

[2-4]

GEOMAGNETIC STORMS OF CYCLE 24 AND THEIR SOLAR SOURCES

*S Watari**, *M Den*, and *Y Kubo*

National Institute of Information and Communications Technology, 4-2-1 Nukuikita, Koganei, Tokyo 184-8795, Japan

Email: watari@nict.go.jp

Maximum of cycle 24 occurred in April 2014 with the maximum sunspot number (SSN) of 116.4 according to 13-month smoothed monthly SSN from the WDC-SILSO, Royal Observatory of Belgium, Brussels. This value of the maximum SSN is low since cycle 14 (1902-1913). Geomagnetic activity of cycle 24 is also low reflecting this low solar activity. The St. Patrick's Day storm in March 2015 is only one storm of cycle 24 with Dst index less than -200 nT. We picked up geomagnetic storms with Dst index less than -100 nT and identified their solar sources. Fourteen storms are picked up as shown in Table 1. The Summer Solstice storm on July 2015 is the second largest storm of cycle 24. Main cause of the geomagnetic storms are coronal mass ejections (CMEs) because the analyzed period is rising and maximum phases of cycle 24. Relatively slow CMEs contributed to the geomagnetic storms according to our analysis. We will report on the geomagnetic storms of cycle 24 and their solar sources using several examples.

Table 1 Geomagnetic storms of cycle 24 with Dst index less than -100 nT

No.	Date	Min. Dst (nT)	Type	Solar Sources	Speed at 1AU (km/s)
1	2011/08/05 17:50 -2011/08/06 15:00	-115	SC	full halo CME	611
2	2011/09/26 12:35-2011/09/28 17:00	-118	SC	full halo CME	704
3	2011/10/24 18:31-2011/10/25 21:00	-147	SC	full halo CME	534
4	2012/03/08 11:03-2012/03/10 19:00	-131	SC	full halo CME	737
5	2012/04/23 03:20-2012/04/26 16:00	-108	SC	partial halo CME	720
6	2012/07/14 18:10-2012/07/17 12:00	-127	SC	full halo CME	667
7	2012/09/30 11:32/23:05-2012/10/01 16:00	-119	SC	full halo CMEs	410
8	2012/10/08 05:16-2012/10/09 24:00	-105	SC	partial halo CME	526
9	2012/11/12 23:12-2012/11/14 19:00	-108	SC	partial halo CME	467
10	2013/03/17 06:00-2013/03/18 12:00	-132	SC	full halo CME	725
11	2013/05/31 16:17-2013/06/02 21:00	-119	SC	coronal hole	774
12	2014/02/18 13:54-2014/02/19 23:00	-112	GC	partial halo CME	530
13	2015/03/17 04:45-2015/03/21 15:00	-223	SC	partial halo CME	683
14	2015/06/22 18:33-2015/06/24 12:00	-195	SC	full halo CME	742

SC means Sudden Commencement and GC means Gradual Commencement.

ACKNOWLEDGEMENTS

We acknowledge SSN data for the WDC-SILSO, Dst indices for WDC-Geomagnetism, Kyoto, the geomagnetic storm catalog for Kakioka Magnetic Observatory, Japan Metrological Agency, and solar wind data for OMNI database, NASA Space Science Data Coordinated Archive. The CME catalog used in this study is generated and maintained at the CDAW Data Center by NASA and The Catholic University of America in cooperation with the Naval Research Laboratory. SOHO is a project of international cooperation between ESA and NASA.