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ANNUAL REPORT OF THE OBSERVED GEOMAGNETIC ACTIVITY AT PANAGJURISHTE OBSERVATORY FOR 2017

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Abstract. Magnetic variations shows different records at each observatory. They depend mainly on the latitude of the observatory and the local time. This paper reports the definitive geomagnetic data obtained at Panagjurishte Observatory in 2017, prepared in the form of local geomagnetic indices. In 2017, the Solar cycle 24 is already in his decreasing phase (https://www.swpc.noaa.gov/products/solar-cycle-progression). It had a "double-peaked" solar maximum, with the first peak reaching sunspot number of 99 in 2011 and the second peak in April 2014 with 101.
Calculated indices show that 2017 had 50 days with "storm" level conditions of the geomagnetic field but only moderate levels have been reached. Only two days, on 22 February and 08 September, picked at K-index 7. This weak activity is reasonable due to the fact that the sunspot numbers that year continue to decline.
Verification of data quality is performed according to "IAGA guide for magnetic measurements and observatory practice".

Key words: PAG observatory, geomagnetic variations, geomagnetic activity, local geomagnetic indices, daily mean values, 2017.

Introduction

The Geomagnetic observatory in Panagjurishte (PAG, 24.177°EN, 42.515°N) is established in 1937 – first on the Balkan Peninsula and unique in Bulgaria and during more than 80 years performs absolute measurements of the geomagnetic field elements and continuous registration of their variations (Buchvarov, 2006). In 2007 PAG observato-

ry was equipped with digital systems for the recording of geomagnetic field element's variations. Three different magnetometers are installed which operates in 24/7 regime: two tri-axial fluxgate magnetometers model FGE (DTU Space) – one of standard type in which the three fluxgate sensors are mounted on a 12x12x12 cm^3 marble cube placed on a three legged aluminium base, and a second version, in which the marble cube is suspended in two crossed phosphor-bronze strips to compensate any tilt of the sensor foundation. The third instrument is a three-axial search coil magnetometer used for studies on the longitudinal propagation of ULF signal (Chamati, 2020). It provides real time measurements at a sampling period of 0.01s which are integrated at a period of 1 s.

Thus, the observatory implemented the technical requirements and was joined to the INTERMAGNET (International Real-time Magnetic Observatory Network), which establishes a global network of cooperating digital magnetic observatories, and facilitate data exchanges and geomagnetic products in close to real time. Preliminary recorded time series and local geomagnetic K-indices are published on the NIGGG web page (http://data.niggg.bas.bg/magn_data1/dailymag_bg.php) and automatically reported to INTERMAGNET. The present paper provides definitive geomagnetic data which are checked and processed to comply with the IAGA standards for observatory practices.

Local geomagnetic indices (K, A_K, ΣK) calculated at PAG observatory

Geomagnetic irregular variations or so called geomagnetic disturbances are driven by the solar wind. Globally, they are evaluated by the Kp-index which is predicted and later on determined by the world data centers (Matzka et al., 2021a). It is a 3-hour quasi-logarithmic scale developed to measure magnetic activity ranging from 0 to 9, with 0 indicating completely quiet conditions and 9, representing extreme magnetic activity. It is intended to measure geomagnetic disturbances outside the normal diurnal quiet time variations (Sq). In order to have a somewhat consistent scale of magnetic activity between observatories at high latitudes, where field variations can be quite large in amplitude, and those at low latitudes, each observatory is assigned its own set of amplitude ranges corresponding to the various K-index levels. By definition, the K-limit scales for all observatories are proportional to the Niemegk scale (Matzka, 2021b).

The eight three-hourly K numbers (after Bartels, 1939) are calculated by a computer code (FMI method, Sucksdorff et al., 1991) from the digital recordings of three component flux-gate variometer FGE.

The local equivalent daily amplitude index ***Ak*** [nT] which is determined by converting K –indices into eight 3-hour equivalent linear amplitudes a_K, and calculating the mean value. The ranges of the individual ***K*** numbers at PAG observatory and the 3-hour equivalent amplitude a_K which is assigned for each K value are defined in Metodiev and Trifonova, 2019. $\boldsymbol{\Sigma K}$ is the daily sum of the eight *K* numbers.

The calculated local geomagnetic indices (*K, Ak, ΣK*) at PAG observatory for 2017 are presented in Table 1.

Table 1. Local geomagnetic indices (K, A_K, ΣK) calculated at PAG observatory in 2017

Activity Indices										
Day	**K**								**Ak [nT]**	**ΣK**
01-Jan-17	3	3	2	2	3	4	3	2	14	22
02-Jan-17	2	2	1	2	1	3	1	1	6	13
03-Jan-17	0	1	2	3	2	4	4	3	13	19
04-Jan-17	1	2	2	2	2	3	4	4	13	20
05-Jan-17	3	2	1	2	3	4	4	4	16	23
06-Jan-17	3	2	2	2	3	3	3	3	12	21
07-Jan-17	4	2	3	3	4	4	4	3	20	27
08-Jan-17	2	2	2	3	3	3	4	4	15	23
09-Jan-17	3	2	1	2	4	3	2	3	12	20
10-Jan-17	2	1	2	1	2	4	3	2	10	17
11-Jan-17	3	1	2	2	1	3	3	2	9	17
12-Jan-17	2	2	3	2	1	1	2	2	7	15
13-Jan-17	1	1	0	0	1	2	2	2	4	9
14-Jan-17	1	2	2	1	1	1	1	1	4	10
15-Jan-17	2	1	1	1	1	1	3	1	5	11
16-Jan-17	1	0	1	1	0	1	2	0	2	6
17-Jan-17	1	1	1	1	2	3	1	1	5	11
18-Jan-17	1	2	3	3	3	4	4	4	17	24
19-Jan-17	3	2	2	3	2	2	2	1	9	17
20-Jan-17	3	2	2	2	2	1	3	3	10	18
21-Jan-17	3	1	2	2	2	3	4	4	14	21
22-Jan-17	3	2	2	2	3	2	2	2	9	18
23-Jan-17	0	1	2	2	1	2	3	2	6	13
24-Jan-17	1	1	#	#	1	0	1	1	2	5
25-Jan-17	2	2	1	1	1	0	0	2	4	9
26-Jan-17	1	1	2	3	4	5	4	3	18	23
27-Jan-17	4	3	3	3	3	4	2	3	17	25
28-Jan-17	2	2	1	1	1	1	2	3	6	13
29-Jan-17	3	2	1	2	2	2	1	0	6	13
30-Jan-17	0	1	1	1	2	2	2	3	6	12
31-Jan-17	3	2	3	3	3	4	4	5	21	27

01-Feb-17	4	3	3	3	4	5	4	5	28	31
02-Feb-17	3	2	3	3	3	4	4	4	19	26
03-Feb-17	2	3	4	2	3	4	4	3	18	25
04-Feb-17	2	2	2	2	2	2	3	3	9	18
05-Feb-17	3	3	2	3	3	4	4	2	16	24
06-Feb-17	2	2	1	2	3	4	2	4	13	20
07-Feb-17	2	2	1	2	3	2	2	1	7	15
08-Feb-17	1	1	1	2	2	2	1	2	5	12
09-Feb-17	2	2	2	2	1	2	3	3	9	17
10-Feb-17	2	1	2	2	2	3	2	3	9	17
11-Feb-17	3	1	1	1	0	0	1	0	3	7
12-Feb-17	1	1	1	1	0	2	2	1	4	9
13-Feb-17	2	1	1	1	0	3	3	2	7	13
14-Feb-17	0	0	0	0	0	0	1	1	1	2
15-Feb-17	0	0	0	1	0	1	2	1	2	5
16-Feb-17	1	1	2	1	3	4	3	2	10	17
17-Feb-17	2	3	3	4	2	4	3	5	20	26
18-Feb-17	5	3	2	1	2	2	4	3	16	22
19-Feb-17	3	3	2	1	2	3	3	1	10	18
20-Feb-17	1	2	1	1	#	#	4	1	6	10
21-Feb-17	2	1	2	2	2	2	1	3	7	15
22-Feb-17	3	2	3	7	5	3	2	1	31	26
23-Feb-17	2	2	#	#	#	#	4	4	9	12
24-Feb-17	4	2	2	4	4	3	2	3	17	24
25-Feb-17	3	2	2	1	1	0	1	3	7	13
26-Feb-17	1	1	1	0	1	0	0	0	2	4
27-Feb-17	1	2	1	2	2	2	4	3	10	17
28-Feb-17	3	2	2	2	1	2	3	3	10	18
01-Mar-17	2	3	2	4	4	5	5	5	28	30
02-Mar-17	4	3	3	4	5	4	5	3	28	31
03-Mar-17	3	3	3	3	3	4	2	1	14	22
04-Mar-17	4	2	2	2	3	4	3	4	17	24
05-Mar-17	3	2	2	2	3	3	5	4	18	24
06-Mar-17	4	3	1	3	5	4	5	4	26	29

07-Mar-17	2	2	3	3	3	4	4	3	16	24
08-Mar-17	3	1	2	2	3	2	4	4	14	21
09-Mar-17	3	2	#	4	3	2	4	3	14	21
10-Mar-17	2	2	3	3	2	2	1	2	9	17
11-Mar-17	1	0	1	1	1	1	2	4	6	11
12-Mar-17	3	3	1	1	2	1	1	1	7	13
13-Mar-17	0	1	1	2	1	1	0	1	3	7
14-Mar-17	1	1	1	1	2	2	2	2	5	12
15-Mar-17	1	1	1	2	1	1	2	4	7	13
16-Mar-17	3	2	0	0	1	1	2	2	5	11
17-Mar-17	0	1	1	1	0	1	1	2	3	7
18-Mar-17	1	0	0	0	1	1	1	2	2	6
19-Mar-17	0	0	1	1	0	1	2	2	3	7
20-Mar-17	0	0	1	0	0	1	1	1	2	4
21-Mar-17	2	3	4	2	2	5	5	4	23	27
22-Mar-17	4	2	2	2	4	4	5	5	25	28
23-Mar-17	4	3	2	2	2	2	1	2	10	18
24-Mar-17	1	2	2	1	3	3	1	0	7	13
25-Mar-17	0	1	1	1	1	1	0	1	2	6
26-Mar-17	2	0	1	1	1	1	1	2	4	9
27-Mar-17	2	4	4	5	5	5	6	4	39	35
28-Mar-17	3	4	2	3	3	3	4	4	19	26
29-Mar-17	3	3	3	3	3	4	3	3	17	25
30-Mar-17	3	3	2	2	3	4	4	4	18	25
31-Mar-17	4	3	3	4	3	4	3	4	21	28
01-Apr-17	2	2	2	3	2	4	3	3	13	21
02-Apr-17	2	2	2	2	2	3	1	1	7	15
03-Apr-17	0	1	2	2	2	2	0	1	4	10
04-Apr-17	2	3	3	3	3	1	1	3	11	19
05-Apr-17	2	1	1	2	2	3	3	4	11	18
06-Apr-17	2	1	1	2	3	3	2	1	8	15
07-Apr-17	3	1	2	2	1	2	3	3	9	17
08-Apr-17	3	3	3	2	2	2	3	4	14	22
09-Apr-17	3	3	3	2	2	3	2	2	11	20

10-Apr-17	2	1	1	2	2	1	1	1	5	11
11-Apr-17	1	1	2	3	2	2	4	3	11	18
12-Apr-17	3	1	1	1	0	1	1	0	4	8
13-Apr-17	1	0	1	0	1	2	3	1	4	9
14-Apr-17	3	3	2	2	2	3	4	2	13	21
15-Apr-17	3	1	2	1	1	2	2	1	6	13
16-Apr-17	1	1	1	1	0	1	2	2	4	9
17-Apr-17	0	1	2	3	2	1	0	1	5	10
18-Apr-17	2	1	1	1	2	2	2	2	6	13
19-Apr-17	3	3	3	1	1	3	4	4	15	22
20-Apr-17	3	5	3	4	3	3	3	3	21	27
21-Apr-17	0	1	1	1	2	4	5	5	17	19
22-Apr-17	3	4	3	4	5	5	4	5	32	33
23-Apr-17	4	3	4	5	5	5	4	4	33	34
24-Apr-17	3	3	3	2	2	3	4	3	15	23
25-Apr-17	3	2	2	3	3	3	3	3	13	22
26-Apr-17	3	1	2	1	1	3	3	3	10	17
27-Apr-17	2	2	2	2	1	2	2	1	6	14
28-Apr-17	1	1	1	1	2	2	1	2	5	11
29-Apr-17	2	1	2	2	1	1	3	3	8	15
30-Apr-17	1	1	1	1	1	2	2	3	6	12
01-May-17	3	2	1	2	1	1	2	2	7	14
02-May-17	1	2	2	2	1	1	0	2	5	11
03-May-17	2	0	1	1	1	2	0	0	3	7
04-May-17	0	2	1	2	1	1	2	4	7	13
05-May-17	3	2	1	2	1	1	1	1	6	12
06-May-17	1	2	2	2	1	0	2	1	5	11
07-May-17	1	2	2	2	1	1	3	2	7	14
08-May-17	2	2	2	2	2	2	2	2	7	16
09-May-17	2	2	1	2	3	3	2	2	9	17
10-May-17	2	1	1	1	3	2	2	2	7	14
11-May-17	1	3	2	1	2	2	2	2	7	15
12-May-17	2	2	2	2	3	1	1	2	7	15
13-May-17	1	2	1	2	2	1	1	2	5	12

14-May-17	2	2	2	3	2	2	3	3	10	19
15-May-17	1	2	2	4	2	2	4	3	13	20
16-May-17	2	2	2	2	4	1	1	1	8	15
17-May-17	2	1	2	2	1	2	2	3	7	15
18-May-17	3	3	2	1	1	2	2	2	8	16
19-May-17	2	3	2	2	2	4	3	3	13	21
20-May-17	3	3	3	3	4	4	3	3	18	26
21-May-17	2	3	2	2	2	1	2	2	8	16
22-May-17	2	1	2	2	3	2	3	2	9	17
23-May-17	1	3	1	1	2	2	3	3	9	16
24-May-17	2	2	1	1	1	0	1	1	4	9
25-May-17	0	2	1	1	1	1	0	2	3	8
26-May-17	2	1	2	1	0	1	1	0	3	8
27-May-17	1	1	0	1	2	4	3	5	13	17
28-May-17	5	5	3	3	3	2	2	1	20	24
29-May-17	1	1	1	2	3	3	3	1	8	15
30-May-17	2	3	1	2	1	1	1	1	6	12
31-May-17	1	2	1	1	2	1	2	2	5	12
01-Jun-17	1	1	2	1	2	3	3	3	9	16
02-Jun-17	2	2	1	1	1	1	1	2	5	11
03-Jun-17	1	1	2	2	3	4	2	2	10	17
04-Jun-17	1	1	0	1	1	0	0	1	2	5
05-Jun-17	1	2	1	1	2	2	1	2	5	12
06-Jun-17	2	2	1	1	1	1	1	0	4	9
07-Jun-17	1	2	1	1	1	2	0	2	4	10
08-Jun-17	1	1	1	1	1	2	1	2	4	10
09-Jun-17	3	2	1	1	1	1	1	1	5	11
10-Jun-17	2	2	1	1	0	1	1	1	4	9
11-Jun-17	1	2	2	2	4	5	5	3	20	24
12-Jun-17	2	2	1	1	3	3	2	3	9	17
13-Jun-17	3	2	2	3	2	2	1	1	8	16
14-Jun-17	1	2	1	3	3	2	1	1	7	14
15-Jun-17	2	2	1	2	1	1	1	0	4	10

16-Jun-17	1	3	4	4	4	4	3	5	24	28
17-Jun-17	3	3	2	2	2	3	4	4	15	23
18-Jun-17	3	3	2	2	2	2	2	2	9	18
19-Jun-17	2	2	2	1	1	1	1	1	5	11
20-Jun-17	0	1	1	1	1	2	1	0	3	7
21-Jun-17	1	2	1	2	1	2	2	2	6	13
22-Jun-17	2	2	1	1	1	1	3	2	6	13
23-Jun-17	1	1	1	1	1	1	2	3	5	11
24-Jun-17	2	1	2	3	2	2	3	3	10	18
25-Jun-17	2	2	3	3	3	3	2	2	11	20
26-Jun-17	2	2	1	2	1	2	3	2	7	15
27-Jun-17	2	1	1	2	2	2	1	1	5	12
28-Jun-17	1	2	1	1	1	1	0	0	3	7
29-Jun-17	1	2	2	2	1	1	1	1	5	11
30-Jun-17	1	2	1	1	2	1	1	2	5	11
01-Jul-17	2	3	2	2	3	3	4	2	13	21
02-Jul-17	3	3	4	4	3	2	3	4	19	26
03-Jul-17	2	2	1	2	0	1	1	2	5	11
04-Jul-17	1	2	1	1	1	1	1	2	4	10
05-Jul-17	1	1	1	1	1	1	1	1	3	8
06-Jul-17	1	2	1	1	1	2	2	4	8	14
07-Jul-17	2	2	1	2	1	2	2	2	6	14
08-Jul-17	1	2	2	1	1	0	1	1	4	9
09-Jul-17	4	3	2	5	3	3	4	3	21	27
10-Jul-17	3	3	2	2	1	2	1	2	8	16
11-Jul-17	2	3	2	1	2	3	1	1	8	15
12-Jul-17	2	1	1	2	2	1	1	1	5	11
13-Jul-17	1	1	1	1	1	1	1	2	4	9
14-Jul-17	1	2	1	0	0	1	1	1	3	7
15-Jul-17	1	2	1	1	1	1	1	1	4	9
16-Jul-17	2	2	5	4	4	5	5	4	30	31
17-Jul-17	3	4	3	3	4	5	2	2	20	26
18-Jul-17	2	3	3	2	1	1	1	1	7	14

19-Jul-17	0	1	1	1	1	2	1	1	3	8
20-Jul-17	1	2	1	2	2	2	2	3	7	15
21-Jul-17	3	3	3	2	2	3	2	2	11	20
22-Jul-17	2	2	4	4	2	3	3	3	15	23
23-Jul-17	3	2	2	3	3	3	3	4	15	23
24-Jul-17	3	2	2	1	2	2	2	3	9	17
25-Jul-17	2	2	1	2	#	#	#	#	3	7
26-Jul-17	#	#	#	3	2	2	2	1	5	10
27-Jul-17	1	2	1	2	1	2	1	3	6	13
28-Jul-17	1	1	1	1	1	3	3	2	7	13
29-Jul-17	1	2	2	2	1	2	1	1	5	12
30-Jul-17	1	2	1	1	1	1	1	0	3	8
31-Jul-17	1	2	1	#	1	1	1	1	3	8
01-Aug-17	1	2	2	2	2	2	1	2	6	14
02-Aug-17	1	1	1	2	2	2	1	2	5	12
03-Aug-17	0	1	0	1	2	4	4	4	12	16
04-Aug-17	3	4	3	3	4	4	3	3	20	27
05-Aug-17	2	3	2	2	3	4	4	3	15	23
06-Aug-17	3	2	3	4	3	2	3	3	15	23
07-Aug-17	1	2	2	2	2	1	1	1	5	12
08-Aug-17	1	2	1	2	2	2	2	1	6	13
09-Aug-17	0	1	1	1	1	1	2	1	3	8
10-Aug-17	0	1	2	2	2	1	1	2	5	11
11-Aug-17	2	2	1	1	1	3	3	2	8	15
12-Aug-17	3	3	1	2	1	1	3	3	10	17
13-Aug-17	3	2	1	2	2	2	2	3	9	17
14-Aug-17	2	2	1	1	1	1	2	2	5	12
15-Aug-17	0	1	1	1	1	1	1	2	3	8
16-Aug-17	2	2	1	1	1	2	3	3	8	15
17-Aug-17	3	2	4	4	4	4	4	4	23	29
18-Aug-17	4	3	2	3	4	4	5	3	23	28
19-Aug-17	4	2	4	4	4	5	3	4	26	30
20-Aug-17	4	4	3	3	2	3	3	3	17	25
21-Aug-17	2	2	3	3	2	2	3	3	11	20

22-Aug-17	4	4	3	2	3	3	3	4	19	26
23-Aug-17	3	3	2	3	4	5	5	3	24	28
24-Aug-17	3	3	2	2	2	2	1	1	8	16
25-Aug-17	0	1	2	1	2	1	1	2	4	10
26-Aug-17	1	1	2	1	1	2	2	1	5	11
27-Aug-17	2	1	1	3	1	3	4	4	13	19
28-Aug-17	1	1	1	1	1	1	0	1	3	7
29-Aug-17	1	1	1	2	1	3	4	3	10	16
30-Aug-17	2	2	2	1	1	1	1	0	4	10
31-Aug-17	2	4	6	5	4	4	4	3	32	32
01-Sep-17	3	2	3	4	4	2	2	4	17	24
02-Sep-17	4	4	4	3	2	3	3	3	19	26
03-Sep-17	2	2	0	2	3	3	1	2	8	15
04-Sep-17	3	3	2	2	3	3	4	5	19	25
05-Sep-17	4	3	3	2	2	2	3	1	12	20
06-Sep-17	2	2	2	4	5	3	1	4	18	23
07-Sep-17	3	4	3	3	2	1	3	6	22	25
08-Sep-17	7	4	5	5	6	6	5	4	62	42
09-Sep-17	2	2	1	2	2	0	0	0	4	9
10-Sep-17	0	0	1	1	1	3	2	3	6	11
11-Sep-17	3	2	2	1	2	3	3	3	11	19
12-Sep-17	2	1	2	2	3	3	5	5	19	23
13-Sep-17	6	2	3	3	2	1	2	0	17	19
14-Sep-17	3	2	2	3	4	6	4	4	26	28
15-Sep-17	4	3	4	3	3	4	5	4	25	30
16-Sep-17	4	4	3	3	4	4	3	3	21	28
17-Sep-17	2	2	2	3	5	4	3	2	17	23
18-Sep-17	4	3	3	3	3	3	3	4	18	26
19-Sep-17	2	1	1	2	1	2	3	2	7	14
20-Sep-17	3	2	2	2	3	2	3	1	10	18
21-Sep-17	1	1	2	2	2	1	2	3	7	14
22-Sep-17	1	0	2	1	1	1	3	3	6	12
23-Sep-17	1	1	1	1	1	1	3	2	5	11
24-Sep-17	1	1	1	1	1	2	3	3	7	13

25-Sep-17	2	2	1	2	0	1	1	0	4	9
26-Sep-17	1	1	1	2	0	0	1	3	4	9
27-Sep-17	3	3	4	3	3	4	5	5	26	30
28-Sep-17	5	4	4	3	4	4	4	4	28	32
29-Sep-17	3	2	2	3	3	2	3	3	12	21
30-Sep-17	2	2	2	2	4	4	3	3	14	22
01-Oct-17	3	2	2	2	3	4	2	3	13	21
02-Oct-17	1	2	2	2	1	1	1	0	4	10
03-Oct-17	2	2	2	1	1	1	1	2	5	12
04-Oct-17	2	2	1	1	1	1	2	2	5	12
05-Oct-17	2	1	1	1	1	1	2	4	7	13
06-Oct-17	3	2	1	2	1	2	2	3	8	16
07-Oct-17	2	1	0	0	0	1	2	1	3	7
08-Oct-17	2	2	1	1	1	1	1	1	4	10
09-Oct-17	2	1	1	1	1	1	0	1	3	8
10-Oct-17	0	1	0	1	1	1	1	3	4	8
11-Oct-17	4	3	4	3	5	5	4	4	29	32
12-Oct-17	5	2	4	4	5	4	3	5	31	32
13-Oct-17	3	3	1	3	5	5	5	5	30	30
14-Oct-17	5	3	4	4	4	4	3	3	25	30
15-Oct-17	3	3	2	4	4	4	4	1	19	25
16-Oct-17	2	2	1	2	2	2	3	3	9	17
17-Oct-17	1	1	1	1	2	2	2	1	5	11
18-Oct-17	1	2	1	1	0	0	2	3	5	10
19-Oct-17	3	2	2	2	2	4	3	3	13	21
20-Oct-17	3	2	1	2	2	1	2	2	7	15
21-Oct-17	2	2	2	2	2	3	3	4	12	20
22-Oct-17	3	2	1	2	1	1	2	3	8	15
23-Oct-17	3	1	1	2	1	1	1	2	6	12
24-Oct-17	1	0	3	3	5	5	3	4	21	24
25-Oct-17	3	2	4	2	3	3	3	4	16	24
26-Oct-17	2	2	3	3	4	4	4	1	16	23
27-Oct-17	3	1	1	2	0	0	2	2	5	11

28-Oct-17	1	1	1	1	1	2	2	1	4	10
29-Oct-17	1	1	0	1	1	1	1	0	2	6
30-Oct-17	1	1	0	1	0	1	0	0	2	4
31-Oct-17	1	0	1	1	2	0	0	0	2	5
01-Nov-17	1	1	1	1	1	0	1	2	3	8
02-Nov-17	2	1	1	1	1	2	2	3	6	13
03-Nov-17	3	2	2	2	3	1	2	2	9	17
04-Nov-17	2	1	1	1	1	1	1	2	4	10
05-Nov-17	1	1	1	1	0	0	1	1	2	6
06-Nov-17	1	0	0	0	0	0	0	1	1	2
07-Nov-17	1	2	3	3	4	4	6	5	28	28
08-Nov-17	4	4	3	4	5	5	4	5	33	34
09-Nov-17	3	3	2	#	#	4	4	4	15	20
10-Nov-17	2	2	3	3	4	4	4	3	18	25
11-Nov-17	3	2	1	2	2	1	1	2	7	14
12-Nov-17	#	#	#	#	#	#	#	#	0	0
13-Nov-17	#	#	#	#	#	2	1	1	2	4
14-Nov-17	3	3	2	1	2	3	3	3	12	20
15-Nov-17	2	2	2	3	3	4	3	3	14	22
16-Nov-17	3	4	3	2	1	2	3	3	13	21
17-Nov-17	1	1	1	2	2	0	1	1	4	9
18-Nov-17	1	1	1	1	2	2	1	2	5	11
19-Nov-17	0	1	2	1	1	1	1	1	3	8
20-Nov-17	1	0	1	1	3	2	3	4	9	15
21-Nov-17	4	3	3	2	3	4	4	4	20	27
22-Nov-17	2	2	1	2	3	3	3	2	10	18
23-Nov-17	2	1	2	3	3	2	3	3	11	19
24-Nov-17	3	2	1	1	0	1	5	4	13	17
25-Nov-17	3	1	1	1	0	2	1	0	4	9
26-Nov-17	0	0	1	0	1	1	2	2	3	7
27-Nov-17	2	2	1	1	2	1	2	1	5	12
28-Nov-17	2	2	2	2	1	1	2	1	6	13
29-Nov-17	1	1	1	1	1	2	2	2	5	11

30-Nov-17	2	3	2	2	2	3	2	2	9	18
01-Dec-17	2	2	1	1	2	3	3	1	8	15
02-Dec-17	1	0	0	0	1	3	1	0	3	6
03-Dec-17	1	1	1	0	0	0	0	2	2	5
04-Dec-17	0	1	1	2	2	3	4	5	14	18
05-Dec-17	3	3	3	4	5	5	4	4	28	31
06-Dec-17	2	3	2	2	3	3	4	2	13	21
07-Dec-17	2	1	2	2	3	3	3	3	11	19
08-Dec-17	1	1	2	2	2	1	2	2	6	13
09-Dec-17	2	1	1	0	2	2	2	0	4	10
10-Dec-17	0	0	1	1	1	1	1	2	3	7
11-Dec-17	1	2	2	2	3	3	3	2	10	18
12-Dec-17	3	2	2	2	1	4	5	3	16	22
13-Dec-17	1	1	2	2	2	2	3	3	8	16
14-Dec-17	3	1	1	1	1	0	2	1	5	10
15-Dec-17	1	0	0	1	2	1	1	2	3	8
16-Dec-17	0	0	1	1	1	1	1	3	4	8
17-Dec-17	3	3	4	3	3	3	5	4	22	28
18-Dec-17	4	3	3	3	3	2	2	1	13	21
19-Dec-17	1	1	0	1	1	2	3	3	6	12
20-Dec-17	2	1	1	2	1	2	3	0	6	12
21-Dec-17	0	0	1	1	1	1	0	0	2	4
22-Dec-17	0	0	1	0	1	0	0	2	2	4
23-Dec-17	1	2	1	2	1	0	1	1	4	9
24-Dec-17	2	2	2	3	3	4	3	4	15	23
25-Dec-17	3	1	1	2	2	3	4	3	12	19
26-Dec-17	3	2	1	1	2	2	4	4	12	19
27-Dec-17	2	2	1	1	1	3	2	3	8	15
28-Dec-17	2	0	1	1	2	2	2	2	5	12
29-Dec-17	1	1	1	1	1	2	3	1	5	11
30-Dec-17	1	1	1	1	1	2	1	3	5	11
31-Dec-17	1	0	1	1	1	1	2	3	5	10

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Definitive daily mean values of the Declination (D), Inclination (I), Horizontal (X and Y), and Vertical (Z) field components

In Table 2 are given days with K-indices equal to or larger than 5 which means geomagnetic storm conditions. Indices above the "threshold" value are marked in red. For 2017 there are 50 days with K-index ≥ 5, 7 days with K-index ≥ 6 and 2 days with K-index =7 (22 Feb and 08 Sep 2017).

Table 2. Days with K-index ≥ 5 registered in 2017 at the Panagjurishte observatory

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DD-MM-YY	00-03	03-06	06-09	09-12	12-15	15-18	18-21	21-24	Ak [nT]	ΣK
26-Jan-17	1	1	2	3	4	5	4	3	18	23
31-Jan-17	3	2	3	3	3	4	4	5	21	27
01-Feb-17	4	3	3	3	4	5	4	5	28	31
17-Feb-17	2	3	3	4	2	4	3	5	20	26
18-Feb-17	5	3	2	1	2	2	4	3	16	22
22-Feb-17	3	2	3	7	5	3	2	1	31	26
01-Mar-17	2	3	2	4	4	5	5	5	28	30
02-Mar-17	4	3	3	4	5	4	5	3	28	31
05-Mar-17	3	2	2	2	3	3	5	4	18	24
06-Mar-17	4	3	1	3	5	4	5	4	26	29
21-Mar-17	2	3	4	2	2	5	5	4	23	27
22-Mar-17	4	2	2	2	4	4	5	5	25	28
27-Mar-17	2	4	4	5	5	5	6	4	39	35
20-Apr-17	3	5	3	4	3	3	3	3	21	27
21-Apr-17	0	1	1	1	2	4	5	5	17	19
22-Apr-17	3	4	3	4	5	5	4	5	32	33
23-Apr-17	4	3	4	5	5	5	4	4	33	34
27-May-17	1	1	0	1	2	4	3	5	13	17
28-May-17	5	5	3	3	3	2	2	1	20	24
11-Jun-17	1	2	2	2	4	5	5	3	20	24
16-Jun-17	1	3	4	4	4	4	3	5	24	28
09-Jul-17	4	3	2	5	3	3	4	3	21	27
16-Jul-17	2	2	5	4	4	5	5	4	30	31
17-Jul-17	3	4	3	3	4	5	2	2	20	26
18-Aug-17	4	3	2	3	4	4	5	3	23	28

19-Aug-17	4	2	4	4	4	5	3	4	26	30
23-Aug-17	3	3	2	3	4	5	5	3	24	28
31-Aug-17	2	4	6	5	4	4	4	3	32	32
04-Sep-17	3	3	2	2	3	3	4	5	19	25
06-Sep-17	2	2	2	4	5	3	1	4	18	23
07-Sep-17	3	4	3	3	2	1	3	6	22	25
08-Sep-17	7	4	5	5	6	6	5	4	62	42
12-Sep-17	2	1	2	2	3	3	5	5	19	23
13-Sep-17	6	2	3	3	2	1	2	0	17	19
14-Sep-17	3	2	2	3	4	6	4	4	26	28
15-Sep-17	4	3	4	3	3	4	5	4	25	30
27-Sep-17	3	3	4	3	3	4	5	5	26	30
28-Sep-17	5	4	4	3	4	4	4	4	28	32
11-Oct-17	4	3	4	3	5	5	4	4	29	32
12-Oct-17	5	2	4	4	5	4	3	5	31	32
13-Oct-17	3	3	1	3	5	5	5	5	30	30
14-Oct-17	5	3	4	4	4	4	3	3	25	30
24-Oct-17	1	0	3	3	5	5	3	4	21	24
07-Nov-17	1	2	3	3	4	4	6	5	28	28
08-Nov-17	4	4	3	4	5	5	4	5	33	34
24-Nov-17	3	2	1	1	0	1	5	4	13	17
04-Dec-17	0	1	1	2	2	3	4	5	14	18
05-Dec-17	3	3	3	4	5	5	4	4	28	31
12-Dec-17	3	2	2	2	1	4	5	3	16	22
17-Dec-17	3	3	4	3	3	3	5	4	22	28

Conclusions

Continuous registration of the geomagnetic field components gives the sum of all field contributions from the internal and external to the Earth sources. A straightforward separation of the individual contributions is impossible and many scientific studies deal with different aspects of this problem (Mandea nad Korte, 2010). Furthermore, there are also effects of additional sources which could influence the magnetic records as for example thunderstorms (Chamati and Andonov, 2021).

Approximate description of the strength of different external variations however, are provided by geomagnetic indices. A quantitative measure of 2017 local geomagnetic activity in the form of 3 hour *K*-index is published here, based upon the range of fluc-

tuations at the PAG observatory records. Table 2 shows that the number of data having disturbed geomagnetic field in 2017 is decreasing down to 50 (for comparison - in 2016 there were 62). The most active period began on August 31 and led to 10 stormy days in September. The strongest events during 2017 were on 22 February and 08 September with largest K-index 7. The observed activity is quite reasonable because 2017 is already in the declining part of the 24th Solar cycle.

Data are checked and verified according to IAGA requirements (Jankowski and Sucksdorff, 1996).

Secular trend of the Declination (D), Inclination (I), Horizontal (X and Y), and Vertical (Z) field components, as well as of the Total field intensity measure in the Panagjurishte observatory up to 2017 is plotted in the next figure:

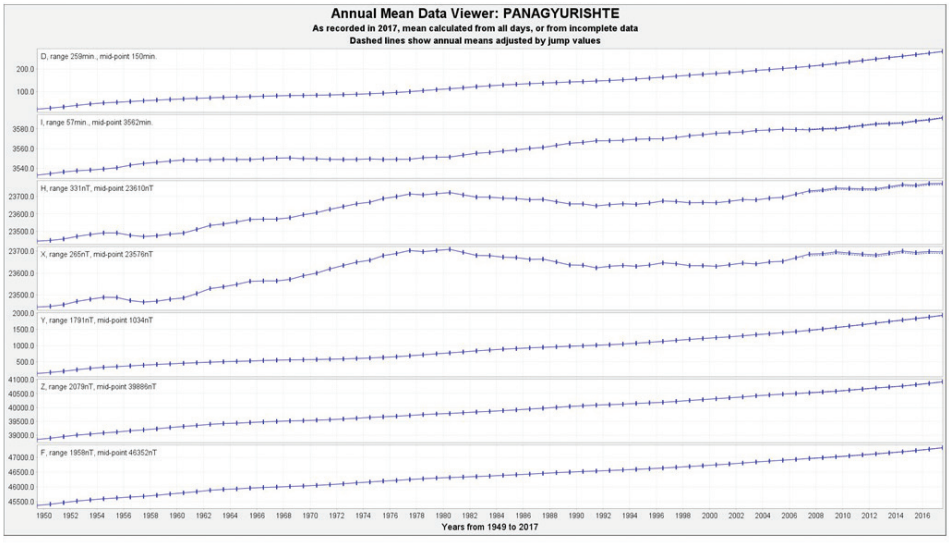

Fig. 1. Annual mean values of D [min], I [min], H [nT], X [nT], Y [nT], Z [nT] and F [nT] registered at PAG observatory from 1948 up to 2017

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Годишен доклад за наблюдаваната геомагнитна активност в Обсерватория Панагюрище през 2017

М. Методиев, П. Трифонова

Резюме: Записите на магнитните вариации показват различни стойности и поведение във всяка обсерватория. Те зависят основно от географската ширина на обсерваторията и местното време.

Тази статия представя окончателните геомагнитни данни, получени в обсерватория Панагюрище през 2017 г., изготвени под формата на локални геомагнитни индекси. През 2017 г. Слънчевият цикъл 24 вече е в своята намаляваща фаза (https://www.swpc.noaa.gov/products/solar-cycle-progression). Той се характеризира с двоен слънчев максимум, като при първия пик е достигнат брой на слънчевите петна 99 през 2011 г., а във втория пик през април 2014 г. броят на петната е 101.

Изчислените индекси показват, че през 2017 г. има 50 дни с условия, определящи ниво „буря“ на геомагнитното поле, но са достигнати само умерени нива. Само два дни, на 22 февруари и 08 септември 2017 г., е изчислен К-индекс 7. Това е очаквано и разбираемо поради факта, че броят на слънчевите петна през тази част от Слънчевия цикъл продължава да намалява.