

## List of isolated substorms

To extract the isolated substorms the daily variations (<http://wdc.kugi.kyoto-u.ac.jp/>) and 1-min digital values (<http://cdaweb.gsfc.nasa.gov/>) of the AL index of the magnetic activity for all of the winter seasons (November, December, January and February) from 1995 to 2012 were used. The following criteria were used to select the isolated substorm:

1. The temporal interval from the preceding disturbance is not less than 3 h.
2. The value of magnetic bay maximum is  $|AL_{\max}| < 1500$  nT.
3. The substorm duration is less than 3 h.
4. The substorm ending was determined by the time moment (UT) after which the disturbance level becomes  $|AL| \leq 0.2 |AL_{\max}|$ .

By criteria 1-3, the substorms were selected by visual examination of the diurnal variations in the AL index.

The following automatic procedure was used to determine the onset time ( $T_0$ ) of the substorm with  $|AL_{\max}| > 300$  nT:

1. The preceding level of AL is subtracted from each of the 1-min values of AL, which results in  $\Delta AL_1$ .  
If  $\Delta AL_1 < -60$  nT, the moment of the preceding AL level is considered as the expected  $T_0$  and the current time is  $T_0+1$ .
2. The next value of AL is taken at  $T_0+2$ , and the difference is calculated as  $\Delta AL_2 = AL(T_0+2) - AL(T_0)$ .  
If this value  $\Delta AL_2 < -100$  nT, the moment  $T_0$  is considered as the substorm onset.

To determine the onset time of substorms of the magnetic activity level  $|AL_{\max}| < 300$  nT was used the simple criterion:  $\Delta AL_1 < -30$  nT.

List of isolated substorms is presented in the table below.

The first column of the table shows the date of the event, the second column is the substorm onset time ( $T_0$ , UT), and the third column is value of AL in the magnetic bay maximum.

Table

Date	$T_0$ , UT	$ AL_{\max} $ , nT
1994_December-28	15:57	519
1995_January-01	09:39	360
1995_January-13	08:14	541
1995_January-18	10:04	1000
1995_February-02	04:55	620
1995_February-09	04:39	342
1995_February-11	06:39	850
1995_February-18	09:44	488
1995_February-24	07:21	281
1995_November-14	10:11	438
1995_December-04	08:57	799
1995_December-23	09:36	491
1996_January-09	13:06	309
1996_February-11	10:02	1131
1996_February-25	07:00	835
1996_November-06	09:07	805
1996_November-09	11:30	853
1996_November-11	17:36	315
1996_November-12	08:01	741
1997_January-12	07:28	1000
1997_January-18	08:59	314
1997_February-12	05:14	392
1997_December-16	13:19	544
1998_January-02	14:01	523

1998_January-14	09:01	499
1998_January-21	06:05	730
1998_February-01	08:43	714
1998_February-22	10:03	346
1998_February-27	07:52	356
1998_November-02	19:14	456
1998_November-29	19:19	646
1998_December-12	10:15	386
1999_January-10	08:59	527
1999_January-25	09:48	573
1999_February-03	08:49	290
1999_February-22	18:56	465
1999_November-06	05:53	137
1999_November-21	05:46	587
1999_November-30	11:22	485
2000_January-25	17:46	397
2000_February-03	14:20	735
2000_February-06	10:03	1115
2000_February-11	04:46	411
2001_January-02	18:16	223
2001_January-06	11:46	248
2001_February-15	06:12	218
2001_February-23	07:06	660
2001_November-11	10:31	551
2001_December-08	08:24	245
2001_December-09	11:13	212
2001_December-27	09:17	202
2002_January-21	02:16	203
2002_February-09	20:02	531
2002_December-16	08:10	262
2003_January-15	09:43	300
2003_February-03	13:00	1118
2003_February-10	18:02	755
2003_November-06	19:44	1121
2003_November-24	14:06	1145
2003_November-27	19:49	272
2003_December-01	16:26	580
2004_January-18	19:22	574
2004_November-03	10:21	522
2004_December-11	13:23	1402
2004_December-12	02:01	793
2004_December-12	06:00	1115
2005_January-07	14:28	1685
2005_November-03	04:29	567

2005_November-03	10:58	1314
2005_November-05	06:11	653
2005_November-05	14:33	580
2005_November-08	15:41	267
2005_November-15	08:42	497
2005_November-19	16:02	955
2005_November-20	16:52	507
2005_November-22	07:49	407
2005_December-01	10:18	558
2005_December-09	21:34	533
2005_December-13	19:39	371
2006_January-07	15:18	796
2006_November-01	14:00	806
2006_December-24	07:06	449
2007_January-01	11:38	586
2007_January-04	07:55	600
2007_January-09	09:49	269
2007_January-10	03:17	196
2007_January-11	11:49	260
2007_January-14	21:50	175
2007_January-18	08:33	1001
2007_January-21	01:51	297
2007_January-22	08:39	201
2007_January-22	11:20	205
2007_January-22	18:05	268
2007_January-24	15:35	504
2007_January-26	07:40	275
2007_January-27	08:37	118
2007_February-09	05:34	193
2007_February-09	10:50	321
2007_February-19	07:46	135
2007_February-24	00:16	152
2007_February-25	06:06	117
2007_February-26	03:09	210
2007_November-01	15:30	225
2007_November-02	05:08	167
2007_November-02	10:43	318
2007_November-03	12:58	264
2007_November-17	05:05	262
2007_November-19	23:00	276
2007_November-28	01:31	228
2007_November-29	13:30	462
2007_December-06	11:27	110
2007_December-07	11:18	91

2007_December-08	12:46	93
2007_December-13	12:02	248
2007_December-14	09:15	287
2007_December-16	21:34	255
2007_December-31	16:53	179
2008_January-05	08:42	795
2008_January-07	11:12	801
2008_January-08	08:32	579
2008_January-09	06:58	359
2008_January-10	11:32	400
2008_January-12	15:32	1005
2008_January-23	06:11	127
2008_January-29	02:56	270
2008_January-29	07:14	209
2008_February-17	12:56	341
2008_February-20	07:05	321
2008_February-22	13:18	242
2008_November-10	12:04	326
2008_November-21	10:42	136
2008_November-23	05:03	208
2008_November-23	10:24	247
2008_November-27	13:09	340
2008_November-29	10:25	297
2008_December-04	10:22	749
2008_December-07	10:22	830
2008_December-08	11:39	161
2008_December-10	12:50	288
2008_December-11	11:59	247
2008_December-12	13:19	316
2008_December-17	14:50	487
2008_December-20	08:20	171
2008_December-20	13:31	206
2008_December-21	06:19	165
2008_December-22	17:10	493
2008_December-27	12:49	153
2008_December-31	10:11	662
2009_January-11	10:00	304
2009_December-14	04:50	271
2010_November-21	18:22	394
2011_January-29	10:15	324
2011_November-17	07:00	257
2011_November-27	15:18	669
2011_December-20	17:31	521
2011_December-29	10:15	1054

2012_November-25	13:53	381
2012_December-17	08:52	1220
2012_December-30	11:07	347
2013_January-06	17:50	356
2013_November-03	05:35	508
2013_November-20	12:32	595
2014_January-11	19:19	457

**General questions**

Vyacheslav Vorobjev (vorobjev@pgia.ru) & Oksana Yagodkina (oksana41@mail.ru)