

## The Study About Registered Solar, Geomagnetic and Ionospheric Storms

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Conditions in space or solar weather often can be determined by activity of CMEs emission (Coronal Mass Ejections), or by eruptions of coronal plasma and energy. Solar weather is changed as is changed number of registered solar storms, number and speed of magnetic clouds and if they were observed by moderate or intensive magnetic storms. These are changes in the speed and power of the Solar Wind, the appearance of intense solar flares, which are associated with the emission of Coronal Mass Ejections (CMEs) and the radiation of coronal holes (CH). The geo-effective impact of solar-geomagnetic disturbances will be analyzed on the case of three solar, geomagnetic and ionospheric storms (Geomagnetic storm in January 2012 and St. Patrick Day Magnetic storm in 2013 and 2015).

On St. Patrick's Day, 17th March 2015 maximum change in the value of the index of geomagnetic activity were registered [ $D_{ST} / dt = -228 \text{ nT}$ ]. Due to the date of registration of this disorder, this geomagnetic storm is called Saint Patrick geomagnetic storm. Start or appearance of St. Patrick geomagnetic storm was determined by registering SSC (A) impulse / 04 45 UT; 17th March 2015./.. The magnitude of sudden impulse of SSC (A) was as follows:  $dX = + 38 \text{ nT/ min}$ ;  $dY = + 7.9 \text{ nT / min}$  (SSC - Sudden Storm Commencement). Registered signal, "sudden impulse", announced geomagnetic storm, which had a maximum change of horizontal component intensity of the geomagnetic field around [ $dX = 174 \text{ nT}$ ] and has registered a maximal period of three hours index geomagnetic activities of  $Kp = 7$ . Figure 1. shows the distribution of three-hour indices geomagnetic activity in the period of duration St. Patrick's Day Magnetic storm.

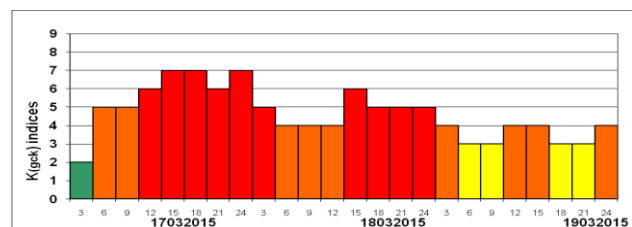


Figure 1: Local three-hours geomagnetic activity indices, Date: 17-19. March 2015, Geomagnetic Observatory Grocka (GCK)

According to the rank, regarding the maximum value of  $D_{ST}$  index of geomagnetic storm, Sv. Patrick was one of the most intense storm registered in the 24th solar cycle. St. Patrick Magnetic storm, from 17th to 19th March 2015, registered at the Geomagnetic observatory Grocka (GCK), is shown in Figure 2. Solar and magnetic weather phenomena (*solar weather & magnetic weather*) and the emerging solar-geophysical processes and events (solar,

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geomagnetic and electromagnetic storms), generated changes in processes and movements in the Earth's atmosphere. Geo-effective impact of geomagnetic storm St. Patrick was observed at the level of the dynamics and structure of atmospheric and meteorological changes, from 16th to 22th March 2015.

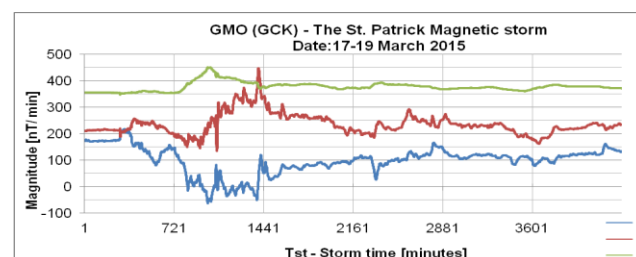


Figure 2: Magnetic Storm St. Patrick, date: 17-19. March 2015, Geomagnetic Observatory Grocka (GCK)

Analyzing the relationship between the solar and geomagnetic activity indices and the wind speed in the Hurricane Nathan (which appeared in this period), it has been found that there are statistically significant correlations. When viewing cross-correlations of mentioned indices of the solar and geomagnetic activities on the one hand and the wind speeds in the Hurricane Nathan on the other hand, the correlation increases, wherein the maximum correlation is achieved when the wind speeds are 'shifted', that is, when they lag 36 hours behind the indicators of the solar and geomagnetic activities.

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