ns	N	...	3	70	360	380	7	0
2010/02/19 1500	2010/02/19 1500	2010/02/20 1800	...	ns	N	...	2	0	440	500	6	0
2010/02/21 0000	2010/02/21 0000	2010/02/22 0000	ns	ns	N	...	2	0	370	380	7	0
2010/02/22 1300	2010/02/22 1300	2010/02/22 2200	ns	ns	N	...	2	10	360	370	7	1
2010/04/05 0826	2010/04/05 1200	2010/04/06 1400	0	0	Y	...	1	200	640	790	9	2
2010/04/09 1800	2010/04/09 1800	2010/04/10 1600	ns	ns	N	...	3W	30	430	470	4	1
2010/04/11 1304	2010/04/12 0100	2010/04/12 1500	0	+3	N	...	1	60	410	460	11	2
2010/04/30 0600	2010/04/30 0600	2010/05/01 1200	N	...	3	20	380	400	4	0
2010/05/28 0258	2010/05/28 1900	2010/05/29 1700	0	0	Y	...	2	60	360	390	14	2
2010/06/20 2000	2010/06/21 0600	2010/06/22 1400	ns	ns	Y	...	2	20	360	410	6	1
2010/08/03 1741	2010/08/04 1000	2010/08/05 0000	0	0	Y	...	2	140	530	590	9	2
2010/10/30 1015	2010/10/31 0500	2010/11/01 2100	ns	ns	Y	...	3	30	340	380	9	1
2010/12/28 0300	2010/12/28 0300	2010/12/28 1500	ns	ns	N	...	2	0	350	360	10	2
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2011/01/24 0700	2011/01/24 1000	2011/01/25 1200	N	...	2	30	350	400	7	1
2011/02/04 1300	2011/02/04 1300	2011/02/04 2000	0	0	Y	...	2	20	430	470	15	2

Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2011/02/18 0130	2011/02/18 1900	2011/02/20 0800	-15	+36	Y	...	2	130	470	600	10	1
2011/03/06 0331	2011/03/06 0900	2011/03/08 0600	ns	ns	Y	...	3	50	430	530	6	0
2011/03/29 1602	2011/03/29 2300	2011/03/31 0400	ns	ns	Y	...	2	50	360	390	12	2
2011/05/28 0100	2011/05/28 0500	2011/05/28 2100	N	...	1	60	510	540	11	2
2011/06/04 2045	2011/06/05 0200	2011/06/05 1900	0	0	Y	...	1	120	510	560	12	2
2011/06/17 0241	2011/06/17 0500	2011/06/17 1300	0	0	Y	...	2	80	500	550	9	1
2011/07/06 0258	2011/07/06 1700	2011/07/07 1200	Y	...	2	30	360	410	5	1
2011/07/14 1200	2011/07/15 0400	2011/07/16 1500	Y	...	2	40	410	530	4	0
2011/08/04 2153	2011/08/05 0500	2011/08/05 1400	N	...	3	70	430	440	5	1
2011/08/05 1751	2011/08/06 2200	2011/08/07 2200	Y	...	1	180	540	610	4	1
2011/09/08 1000	2011/09/08 1000	2011/09/09 1200	N	...	2	0	320	340	2	1
2011/09/09 1242	2011/09/10 0300	2011/09/10 1500	Y	...	2	150	470	530	14	2
2011/09/16 1900	2011/09/16 1900	2011/09/17 0500	N	...	2	10	390	420	4	0
2011/09/17 0343	2011/09/17 1400	2011/09/18 0600	N	...	2	70	430	590	11	2
2011/09/18 1000	2011/09/18 1200	2011/09/18 2100	N	...	1	40	440	480	5	1
2011/09/22 0300	2011/09/22 1500	2011/09/23 0300	N	...	3	20	390	420	5	1
2011/09/26 1234	2011/09/26 2000	2011/09/28 1500	Y	...	2	130	580	700	7	0
2011/10/05 0736	2011/10/05 1000	2011/10/05 2200	Y	...	2	90	450	460	12	1
2011/10/06 1200	2011/10/06 1200	2011/10/06 2300	N	...	1	10	370	380	11	2
2011/10/07 0247	2011/10/07 0200	2011/10/07 1700	Y	...	3	0	380	390	4	0
2011/10/22 2100	2011/10/22 2100	2011/10/23 1600	N	...	3	0	290	310	6	1
2011/10/24 1831	2011/10/24 2200	2011/10/25 1600	0	0	Y	...	2	150	460	510	21	2
2011/10/30 1001	2011/10/31 0100	2011/10/31 1500	N	...	3	30	410	420	6	0
2011/11/01 0907	2011/11/02 0100	2011/11/03 0400	Y	...	3	70	380	430	6	1
2011/11/07 1500	2011/11/07 1700	2011/11/07 2300	0	0	N	...	2	20	330	350	10	2
2011/11/12 0559	2011/11/13 1000	2011/11/15 0200	Y	...	3	80	370	460	5	1
2011/11/28 2150	2011/11/29 0000	2011/11/29 0800	0	0	Y	...	3	100	450	510	15	2
2011/12/02 1717	2011/12/02 1800	2011/12/03 0700	N	...	3	0	400	420	7	1
2011/12/25 0200	2011/12/25 0200	2011/12/25 1700	Y	...	2	0	360	370	4	1
2011/12/29 2200	2011/12/29 2200	2011/12/30 0900	Y	...	3	0	400	420	7	1
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2012/01/21 0501	2012/01/21 0600	2012/01/22 0800	N	...	2	30	320	330	10	2
2012/01/22 0611	2012/01/22 2300	2012/01/23 0700	Y	...	3	50	450	460	9	2
2012/02/14 0700	2012/02/14 2100	2012/02/16 0600	N	...	3	40	370	400	9	1
2012/02/16 0700	2012/02/16 1400	2012/02/18 0000	Y	...	3	20	320	380	5	1
2012/02/26 2139	2012/02/27 1900	2012/02/28 1600	Y	...	3	80	440	490	13	2
2012/02/29 0500	2012/02/29 0500	2012/03/01 0000	Y	...	3	20	440	450	7	1

Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2012/03/02 2100	2012/03/02 2100	2012/03/04 0200	N	...	3	0	390	420	6	1
2012/03/06 0800	2012/03/06 0800	2012/03/06 1500	Y	...	3W	0	370	380	11	1
2012/03/08 1103	2012/03/09 0300	2012/03/11 0700	Y	...	2	270	550	890	7	1
2012/03/15 1306	2012/03/15 1700	2012/03/16 1000	N	...	3	170	680	760	9	1
2012/04/23 0320	2012/04/23 1700	2012/04/24 0500	1	60	370	390	13	2
2012/04/25 1700	2012/04/26 0000	2012/04/27 1800	Y	...	3	70	540	710	5	0
2012/05/16 1600	2012/05/16 1600	2012/05/17 2200	Y	...	2	0	370	390	10	2
2012/06/08 0700	2012/06/08 1000	2012/06/10 1400	2	30	480	600	5	0
2012/06/16 2019	2012/06/16 2300	2012/06/17 1200	Y	...	1	80	440	510	28	2
2012/07/04 1900	2012/07/05 0000	2012/07/06 0800	Y	...	3	50	470	540	8	1
2012/07/08 0800	2012/07/09 0000	2012/07/09 1400	Y	...	2	20	410	450	12	2
2012/07/14 1809	2012/07/15 0600	2012/07/17 0500	1	220	490	670	16	2
2012/07/21 1612	2012/07/22 1100	2012/07/23 1600	N	...	3	50	460	520	5	0
2012/09/01 0600	2012/09/01 0700	2012/09/03 1500	2	20	310	330	8	1
2012/09/03 1213	2012/09/04 1100	2012/09/05 0200	2	120	430	440	9	0
2012/09/04 2245	2012/09/05 0600	2012/09/05 1800	N	...	2	40	500	540	10	2
2012/09/06 0200	2012/09/06 0200	2012/09/06 1500	Y	...	1	0	420	420	10	2
2012/09/30 1131	2012/09/30 1400	2012/09/30 2000	3	30	310	310	8	0
2012/09/30 2305	2012/10/01 0000	2012/10/02 0000	Y	...	3	70	370	410	14	2
2012/10/02 2200	2012/10/02 2200	2012/10/03 0600	N	...	3	0	320	320	6	1
2012/10/08 0516	2012/10/08 1800	2012/10/09 1200	1	70	390	420	16	2
2012/10/12 1900	2012/10/12 2200	2012/10/13 1000	2	40	490	530	11	2
2012/10/31 1538	2012/11/01 0000	2012/11/02 0300	Y	...	1	70	340	370	11	2
2012/11/09 0300	2012/11/09 0300	2012/11/09 1500	N	...	2	0	370	380	2	1
2012/11/12 2311	2012/11/13 0800	2012/11/14 0300	Y	...	1	50	380	460	21	2
2012/11/23 2152	2012/11/24 1200	2012/11/25 1000	Y	...	2	70	380	410	12	1
2012/11/26 0512	2012/11/26 1200	2012/11/28 0500	N	...	3	90	450	530	6	0
2012/11/28 1800	2012/11/28 1800	2012/11/29 1400	N	...	3	20	360	380	4	0
2012/12/14 0200	2012/12/14 0700	2012/12/14 1700	Y	...	3	30	330	330	7	2
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2013/01/17 1600	2013/01/17 1600	2013/01/18 1200	Y	...	2	0	390	400	12	2
2013/01/18 1237	2013/01/19 0000	2013/01/19 1700	N	...	2	40	430	460	5	1
2013/02/13 1700	2013/02/14 0800	2013/02/16 1400	N	...	3	20	360	400	4	0
2013/02/16 1209	2013/02/17 1000	2013/02/17 1900	N	...	2	60	360	410	7	1
2013/03/17 0559	2013/03/17 1500	2013/03/19 1600	N	...	1	230	520	720	9	2
2013/03/20 1700	2013/03/20 1800	2013/03/20 2200	N	...	3	110	520	640	9	1
2013/04/13 2254	2013/04/14 1700	2013/04/15 2300	Y	...	2	100	410	520	9	2

Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2013/04/30 0949	2013/04/30 1200	2013/05/01 0700	Y	...	1	50	400	430	10	2
2013/05/01 0900	2013/05/01 1100	2013/05/01 1800	N	...	2	30	430	460	10	1
2013/05/25 2000	2013/05/25 2300	2013/05/26 2200	Y	...	1	140	660	750	7	0
2013/06/06 0255	2013/06/06 1400	2013/06/08 0000	Y	...	1	30	430	510	11	2
2013/06/08 0600	2013/06/08 1000	2013/06/08 2000	Y	...	2	20	430	450	3	1
2013/06/27 1438	2013/06/28 0200	2013/06/29 1200	Y	...	1	70	390	450	10	2
2013/07/05 0100	2013/07/05 0100	2013/07/07 1600	Y	...	2	10	350	370	10	2
2013/07/12 1714	2013/07/13 0500	2013/07/15 0000	Y	...	1	60	430	500	13	2
2013/08/20 2227	2013/08/21 0800	2013/08/21 1400	N	...	3	30	460	470	7	1
2013/08/22 1926	2013/08/23 2000	2013/08/25 0300	Y	...	3	40	470	570	6	1
2013/08/24 0003(S)	2013/08/25 0300	2013/08/26 0300	Y	...	3	30	400	520	4	1
2013/10/02 0154	2013/10/02 2300	2013/10/03 2200	Y	...	1	220	470	630	7	2
2013/10/08 2020	2013/10/09 0900	2013/10/11 0000	Y	...	1	100	480	650	6	0
2013/11/08 2200	2013/11/08 2200	2013/11/09 0700	N	...	3	0	420	460	12	2
2013/11/11 1700	2013/11/11 1700	2013/11/12 0300	Y	...	2	0	460	480	7	1
2013/11/30 2000	2013/12/01 1100	2013/12/02 2300	Y	...	2	50	450	540	9	2
2013/12/15 1300	2013/12/15 1600	2013/12/16 0500	Y	...	2	30	460	500	7	2
2013/12/24 2100	2013/12/25 0500	2013/12/25 1700	Y	...	2	30	300	330	11	2
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2014/02/05 1400	2014/02/06 0300	2014/02/07 1700	Y	...	2	50	370	400	7	0
2014/02/07 1705	2014/02/08 0100	2014/02/09 1200	Y	...	2	110	420	460	9	2
2014/02/10 1800	2014/02/11 1200	2014/02/13 1000	Y	...	2	60	430	560	6	1
2014/02/15 1316	2014/02/16 0500	2014/02/16 1600	Y	...	2	100	380	450	15	2
2014/02/17 0300	2014/02/17 0300	2014/02/17 1600	Y	...	3W	0	400	410	6	1
2014/02/18 0640	2014/02/18 1500	2014/02/19 0700	Y	...	2	60	400	410	8	1
2014/02/19 0348	2014/02/19 1200	2014/02/20 0300	Y	...	1	60	520	530	11	2
2014/02/20 0318	2014/02/21 0200	2014/02/22 1200	Y	...	2	180	490	690	6	0
2014/04/05 1000	2014/04/05 2200	2014/04/07 0500	Y	...	2	40	380	500	13	2
2014/04/11 0600	2014/04/11 0600	2014/04/12 2000	Y	...	3	10	350	380	5	2
2014/04/18 1900	2014/04/18 1900	2014/04/20 0000	Y	...	2	0	490	500	8	0
2014/04/19 1836	2014/04/20 0100	2014/04/20 1200	Y	...	2	30	510	530	5	1
2014/04/20 1056	2014/04/21 0700	2014/04/22 0900	Y	...	2	200	540	700	6	1
2014/04/29 2000	2014/04/29 2000	2014/04/30 2100	Y	...	3	0	310	320	9	2
2014/06/07 1652	2014/06/08 2000	2014/06/10 1700	Y	...	2	60	480	610	9	0
2014/08/19 0657	2014/08/19 1600	2014/08/21 0500	Y	...	1	40	360	440	17	2
2014/09/12 1553	2014/09/12 2200	2014/09/14 0200	Y	...	1	230	600	720	20	2
2014/09/17 0200	2014/09/17 0200	2014/09/18 2000	Y	...	2	0	310	320	9	1

Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)	Comp. Start, End (Hrs wrt. Plasma/Field) (c)	MC Start, End (Hrs wrt. Plasma/Field) (d)	BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)		
2014/11/10 0220	2014/11/11 0700	2014/11/11 2000	N	...	3	50	480	520	9	0
2014/12/21 1911	2014/12/22 0400	2014/12/22 1700	Y	...	2	70	380	430	16	2
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)	Comp. Start, End (Hrs wrt. Plasma/Field) (c)	MC Start, End (Hrs wrt. Plasma/Field) (d)	BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)		
2015/01/02 0717	2015/01/02 1500	2015/01/02 2200	Y	...	3	20	390	450	8	1
2015/01/03 1400	2015/01/03 1400	2015/01/04 1600	Y	...	2	10	430	460	9	1
2015/01/07 0616	2015/01/07 0700	2015/01/07 2000	Y	...	1	30	450	470	16	2
2015/03/16 1400	2015/03/16 1400	2015/03/16 2300	Y	...	3	30	420	440	11	0
2015/03/17 0445	2015/03/17 1300	2015/03/18 0500	Y	...	1	90	560	620	20	2
2015/03/21 2054	2015/03/22 0200	2015/03/22 2000	Y	...	3	70	640	700	8	0
2015/03/28 0000	2015/03/28 1100	2015/03/29 1100	Y	...	2	10	390	420	13	2
2015/03/29 1500	2015/03/29 1900	2015/03/30 1200	Y	...	3	20	360	390	6	0
2015/03/31 0832	2015/03/31 1800	2015/04/01 1000	Y	...	2	40	400	420	13	2
2015/04/09 1011	2015/04/09 1100	2015/04/09 2200	N	...	3	30	380	390	12	0
2015/04/10 0000	2015/04/10 1300	2015/04/11 0900	Y	...	1	40	380	450	13	2
2015/05/06 0141	2015/05/06 1200	2015/05/07 2100	Y	...	1	80	420	470	13	2
2015/05/07 2100	2015/05/07 2100	2015/05/09 0400	Y	...	1	0	390	400	6	0
2015/05/10 1200	2015/05/10 1200	2015/05/11 0200	N	...	2	0	370	400	11	2
2015/05/18 1900	2015/05/18 2000	2015/05/19 0200	Y	...	3	40	460	480	16	2
2015/06/22 1833	2015/06/23 0200	2015/06/24 1400	Y	...	2	190	610	740	14	1
2015/06/24 1329	2015/06/25 1000	2015/06/26 0600	Y	...	2	170	550	720	5	0
2015/06/26 0600	2015/06/26 1200	2015/06/27 0200	Y	...	3	50	490	560	5	1
2015/07/13 0138	2015/07/13 0600	2015/07/14 1500	Y	...	2	40	490	650	8	0
2015/08/07 0600	2015/08/07 1600	2015/08/08 1400	N	...	2	10	510	560	9	0
2015/08/15 0829	2015/08/15 2100	2015/08/16 0800	Y	...	2	10	500	510	12	1
2015/08/26 0800	2015/08/26 0800	2015/08/28 1000	Y	...	2	20	370	420	11	1
2015/09/07 1400	2015/09/08 0000	2015/09/09 1500	Y	...	1	190	460	600	15	2
2015/09/13 0700	2015/09/13 0700	2015/09/13 1800	Y	...	3	10	460	480	5	0
2015/09/20 0604	2015/09/21 0800	2015/09/22 0100	Y	...	2	120	510	600	5	0
2015/10/24 1854	2015/10/25 1400	2015/10/27 0400	Y	...	2	60	430	490	7	1
2015/11/04 0355	2015/11/04 1500	2015/11/04 1900	Y	...	2	70	640	740	8	1
2015/11/06 1818	2015/11/07 0600	2015/11/08 1600	N	...	1	90	500	680	13	2
2015/12/19 1616	2015/12/20 0300	2015/12/21 2000	Y	...	1	110	400	490	15	2
2015/12/31 0050	2015/12/31 1700	2016/01/02 1100	Y	...	2	90	440	480	10	2
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)	Comp. Start, End (Hrs wrt. Plasma/Field) (c)	MC Start, End (Hrs wrt. Plasma/Field) (d)	BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)		
2016/01/18 2157	2016/01/19 1000	2016/01/21 0000	Y	...	2	70	370	400	14	2
2016/01/24 1400	2016/01/24 1800	2016/01/26 1800	Y	...	2	30	410	490	5	1

Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2016/03/05 1000	2016/03/05 1900	2016/03/06 1500	N	...	2	10	360	370	12	2
2016/03/20 0700	2016/03/20 1400	2016/03/21 0400	N	...	3	20	400	430	7	1
2016/04/14 0735	2016/04/14 0900	2016/04/15 0400	Y	...	3	30	420	480	8	1
2016/04/17 0300	2016/04/17 0300	2016/04/18 0800	N	...	3	0	400	440	5	1
2016/07/19 2305	2016/07/20 0700	2016/07/22 1500	Y	...	1	110	440	570	10	2
2016/07/24 1500	2016/07/24 2100	2016/07/25 1600	Y	...	1	50	430	450	7	2
2016/07/25 2200	2016/07/25 2200	2016/07/26 1000	Y	...	2	0	370	390	4	0
2016/08/02 1400	2016/08/02 1400	2016/08/03 0300	Y	...	2	10	420	460	20	2
2016/10/12 2212	2016/10/13 0600	2016/10/14 1600	Y	...	1	80	390	460	19	2
2016/11/04 1800	2016/11/04 1800	2016/11/05 2100	Y	...	3W	0	350	360	4	0
2016/11/09 0604	2016/11/10 0000	2016/11/10 1600	N	...	2	50	360	370	11	2
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2017/04/04 0100	2017/04/04 0400	2017/04/04 1400	Y	...	3	20	410	420	13	2
2017/04/09 0000	2017/04/09 0000	2017/04/10 0800	Y	...	3	0	470	520	7	1
2017/04/13 1500	2017/04/14 0000	2017/04/15 0000	Y	...	2	50	380	450	6	1
2017/05/27 1534	2017/05/27 2200	2017/05/29 1400	Y	...	1	80	360	390	16	2
2017/07/16 0559	2017/07/16 1500	2017/07/17 2000	Y	...	1	90	520	620	13	2
2017/08/21 2200	2017/08/22 0400	2017/08/23 1800	Y	...	3	50	500	620	5	1
2017/09/06 2347	2017/09/07 2000	2017/09/08 0400	Y	...	2	170	490	580	10	1
2017/09/07 2302	2017/09/08 1100	2017/09/10 2100	Y	...	1	220	590	800	7	1
2017/12/25 0000	2017/12/25 0000	2017/12/26 0400	N	...	3W	0	480	550	7	1
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2018/03/09 1809	2018/03/09 2200	2018/03/11 0000	Y	...	1	80	410	450	14	2
2018/05/13 0600	2018/05/13 0600	2018/05/13 1400	Y	...	3	0	430	440	10	1
2018/06/06 1100	2018/06/06 1100	2018/06/07 1000	Y	...	2	0	400	440	9	2
2018/06/25 0910	2018/06/25 1000	2018/06/26 0500	Y	...	2	0	420	430	7	1
2018/06/30 1300	2018/06/30 2000	2018/07/02 1000	Y	...	3	40	390	460	3	1
2018/07/10 1200	2018/07/10 1200	2018/07/11 1100	Y	...	2	0	330	360	9	2
2018/08/25 0200	2018/08/25 1200	2018/08/26 1200	Y	...	2	30	410	440	16	2
2018/09/23 0400	2018/09/23 0400	2018/09/24 0000	Y	...	3	0	440	460	8	0
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2019/05/07 2200	2019/05/07 2200	2019/05/09 0400	N	...	3	0	320	330	3	0
2019/05/10 1754	2019/05/11 0600	2019/05/13 0700	Y	...	2	40	350	380	8	1
2019/05/13 2326	2019/05/14 0600	2019/05/15 1600	Y	...	2	60	470	560	8	2
2019/05/16 2100	2019/05/16 2300	2019/05/18 0800	Y	...	3	30	450	480	6	1
2019/05/26 2214	2019/05/27 0400	2019/05/28 0000	Y	...	1	60	350	370	10	2

Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2019/10/29 2000	2019/10/29 2000	2019/10/30 2100	Y	...	2	20	380	410	10	2
2019/11/11 0600	2019/11/11 1000	2019/11/12 1200	Y	...	3	60	360	380	12	2
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2020/01/04 1000	2020/01/04 1000	2020/01/05 0600	Y	...	2	0	370	400	8	2
2020/04/20 0231	2020/04/20 0900	2020/04/21 0400	Y	...	1	50	330	360	15	2
2020/10/05 0806	2020/10/05 1700	2020/10/06 1400	Y	...	2	20	350	370	10	2
2020/12/10 0210	2020/12/10 2300	2020/12/13 0400	Y	...	2	110	440	570	5	0
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2021/02/23 0200	2021/02/23 0800	2021/02/24 1500	Y	...	3W	40	510	590	5	0
2021/05/12 0637	2021/05/12 1500	2021/05/14 2000	Y	...	2	120	410	500	8	2
2021/05/26 1244	2021/05/26 2200	2021/05/29 0500	Y	...	3	40	410	430	9	0
2021/07/05 0141	2021/07/05 0400	2021/07/06 0200	Y	...	2	20	340	350	7	2
2021/08/27 0114	2021/08/27 1200	2021/08/28 1500	Y	...	1	40	380	420	12	2
2021/09/27 0000	2021/09/27 0000	2021/09/27 2100	Y	...	2	10	390	400	10	2
2021/10/01 1000	2021/10/01 1100	2021/10/02 1300	Y	...	2	20	480	560	11	2
2021/10/12 0226	2021/10/12 1600	2021/10/14 0000	Y	...	2	60	440	490	6	1
2021/11/03 1942	2021/11/04 0700	2021/11/05 0500	Y	...	1	250	650	770	17	2
2021/11/27 2251	2021/11/28 1000	2021/11/29 0200	Y	...	2	70	370	400	10	2
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2022/01/18 2340	2022/01/19 0500	2022/01/20 0100	Y	...	2	80	610	680	5	1
2022/02/01 2220	2022/02/02 1600	2022/02/03 1100	Y	...	2	110	460	500	14	2
2022/02/03 2341	2022/02/04 0300	2022/02/04 2000	Y	...	2	40	510	570	10	2
2022/02/09 2100	2022/02/10 1300	2022/02/11 1800	N	...	1	30	400	430	13	2
2022/03/13 1047	2022/03/13 2100	2022/03/15 1900	Y	...	2	190	410	540	15	2
2022/03/31 0224	2022/03/31 1200	2022/04/01 1200	Y	...	1	60	490	600	20	2
2022/04/06 2318	2022/04/07 1300	2022/04/08 2200	Y	...	3	40	380	430	8	0
2022/04/12 1122	2022/04/13 0200	2022/04/13 2200	Y	...	2	60	460	510	11	2
2022/04/14 0900	2022/04/14 1300	2022/04/15 0200	Y	...	2	20	520	550	18	2
2022/07/07 0900	2022/07/07 1200	2022/07/08 0800	Y	...	1	30	380	400	19	2
2022/07/08 0200	2022/07/08 1100	2022/07/08 1900	Y	...	2	20	400	410	10	1
2022/07/09 1200	2022/07/09 1400	2022/07/10 1200	Y	...	3	0	370	380	5	0
2022/07/18 2119	2022/07/19 0500	2022/07/20 1100	Y	...	1	100	440	490	10	2
2022/08/19 1731	2022/08/20 0800	2022/08/20 1800	Y	...	3	50	490	700	5	1
2022/08/30 1925	2022/08/30 2200	2022/08/31 2000	Y	...	3W	20	520	580	7	0
2022/09/12 0700	2022/09/12 0700	2022/09/12 2100	Y	...	3W	0	380	400	6	1
2022/10/21 1000	2022/10/21 1000	2022/10/22 1800	N	...	3	10	360	370	9	2

Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2022/11/06 2000	2022/11/07 0300	2022/11/07 1900	Y	...	2	20	390	410	12	2
2022/11/12 1200	2022/11/12 1200	2022/11/13 1200	N	...	3	20	460	470	7	1
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2023/01/03 2100	2023/01/04 0200	2023/01/05 2200	Y	...	1	30	380	430	18	2
2023/02/27 1000	2023/02/27 2000	2023/02/28 1700	N	...	3	110	650	820	10	0
2023/03/01 0000	2023/03/01 0900	2023/03/01 2100	Y	...	2	30	590	700	6	1
2023/03/02 0900	2023/03/02 0900	2023/03/02 2200	N	...	3	20	480	510	8	1
2023/03/12 0600	2023/03/12 0900	2023/03/14 0200	Y	...	3	20	350	390	7	1
2023/03/15 0427	2023/03/15 2100	2023/03/17 0700	Y	...	2	110	490	570	7	0
2023/03/23 0500	2023/03/23 1400	2023/03/24 0700	Y	...	1	30	450	490	20	2
2023/04/18 1402	2023/04/19 0800	2023/04/21 0200	Y	...	1	140	420	620	9	2
2023/04/23 1738	2023/04/24 0100	2023/04/25 1900	Y	...	2	140	520	680	17	2
2023/05/09 2250	2023/05/10 1200	2023/05/12 0600	Y	...	2	120	550	660	6	0
2023/05/12 0633	2023/05/12 1200	2023/05/13 2100	Y	...	2	110	480	580	7	0
2023/05/20 1000	2023/05/20 1000	2023/05/21 1600	Y	...	3W	40	520	590	7	1
2023/07/07 1200	2023/07/07 1200	2023/07/08 1500	Y	...	3W	0	450	500	6	0
2023/07/14 1611	2023/07/14 2000	2023/07/15 1000	Y	...	2	40	380	430	12	1
2023/07/16 1922	2023/07/17 2000	2023/07/19 0400	1	100	500	570	6	1
2023/07/25 2233	2023/07/26 1700	2023/07/28 1100	Y	...	2	110	460	570	7	0
2023/08/05 0255	2023/08/05 1800	2023/08/06 1400	Y	...	3	60	350	440	8	1
2023/09/02 0434	2023/09/02 2000	2023/09/04 0000	Y	...	2	40	490	720	7	0
2023/09/17 0234	2023/09/18 0200	2023/09/19 0000	Y	...	2	70	430	480	10	1
2023/09/18 1331	2023/09/19 0800	2023/09/21 1000	Y	...	3	110	510	640	6	0
2023/09/24 2043	2023/09/25 0900	2023/09/26 1100	Y	...	1	110	440	480	19	2
2023/09/28 2131	2023/09/29 1000	2023/09/30 2300	Y	...	2	70	430	460	6	1
2023/10/05 2225	2023/10/06 1600	2023/10/07 1800	Y	...	2	50	370	490	6	0
2023/11/12 0613	2023/11/12 1200	2023/11/13 1700	Y	...	3	70	460	570	8	1
2023/12/01 0926	2023/12/01 2000	2023/12/03 0000	Y	...	1	100	460	530	14	2
2023/12/15 1148	2023/12/15 2200	2023/12/16 1200	Y	...	3	120	500	510	8	0
2023/12/17 0739	2023/12/17 2200	2023/12/18 1500	Y	...	3	80	470	530	11	0
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2024/01/03 1510	2024/01/03 2100	2024/01/04 1000	Y	...	3	50	450	480	7	1
2024/01/23 2300	2024/01/23 2300	2024/01/25 0600	Y	...	2	20	440	470	4	0
2024/01/26 2000	2024/01/26 2300	2024/01/28 1600	Y	...	2	60	380	470	7	0
2024/03/21 0250	2024/03/21 1500	2024/03/23 0000	Y	...	2	30	360	380	9	0
2024/03/24 1434	2024/03/24 1800	2024/03/26 1000	Y	...	1	250	700	850	14	2

Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2024/04/30 1222	2024/05/01 0000	2024/05/02 0000	Y	...	1	20	380	420	12	2
2024/05/02 1407	2024/05/03 0200	2024/05/05 0400	Y	...	2	40	390	500	4	0
2024/05/10 1705	2024/05/10 2000	2024/05/12 1500	Y	...	2	260	800	960	25	0
2024/05/12 0917	2024/05/12 2100	2024/05/14 0600	Y	...	1	30	660	900	7	1
2024/05/17 1329	2024/05/18 0000	2024/05/19 1800	Y	...	3	90	400	470	7	1
2024/06/28 1014	2024/06/28 1700	2024/06/29 0400	dg	...	2	40	470	490	9	1
2024/07/15 2200	2024/07/15 2200	2024/07/16 1600	Y	...	2	60	350	380	14	2
2024/07/23 2023	2024/07/24 0000	2024/07/25 0100	Y	...	3	50	320	350	12	2
2024/07/30 0003	2024/07/30 0300	2024/07/31 1500	Y	...	2	110	450	500	9	2
2024/07/31 1128	2024/08/01 0000	2024/08/01 1800	Y	...	3	30	430	490	9	0
2024/08/10 1250	2024/08/11 1200	2024/08/14 0000	Y	...	2	0	460	520	18	2
2024/08/17 1423	2024/08/17 1700	2024/08/18 1200	Y	...	2	120	450	470	14	1
2024/08/27 0841	2024/08/27 1600	2024/08/30 0800	Y	...	3	60	310	370	7	2
2024/08/31 1200	2024/08/31 1700	2024/09/01 1000	Y	...	3	30	380	410	11	2
2024/09/02 1800	2024/09/03 0200	2024/09/04 1200	Y	...	3	30	380	470	10	2
2024/09/04 1032	2024/09/4 1400	2024/09/06 0000	Y	...	3	80	390	440	11	1
2024/10/06 0739	2024/10/06 1400	2024/10/07 2000	Y	...	3	80	480	530	13	0
2024/10/08 0000	2024/10/08 0000	2024/10/08 1100	Y	...	3	0	420	440	16	1
2024/10/10 1514	2024/10/10 2200	2024/10/12 0300	Y	...	1	360	690	750	20	2
2024/10/12 0900	2024/10/12 1200	2024/10/14 1800	Y	...	2	80	480	630	5	0
2024/11/29 0305	2024/11/29 1700	2024/12/01 0600	Y	...	3W	70	390	430	9	0
2024/12/17 0517	2024/12/17 0800	2024/12/17 2000	Y	...	1	20	640	660	20	2
2024/12/31 1623	2025/01/01 1000	2025/01/02 0500	Y	...	2	100	510	530	15	0
Disturbance Y/M/D (UT) (a)	ICME Plasma/Field Start, End Y/M/D (UT) (b)		Comp. Start, End (Hrs wrt. Plasma/Field) (c)		MC Start, End (Hrs wrt. Plasma/Field) (d)		BDE? (e)	BIF? (f)	Qual. (g)	dV (km/s) (h)	V_ICME (km/s) (i)	V_max (km/s) (j)	B (nT) (k)	MC? (l)
2025/01/02 0500	2025/01/02 1200	2025/01/03 2200	Y	...	1	30	460	540	7	2

* This table is updated frequently and a more recent version may be available. Contact [Ian Richardson](#).

Footnotes

(a) The time of the associated geomagnetic storm sudden commencement (typically related to the arrival of a shock at Earth) if reported in the NGDC file [storm2.ssc](#) (currently only to 2011) or the [Service International des Indices Geomagnetique](#). Some other SSCs have been identified using abrupt increases in the 1-minute SYM-H geomagnetic index. Otherwise, 'A' indicates the time of shock passage at ACE (e.g., in the [ACE List of Disturbances and Transients](#) or the [Kasper/Stevens Shock list](#)), 'W' indicates the time of a shock at the WIND spacecraft (from the Kasper/Stevens list or inspection of Wind plasma/field data), and 'S' indicates the time of a possible shock identified by the SOHO CELIAS/MTOF/PM ["Shockspotter" program](#). If no shock or SC is reported or evident from these sources, the estimated arrival time of the disturbance (which in some cases is the ICME leading edge) is given to the nearest hour. Typical features we look for are increases in the solar wind speed, magnetic field strength and density that are more gradual than those associated with shocks.

(b) Estimated start and end times of the ICME based primarily on plasma and magnetic field observations. See [Cane and Richardson, JGR, \(2003\)](#) for additional information on the methods used to identify ICMEs. The times are estimated to ~ the nearest hour.

(c) Start and end times of the associated interval of abnormal solar wind composition/charge states (e.g., enhanced O7/O6, Mg/O, Fe charge states) estimated from [ACE/SWICS data](#) in hours relative to the start and end times of the ICME based on plasma/field observations as in (b). See [Richardson and Cane, Solar Physics, \(2010\)](#) for further details. A positive (negative) value means that the compositional signature starts after (before) the ICME leading edge or ends after (before) the ICME trailing edge. 'ns' indicates that there is no clear compositional/charge state signature, while 'nc' means that there is no change or the boundary is not clear in the compositional data (for example, between two adjacent ICMEs with similarly elevated ion charge states). No SWICS data are available until February, 1998.

(d) Start and end times of the magnetic clouds reported by [Lepping](#) or [Huttunen et al. Ann Geophys. \(2005\) 23:1-17](#) (see also (l)) in hours relative to the ICME leading or trailing edges. In a few cases, there are 2 magnetic clouds reported during the interval of interest. Magnetic clouds are structures associated with a subset of ICMEs defined by Burlaga and co-workers as having enhanced (> 10 nT) magnetic fields that rotate smoothly through a large angle, low proton temperatures, and low plasma beta (e.g., [Klein and Burlaga \[1982\]](#); [Lepping et al. \[1990\]](#)).

(e) Evidence of BiDirectional suprathermal Electron strahls (BDE) in [ACE/SWEPAM Observations](#). If data are unavailable from SWEPAM (data commence on 10/22/97), observations from the [3-D P instrument on WIND](#) are referred to. "SEP" indicates that an intense solar energetic particle event was in progress at the time of ICME passage and electron flows therefore cannot be determined.

(f) Evidence of Bidirectional energetic Ion Flows (BIF) in 0.5 -4.0 MeV ion observations from the [IMP 8 Goddard Medium Energy instrument](#). '...' indicates no data, low particle intensities, or when IMP 8 was inside the Earth's bow shock.

(g) The "quality" of the boundary times ('1' indicating the most reliable) based on assessment of the various data sets, including plasma, magnetic field and solar wind composition/charge states. 'W' indicates that the overall ICME signatures are particularly weak.

(h) Increase in solar wind speed at the upstream disturbance (shock/wave) estimated from 1 hour averaged solar wind data. 'S' indicates that a forward fast shock has been reported in the [ACE List of Disturbances and Transients](#) or [CfA Interplanetary Shock Database](#) (including ACE and WIND observations).

(i) Mean ICME speed, based on solar wind speed observations during the period from (b) to (c) above.

(j) Maximum solar wind speed during the period from the disturbance (a) to the trailing edge of the ICME (c).

(k) Mean magnetic field strength in the ICME, based on the interval from (b) to (c), to the nearest 1 nT.

(l) '2' indicates that a magnetic cloud has been reported in association with the ICME (see (d) above) or (occasionally, or for recent events) that by our assessment, the ICME has the clear features of a magnetic cloud but a magnetic cloud may not have been reported. 'H' indicates an event reported by [Huttunen et al. Ann Geophys. \(2005\) 23:1-17](#) that is not listed by [Lepping](#). '1' indicates that the ICME shows evidence of a rotation in field direction, but lacks some other characteristics of a magnetic cloud, for example an enhanced magnetic field. '0' indicates that the ICME is not a reported magnetic cloud, and lacks most of the typical features of a magnetic cloud, such as a smoothly rotating, enhanced magnetic field.

(m) The minimum value of the geomagnetic [Dst index](#) during the period between the disturbance and ICME trailing edge (or slightly thereafter if storm peak is generated by the trailing regions of the ICME). 'P' indicates a "provisional" value, and 'Q' that [real time \("quicklook"\) data from the WDC for Geomagnetism, Kyoto](#), are used. (Note that quicklook Dst values at the WDC are revised after they are initially posted, so the quoted values for recent ICMEs may be subject to revision.) Otherwise values are "final". See [Zhang et al. \[2007\]](#) for a discussion of the solar and interplanetary drivers of the intense ($Dst \leq 100$ nT) geomagnetic storms during 1996-2005.

(n) Mean 1 AU transit speed of the *disturbance* based on the CME association in (o). Note that a range may be given when there are several CMEs listed, and that the transit speed may be overestimated for later CMEs that may not be associated with the initial disturbance.

(o) Probable coronal mass ejection (CME) associated with the ICME, [observed by the LASCO coronagraphs on the SOHO spacecraft](#) or (S) by [STEREO](#). 'H' indicates that the CME had a 360 deg. angular extent (i.e. a halo CME) in the CDAW catalog. 'W' denotes a CME association from [Woods et al. \[2017\]](#). 'D' is an association from, or consistent with, the [CCMC DONKI Database](#) that typically takes STEREO and near-Earth coronagraph observations (if available) and ENLIL+cone ICME modeling into consideration. Note that multiple DONKI CME may have estimated Earth arrival times that are consistent with the in situ observations, but it is possible that not all these CMEs may contribute to the structures actually observed. Generally, the CME time in DONKI has been adjusted to the time of the corresponding CME in the CDAW catalog, if this can be identified, for consistency with the pre-DONKI events. '?' indicates that the CME association may be doubtful. Times in brackets indicate solar events associated with the ICME during an interval with no coronagraph coverage. 'dg' indicates that there was a LASCO data gap around the expected time of the associated CME. Note that the absence of an associated CME, especially for more recent events, may indicate that this information has still to be compiled, and may be added later. A few associations were identified in collaboration with other members of the [ISSI Working Team "Understanding the Origins of Problem Geomagnetic Storms"](#).

(p) There are multiple candidate CMEs; the time of the most likely association may be listed.

Selective Revision History Since December, 2007

Feb. 12, 2008: Added ICMEs on August 23 and 24, 2005.

May 16, 2008: Updated to May 15. SWICS data now available for all 2007. Updated quick look Dst in 2006 to provisional.

June 20, 2008: Updated to June 19. Corrected footnote l to explain the meaning of 0 and 1 in the magnetic cloud column. Updated Lepping cloud associations in 2006-7

November 26, 2008: Updated to November 24; one ICME now identified in 2008!

January 16, 2009: 4/15 2002 CME noted as halo

January 29, 2009: Updated to January 21 2009. Headers added within file.

March 9, 2009: Updated to March 5, 2009. Two potential ICMEs added in Jan 09. Note that these (and the Dec. 17, 2008 event) are very brief (few hours) compared to more typical events.

April 21, 2009: Corrected broken Riley et al. 2006 link (change of ApJ publisher site!).

April 27, 2009: Changed 2004 12/11 MC? to 1.

May 13, 2009: Added STEREO CMEs for 2008-9 events.

November 2, 2009: Removed Aug 27, 2001 event - probably sheath.

December 15, 2009: Updated; corrected typos, reassessed early Halloween 2003 period and split one ICME into two (10/25,10/26).

January 8, 2010: Updated to end of 2009; link to Kasper shock database restored. 2007 Dst values changed to provisional. Quick look values in 2008-9 revised.

November 22, 2010: A handful of Vmax values corrected based on [ACE SWEPAM+SWICS proton database](#).

January 6, 2011: Extended to end of 2010; link to Lepping magnetic cloud list updated; BDE and composition signature information added for recent events; Quick-look Dst values revised for 2010 events.

December 22, 2011: Dst values for 2004-2008 events revised to final.

February 22, 2012: Corrected Dst for Aug. 24, 2005 event. Also reassessed boundary quality as 3.

August 20, 2012: Corrected (interchanged) V(ICME) and V(max) entries for ICMEs since mid 2011

February 15, 2013: Updated Dst values for 2009-2011 from quicklook to provisional.

April 23, 2013: Added SOHO CELIAS/MTOF/PM shockspotter shock times. Note that these are based on plasma data only.

May 22, 2013: Added assessment of BDEs for 2011, 2012 events. Updated BIRS link.

August 23, 2013: Added event on 9/26, 2011. This was missed because ACE Tp data showed Tp~Texp, whereas OMNI data show Tp less than Texp, suggestive of an ICME. Also added recent sudden commencement times from the tables at [SERVEI INTERNACIONAL DE VARIACIONS MAGNÈTIQUES REPIDES](#).

January 2, 2014: Updated Dst values for 2012 from quicklook to provisional.

May 7, 2014: Updated Dst values for 2009 from provisional to final. Removed transit speeds in 2009 where CME is unclear. Broken links to papers in AGU journals fixed.

October 29, 2014: Used SYM-H to obtain SSC times for some events in 2011-2014. Added several solar associations. Updated BDEs to end of current plots at the ACE Science Center.

January 9, 2015: Updated Dst values for 2010 and 2011 to final, and for 2013 to provisional.

February 5, 2015: Updated events on March 6, 8, 2012.

September 22, 2015: Updated list and replaced quicklook Dst values for 2014 with provisional values.

May 18, 2016: Added years to all times and removed year from header for each year.

August 14, 2017: Updated Dst; 2012 to final, 2015 to provisional.

February 23, 2018: Added solar event associations from Woods et al. [2017]

June 8, 2018: Updated Dst (2013-14 to final, 2016 to provosional) and ACE BDEs to July 2017. Added a few solar associations from ISSI team.

May 18, 2022: Completed adding potential solar associations from the DONKI CME catalog based on ICME modeling back to the beginning of this catalog (2010), and indicated previous associations consistent with DONKI. Updated quicklook to provisional and provisional to final Dst values.

April 21, 2023: Updated 2016 Dst values to final.

February 1, 2024: Many broken URLs updated.

General Comments

This list of near-Earth interplanetary coronal mass ejections (ICMEs), believed to be the interplanetary manifestations of the coronal mass ejections seen near the Sun by coronagraphs, is based on, and updated from, [Cane and Richardson, Interplanetary coronal mass ejections in the near-Earth solar wind during 1996–2002, JGR \[2003\]](#), and [Richardson and Cane, Near-Earth Interplanetary Coronal Mass Ejections During Solar Cycle 23 \(1996–2009\): Catalog and Summary of Properties, Solar Physics, \[2010\]](#). It was originally motivated by our interest in the effects of ICMEs on energetic particles, including those accelerated by solar flares and interplanetary shocks, and galactic cosmic rays, during cycle 23 and earlier solar cycles. These effects (e.g., Richardson, I. G., Using energetic particles to probe the magnetic topology of ejecta, in *Coronal Mass Ejections, Geophys. Monogr. Ser.*, vol. 99 edited by N. Crooker, J. A. Joselyn, and J. Feynman, pp. 189–198, AGU, Washington, D. C., 1997; [Cane and Lario \[2006\]](#), and references therein) include short-term "Forbush" depressions in the galactic cosmic ray intensity (e.g., [Cane \[2000\]](#)), bidirectional energetic particle flows, long scattering mean free paths, and unusual particle flow directions. To examine these effects, we need to know when ICMEs are passing the observing spacecraft. Conversely, energetic particle observations can help to indicate when ICMEs are present. Some two dozen in-situ signatures of ICMEs (earlier terms include "shock drivers", "pistons", "ejecta") have been reported in magnetic field, plasma, solar wind composition and charge states, and energetic particles from suprathermal solar wind to galactic cosmic ray energies (e.g., [Zurbuchen and Richardson \[2006\]](#)). Thus, ideally ICME identification should combine as many data sets as possible, such as those available from ACE and other near-Earth spacecraft. Criteria may be set that are likely to identify ICMEs in particular data sets (cf. Table 1 of [Zurbuchen and Richardson \[2006\]](#)).

Our philosophy in making the list has been to combine a number of available data sets and try to assess when ICMEs were probably present in the near-Earth solar wind, using both criteria characteristic of ICMEs and visual inspection of the data, in order to produce as comprehensive a list as possible. In particular, it is important to recognize that we do not limit our list to events that have the characteristics of magnetic clouds, as defined by Burlaga and co-workers, i.e., enhanced (> 10 nT) magnetic fields that rotate smoothly through a large angle, low proton temperature, and low plasma beta (e.g., [Klein and Burlaga \[1982\]; Lepping et al. \[1990\]](#)). Although these are very important events, since they are generators of many large geomagnetic storms, are easily modeled as flux ropes or more complicated structures, and are an inevitable consequence of current models of CME initiation, they are only a subset of all ICMEs, as the list indicates. It is still unclear whether there is a magnetic cloud structure in all ICMEs, but this is only intercepted in a subset of events, or whether there are ICMEs that do not include magnetic clouds.

Before the launch of ACE (August, 1997), and during occasional ACE data gaps, we have referred to observations from other spacecraft including [IMP 8](#) and [WIND](#), and the [OMNI near-Earth solar wind database](#).

Our original list, for 1996-2002, appeared in [Cane and Richardson \[2003\]](#). In the current updated and revised list, we have incorporated the ACE/SWICS composition and charge state data (discussed in relation to ICMEs by [Richardson and Cane \[2004\]](#), though note the caveats in [Richardson and Cane, \[2010\]](#)). We have reviewed all the original event identifications, removing a few events with particularly weak signatures. A few events have also been added. For example, the SWICS charge state data may confirm an event for which the other signatures previously considered were marginal. There are still some events that we have retained in the list, indicated by 'W' in the "Quality" column, that have relatively weak signatures. Overall, we estimate that potential events with marginal signatures that might or might not be included in the list constitute ~10% of the total number of events. We have also added several parameters to those in the original list, and have removed the sudden commencement size (which is available on request if required). Provisional Dst values in the original list have been updated to final. A few errors in the original list have also been corrected. This revised list is discussed in detail in [Richardson and Cane, Near-Earth Interplanetary Coronal Mass Ejections During Solar Cycle 23 \(1996–2009\): Catalog and Summary of Properties, Solar Physics, \[2010\]](#).

At times of high solar activity, several ICMEs may pass by in rapid succession. Although we have tried to identify individual ICMEs, it is possible that a given ICME interval may include more than one ICME. There are also a few extended ICMEs for which it is unclear whether they consist of one ICME or multiple ICMEs. We have been cautious about following the line of argument that "there are x preceding halo CMEs observed by LASCO so there should be evidence of x ICMEs near the Earth" since we are aware that some reported halo CMEs do not reach the Earth and there are many ICMEs (cf. the list) that do not have clear CME counterparts. Thus we do not necessarily expect a one-to-one association between halo CMEs and subsequent ICMEs.

A well-known problem when identifying ICMEs using different data sets is that the boundaries may not agree exactly, or some signatures may be completely absent. Reasons presumably include event to event variations in the conditions at the Sun during CME ejection, the different physical processes that give rise to the various signatures and which may occur at the Sun (e.g., composition/charge states, formation of magnetic clouds), during ICME expansion in the solar wind (e.g., abnormally low proton temperatures), or depend on the magnetic field line topology and connection to the Sun (e.g., energetic particle decreases and bidirectional flows) that may be influenced by reconnection between field lines in the ICME and ambient solar wind. In the above list, we give first the estimated ICME start and

end times based predominantly on solar wind plasma and magnetic field observations, with consideration of other data sets, essentially as given in the Cane and Richardson [2003] list. We also give the estimated offsets from these times for the boundaries suggested by signatures in the SWICS plasma composition and charge state data (e.g., enhanced oxygen and iron charge states, Mg/O) and for reported magnetic clouds. Although in many events, these boundaries are essentially co-located (to within an accuracy of an hour or so), there are other events where the boundaries appear to be substantially different. We also indicate the offset times of the boundaries of the reported magnetic clouds, which are often determined primarily by the need to choose an interval of "well-behaved" magnetic field to input to a model.

This catalog is a work in progress and subject to revision!

We acknowledge all the various experimenters who have made their data available through the ACE Science Center and other sources. Portions of this work were supported by a NASA Heliophysics Guest Investigator Grant and by the ACE mission.

Please send comments, questions or corrections to [Ian Richardson \(ian.g.richardson@nasa.gov\)](mailto:Ian.Richardson@nasa.gov).

Papers citing the ICME catalog as published in: [Cane and Richardson, Interplanetary coronal mass ejections in the near-Earth solar wind during 1996–2002, JGR \[2003\]](#) and [Richardson and Cane, Near-Earth Interplanetary Coronal Mass Ejections During Solar Cycle 23 \(1996–2009\): Catalog and Summary of Properties, Solar Physics, \[2010\]](#)

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