

# The Helicity Sign of Flux Transfer Event Flux Ropes and its Relationship to the Guide Field and Hall Physics in Magnetic Reconnection at the Magnetopause

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### 1. Table S1

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**Introduction** This supplementary information includes Table S1 which lists the 82 events observed by the Cluster spacecraft. Events from Magnetospheric Multiscale are found in the supplementary information of Kieokaew et al. (2021). Table S1 includes the spacecraft used to observe the FTE where c1 denotes Cluster 1 and c3 denotes Cluster 3, the start and end times of the observation, which correspond to the start and end of the bipolar variation, the location in the Geocentric Solar Ecliptic (GSE) coordinate system and the helicity sign  $H$ .

s/c	tbegin	tend	X_GSE	Y_GSE	Z_GSE	H
c1	2002-11-10T10:15:40.000	2002-11-10T10:16:00.000	-5.477	16.818	-5.114	-1
c1	2002-11-10T10:17:45.000	2002-11-10T10:18:35.313	-5.663	17.4	-5.232	-1
c1	2002-11-10T10:44:46.000	2002-11-10T10:45:30.000	-5.297	16.694	-5.371	-1
c1	2002-11-10T10:53:47.000	2002-11-10T10:54:30.588	-5.466	17.263	-5.536	-1
c1	2002-11-10T11:42:15.000	2002-11-10T11:43:30.000	-5.188	17.046	-5.94	-1
c1	2002-11-10T11:59:44.940	2002-11-10T12:00:19.609	-4.813	16.314	-6.017	1
c1	2002-11-10T12:49:00.000	2002-11-10T12:50:30.608	-4.797	16.7	-6.465	1
c1	2002-11-10T13:01:28.000	2002-11-10T13:03:02.352	-4.718	16.625	-6.565	1
c1	2002-11-12T10:29:00.000	2002-11-12T10:29:46.710	-7.271	17.226	0.039	-1
c1	2002-11-12T10:58:30.000	2002-11-12T10:59:45.952	-7.171	17.325	-0.264	1
c1	2002-11-12T11:08:50.000	2002-11-12T11:09:17.135	-7.136	17.355	-0.365	1
c1	2002-11-12T13:10:40.000	2002-11-12T13:12:00.000	-6.669	17.604	-1.581	-1
c1	2002-11-12T13:53:00.000	2002-11-12T13:54:00.021	-6.484	17.641	-2.01	-1
c3	2002-11-12T19:06:47.000	2002-11-12T19:07:17.740	-5.017	17.685	-5.104	1
c1	2002-11-12T20:45:30.000	2002-11-12T20:46:30.000	-4.249	16.618	-5.864	-1
c1	2002-11-12T20:53:30.000	2002-11-12T20:54:02.000	-4.198	16.573	-5.932	1
c1	2002-11-12T21:45:45.000	2002-11-12T21:47:15.684	-4.143	16.943	-6.41	-1
c3	2002-11-13T00:04:30.000	2002-11-13T00:05:45.359	-2.923	15.191	-7.435	1
c3	2002-11-13T00:08:30.000	2002-11-13T00:09:28.000	-3.289	15.965	-7.46	1
c1	2002-11-13T00:25:15.000	2002-11-13T00:26:30.000	-3.183	15.828	-7.576	1
c1	2002-11-15T01:20:00.000	2002-11-15T01:21:30.159	-5.061	17.801	-3.421	1
c1	2002-11-15T01:27:30.000	2002-11-15T01:29:00.000	-5.057	18.304	-3.66	1
c1	2002-11-15T02:14:15.000	2002-11-15T02:16:00.000	-4.849	18.225	-4.077	1
c1	2002-11-15T04:31:30.000	2002-11-15T04:32:00.000	-4.027	17.201	-5.186	-1
c1	2002-11-15T11:06:00.000	2002-11-15T11:07:02.000	-1.511	14.135	-8.226	1
c1	2002-11-17T04:32:00.000	2002-11-17T04:33:00.000	-5.806	17.769	0.023	-1
c1	2002-11-17T05:21:00.000	2002-11-17T05:21:40.640	-5.654	17.893	-0.401	-1
c1	2002-11-17T05:23:30.108	2002-11-17T05:24:00.143	-5.646	17.898	-0.421	-1
c1	2002-11-17T05:31:10.326	2002-11-17T05:31:40.241	-5.616	17.919	-0.502	-1
c1	2002-11-17T05:37:10.000	2002-11-17T05:37:40.000	-5.594	17.933	-0.562	-1

c1	2002-11-17T05:51:15.000	2002-11-17T05:52:00.000	-5.54	17.965	-0.703	-1
c1	2002-11-17T23:24:27.712	2002-11-17T23:25:00.000	0.296	11.656	-9.19	-1
c3	2002-11-26T13:54:30.000	2002-11-26T13:55:10.000	-3.131	18.034	1.488	1
c1	2002-11-28T18:46:15.000	2002-11-28T18:47:30.000	-3.563	15.925	4.317	1
c3	2002-11-28T19:48:30.000	2002-11-28T19:50:00.000	-2.955	16.751	3.269	1
c1	2002-12-01T04:11:29.000	2002-12-01T04:12:30.000	-2.822	16.246	4.131	1
c1	2002-12-08T03:53:40.000	2002-12-08T03:54:28.409	-1.676	14.166	5.957	-1
c1	2002-12-08T05:51:48.000	2002-12-08T05:52:50.000	-1.185	15.555	4.988	-1
c3	2002-12-08T06:13:50.712	2002-12-08T06:15:30.000	-0.602	15.93	4.294	-1
c3	2002-12-08T08:45:55.000	2002-12-08T08:46:40.000	0.034	17.306	2.94	-1
c1	2002-12-10T15:27:45.727	2002-12-10T15:30:00.000	-0.384	15.913	4.689	-1
c1	2002-12-10T15:59:33.986	2002-12-10T16:01:00.000	0.241	16.326	3.935	1
c1	2002-12-10T16:48:56.000	2002-12-10T16:50:05.501	0.003	16.642	3.96	-1
c1	2002-12-10T22:48:00.000	2002-12-10T22:49:33.000	1.716	18.515	0.446	-1
c1	2002-12-24T16:10:17.254	2002-12-24T16:10:57.690	0.869	11.273	7.284	-1
c3	2003-01-07T21:43:30.000	2003-01-07T21:44:00.000	3.282	9.511	6.992	-1
c3	2003-01-07T21:50:30.594	2003-01-07T21:51:45.000	3.386	9.636	6.958	-1
c1	2003-01-10T05:35:43.607	2003-01-10T05:36:33.381	2.317	8.546	7.78	-1
c1	2003-01-10T05:49:15.000	2003-01-10T05:50:45.000	2.837	8.378	7.19	1
c1	2003-01-10T06:07:25.875	2003-01-10T06:07:50.762	2.495	8.76	7.744	-1
c3	2003-01-15T01:25:15.000	2003-01-15T01:25:51.416	4.833	9.355	6.866	-1
c3	2003-01-15T01:45:45.000	2003-01-15T01:46:15.000	5.137	9.63	6.763	-1
c3	2003-01-15T01:50:50.000	2003-01-15T01:52:30.000	5.194	9.693	6.738	-1
c3	2003-01-15T02:11:33.108	2003-01-15T02:12:30.000	5.505	9.954	6.626	-1
c3	2003-01-15T03:14:10.000	2003-01-15T03:14:30.000	6.347	10.661	6.255	-1
c1	2003-01-22T04:45:08.000	2003-01-22T04:45:30.000	5.647	9.089	7.377	1
c1	2003-01-31T19:27:26.000	2003-01-31T19:28:00.000	9.329	8.97	6.51	-1
c1	2003-01-31T19:43:45.000	2003-01-31T19:44:45.000	9.577	9.061	6.39	1
c3	2003-02-02T23:35:56.000	2003-02-02T23:36:53.000	4.412	6.285	7.817	1
c1	2003-02-03T00:37:45.000	2003-02-03T00:38:45.000	5.646	6.92	7.698	1
c3	2003-02-03T01:04:25.000	2003-02-03T01:04:52.000	6.304	6.679	7.062	1
c3	2003-02-07T18:33:15.000	2003-02-07T18:34:00.000	5.898	5.738	7.146	-1
c1	2003-02-07T20:51:20.000	2003-02-07T20:54:00.000	8.671	6.73	6.617	1
c1	2003-02-17T07:25:00.000	2003-02-17T07:26:30.000	7.393	4.82	7.043	1
c3	2003-02-22T02:00:00.000	2003-02-22T02:01:15.000	8.246	4.217	6.943	1
c1	2003-03-05T21:14:30.000	2003-03-05T21:15:30.000	5.916	3.104	7.675	-1
c1	2003-03-08T07:02:53.000	2003-03-08T07:03:36.000	7.086	2.761	7.656	-1
c1	2003-03-15T09:22:15.000	2003-03-15T09:22:55.000	5.97	2.143	7.638	1
c1	2003-03-15T09:48:43.000	2003-03-15T09:49:14.000	6.633	2.019	7.653	1
c3	2003-03-15T09:53:55.000	2003-03-15T09:55:00.000	6.393	1.569	7.052	1
c3	2003-03-19T13:57:30.000	2003-03-19T13:58:30.000	2.07	-4.567	-9.129	1
c1	2003-04-08T03:42:15.000	2003-04-08T03:43:30.000	5.403	0.085	7.469	1
c1	2003-04-20T02:37:56.000	2003-04-20T02:38:57.000	6.846	-2.619	7.518	1

c3	2003-04-24T22:00:00.000	2003-04-24T22:00:45.000	7.617	-4.482	7.364	-1
c3	2003-05-28T04:09:24.000	2003-05-28T04:09:50.000	3.347	-6.063	6.834	-1
c3	2003-06-03T09:56:23.000	2003-06-03T09:58:00.000	-3.552	-12.872	-9.585	-1
c3	2003-06-03T12:40:00.000	2003-06-03T12:41:03.000	-3.769	-10.416	-10.028	1
c1	2003-06-05T13:29:08.000	2003-06-05T13:29:45.000	-3.426	-15.557	-7.94	1
c1	2003-06-19T16:10:22.000	2003-06-19T16:11:45.000	-6.778	-16.569	-6.032	-1
c1	2003-06-23T17:16:53.000	2003-06-23T17:17:45.000	-3.478	-15.412	4.271	-1
c1	2003-06-27T03:26:45.000	2003-06-27T03:28:45.000	-8.432	-11.976	-8.773	-1
c1	2003-06-27T03:38:05.000	2003-06-27T03:39:10.000	-8.411	-11.866	-8.823	1

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