

Note: Last day analyzed is 12/31/2016 for STA and 9/27/2014 for STB. List is updated on 01/18/2018.

The event list is compiled by Dr. Lan Jian (lan.jian@nasa.gov) for reference purpose. Not all the desired data are available, such as the particle composition data, for event identification. Not all the events are magnetic clouds in which there are low- β and well-organized flux ropes. Some of the ICME events are arguable. For event details and ambiguous event, please consult Dr. Lan Jian. If there is a shock at the edge, the time is usually set at the closest minute.

The criteria of event classification are published in the following papers. The results of STEREO ICME survey in 2007-2016 are published in the 2018 ApJ paper.

L.K. Jian, C.T. Russell, J.G. Luhmann, and A.B. Galvin, STEREO Observations of Interplanetary Coronal Mass Ejections in 2007-2016, The Astrophys. J., 885, 114, doi: 10.3847/1538-4357/aab189, 2018.

L.K. Jian, C.T. Russell, J.G. Luhmann, A.B. Galvin, K.D.C. Simunac, Solar Wind Observations at STEREO: 2007 – 2011, Amer. Inst. Phys. Proceedings of Solar Wind 13, 1539, 191-194, doi: 10.1063/1.4811020, 2013.

L. Jian, C.T. Russell, J.G. Luhmann, and R.M. Skoug, Properties of Interplanetary Coronal Mass Ejections at One AU during 1995 – 2004, Solar Phys., 239, 393-436, 2006.

List of Interplanetary Coronal Mass Ejections (ICMEs) Observed by STEREO A/B

#	STEREO	Start time [Year Doy Month/Day HH:MM]	Magnetic obstacle (~ flux rope) start time ¹	End time	Ptmax [pPa]	Bmax [nT]	Vmax [km/s]	ΔV^2 [km/s]	Group ³	MC (2 for better defined)	Comment
2006											
1	A & B	2006 348 12/14 14:12	2006 348 12/14 23:04	2006 349 12/15 14:08						2	plasma data data gap, like Group 3 event

2007

1	A	2007 14 1/14 12:11	2007 14 1/14 14:39	2007 15 1/15 7:34		15				2	plasma data data gap, like Group 1 event
2	B	2007 14 1/14 12:24	2007 14 1/14 13:59	2007 15 1/15 7:37		14.8				2	
3	A	2007 142 5/22 14:00	2007 142 5/22 14:00	2007 143 5/23 13:30	63	11.5	540	-80	2	2	STEREO B: higher Ptmax, shorter. At both A & B, followed by fast stream
4	B	2007 142 5/22 04:20	2007 142 5/22 04:20	2007 142 5/22 22:00	180	17.5	480	-60	1	2	
5*	A	2007 237 8/25 20:30	2007 237 8/25 23:27	2007 238 8/26 16:00	130 (200)	14.8	380	~	2	1	Vp almost constant, a concave in Pt, sharp increases of Np, Tp, entropy, and β , followed by fast stream
6*	A	2007 323 11/19 22:00	2007 323 11/19 22:00	2007 325 11/21 3:17	250	19.3	450	-50	/	0	field rotation, bi-directional electron flux (BDE), followed by a fast stream, near heliospheric current sheet (HCS)
7	B	2007 296 10/23 10:35	2007 296 10/23 16:50	2007 297 10/24 00:07	50 (122)	10.6	395 (420)	-35	2	1	not nice B rotations, slow, low β , followed by a stream interaction region (SIR)
8*	B	2007 323 11/19 22:50	2007 323 11/19 22:50	2007 324 11/20 06:56	250 (270)	15.2	485	-80	/	0	low β , some B rotations, but not coherent, embedded within an SIR, near a HCS, no prominent BDE, the forward shock occurred 9 hours earlier may be attributed by the combined force of the ICME and SIR
9	B	2007 364 12/30 02:00	2007 364 12/30 07:00	2008 1 1/1 05:50	76	12	365 (375)	-85	1	2	fuzzy plasma data, slow, nice field rotations, left-handed flux rope

2008

1	A	2008 81 3/21 06:40	2008 81 3/21 08:33	2008 81 3/21 18:39	35 (50)	8.8	480	-50	2	2	in the declining part of fast stream; very small β ; Np, Tp, and S change during the event
2	A	2008 132 5/11 6:31	2008 132 5/11 11:00	2008 133 5/12 06:00	~ 82	14.4	NA	NA	1	2	plasma data gap, nice flux rope, COR2 and HI at STB saw it
3	A	2008 187 7/5 00:48	2008 187 7/5 05:34	2008 188 7/6 18:00	68	10	360	-60	2	0	low β , some rotations of B, but not coherent, Pt is still higher than ambient after the structure
4	A	2008 248 9/4 05:25	2008 248 9/4 13:30	2008 249 9/5 12:00	118	10	360	-60	2	0	very slow, not near HCS
5*	A	2008 305 10/31 12:10	2008 305 10/31 12:10	2008 305 10/31 16:30	120	16	400	40	2	2, short	embedded within a SIR, low Tp and low β , hard to identify the boundary of the ICME
6*?	A	2008 333 11/28 21:49	2008 333 11/28 21:49	2008 334 11/29 00:20	310	20	380	30	2	0	uncertain, very short, embedded within a SIR, STB saw a CME candidate on 11/24
7	B	2008 36 2/5 20:37	2008 36 2/5 20:37	2008 38 2/7 10:50	118	13	385	-75	/	0	Pt irregular, B not quiet, but there are BDE and field rotations, has candidate CME, near HCS
8	B	2008 66 3/6 12:35	2008 66 3/6 12:35	2008 66 3/6 17:03	280	17	400	~	2	0	Vp almost constant, $\beta \sim 0.6$, no BDE, followed by a fast stream

9	B	2008 120 4/29 14:10	2008 120 4/29 15:34	2008 121 4/30 07:00	159	13 (14)	490	90	1	0	BDE for the later part, strong forward shock, Vp almost remains constant, HCS at the leading edge
10?	B	2008 136 5/15 23:00	2008 136 5/15 23:00	2008 137 5/16 18:00	14	3.7	500	-110	/	2, B is weak	no Pt increase, extremely low Pt, nice field rotation, with BDE
11	B	2008 158 6/6 15:36	2008 158 6/6 22:15	2008 159 6/7 12:32	130 (187)	14.8	430	-52	2	2	followed by a faster speed stream, Pt profile irregular, has a concave, very low β
12	B	2008 228 8/15 12:00	2008 228 8/15 12:00	2008 228 8/15 22:00	68	9.2	365	~	2	1, beta is not low and ~1	nice flux rope, very slow solar wind, followed by a fast stream, near HCS
13	B	2008 293 10/19 01:02	2008 293 10/19 01:02	2008 294 10/20 11:32	68	9	372	-87	2	0	very slow, 8-hr plasma data gap at the leading part, nice field rotation, BDE, no good CME candidate
14	B	2008 366 12/31 02:00	2008 366 12/31 02:00	2009 1 1/1 07:20	75	9	460	-90	/	2, B is weak	nice MC, clear BDE, big data gap of Np, Tp, and Pt

2009

1	A	2009 25 1/25 18:22	2009 27 1/25 18:22	2009 27 1/27 10:00	90	11.5	400	-40	2	1	relatively nice field rotations, with forward shock, STB saw CME on 1/20 at right location
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2	A	2009 154 06/03 00:00	2009 154 06/03 06:42	2009 155 06/04 22:40	75	11.5	440 (460)	-140	1	2	nice BDE, sharp increases of Pt and B at about 154 17:00, high Np, the region between 154 00:00 and 06:42 has odd behaviors of plasma and field components
3	A	2009 192 07/11 23:10	2009 192 07/11 23:10	2009 194 07/13 05:45	120	9.6	340	-50	/	1	followed by a fast wind, so sort of embedded within a SIR
4	A	2009 289 10/16 14:57	2009 289 10/16 21:35	2009 290 10/17 22:16	90	11	380	-80	2	2	slow, low Tp and B, STB does not see the CME candidate, partial BDE
5	A	2009 303 10/30 01:40	2009 303 10/30 01:40	2009 303 10/30 20:00	35	6.5	415	-65	2	0	partial BDE, very weak, Vp does not gradually decrease, STB see a CME on 10/27, but it is unlikely to be the source of this ICME
6	A	2009 305 11/1 08:00	2009 305 11/1 08:00	2009 307 11/3 02:00	35	9	530	-185	1	1	low Np and β , not very low Tp, weak Pt, clear BDE, a current sheet at the center, following a SIR
7	A	2009 318 11/14 8:00	2009 318 11/14 20:00	2009 319 11/15 21:30	120	9.6	340	-50	2	1	very slow, B profile is a little concave
8*	A	2009 329 11/25 23:00	2009 329 11/25 23:00	2009 330 11/26 01:30	150	18	370	-30	1	0	within a SIR, very short, but clear flux rope signatures, strong flux of suprathermal electrons, but no BDE
9	A	2009 342 12/8 23:38	2009 343 12/9 9:00	2009 344 12/10 23:13	200 (180)	12.5	350	-60	/	1	Ptmax is in the later part of the obstacle region

10*	B	2009 13 1/13 05:22	2009 13 1/13 05:22	2009 13 1/13 22:00	77	11.5	400	-70	/	2	good CME candidate from STA SCCHI, replacing the fast wind part of a SIR
11	B	2009 170 06/19 00:24	2009 170 06/19 07:40	2009 171 06/20 10:00	60 (120)	11.3	380	-115	2	1	relatively large-scale rotation of B in the sheath region. The region of 170 07:40 - 11:30 has a stronger B, possibly due to another CME. 2 CME candidates seen by STA on 6/13 and 6/14
12	B	2009 197 07/16 17:08	2009 197 07/16 17:08	2009 198 07/17 17:00	120	9.4	330	-50	2	1	BDE for part of 07/16, Pt is higher at the trailing part due to the compression of the upcoming faster solar wind. STA SECCHI detected CME candidate on 07/13, which is unlikely because the solar wind is slow
13	B	2009 212 07/31 02:16	2009 212 07/31 02:16	2009 212 07/31 10:54	58	10.2	460	-80	2	0	short, no clear CME candidate, low Tp and beta, the direction of suprathermal electrons is different from ambient
14	B	2009 217 08/05 22:35	2009 218 08/06 04:39	2009 219 08/07 05:24.5	100 (130)	13.8	350	125	2	1	ambiguous, bounded by a pair of f-r shocks, like hybrid of SIR and ICME. large-scale field rotations and low beta, but the rotations are not smooth, no BDE, no CME candidate seen by STA
15	B	2009 237 08/25 09:40	2009 237 08/25 09:40	2009 238 08/26 13:27	75	11	360	-50	1	2	BDE for a part of the ICME, no CME candidate from STA

16*	B	2009 242 08/30 02:50	2009 242 08/30 16:20	2009 243 08/31 05:40	75	12	395	95	/	0	within a SIR, BDE, 2 CME candidates seen by STA COR2 on 8/25 10:39 and 8/26 6:54, a shock within the magnetic obstacle, likely due to the following faster wind
17	B	2009 252 09/09 17:17	2009 252 09/09 17:17	2009 254 09/11 04:13	80	8.5	340	-50	2	0	BDE, CME candidate seen by STA COR2 on 9/5 at 10:54, not very low Tp, solar wind speed gradually decreases, field rotations are not very smooth and a little noisy
18	B	2009 272 09/28 03:10	2009 272 09/28 03:10	2009 272 09/28 12:15	26	6.6	330	~	1	2	near HCS, low Tp and Np, short, probably due to small ejection or bubble near the streamer belt, possible candidate seen at STA
19	B	2009 275 10/02 15:42	2009 276 10/03 05:48	2009 277 10/04 04:32	106 (140)	13.2	360	-80	1	2	nice field rotations, no BDE, possible CME candidate - 09/27 3:54 seen by STA
20	B	2009 314 11/10 18:48	2009 314 11/10 18:48	2009 315 11/11 11:00	60	11.5	370	-45	1	2	low beta, there are CME candidates, plasma parameters do not vary smoothly, and it is followed by an about 7-hour field rotation region
21	B	2009 331 11/27 12:36	2009 331 11/27 12:36	2009 331 11/27 20:44	100	10.5	345	~	2	0	beta < 1, there are CME candidates on Nov. 21 and 22. Field rotations are not nice, solar wind speed is about constant, and no BDE. ICME boundary layer at the two sides

22	B	2009 363 12/29 17:15	2009 364 12/30 1:50	2009 364 12/30 09:20	75	12	355 (370)	-55	1	2	slow, well-defined flux rope, but no BDE until about 364 12/30 08:00
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2010

1*	A	2010 36 2/5 3:33	2010 36 2/5 12:40	2010 37 2/6 2:00	140 (150)	14 (15)	420	~	2	1	a current sheet in the flux rope, causing a Pt peak, followed by a fast wind of 600 km/s
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2	A	2010 64 3/5 18:25	2010 64 3/5 18:25	2010 65 3/6 10:10	110	12.6	320	~	/	0	B is quieter than ambient but has a dip in middle, low Tp and β
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3	A	2010 113 4/23 00:35	2010 113 4/23 6:27	2010 113 4/23 14:06	100	12	450	-50	2	0	low Tp and β , B has some rotations but not coherent, BDE, Nalp/Np ~ 6%
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4	A	2010 150 5/30 15:00	2010 151 5/31 00:26	2010 151 5/31 14:00	125.5	10 (11.4)	430 (463)	-45	3	0	Nalp/Np ~ 6-8%, BDE in the obstacle part, no significant Fe/p difference
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5	A	2010 154 6/3 8:36	2010 154 6/3 12:30	2010 155 6/4 02:46	120 (135)	15	410	-80	2	0	low β , BDE, B rotations are not coherent, SOHO saw some CME candidates
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6	A	2010 167 6/16 16:20	2010 167 6/16 16:20	2010 169 6/18 3:44	62	9	510	-130	1	1	low Tp and β , B rotations are noisy, high Nalp/Np, in the trailing part of a fast stream, BDE
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7	A	2010 229 8/17 17:40	2010 230 8/18 7:35	2010 231 8/19 6:00	43 (47)	7.2 (7.8)	370 (475)	-60	1	0	very weak, partial BDE, low Tp and beta ~ 1, not nice B, probably related to CME on 8/14. Leading edge is not shock because it is too close to current sheet and B increases gradually
8	A	2010 232 8/20 16:14	2010 232 8/20 22:22	2010 233 8/21 13:14	380	19 (26)	600	-118	3	0	Vp decrease is small, BDE
9	A	2010 242 8/30 21:38	2010 242 8/30 21:38	2010 243 8/31 9:32	180	19.8	540	130	1	1	embedded within a SIR
10	A	2010 250 9/7 8:29	2010 250 9/7 8:29	2010 251 9/8 9:04	140	12	550	-120	3	0	BDE
11	A	2010 254 9/11 6:59	2010 254 9/11 16:45	2010 256 9/13 5:55	140 (400)	17 (22.5)	620 (660)	-220	1	2	BDE, high Nalp/Np and Fe charge state
12	A	2010 260 9/17 22:34	2010 261 9/18 6:22	2010 262 9/19 6:21	176.3 (192.7)	16.5	450	-100	2	2	relatively high Nalp/Np, Fe charge state and Fe/H, partial BDE
13	A	2010 348 12/14 17:16	2010 349 12/15 10:20	2010 350 12/16 04:00	180 (260)	19.7 (21)	530 (570)	-100	2	2	low Tp, quiet B, and BDE in the obstacle, sheath region has low B
14	B	2010 20 1/20 20:20	2010 20 1/20 20:20	2010 21 1/21 22:48	36	7	350	-50	2	0	not smooth field rotation, the boundary layer ahead of the ICME has mag. reconnection features, the plasma parameters and field are very different during the first 6 hours from other time. BDE in the first 4 hours. Webb et al. (2014) concludes the CME on 14-15 Jan. is the candidate

15	B	2010 45 2/14 7:50	2010 45 2/14 7:50	2010 46 2/15 9:34	20	6.6	475	-145	2	0	very weak, very low $N_p \sim 0.1/\text{cc}$ possibly partly due to rarefaction, low T_p and β , quiet B, BDE, SOHO observed CME candidate
16	B	2010 103 4/13 22:11	2010 103 4/13 22:11	2010 104 4/14 9:46	100	14	440	~	1	1, B_r is ~ 0 and has no rotation	low T_p and β , nice B_t and B_n rotations, no BDE
17	B	2010 158 6/7 4:08	2010 158 6/7 22:21	2010 159 6/8 12:30	87 (120)	11.5	390	-45	3	0	V_p varies irregularly; the sheath region is long; there are ICME boundary layers
18	B	2010 166 6/15 4:04	2010 166 6/15 4:04	2010 167 6/16 14:00	27	5.8	470	-138	1	1	BDE for most of the duration, very weak
19?	B	2010 174 6/23 8:00	2010 174 6/23 8:00	2010 176 6/25 3:30	60	7.6	550	-160	/	0	BDE, P_t is weak and irregular, field rotations, B is noisy so it is an ambiguous event, followed by a fast stream, possible CME candidates
20	B	2010 215 8/3 5:00	2010 215 8/3 5:00	2010 215 8/3 9:50	460	33.5	760	-180	2	0	low β but high T_p , B rotations, BDE, takes the place of SIR
21?	B	2010 215 8/3 14:20	2010 215 8/3 14:20	2010 216 8/4 7:9.35	320	13	740	-240	3	0	low β , V_p does not decrease monotonically, high suprathermal electron flux, BDE after the ICME, the two ICMEs are separated by about 4 hours, possible CME candidates seen by SOHO

22*	B	2010 259 9/16 10:50	2010 259 9/16 10:50	2010 260 9/17 7:12	75	12.6	550	210	2	0	embedded within a SIR, BDE before the ICME, high flux of suprathermal electrons within the ICME, not nice field rotations, but clear low beta and higher B than ambient, possible CME candidates seen by SOHO
23?	B	2010 262 9/19 23:22	2010 262 9/19 23:22	2010 263 9/20 6:45	16	5.4	520	-50	/	0	low Np and β , quiet B, BDE, very weak Pt though
24	B	2010 303 10/30 17:30	2010 303 10/30 17:30	2010 304 10/31 7:20	60	10.2	410	-45	2	1	slow and weak, low β , B is a little noisy
25	B	2010 312 11/8 2:46	2010 312 11/8 2:46	2010 313 11/9 9:06	140	17.5	430	65	2	2	embedded within a SIR, nice field rotations, DG before it, partial BDE
26	B	2010 323 11/19 20:26	2010 324 11/20 6:34	2010 325 11/21 9:10	60	12	490 (500)	-135	1	2	low β , nice B rotations, BDE, followed by a fast stream
27	B	2010 336 12/2 2:40	2010 336 12/2 9:55	2010 337 12/3 11:11	44 (48)	7.5 (7.8)	320	-55	2	0	weak and leading a SIR, BDE
28	B	2010 350 12/16 20:00	2010 351 12/17 1:50	2010 352 12/18 10:45	52 (61)	10	315	-105	2	2	weak BDE, at HCS
29	B	2010 359 12/25 20:20	2010 359 12/25 20:20	2010 361 12/27 06:00	65	11.7	280	~	2	0	ahead of a HCS and SIR

2011

1	A	2011 16 1/16 5:40	2011 16 1/16 5:40	2011 17 1/17 10:10	160	18.5	470	~	1	2	low Tp and beta, BDE, CME candidate seen by SOHO C2 on 1/12
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2	A	2011 26 1/26 15:09	2011 26 1/26 15:09	2011 27 1/27 3:05	39	9	490	~	1	2	very weak, low beta, after a SIR and fast stream, BDE, CME candidate: 1/23 seen by SOHO and STA
3	A	2011 32 2/1 10:25	2011 32 2/1 10:25	2011 33 2/2 18:40	82	11.7	410	~	/	0	low beta, low Np, not smooth field rotations, BDE, CME candidate: 1/28 seen by SOHO and STA
4?	A	2011 34 2/3 10:3.5	2011 34 2/3 10:3.5	2011 34 2/3 15:35	30	7.6	370	~	1	0	short, no BDE, weak, quieter B and smooth B rotations, possible CME candidate: 1/31 seen by SOHO and STA
5	A	2011 34 2/3 17:00	2011 34 2/3 17:00	2011 35 2/4 2:48	50	9	370	~	1	1	close to the previous flux rope, field rotations are not nice, beta ~ 0.4, no BDE, Bt rotation is continuous with the previous flux rope, possible CME candidate: 1/31 seen by SOHO and STA
6	A	2011 68 3/9 6:47.67	2011 68 3/9 6:47.67	2011 68 3/9 14:00	800	27.5	800	~	3	0	very strong Bmax and Pmax, no nice field rotations, embedded within a fast stream, CME candidate on 3/7 seen by both SOHO and STA
7	A	2011 71 3/12 00:25	2011 71 3/12 00:25	2011 71 3/12 16:47	29	6.5	525	-80	/	0	low Tp and beta, BDE, a current sheet ~ 1 hr in the ICME, possible candidate on 3/8

8	A	2011 78 3/19 11:24.655	2011 78 3/19 23:34	2011 80 3/21 1:30	92 (110)	12.8 (14.2)	490 (520)	-90	3	0	low Tp and beta for 78 23:34 - 79 11:00, not nice B rotations, BDE throughout, possible CME candidate on 3/16
9	A	2011 81 3/22 3:57.628	2011 82 3/23 6:55	2011 84 3/24 23:17	100 (400)	15 (27)	730 (770)	-290	3	1	very low Np and beta in the obstacle, large-scale B rotations but not a big angle change, CME candidate on 3/19
10	A	2011 95 4/5 21:43	2011 96 4/6 9:40	2011 96 4/6 23:41	105 (150)	14 (16.5)	545 (590)	~	2	1	3-hr data gap, a current sheet in the middle of obstacle, no very suitable CME candidate though
11	A	2011 101 4/11 12:8	2011 101 4/11 18:14	2011 102 4/12 10:40	85	11.2	720 (780)	-120	2	0	multiple current sheets in the obstacle, CME candidate on 4/7, BDE
12	A	2011 105 4/15 7:52	2011 105 4/15 7:52	2011 106 4/16 9:25	90	12.2	460	-90	1	2	only BDE at the last 3 hrs, possible CME candidate at the end of 4/11, at HCS
13	A	2011 111 4/21 7:12	2011 111 4/21 7:12	2011 112 4/22 10:58	60	11	375	-75	1	0	weak, CME candidate on 4/16, partial BDE, followed by another B rotation
14	A	2011 113 4/23 10:00	2011 113 4/23 10:00	2011 114 4/24 7:32	52	8.6	350	-65	2	0	high suprathermal electron flux, CME candidate on 4/19, some B rotations between ICME #12 and 13

15	A	2011 118 4/28 9:00	2011 118 4/28 9:00	2011 119 4/29 20:07	48	9.3	453	-131	2	2	not central Ptmax, weak, CME candidate on 4/24
16*	A	2011 126 5/6 22:00	2011 126 5/6 22:00	2011 127 5/7 4:11	180	17.5	465	~	2	0	embedded within a SIR, probably attributed to CME on 5/3, BDE, B is quiet and has relatively nice rotations, but a current sheet inside
17	A	2011 156 6/5 18:59	2011 157 6/6 12:22	2011 158 6/7 11:15	320 (400)	28.3	1000	-200	1	2	long sheath, plasma data gap, two nice flux ropes: 157 12:22-15:02, 157 17:15-158 1:38, CME candidates on late 6/4 and early 6/5, BDE
18	A	2011 193 7/12 3:47.07	2011 193 7/12 18:00	2011 194 7/13 12:15	13 (78)	4.4 (7.2)	460 (545)	-70	3	0	strong f.s., BDE, CME candidate on 7/7, weak B and Pt, beta is not too small
19	A	2011 204 7/23 9:41.155	2011 204 7/23 9:41.155	2011 205 7/24 11:45	170	13.4	432	-87	/	0	BDE, CME candidate on 7/18, followed by a faster solar wind, so Pt pump at the trailing part and a r.s. formed at 22:36:5 on 7/24
20	A	2011 218 8/6 12:42.663	2011 218 8/6 16:38	2011 219 8/7 19:38	105 (140)	12.5 (13)	600	200	/	0	followed by a faster wind (700 km/s), but no r.s. at the trailing edge, because B is gradual and close to current sheet. B is noisy, a concave in Pt, nice BDE, CME candidate on 8/7
21	A	2011 225 8/13 19:43.34	2011 225 8/13 22:40	2011 226 8/14 15:11	68 (150)	12 (12.3)	500	-95	3	0	BDE, CME candidate on 8/9

22	A	2011 247 9/4 22:40	2011 247 9/4 22:40	2011 248 9/5 11:08	70	9.4	350	~	1	0	slow, partial BDE, B rotations although a little noisy, a dip in B, 2 depletion regions of Tp and S, beta ~ 1, possible CME candidate on 8/30 or 9/1
23	A	2011 251 9/8 16:1.45	2011 252 9/9 00:05	2011 254 9/11 8:51.49	330	25	490	50	/	0	BDE, low Np and beta, V does not increase monotonically, B rotations are not coherent, multiple CME candidates on 9/4 - 9/7
24	A	2011 267 9/24 8:30	2011 267 9/24 8:30	2011 268 9/25 18:00	350	17	600	-180	3	0	BDE. In the beginning, fuzzy plasma data, some spikes of Pt, high Tp. A nice 5-hr flux rope on 9/25. Possible CME candidates on 9/19 and 9/21
25	A	2011 275 10/2 6:53.25	2011 276 10/3 6:27	2011 277 10/4 10:00	150 (160)	18	510 (610)	-110	1	2	partial BDE, the B and Pt in sheath are not high, there are large-scale B rotations in sheath too but B is noisy. CME candidates on 9/28 and 9/29
26	A	2011 298 10/25 4:51.238	2011 298 10/25 15:47	2011 299 10/26 16:00	70 (260)	11.5 (16.5)	440 (446)	~	3	0	partial BDE, CME candidates on early 10/22, STA saw the halo.
27	A	2011 329 11/25 21:39.0617	2011 330 11/26 1:30	2011 330 11/26 13:30	38 (68)	7.6 (8.6)	490	-70	3	0	BDE, CME candidate on 11/21, B rotations are not nice
28	A	2011 330 11/26 18:9.4	2011 331 11/27 00:20	2011 332 11/28 05:00	90 (110)	10.6	520	-115	/	0	BDE, CME candidate on 11/22 (STA halo), several rotations of B

29	A	2011 332 11/28 14:51.425	2011 332 11/28 19:20	2011 333 11/29 22:10	80 (200)	10 (18)	580	-205	3	0	BDE, CME candidate on 11/24 (STA halo), B is much higher in the sheath region
30	A	2011 336 12/2 5:45	2011 336 12/2 5:45	2011 336 12/2 20:28	23	6.7	480	~	2	0	partial BDE, CME candidate on 11/28, after a SIR, very weak, a Vp drop after the ICME
31	A	2011 340 12/6 22:43.5	2011 341 12/7 6:55	2011 341 12/7 18:00	80 (140)	7.2 (12.5)	357 (395)	-42	3	0	BDE, CME candidate on 12/3. The CME is nice, but the ICME is very slow. B is mainly in -R direction. Followed by a HCS and SIR
32	A	2011 355 12/21 9:27.467	2011 355 12/21 9:27.467	2011 356 12/22 16:35	140	8.3	640	-130	3	0	in the fast wind following a SIR. BDE, CME candidate on 12/17. B does not have nice rotations, beta and Tp are not low
1	B	2011 17 1/17 15:46	2011 18 1/18 0:0	2011 18 1/18 9:38	53 (100)	9.5 (10)	375 (430)	-65	3	0	B field has somewhat rotations, but not smooth. beta is not very low, CME candidate: 1/13 detected by SOHO
2	B	2011 18 1/18 12:50	2011 18 1/18 12:50	2011 18 1/18 22:00	32	7.6	340	~	2	0	low beta, B field has some rotations but not complete, close to the previous ICME, CME candidate seen by SOHO not STA: 1/13 two (one for the previous ICME), or 1/14

3	B	2011 57 2/26 8:28	2011 57 2/26 16:00	2011 58 2/27 23:00	90 (220)	14.6 (15.5)	760	-240	3	2	BDE, very low beta, low Tp, fast, V declining, B is high at the beginning of the flux rope part, a low B region in the sheath, CME candidate: 2/24 detected by SOHO, very fast
4	B	2011 66 3/7 8:31.83	2011 66 3/7 19:10	2011 67 3/8 17:21	190 (215)	17.6 (18.5)	455	-65	3	0	BDE, not smooth or large B rotations, two f.s., B is high in the beginning part of the flux rope, CME candidate on 3/3 seen by SOHO
5	B	2011 70 3/11 5:23	2011 70 3/11 15:18	2011 71 3/12 12:00	105 (170)	13.5	490	-125	2	2	BDE, CME candidate on 3/7 seen by SOHO and STA COR2, B is low in the trailing part of the sheath region
6*	B	2011 79 3/20 15:46	2011 80 3/21 10:00	2011 81 3/22 3:00	70 (110)	12.7	490	~	/	0	likely a combination of SIR+ICME, because there was SIR in previous CRs. BDE and low beta last much longer than the event. The CME candidate on 3/17 seen by SOHO. A sharp field increase at the center of the flux rope part
7	B	2011 87 3/28 8:53	2011 87 3/28 17:48	2011 88 3/29 18:48	100 (380)	13.6 (19.2)	690	-190	3	1	low beta, BDE, front edge is not a shock because the B decreased in a few min. CME candidate on 3/25-26 seen by SOHO

8	B	2011 90 3/31 23:38.83	2011 91 4/1 4:00	2011 91 4/1 13:50	250 (420)	22 (24)	580 (695)	-95	2	0	BDE, CME candidate on 3/29 seen by SOHO and STB, Tp is high though. Field disturbance between this one and the next ICME
9	B	2011 91 4/1 21:00	2011 91 4/1 21:00	2011 92 4/2 10:00	80	13	540	-110	2	1	no coherent rotation in Br, very low Tp and beta, BDE, CME candidate on 3/30 seen by SOHO
10	B	2011 94 4/4 17:00	2011 94 4/4 17:00	2011 95 4/5 15:07	64	8.2	420	-88	1	2	nice B rotations, a bump in Np and Pt, beta ~1, BDE, no good CME candidate
11	B	2011 102 4/12 3:09	2011 102 4/12 3:09	2011 102 4/12 23:18	43	9.1	430	-93	2	0	between two SIRs, beta 0.1-1, Bn ~ 0 in the most part, CME candidate on 4/7 seen by SOHO
12	B	2011 124 5/4 19:06	2011 124 5/4 19:06	2011 125 5/5 8:25	190	16	440	~	/	0	low beta, not BDE, short, CME candidate on 4/30 or 5/1 seen by SOHO, Vp irregular variation
13	B	2011 152 6/1 7:25.44	2011 152 6/1 17:35	2011 153 6/2 18:00	320 (540)	27.5	510 (525)	-130	3	0	low beta, BDE, B rotations are not coherent, CME candidate on 5/29 seen by SOHO C2
14	B	2011 168 6/17 7:40	2011 168 6/17 7:40	2011 169 6/18 4:00	235	19.2	600	~	2	1	low beta, partial BDE, closely following a SIR, CME candidate on 6/14 seen by SOHO

15* ?	B	2011 177 6/26 18:10	2011 177 6/26 18:10	2011 177 6/26 23:15	110	14.3	420	40	2	0	embedded within a SIR, no BDE, Tp low for the first half, no clear CME candidate
16	B	2011 181 6/30 13:18	2011 181 6/30 13:18	2011 182 7/1 00:25	65	9.5	340	~	2	0	short, low beta, BDE, no clear CME candidate (Nariaki Nitta suggested it might be related to a very slow CME on 6/23)
17?	B	2011 204 7/23 07:05	2011 204 7/23 07:05	2011 204 7/23 12:00	37	8.4	290	~	1	0	short, low beta, no BDE, possible CME candidate on 7/18 seen by SOHO
18	B	2011 232 8/20 21:51.775	2011 232 8/20 21:51.775	2011 233 8/21 21:20	90	12.8	410	-83	2	0	low beta, some BDE, suprathermal electron flux is enhanced, B rotations are not smooth, CME candidate on 8/16 by SOHO COR2 difference movie in SEEDS
19*	B	2011 264 9/21 6:14	2011 264 9/21 6:14	2011 264 9/21 11:40	70	12.5	450	~	3	0	beta ~ 0.1, high B, embedded within a SIR, CME candidate on 9/16 by SOHO C2
20	B	2011 267 9/24 3:58	2011 267 9/24 5:00	2011 267 9/24 9:6.17	340	23.3	700 (800)	-170	2	0	beta is relatively low, Tp is not low, B has multiple depletions, suprathermal electron flux is high, BDE, possible CME candidate on 9/20 seen by SOHO C2

21	B	2011 267 9/24 9:6.17	2011 267 9/24 12:36	2011 267 9/24 19:28	420 (520)	28 (33)	820	~	3	0	low beta, 267 3:58 is not a f.s., suprathermal electron flux is high, BDE, CME candidate on 9/22 seen by SOHO C2 - a very fast CME
22	B	2011 276 10/3 22:23.417	2011 277 10/4 02:00	2011 277 10/4 12:40	350 (815)	26 (33)	720	-80	1	2	nice MC, BDE, CME candidate on late 10/1, a much weaker shock at 10/3 11:48.25
23	B	2011 280 10/7 11:26.69	2011 280 10/7 11:26.69	2011 281 10/8 6:28	85	11	525	-125	3	0	BDE, Tp is not low, possible CME candidate on early 10/2
24	B	2011 291 10/18 19:20.17	2011 291 10/18 19:20.17	2011 292 10/19 8:00	185	18	430	-73	1	0	short, BDE, CME candidate on 10/14, followed by some field rotations
25	B	2011 302 10/29 10:00	2011 302 10/29 17:00	2011 304 10/31 13:23	80 (170)	12.5	500	-160	1	2	BDE, CME candidate on 10/25 (very nice SOHO movie), a r.s. occurred half a day after the trailing edge, on 11/1 2:19:55 because of a faster solar wind
26	B	2011 310 11/6 5:10.75	2011 310 11/6 22:50	2011 313 11/9 4:00	50 (140)	10 (17)	635 (720)	-235	1	2	low Tp and beta, B and Pt maxima are weak, nice BDE, CME candidate on early 11/4, which is a very fast one

27	B	2011 324 11/20 13:38.71	2011 324 11/20 22:40	2011 326 11/22 1:10	190 (200)	16.5	600	-105	1	0	BDE, CME candidate on 11/17. Np, Tp, and B are variable in the obstacle, a current sheet is embedded, delta V is the speed difference between the max speed in the front part and the minimum speed in the trailing part
28	B	2011 336 12/2 16:3.995	2011 336 12/2 16:3.995	2011 337 12/3 11:00	45	8.4	580	-148	3	0	BDE, CME candidate on 11/28
29*	B	2011 360 12/26 23:50.767	2011 361 12/27 7:00	2011 362 12/28 11:00	170	16.7	410	95	1	2, two flux ropes	partial BDE, low beta, a current sheet and a big B dip between two flux ropes, combined with a SIR, V increases, CME candidate on 12/23

2012

1	A	2012 1 1/1 13:22.346	2012 1 1/1 17:00	2012 2 1/2 4:00	143 (165)	14	440 (455)	~	2	0	BDE, not low Tp and β , a current sheet in the obstacle, SOHO and STA see CME candidate on 2011 12/29
2*	A	2012 5 1/5 20:40	2012 5 1/5 20:40	2012 6 1/6 12:56	280	22.6	560	-100	2	0	intermittent BDEs, low Tp and β , high B, V does not vary gradually, SOHO and STA see CME candidate on 1/2, enhanced Fe charge state

3	A	2012 25 1/25 22:10	2012 25 1/25 22:10	2012 26 1/26 22:00	50	8.7	590	-180	2	0	BDE, V declining, quiet B with some rotations, a dip in B, a very slight increase of Fe charge state, weak Pt, possibly related to CME on 1/22
4*	A	2012 29 1/29 13:04	2012 29 1/29 13:04	2012 31 1/31 12:00	1300	49	640	-210	3	0	BDE, very strong B, significant increase of Fe charge state on the second half day of 1/29. A questionable shock is at 1/29 2:13, where the plasma signatures are clear but a small current sheet coincides. It is possibly driven by SIR. This ICME takes place of a SIR. With such a strong B, the SIR is not representative any more
5*	A	2012 52 2/21 5:05	2012 52 2/21 5:05	2012 52 2/21 9:15	250	23	390	-45	1	2, short	low Tp and beta, well-organized B rotations, BDE, embedded within a SIR
6	A	2012 63 3/3 10:00	2012 63 3/3 10:00	2012 63 3/3 18:00	130	16.2	470	-100	1	0	near HCS, low Tp and beta, somewhat BDE while flux is enhanced in all directions, possibly due to 2/28 CME
7	A	2012 64 3/4 10:34	2012 64 3/4 10:34	2012 64 3/4 22:00	85	12	436	~	3	1	low Tp and beta, BDE, possibly due to 2/29 CME

8	A	2012 75 3/15 22:31	2012 75 3/17 4:10	2012 78 3/18 06:00	29 (400)	8 (16)	490 (620)	-80	3	0	long sheath, BDE since the start of the ICME, high Fe charge state, low Tp and beta in the obstacle. No good CME candidate
9	A	2012 78 3/18 19:31	2012 79 3/19 4:38	2012 79 3/19 16:00	150 (200)	16	525	~	2	1	slightly low Tp and beta, BDE, some field rotations, no appropriate CME candidate
10*	A	2012 79 3/19 19:17	2012 80 3/20 05:00	2012 80 3/20 14:45	100 (700)	15 (34)	720	-150	/	0	BDE, high Fe charge state in the obstacle, SOHO and STB COR2 saw CME candidate on 3/16, high Pt probably due to a combination of SIR and ICME, HCS crossing embedded
11*	A	2012 110 4/19 10:7	2012 110 4/19 10:7	2012 110 4/19 21:00	220	22	400	~	1	1	embedded within an SIR, no BDE, low beta, high Fe charge state
12	A	2012 139 5/18 12:43	2012 139 5/18 21:22	2012 140 5/19 9:12	45 (330)	10.5 (19)	840	-140	3	1	BDE, Fe charge state is slightly higher at the beginning of the magnetic obstacle, Vp is very fast, plasma DG
13?	A	2012 145 5/24 1:00	2012 145 5/24 1:00	2012 145 5/24 19:22	56	9.5	470	-90	2	0	BDE, weak, high Fe charge state, no good field rotations

14	A	2012 149 5/28 2:48	2012 149 5/28 9:00	2012 150 5/29 4:22	800 (1200)	44.5	830 (840)	-130	1	1	partial DG of plasma data in obstacle, low beta and BDE last beyond the ICME, high Fe charge state, trailing edge is defined using plasma data
15	A	2012 172 6/20 8:20	2012 172 6/20 8:20	2012 173 6/21 4:27	120	16	380	~	/	2	BDE, slightly high Fe charge state, low beta, HCS at the end of the ICME, SOHO saw CME candidate on 6/16
16	A	2012 177 6/25 20:55	2012 177 6/25 20:55	2012 181 6/29 11:30	145	14	520	-170	3	0	V in the trailing edge is about 350 km/s, so V_{exp} is 170 km/s. BDE, high Fe charge state, low beta in the second half part. HCS is in the middle. CME seen by SOHO on 6/23 moves to high latitude, while STA saw a halo CME, so this event could be the flank of the ICME
17	A	2012 192 7/10 18:55	2012 193 7/11 9:10	2012 195 7/13 4:00	140 (175)	16	780	-360	3	0	following a SIR, high Fe charge state from about 7/11 10:30 to 7/12, BDE lasts till 7/14 8:00 but the flux is weaker after the ICME. Likes to have 2 flux ropes, low beta, CME candidate on 7/7, multiple eruptions on the Sun

18	A	2012 198 7/16 00:45	2012 198 7/16 00:45	2012 198 7/16 18:00	25	8	430	~	2	0	very low β , fuzzy plasma data, high Fe charge state extends before the ICME, BDE, a current sheet at the end edge, CME candidate seen on 7/11 at SOHO and STA
19	A	2012 199 7/17 3:40	2012 199 7/17 3:40	2012 200 7/18 00:25	30	7.1	380	-50	2	0	low T_p , closely follow an ICME, CME candidate seen on 7/12 at SOHO and STA
20	A	2012 202 7/20 22:43	2012 203 7/21 11:40	2012 204 7/22 2:30	120 (700)	12.5 (23)	690 (760)	-100	3	1	catching up a SIR, high Fe charge state in the flux rope part, possible CME candidate seen on 7/19 at SOHO and STA
21	A	2012 205 7/23 20:55	2012 205 7/23 22:55	2012 206 7/25 03:45	DG, > 4727.3	109	1873 (2246)	-1029	/	2	N_p and T_p DG because energetic particle flux interferes with their calibration, P_t is N/A. See PLASTIC site for specifically processed data
22	A	2012 218 8/5 15:37	2012 219 8/6 4:00	2012 220 8/7 6:00	130 (160)	15	505 (535)	-120	/	1	BDE, high Fe charge state, a current sheet and a trough of B in the obstacle part, the shape of P_t profile is irregular
23	A	2012 226 8/13 14:23.54	2012 226 8/13 14:23.54	2012 228 8/15 4:15	230	12.8	465	~	3	0	intermittent BDE, high Fe charge state, no nice flux rope, CME candidate seen by STA and SOHO on 8/10

24	A	2012 253 9/9 00:07	2012 253 9/9 00:07	2012 253 9/9 15:52	64	10.3	350	~	2	2	enhanced B with rotations, low T_p and beta, embedded within a SIR-like structure, whose fast wind is only 400 km/s
25	A	2012 255 9/11 17:10.367	2012 256 9/12 7:34	2012 258 9/14 1:15	105 (280)	12 (18.8)	430	-50	3	2	BDE, nice B rotations, low beta, 10-hr DG
26	A	2012 260 9/16 23:11.055	2012 260 9/16 23:11.055	2012 262 9/18 11:8	88	9.3	440	-125	3	0	partial BDE, V_p declining, low beta in the 2nd half of the period
27	A	2012 263 9/19 21:45.78	2012 264 9/20 14:22	2012 265 9/21 22:35.767	70 (140)	12 (12.5)	480 (485)	80	2	1	6-hr B dip in sheath region, low beta and B rotations in the flux rope, V_p first decreases slightly and then increases, followed by a fast wind of 550 km/s
28	A	2012 267 9/23 14:28.753	2012 267 9/23 21:00	2012 268 9/24 11:00	90 (200)	11.8 (15)	580 (610)	-100	3	0	relatively short, B rotations, moderate low beta
29	A	2012 279 10/5 2:51.445	2012 279 10/5 16:10	2012 281 10/7 12:00	70 (95)	11.8	445 (482)	-105	2	2	BDE for most of the time, low T_p and beta, field depletion in sheath
30	A	2012 285 10/11 1:46.025	2012 285 10/11 22:38	2012 287 10/13 2:30	94	12	385 (388)	-60	2	0	BDE, B depletion in long sheath, V_p does not change much, low β

31	A	2012 296 10/22 15:35.9	2012 297 10/23 20:6	2012 298 10/24 1:33	63 (68)	8.7 (9.5)	380 (454)	-40	/	1	suprathermal electron flux is enhanced till 297 10/23 15:24, beta ~ 1. short flux rope in the period of 297 20:6 - 298 1:33, with remarkably low Np, Tp, and beta, as well as high B, decreased suprathermal electron flux
32	A	2012 300 10/26 0:42.5	2012 300 10/26 10:36	2012 301 10/27 11:00	52 (77)	9.9	388	-58	2	0	low beta, BDE, a current sheet in the flux rope
33	A	2012 315 11/10 22:30.0625	2012 316 11/11 00:45	2012 316 11/11 13:18	300 (390)	22.5	525 (565)	-115	1	1	not low Tp, Np is high, 11/7 CME candidate seen by SOHO and ST A/B
34	A	2012 316 11/11 21:19	2012 317 11/12 15:23.5	2012 318 11/13 15:5	20 (155)	6.3 (16.8)	500	-125	/	1	low Tp and β , BDE; enhanced B and Pt in the sheath as well as 2 r.s. due to the interaction with the preceeding ICME, 11/8 CME candidate seen by SOHO and ST A/B
35	A	2012 318 11/13 20:57.05	2012 319 11/14 10:42	2012 321 11/16 8:45	98 (140)	15.6	490 (510)	-175	3	2	low β , BDE till 320 11/15 14:00
36	A	2012 328 11/23 18:27.62167	2012 328 11/23 22:20	2012 330 11/25 14:26	110 (160)	12 (16.3)	473 (500)	~	3	0	BDE, several distinuities in the obstacle, not smooth B rotations, CME candidates seen by SOHO, ST A/B on 11/20 and 11/21
37	A	2012 331 11/26 7:57.825	2012 331 11/26 15:00	2012 333 11/28 1:22	90 (185)	12.3 (19)	525 (555)	-175	2	0	BDE, low β , a B dip in the center, several flux ropes

1	B	2012 10 1/10 12:22	2012 11 1/11 17:43	2012 12 1/12 13:42	100	6.5 (11.5)	490	-125	3	0	BDE, V decreases and B is relatively quiet in the trailing part which is not a nice obstacle. Two pile-ups of Pt in the "sheath" part. Beta is not low. The start time of the magnetic obstacle coincides with a HCS. Boundaries are picked based on plasma data. CME candidate is seen by STB COR2 on 1/7
2	B	2012 16 1/16 9:49.258	2012 17 1/17 7:30	2012 18 1/18 9:00	60 (160)	11	400 (425)	-85	2	2	long sheath, B rotation, low beta and BDE in the obstacle, slow, CME candidate is seen by STB COR2 on 1/12
3	B	2012 19 1/19 1:46.02	2012 19 1/19 1:46.02	2012 19 1/19 16:43	170	17	530	-145	3	0	BDE, beta is ~1, B rotations are not nice, No appropriate CME candidate
4	B	2012 30 1/30 11:7.875	2012 30 1/30 11:7.875	2012 31 1/31 4:51	85	7.5	480	-120	2	0	no nice flux rope, beta is not low, BDE, CME candidate on 1/27
5*	B	2012 68 3/8 13:36.725	2012 69 3/9 1:00	2012 69 3/9 11:30	20 (700)	5.8 (35)	760 (820)	-80	3	1	hybrid of ICME and fast stream, strong shock, low beta, BDE, coherent magnetic field rotations, CME candidate seen by STB COR2 and SOHO on 3/5

6	B	2012 70 3/10 21:17.2	2012 71 3/11 1:34	2012 72 3/12 21:51	60	8.6	720	-290	2	1	low beta, BDE extends beyond the ICME, B and Pt are higher in the trailing part, Np and Tp vary within the ICME, CME candidate seen by STB COR1 and COR2 on 3/7
7	B	2012 86 3/26 16:30.513	2012 86 3/26 17:45	2012 88 3/28 3:52	290	16.5	550	-145	3	0	BDE, not nice B rotations, CME candidate on 3/24
8	B	2012 88 3/28 21:37.543	2012 88 3/28 23:10	2012 89 3/29 19:40	600	36	690	-215	3	1	BDE, B enhancement in the leading part, quiet B and B rotations, Tp and beta are not low, CME candidate on 3/25
9	B	2012 89 3/29 23:25	2012 90 3/30 1:37	2012 90 3/30 8:30	100	14.6	750	270	1	0	BDE lasts beyond the ICME, CME candidate on late 3/26
10	B	2012 108 4/17 3:36.643	2012 108 4/17 9:40	2012 109 4/18 9:5	45 (90)	8.5 (12)	700	-180	3	0	BDE, low beta, B rotations are not nice, no clear CME candidate
11*	B	2012 129 5/8 14:55	2012 129 5/8 18:35	2012 130 5/9 10:16	320 (470)	28	510	-150	3	2	BDE, low Np and beta, Tp is high, relatively nice B rotations, Vp declining is not gradual, probably a combination of SIR and ICME
12	B	2012 130 5/9 13:30	2012 130 5/9 13:30	2012 131 5/10 10:40	60	8	510	-164	2	0	BDE, low Tp and beta, closely following the preceding ICME by 3 hrs apart
13*	B	2012 133 5/12 23:8.5116	2012 134 5/13 3:00	2012 135 5/14 4:30	110	13.8	480	~	3	0	BDE, low beta, B is not quiet, a HCS nearby, a combination of SIR and ICME

14	B	2012 163 6/11 21:6.4617	2012 164 6/12 3:00	2012 164 6/12 19:21	180	15	465	~	3	0	strong leading shock, BDE, Tp and beta are not low
15	B	2012 170 6/18 8:00	2012 170 6/18 23:47	2012 172 6/20 10:00	105 (150)	11.3	525	-135	2	2	BDE, low Tp and beta, a HCS and SIR follow this ICME
16	B	2012 180 6/28 8:38	2012 180 6/28 8:38	2012 182 6/30 2:20	36	6	605	-215	2	1	B rotates over long time scale, low beta, BDE, B and Pt are weak, HCS after the ICME
17	B	2012 186 7/4 6:56.6167	2012 186 7/4 11:40	2012 187 7/5 12:50	450 (740)	33 (36)	720 (730)	-200	1	2	nice ICME
18	B	2012 205 7/23 21:21	2012 206 7/24 20:00	2012 207 7/25 12:00	80 (150)	12.5	350 (400)	~	2	1	BDE, low Tp and beta, halo CME candidate seen on 7/19 by STB, a HCS after that
19	B	2012 210 7/28 14:59	2012 210 7/28 17:08	2012 211 7/29 1:00	82 (93)	11.1	460	~	/	0	concave Pt profile, BDE, low beta
20	B	2012 237 8/24 22:23	2012 237 8/24 22:23	2012 238 8/25 2:24	150	17.3	400	-85	2	0	Vp declining, low Tp and beta, enhanced suprathermal electron flux, embedded within a transient structure
21	B	2012 242 8/29 6:35.33	2012 242 8/29 6:35.33	2012 243 8/30 6:36	85	10	430	-105	3	0	BDE, Tp and beta are not low
22*	B	2012 247 9/3 7:11	2012 248 9/4 5:30	2012 249 9/5 20:58	65 (750)	8 (20)	600	~	3	0	ICME+SIR, BDE, Tp and beta are not low, HCS on 9/2

23	B	2012 267 9/23 8:44	2012 267 9/23 23:38	2012 268 9/24 9:46	120 (600)	15 (30)	400 (500)	~	3	0	high B and Pt in the sheath, low beta and partial BDE in the obstacle part, CME candidate seen by ST A/B and SOHO on 9/20
24	B	2012 269 9/25 16:26	2012 270 9/26 3:21	2012 272 9/28 16:55	70 (240)	13.2 (21)	710 (740)	-360	2	2	nice event, BDE, low beta, 2 rotations in Bn, before HCS
25	B	2012 286 10/12 0:13	2012 286 10/12 0:13	2012 287 10/13 12:27	130	10.7	465	-125	3	0	short-duration B rotations after B compression, beta is not low, suprathermal electron flux is high in the leading part and then BDE, partial BDE on 10/14-15 too
26	B	2012 291 10/17 6:57	2012 291 10/17 11:20	2012 292 10/18 21:15	112 (122)	14.4 (16)	365	-85	1	0	very slow, low Tp and beta, B is high in the first half part, BDE, large-scale B rotations which are not very smooth
27	B	2012 299 10/25 19:10	2012 300 10/26 4:00	2012 301 10/27 10:00	160 (400)	13 (19.5)	390 (435)	~	2	2	12-hr DG after the ICME and then a fast stream, low beta, nice B rotations and BDE
28?	B	2012 309 11/4 1:22	2012 309 11/4 1:22	2012 310 11/5 18:00	28.5	6.8	355	-70	1	0	BDE, slow, beta~1, very weak

29	B	2012 316 11/11 13:36.1	2012 316 11/11 13:36.1	2012 318 11/12 16:10	210	16	512	-112	3	0	BDE lasted 1 day beyond the ICME, prominent plasma signatures of shock but clear current sheet at the leading edge
30	B	2012 324 11/19 9:50	2012 324 11/19 12:30	2012 325 11/20 0:26	300 (650)	22	465 (505)	-72	1	1	flux of suprathermal electron increased in the leading part, then no clear BDE; field depletion in the sheath region, odd field foldings in the flux rope
31	B	2012 325 11/20 2:00	2012 325 11/20 2:00	2012 325 11/20 12:40	180	18	440	-120	2	0	BDE, closely following an ICME, low β , Bt and Bn dominate
32	B	2012 333 11/28 3:36.3167	2012 333 11/28 7:37	2012 334 11/29 7:00	35	8	347	-57	2	0	very slow, low beta, BDE, B rotations are not smooth, a current sheet at 333 13:30
33*	B	2012 360 12/25 0:37.74167	2012 360 12/25 6:33.083	2012 360 12/25 22:12	150	13.7	402	-52	2	0	not nice flux rope, a current sheet in the center. The event is followed by a faster wind, compression of B and Pt; CME candidate on 12/20 seen by ST A and B, SOHO, partial BDE, suprathermal electron flux increases significantly in the leading part

2013

1	A	2013 9 1/9 2:25	2013 9 1/9 10:38	2013 10 1/10 17:17	180 (230)	18	530	-130	3	2, classic, some data gap	nice MC, short B kink in the front page of the flux rope, parallel shock without B rapid jump
2	A	2013 25 1/25 0:14	2013 25 1/25 12:23	2013 27 1/27 3:00	115 (150)	14 (14.5)	415	45	3	0	16-hr data gap in the obstacle part, partial BDE, followed by faster wind of 450 km/s and BDE
3	A	2013 39 2/8 7:44	2013 39 2/8 18:22	2013 41 2/10 3:20	50 (105)	9.5 (11.5)	335	-65	2	1	slow, T_p and β are moderately low, not very smooth B rotations, ahead of a SIR
4	A	2013 50 2/19 7:44	2013 50 2/19 7:44	2013 51 2/20 6:11	200 (240)	20	460	~	/	1	low β , not coherent B rotation, a 6-hr V, Np, B dip in the middle where T_p increased, partial BDE
5	A	2013 59 2/28 21:14	2013 60 3/1 13:30	2013 64 3/5 20:25	125 (340)	15.5 (18.5)	550 (470)	-220	3	0	long, BDE, high Fe charge state, low beta, not quiet B
6	A	2013 67 3/8 2:20		2013 68 3/9 9:35	195	13.5	418	-118	3	0	no enhancement of Fe charge state, it is in fact lower than previous days, partial BDE
7	A	2013 85 3/26 2:45.725	2013 85 3/26 9:16	2013 85 3/26 20:55	135 (460)	10.5 (15)	475 (520)	-59	3	1	BDE beyond the ICME, no significant change of Fe charge state, not nice B rotations

8	A	2013 86 3/27 16:09	2013 86 3/27 20:32	2013 87 3/28 6:00	25 (34)	5.6 (6.2)	436 (470)	-66	2	1	BDE, short, weak, B rotations, T_p and β are not low, slight increase of Fe charge state
9	A	2013 106 4/16 15:36.6		2013 107 4/17 21:5	150	18	500	-130	2	1	a sharp shock, low β , partial BDE, high Fe charge state extending to 4/18, not monotonic V_p decrease, P_t is irregular
10?	A	2013 108 4/18 6:10		2013 108 4/18 11:15	40	10.2	380	-35	2	0	very weak, before a SIR, low T_p and β , quiet plasma and field, no coherent B rotations, no appropriate CME, ahead of a HCS, no BDE, high Fe charge state, could be remnant of the previous ICME
11	A	2013 112 4/22 10:8.342	2013 113 4/23 0:0	2013 113 4/23 19:30	75 (290)	9 (13.5)	620	~	3	0	a V_p rise after the event, BDE and high charge state of Fe beyond the event
12	A	2013 117 4/27 4:19.73	2013 117 4/27 6:55	2013 117 4/27 23:00	60 (73)	9	410	~	3	0	BDE with one direction dominates, not very low T_p or β , no evident increase of Fe charge state
13	A	2013 117 4/27 23:32		2013 118 4/28 19:14	78	10.5	432	~	3	0	irregular V_p variation, strong shock, weak, partial BDE
14	A	2013 122 5/2 21:02	2013 123 5/3 5:50	2013 124 5/4 16:10	240 (390)	22	570 (610)	-160	1	2	BDE, low β , slightly enhanced Fe charge state

15	A	2013 132 5/12 23:30	2013 133 5/13 16:00	2013 135 5/15 12:36	26 (132)	5.4 (11.5)	570 (610)	-165	3	0	Br dominates, B is weak, a slow-shock like feature at 133 20:45, BDE and rise of Fe charge state, truncated plasma feature in the obstacle
16	A	2013 145 5/25 6:5		2013 146 5/26 1:30	220	18.5	475	~	2	0	BDE, no significant increase of Fe charge state, $\beta \sim 1$, no monotonic V decrease, not nice B rotations
17*?	A	2013 149 5/29 12:20	2013 149 5/29 19:00	2013 151 5/31 6:00	40 (80)	8.7 (10.4)	480	~	2	0	partial BDE, low β , CME candidate seen by STB COR2 on 5/24 20:54, no monotonic V decrease, no nice or quiet B rotations, a current sheet in the center, the profiles in the first a few hours looks like SIR, no increase of Fe charge state
18	A	2013 171 6/20 11:13		2013 172 6/21 9:37	110	16	500	-120	1	2	coherent B rotations, $\beta \sim 0.1$, partial BDE, rise of Fe charge state, not monotonic V_p decrease, a rise of T_p in the middle of the period
19	A	2013 178 6/27 16:17.7		2013 179 6/28 00:37	90	14.5	397	~	2	0	BDE, rise of Fe charge state, CME candidate seen by STB COR2 on 6/22, HCS on 6/25, surrounded by variable slow wind

20?	A	2013 195 7/14 23:20		2013 197 7/16 13:26	14	5.4	335	~	/	0	in slow wind, fuzzy plasma data, BDE, low β , Fe charge state is moderately enhanced although the data are spotty, B rotations mainly in the R-T plane, no right CME candidate
21	A	2013 206 7/25 6:12	2013 206 7/25 11:52	2013 207 7/26 12:00	900	41.5	545	-130	2	1	low β , high Fe charge state, not smooth B rotations, coincides with HCS
22	A	2013 208 7/27 18:52	2013 209 7/28 1:50	2013 209 7/28 23:37	73 (305)	10 (19)	580	-105	3	0	partial low β and BDE, no obvious increase of Fe charge state, CME candidate on 7/24 seen by STA and STB COR 1 and 2
23	A	2013 222 8/10 9:16	2013 222 8/10 17:24	2013 224 8/12 7:00	103	16	453	-133	1	2	low β , BDE, nice B rotations, increased Fe charge state
24	A	2013 234 8/22 7:5	2013 234 8/22 23:15	2013 236 8/24 23:25	120 (500)	16.6 (27)	475 (540)	-145	3	2	low β , BDE, nice B rotations, increased Fe charge state, B dips in sheath region
25?	A	2013 244 9/1 1:10	2013 244 9/1 9:47	2013 244 9/1 20:8	42 (44)	9	370 (415)	-50	2	0	low β , BDE, not smooth B rotations, short, no increase of Fe charge state, CME candidate on early 8/28 seen by STA and STB

26	A	2013 264 9/21 6:00	2013 264 9/21 18:20	2013 265 9/22 23:20	70 (160)	11.9	430	-90	2	0	low β , BDE, B rotations, increased Fe charge state, Vp gradually increased in sheath region
27	A	2013 277 10/4 4:28	2013 278 10/5 1:8	2013 279 10/6 22:13	60 (68)	11.6	353	-66	1	2	low β , BDE lasted one more day, increased Fe charge state, slow, nice rotations in T-N plane, Br~0
28?	A	2013 290 10/17 15:15		2013 292 10/19 5:27	25	6	357	-92	/	0	in long-lasting slow wind, quiet B and plasma data, somewhat rotation of Br, $\beta\sim 1$, partial BDE, increased Fe charge state and spotty data, CME candidate on 10/12 seen by STB
29	A	2013 295 10/22 17:1	2013 296 10/23 4:12	2013 297 10/24 11:37	44 (56)	9.6 (10)	350 (360)	-60	2	1	slow, low β , BDE, moderate increase of Fe charge state, B rotations but not smooth, CME candidate on 10/18 seen by STA and STB
30	A	2013 305 11/1 10:55		2013 307 11/3 0:46	350	19	500	-106	3	0	partial BDE, increase of Fe charge state, CME candidate on 10/28 seen by STA and STB, DG of 11 hrs

31*	A	2013 308 11/4 8:56	2013 308 11/4 20:00	2013 310 11/6 01:30	265 (400)	22	665	-225	2	1	BDE, increased Fe charge state, low β , B rotations, overlap with the following SIR, a reasonable P _{tmax} in the sheath is used rather than the spike values. The P _{tmax} in the magnetic obstacle is partly due to ICME-SIR interaction. nice CME candidate on 11/2 5:24 seen by STA and STB, with V of 1087 km/s at STB
32	A	2013 315 11/11 10:31	2013 316 11/12 2:00	2013 317 11/13 3:00	45 (118)	9.3	420	~	3	0	low β , BDE, slow, slight increase of Fe charge state, not smooth B rotations
33	A	2013 317 11/13 17:00		2013 318 11/14 3:00	48	8	440	-85	1	0	weak, BDE, $\beta \sim 1$, no good B rotations, no increase of Fe charge state, no good CME candidate
34	A	2013 318 11/14 5:50	2013 318 11/14 9:00	2013 318 11/14 21:00	60 (140)	11.3	445	~	3	1	low β , BDE, increased Fe charge state, B declining at the leading part, another B plateau in the trailing part, no nice B rotations, CME candidate on 11/10 17:54 seen by STA and STB
35?	A	2013 322 11/18 18:24	2013 323 11/19 0:31	2013 324 11/20 22:52	54 (68)	9.3 (10.5)	350 (356)	-85	3	0	weak, slightly low β , BDE, moderately increased Fe charge state, somewhat B rotations, no good CME candidate

36*	A	2013 330 11/26 19:30		2013 331 11/27 7:30	88	12.3	420	43	2	1	in a SIR, B rotations mainly in T-N plane, low T_p and β , BDE on 11/27 0:00-6:30, increased Fe charge state in the event and 2 days before, CME candidate on 11/21 and 11/22 seen by STA and STB
37	A	2013 335 12/1 22:29	2013 336 12/2 6:00	2013 338 12/4 7:40	411.81	29.5	620 (690)	-210	1	2	β reaches 0.01, BDE, significant increase of Fe charge state, nice B rotations
38*	A	2013 359 12/25 11:49		2013 359 12/25 22:30	90	12.2	420	~	2	0	low β , partial BDE and increased Fe charge state, embedded within a SIR, sharp current sheet in the center
39?	A	2013 361 12/27 22:22		2013 363 12/29 3:38	14	3.5	428	-78	/	0	in the trailing part of "fast" wind (<500 km/s), low T_p , B in R-T plane, significant increased Fe charge state, partial BDE, CME candidate could be 12/24
40	A	2013 365 12/31 13:31	2013 365 12/31 23:30	2014 2 1/2 14:00	30 (50)	7.2 (7.6)	490 (500)	-120	3	0	low β , BDE, not much increase of Fe charge state

1	B	2013 39 2/8 8:20		2013 39 2/8 15:28	64	10.7	320	35	/	1	diffusive PAD, B rotation and increase, 2 days ahead of HCS, maybe a part of CME, candidate on 2/3 observed by SOHO, ST A and B, low β lasted about 1 day beyond the event
2	B	2013 49 2/18 3:6	2013 49 2/18 8:24	2013 50 2/19 18:00	350	20 (22)	470	145	3	0	diffusive PAD and then BDE, V increases and then remained at about 450 km/s, fall where the SIR should be, CME candidate on 2/15 seen by STA, not very low T_p
3	B	2013 66 3/7 12:23	2013 67 3/8 8:00	2013 69 3/10 8:45	80 (850)	11 (17.3)	620 (610)	~	3	0	following a SIR, BDE, V first declines then increases, very low β , fuzzy plasma data in the second half of the event
4	B	2013 83 3/24 5:20		2013 83 3/24 22:00	160	18	460	~	/	1	low β , enhanced B, no monotonic V change, no BDE, possible CME candidate seen by STA and SOHO on 3/21, but clearly by STB, front edge is not f.s., current sheet at the rear edge
5*	B	2013 99 4/9 23:40		2013 100 4/10 14:00	54	10.5	355	~	2	0	BDE, low T_p and β , no nice B rotations, embedded within a SIR

6	B	2013 117 4/27 1:9	2013 117 4/27 5:00	2013 117 4/27 20:13	70 (85)	9.5 (10.2)	473	-53	3	0	low β , no nice B rotations, BDE, possible CME candidate on 4/23 seen by STA and STB
7	B	2013 118 4/28 19:38		2013 119 4/29 16:50	70	8	430	-93	3	0	slow, β is slightly below 1, weak BDE, no nice B rotations, possible CME candidate on 4/24 seen by STA and STB
8	B	2013 124 5/4 4:52	2013 124 5/4 15:00	2013 126 5/6 9:40	170 (180)	19.5	440 (453)	-104	1	2	low β , BDE, Pt max at the leading part of the obstacle, CME candidate on 5/1 seen by STA and STB
9?	B	2013 127 5/7 4:37		2013 127 5/7 19:22	98	13	390	~	1	1	slow, relatively low β , large-scale B rotations, partial BDE, no clear CME candidate, at sector boundary
10	B	2013 135 5/15 13:34	2013 136 5/16 1:16	2013 136 5/16 16:00	140 (280)	17.5 (21)	640 (660)	-80	3	0	BDE, B declines fast, CME candidate on 5/13 seen by STB
11	B	2013 137 5/17 2:54		2013 138 5/18 0:00	80	10.7	650	-150	2	0	relatively low β , partial BDE, not low T_p , no nice B rotations, CME candidate on 5/13 seen by STA and STB
12	B	2013 153 6/2 6:9	2013 153 6/2 12:15	2013 157 6/6 8:52	103	12	505	-205	3	0	low β , BDE, multiple flux ropes, CME candidates on 5/30-31 seen by STA and STB COR1

13*	B	2013 170 6/19 15:8		2013 171 6/20 22:00	150	11.3	700	~	/	1	embedded in fast wind, $\beta \sim 0.01$, partial BDE and flux rope, CME candidate on 6/18 seen by STA and STB COR1
14	B	2013 186 7/5 7:4		2013 188 7/7 1:47	90	12.5	416	-126	3	0	partial low β and BDE, multiple flux ropes, CME candidate on 7/2 seen by STA COR2
15	B	2013 234 8/22 2:10	2013 234 8/22 13:00	2013 235 8/23 7:0	60 (100)	9.4 (11)	640 (710)	-150	3	0	in the trailing part of fast wind, BDE, B rotations, CME candidate on early 8/20
16*	B	2013 246 9/3 15:50	2013 246 9/3 22:30	2013 247 9/4 22:47	290 (380)	14.8 (18)	600	-160	3	0	BDE, replacing the SIR in previous CR, $\beta \sim 1$
17	B	2013 252 9/9 14:32	2013 253 9/10 6:52	2013 253 9/10 22:53	60 (250)	12 (13)	480 (550)	~	3	1	very low beta for 6 hrs, no BDE, seems to be 2 flux ropes, replacing SIR in previous CR, CME candidate on 9/6 seen by STA and STB COR2, HCS at the leading part of the ICME
18	B	2013 258 9/15 16:20	2013 259 9/16 4:20	2013 260 9/17 0:25	28 (65)	6.2 (9)	320 (340)	-20	2	1	very slow, probably decreased a lot by slow wind, relatively low β and low T_p , BDE, nice B rotations although not much increase, nice CME candidate on 9/10 or 9/11 seen by STA and STB

19	B	2013 281 10/8 4:54	2013 281 10/8 17:25	2013 282 10/9 23:35	60 (125)	8.8 (10.7)	478 (480)	-133	3	1	low β , BDE, 2 flux ropes, CME candidates on late 10/4 and early 10/5 seen by STA and STB
20	B	2013 294 10/21 18:23		2013 296 10/23 5:30	39	9.3	310	~	2	0	low β , very slow, major rotation in Bt, CME candidate on 10/15 seen by STA and STB, BDE in first half a day, the dominant field polarity of the ICME is opposite to the background
21	B	2013 309 11/5 2:43		2013 309 11/5 23:47	205	15.2	420	-92	3	0	BDE, $\beta \sim 1$, not decreased T_p , CME candidate on 11/2 seen by STA and STB COR2
22	B	2013 310 11/6 2:00	2013 310 11/6 13:38	2013 311 11/7 14:00	54 (800)	9 (30)	740 (700)	-200	3	1	low β and T_p , BDE, very quiet and weak B in magnetic obstacle
23	B	2013 312 11/8 13:28	2013 312 11/8 18:44	2013 314 11/11 7:15	250 (mag)	25.5	> 860	> -280	1	2	18-hour plasma DG, low β , BDE throughout the ICME and 2.5 days beyond it, CME candidate on 11/7 seen by STA and STB
24	B	2013 328 11/24 3:22		2013 328 11/24 22:12	40	8	410	-50	2	0	low β , BDE, somewhat B rotations
25	B	2013 342 12/8 18:22	2013 343 12/9 2:25	2013 344 12/10 18:40	36 (62)	6.4 (8.6)	470	-125	2	0	partial BDE, $\beta \sim 1$, not smooth B rotations

26	B	2013 351 12/17 13:29	2013 352 12/18 2:5	2013 354 12/20 15:00	70	7.3 (9.5)	430 (465)	-110	3	0	BDE throughout the ICME and 1 day afterward, $\beta \sim 1$, multiple CME candidates on 12/12-12/17 seen by COR2
27	B	2013 355 12/21 8:25		2013 356 12/22 0:0	42	8.6	425	-125	2	0	low β and BDE, N_p is very low for 6-hr and plasma data are fuzzy during the period, closely followed by a SIR embedding a flux-rope-like structure
28	B	2013 362 12/28 17:6	2013 363 12/29 4:12	2013 364 12/30 14:00	270 (420)	20 (24)	550	-200	3	1	low β and BDE, a lot of changes in plasma data, B rotations are relatively smooth
29	B	2013 365 12/31 21:47		2014 1 1/1 5:51	72	11.7	435	-45	1	1	short and weak, low β and BDE, B rotations, CME candidate on 12/27 seen by STA and STB COR2

2014

1*	A	2014 9 1/9 13:17.6	2014 9 1/9 16:00	2014 10 1/10 13:33	240 (376.3)	21	580	-110	2	0	embedded within a SIR, low T_p and β , partial BDE, not smooth B rotations, several B dips in the center, enhanced Fe charge state lasting 2 days beyond the event, CME candidate on 1/5 seen by ST A&B COR2
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2	A	2014 13 1/13 17:17		2014 16 1/16 3:32	118	15	400	-100	/	1, partial	Np, B, and Pt rose in the second half of the event, BDE but one direction dominated, low β , a shock at the center, Fe charge state increased partially, CME candidate on 1/9 seen by STB COR2
3	A	2014 29 1/29 18:13.45		2014 30 1/30 11:10	170	14	500	-110	3	0	Vp declined, Tp did not decrease, $\beta \sim 1$, BDE, no increase of Fe charge state
4	A	2014 33 2/2 00:18		2014 34 2/3 12:15	125	15	410	~	1	0	another shock 18 hr ahead, B increase, not smooth B rotations, patchy low Tp and β , increase of Fe charge state, patchy BDE
5	A	2014 36 2/5 3:27	2014 36 2/5 10:00	2014 37 2/6 7:18	140 (210)	14.8 (18)	500 (550)	-140	3	0	slightly low β , no nice B rotations, V declining is not monotonic, BDE, CME candidate seen by STA and STB COR2 at about 9:55 on 2/2
6?	A	2014 37 2/6 11:34		2014 38 2/7 20:30	34	8.4	475	-135	/	0	Pt is weak and not enhanced, BDE, low β , B is mainly in north direction, Fe charge state increased moderately, could be related to the CME seen by STA and STB COR2 at 19:55 on 2/2

7	A	2014 38 2/7 20:59	2014 39 2/8 6:36	2014 40 2/9 2:27	130 (180)	16.6 (17.5)	450 (460)	~	3	1	rise of B, rotations in R-N plane, low β , partial and weak BDE in the magnetic obstacle, slight increase of Fe charge state lasting 1 day beyond the event, B dip before the obstacle, CME candidate: halo CME seen by STA COR2 on 2/4
8*	A	2014 47 2/16 7:50	2014 47 2/16 15:6	2014 48 2/17 16:15	280 (440)	10.7	660 (720)	-195	3	0	replacing fast wind in a SIR, not nice B rotations, BDE, partial increase of Fe charge state, CME candidate seen by ST A&B COR2 on 2/14
9	A	2014 53 2/22 8:0	2014 53 2/22 8:49	2014 53 2/22 21:48	70 (92)	10.4 (11)	440 (460)	-70	3	0	$\beta \sim 1$, no BDE, no B rotations, no increase of Fe charge state, B dip and reconnection-like region before the obstacle
10	A	2014 53 2/22 23:6.4	2014 54 2/23 10:15	2014 54 2/23 17:18	28 (100)	5 (11)	435 (480)	-45	3	0	$\beta \sim 1$, weak BDE in the obstacle part
11	A	2014 56 2/25 12:15.93	2014 57 2/26 00:38	2014 57 2/26 8:26	35 (110)	6.5 (11)	410	~	3	1	partial BDE, low β and increased Fe charge state in the obstacle, not monotonic change of V, two intervals of decreased B before the obstacle
12	A	2014 58 2/27 20:46.75		2014 60 3/1 18:35	73	9.8	465	-135	/	0	Pt irregular, partial BDE

13*	A	2014 66 3/7 18:35	2014 67 3/8 2:38	2014 67 3/8 23:12	60 (260)	8.8 (16)	560 (600)	~	3	0	replacing fast wind in a SIR, not nice B rotations, BDE
14	A	2014 70 3/11 9:37	2014 71 3/12 2:49	2014 73 3/14 1:16	65 (250)	12 (18)	550 (620)	-195	1	2	B dip in the sheath, BDE, low T_p and β , nice B rotations
15*	A	2014 73 3/14 16:37.67	2014 74 3/15 1:15	2014 74 3/15 14:25	70 (95)	10 (11)	720	-290	2	0	in the fast wind of a SIR, low β , no BDE
16	A	2014 89 3/30 21:38	2014 90 3/31 1:5	2014 90 3/31 13:20	220 (500)	21.5 (25)	705	-125	2	1	low T_p and β , BDE, not nice rotations
17?	A	2014 91 4/1 13:30		2014 91 4/1 21:43	70	10	495	-70	2	0	low T_p and β , somewhat B rotations, diffusive distribution of suprathermal e
18	A	2014 99 4/9 13:7.75	2014 100 4/10 6:5	2014 100 4/10 15:35	120 (170)	14.6 (16)	425 (490)	-55	/	0	low T_p and β , B rotations in T-N plane, partial BDE, a shock 14 hrs ahead
19	A	2014 101 4/11 15:24	2014 102 4/12 11:40	2014 102 4/12 20:33	36 (150)	9 (14)	455 (520)	-55	3	0	low β , partial BDE
20	A	2014 131 5/11 12:33.6	2014 131 5/11 18:00	2014 133 5/13 6:00	370 (380)	27.5	620	~	/	1	low β , two flux ropes, BDE and diffusive suprathermal e distribution, ICME replacing the fast wind

21?	A	2014 159 6/8 1:44		2014 160 6/9 9:29	47	9.7	365	~	2	0	low T_p and β , B rotations, no BDE, caught up by another ICME, CME candidate seen by COR2 on 6/4
22	A	2014 160 6/9 9:30.45	2014 161 6/10 4:10	2014 161 6/10 23:50	60 (400)	11 (20)	410 (488)	-77	3	0	low T_p and β in the obstacle, BDE, CME candidate seen by COR2 on 6/5
23	A	2014 162 6/11 0:14.7		2014 162 6/11 12:30	175	16.8	440	~	3	0	following the previous ICME closely, CME candidate seen by COR2 on 6/6
24?	A	2014 164 6/13 0:53		2014 164 6/13 7:53	33	8.3	400	~	1	0	short, in the slow wind, low β , partial BDE, CME candidate could be a halo CME seen by STA COR2 on 6/8
25?	A	2014 174 6/23 11:00		2014 176 6/25 11:00	42	9.6	350	~	1	0	very slow solar wind, low β , mostly BDE, current sheets in B rotations, STA COR2 observed partial halo CME on 6/19
26*	A	2014 180 6/29 23:30		2014 182 7/1 10:42	76	12.5	575	-165	3	1	low β , BDE, not-smooth B rotations, embedded within a SIR
27*	A	2014 185 7/4 16:53	2014 185 7/4 22:27	2014 186 7/5 8:51	66	11.862	340	~	/	2	in the front side of a SIR, partial low β , incomplete and smooth B rotations, slightly higher Fe charge state, no BDE, COR 1 and 2 observed a possible CME source

28	A	2014 193 7/12 17:18	2014 194 7/13 6:30	2014 195 7/14 5:48	150 (265)	11.3 (23)	540	-130	3	0	partial low β , BDE, no Fe charge state increase, big changes at shock, no smooth B rotations
29	A	2014 223 8/11 9:3	2014 224 8/12 7:25	2014 225 8/13 20:5	230 (270)	21.5 (22)	470 (590)	-170	3	2	low β (<0.1), partial BDE (not evident in flux rope part), smooth B rotations (mainly in T-N), high Fe charge state
30	A	2014 243 8/31 2:55	2014 243 8/31 14:00	2014 244 9/1 22:30	N/A	13.2 (20)	≥ 510	N/A	N/A	0	not good B rotations, a sharp current sheet within the obstacle
31	A	2014 246 9/3 13:38	2014 246 9/3 13:38	2014 247 9/4 3:35	N/A	14	N/A	N/A	N/A	0	not good B rotations, time agrees with the Enlil simulation of 9/1 CME by CCMC
32	A	2014 267 9/24 14:55	2014 267 9/24 17:30	2014 268 9/25 20:38	N/A	33	N/A	N/A	N/A	2	relatively smooth B rotations
33	A	2014 289 10/16 20:11	2014 290 10/17 7:8	2014 292 10/19 6:00	400 (1100)	27 (35)	550 (665)	-140	2	1	plasma data gap for about half of the event, low beta, no SWEA plot
34	A	2014 331 11/27 13:32	2014 331 11/27 20:20	2014 332 11/28 22:47	N/A	16.4 (21.4)	≥ 585	N/A	N/A	1	not good B rotations but of large scale, a current sheet in the middle
35	A	2014 349 12/15 5:38	2014 350 12/16 3:30	2014 351 12/17 3:34	≥ 490	30.5 (35)	≥ 680	N/A	N/A	0	not good B rotations but of large scale
36?	A	2014 356 12/22 10:00	2014 356 12/22 10:00	2014 356 12/23 11:8	N/A	8.3	N/A	N/A	N/A	0	only Br rotates, quite B

1*	B	2014 25 1/25 2:00		2014 25 1/25 15:15	46	10.5	440	140	2	0	embedded in a SIR with f-s shock pair, plasma data is fuzzy, $\beta \sim 0.1$, not coherent B rotations, BDE, a B dip in the leading part
2	B	2014 29 1/29 5:20	2014 29 1/29 17:14 sharp changes of Br	2014 31 1/31 9:00	59	9.2	700	-290	3	0	BDE, $\beta \sim 1$, B rotations are not coherent
3	B	2014 36 2/5 16:5	2014 37 2/6 12:3	2014 39 2/8 10:39	97	13	375 (395)	-75	2	1	low β , partial and intermittent BDE, a current sheet in the obstacle, and a B dip, 10-hr DG at the trailing part before a f.s.
4	B	2014 52 2/21 7:17	2014 52 2/21 13:47	2014 53 2/22 8:10	DG	DG	800	-200	DG	DG	DG of B, Np and Tp data fuzzy, Tp increased 13 min earlier than V jump at f.s., lower Tp in magnetic obstacle, CME candidate on 2/19
5	B	2014 59 2/28 4:23		2014 60 3/1 16:00	85	9.4	480	-140	3	0	suprathermal e flux increases at all pitch angles; Br dominates for 12-hr in the trailing part
6*	B	2014 62 3/3 22:00		2014 64 3/5 17:00	50	8.2	460	-160	/	0	low β , partial BDE, V declines, embedded within SIR, a current sheet in the center, plasma data fuzzy

7	B	2014 67 3/8 4:41	2014 67 3/8 20:00	2014 68 3/9 10:00	90 (750)	14 (18)	550 (610)	-130	3	2, partial	low β , BDE, B rotations, long sheath region, wide boundary layers at the two sides of magnetic obstacle
8*	B	2014 73 3/14 23:10	2014 74 3/15 5:15	2014 75 3/16 18:12	390 (800)	25 (28)	635 (660)	-185	2	1, partial	2 flux ropes separated by 6 hrs, each has low β and some not smooth B rotations, the second one with BDE and much weaker B than the first one, CME candidate on 3/12
9	B	2014 77 3/18 12:00		2014 78 3/19 19:22	35	9	570	-160	1	1	low β , B rotations, V_p decreases although not monotonically, Pt is weak, partial BDE
10	B	2014 91 4/1 4:53		2014 91 4/1 21:37	54	9	380	-80	3	0	slow, BDE, $\beta \sim 1$
11	B	2014 102 4/12 2:27	2014 102 4/12 20:46	2014 105 4/15 7:13	120 (280)	16.7 (18.2)	453 (490)	-173	1	2	low β , BDE, nice B rotations
12	B	2014 128 5/8 1:37	2014 128 5/8 21:00	2014 130 5/10 8:23	100 (115)	10.3 (14)	450 (540)	-140	2	2	low β , BDE, nice B rotations, replacing a SIR
13	B	2014 160 6/9 1:18	2014 161 6/10 0:00	2014 161 6/10 17:10	76 (175)	11.8 (18)	500 (660)	-110	/	1, short	low N_p , $\beta < 0.1$, southward B dominates in 10 hr of the obstacle
14?	B	2014 178 6/27 18:27	2014 179 6/28 15:20	2014 180 6/29 19:45	28 (85)	6.7 (10.5)	380 (410)	-80	3	0	low β , BDE, not smooth B rotations

15*	B	2014 182 7/1 12:51	2014 182 7/1 20:15	2014 183 7/2 18:48	480 (640)	33	700	-160	/	0	embedded in a SIR, low Np, $\beta < 0.1$, BDE
16*	B	2014 223 8/11 6:20		2014 225 8/13 14:47	115	11.3	680	-330	2	0	after a SIR, low β , BDE, not smooth B rotations, CME candidate seen by STA and STB on 8/8
17	B	2014 243 8/31 17:45	2014 244 9/1 0:52	2014 245 9/2 21:7	90 (250)	13.5	485	-135	2	1	Np DG and fuzzy Vp and Tp data for the last 30 hr, current sheet in B rotations, BDE, CME candidate on 8/28 seen by STB COR2
18	B	2014 246 9/3 7:45	2014 247 9/4 0:25	2014 249 9/6 11:42	DG	26	605 (810)	-205	DG	0	Np DG, partial BDE, CME candidate seen by STB COR2 on 9/1, causing "snow storm"
19	B	2014 268 9/25 14:9	2014 268 9/25 17:22	2014 269 9/26 16:32	2300	68	760	DG	1	0	low β , high B, multiple B rotations although not coherent, multiple flux ropes, plasma DG for 1 day, CME candidates seen by STB COR2 on 9/23 and 9/24

2015

1	A	2015 32 2/1 18:40	2015 32 2/1 18:40	2015 33 2/2 8:00	NaN	12.2	NaN	NaN	NaN	2	plasma data gap, using only B, quiet and increased B, B rotations
2	A	2015 54 2/23 10:33	2015 55 2/24 3:21	2015 56 2/25 7:30	NaN	12.5 (31)	NaN	NaN	NaN	0	plasma data gap, using only B, quiet and increased B, B rotations

3	A	2015 61 3/2 8:55	2015 61 3/2 15:00	2015 63 3/4 1:25	NaN	28	NaN	NaN	NaN	1	plasma data gap, using only B, quiet and increased B, B rotations
4	A	2015 208 7/27 6:30	2015 208 7/27 6:30	2015 208 7/27 17:55	NaN	12.5	NaN	NaN	NaN	1	plasma data gap, using only B, quiet and increased B, B rotations
5	A	2015 211 7/30 3:45	2015 211 7/30 3:45	2015 211 7/30 18:20	NaN	12.5	NaN	NaN	NaN	2	plasma data gap, using only B, quiet and increased B, B rotations
6*	A	2015 336 12/2 11:33	2015 336 12/2 12:20	2015 337 12/3 0:34	230	23.5	508	-83	2	1	low β , quiet B, not much B rotation, partial BDE, boundary layers at the two sides, embedded within a SIR

2016

1	A	2016 9 1/9 18:8	2016 11 1/10 15:30	2016 12 1/12 12:00	165 (310)	17 (20)	435	~	3	0	quiet B, partial BDE, no good rotation, a glancing pass of 1/6 CME
2	A	2016 73 3/13 17:40	2016 74 3/14 2:40	2016 75 3/15 12:00	105 (220)	12 (20)	610 (640)	-200	2	1	low β and T_p , not much B rotation, partial BDE
4	A	2016 106 4/15 1:26	2016 106 4/15 5:20	2016 108 4/17 17:25	103 (105)	12	520 (550)	-160	2	2	low β and T_p , smooth B rotations, BDE, V declining
5	A	2016 184 7/2 20:48		2016 187 7/5 14:11	212	19	640	-215	3	0	strong shock, BDE, low β in the trailing part, followed by a faster wind, simulation of 6/30 CME in DONKI
5	A	2016 255 9/11 5:53	2016 255 9/11 5:53	2016 256 9/12 8:56	72	11	465	-72	1	1	low β and T_p , B rotation, partial BDE

6*	A	2016 303 10/29 11:40	2016 303 10/29 11:40	2016 305 10/31 3:20	280	25	460	~	2	2	slow, low β and T_p , B rotation, partial BDE, a current sheet in the obstacle, Pt profile is concave, embedded within a SIR
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(): values are from the region including the sheath region when the values in the sheath are higher than in the obstacle.

Magnetic obstacle (~flux rope) start time¹: if it is different from the ICME start time, there is a sheath region. Since 2013, it is left blank if there is no clear obstacle or the whole event is a magnetic obstacle without any sheath region.

ΔV^2 : temporal variation of solar wind speed over one event, negative value indicating solar wind is expanding, and "~" means the solar wind speed remains almost constant over the event.

Group³: We sort ICMEs into 3 groups depending on their temporal profiles of Pt. Corresponding to the Group 1, 2, and 3 ICMEs, the Pt profile, excluding any shock and/or sheath region (if present), respectively, has a central pressure maximum, a steady plateau, or a gradual decay. In the hypothesis that all ICMEs have a central flux rope, these three groups of Pt profiles are due to different approach distances to the central flux rope. Group 1 ICMEs are assumed to be the ones penetrated by spacecraft near the flux rope axis, and they usually present signatures of magnetic clouds. See Jian et al. (2006) for more detail.

? Ambiguous event.

Records:

1. 3/13/2010: Revised.
2. 8/9/2010: Add 1/14/2007 ICMEs for STEREO A and B, when plasma data were not available from STEREO.
3. 4/8/2011: Extend the survey beyond 10/31/2009 to 5/31/2010 for STA and 11/30/2010 for STB.
4. 5/26/2011: Extend the survey to 12/31/2010.
5. 11/4/2011: Add 9/28/2009 STB event. It is shorter than 12 hours though.

6. 3/19/2012: Add ICMEs during January - September of 2011 at STB.
7. 4/4/2012: Add ICMEs during January - July of 2011 at STA.
8. 4/13/2012: Add ICMEs during October -December of 2011 at STB.
9. 7//11/2012: Add the ICME on 17-19 August 2010 at STA.
10. 7/30/2012: Add ICMEs during August - December of 2011 at STA.
11. 9/28/2012: Change the comment of ICME on 8/30/2009 at STB.
12. 3/18/2013: Add ICMEs during January - August of 2012 at STA.
13. 4/3/2013: Change the comment of 1/29/2012 ICME at STA, because the leading shock is questionable.
14. 5/24/2013: Add ICMEs during January - August of 2012 at STB.
15. 6/10/2013: Change the analysis of 8/30/2009 event at STB.
16. 9/6/2013: Add comment for 6/30/2011 ICME at STB.
17. 10/22/2013: Add ICMEs during Sept - Dec of 2012 at STB.
18. 11/4/2013: Add ICMEs during Sept - Dec of 2012 at STA.
19. 3/13/2014: Add ICMEs on 8/3/2010 at STB, on 2/3/2011 at STA, on 7/23/2011 at STB.
20. 5/28/2014: Add ICMEs during Jan.-June of 2013 at STA.
21. 6/6/2014: Change the group classification of 1/20/2010 ICME at STB and update the reference.
22. 9/4/2014: Add ICMEs during 2013 at STB, change the note for the ICME on 1/29/2012 at STA.
23. 9/26/2014: Add ICMEs during July - Dec. of 2013 at STA.
24. 3/4/2015: Add ICMEs during Jan.-June of 2014 at STA.
25. 12/4/2015: Add ICMEs during Jan. - Sept. of 2014 at STB.
26. 3/22/2016: Fix three errors of doys in the time marks.
27. 11/7/2016: Add ICMEs during July - August of 2014 at STA. Because the plasma data are only available for a few hours per day in the rest of 2014 and the Level 2 PLASTIC data of 2015 are in process, the event survey is only updated to 8/26/2014.
28. 6/7/2017: Change the comment for ICME on 1/13/2009 at STB because the plasma data gap is removed.
29. 7/15/2017: Update STA ICMEs to the end of 2016, using Version 11 PLASTIC data and the new Level 2 merged data.

30. 8/9/2017: Add ICMEs at STA in Sept-Dec of 2014 when there was a reduced coverage of plasma data.
31. 12/22/2017: Add the classification of MCs throughout the list.
32. 1/12/2018: Check and update the ICME parameters in 2007 and 2008, because the plasma data were reprocessed after the compiling of the list.
33. 1/18/2018: The citation of Jian et al. (2018) is added.