

November 2023 was an active month in the sense of solar activity. A number of 178 coronal mass ejections (CMEs) was spotted, 18 CMEs with angular width  $90^\circ < \text{da} < 180^\circ$ , none CME with angular width  $180^\circ < \text{da} < 270^\circ$  and one HALO CME recorded in this month, resulting into distinct modulation of the galactic cosmic rays (GCRs) (source: <http://sidc.oma.be/cactus/catalog.php>). The Sun was also productive in the sense of solar flares (SFs). A number of 537 C- and M-class solar flares spotted with 520 C and 17 M class solar flare (<https://solarmonitor.org>). The most energetic one being an M9.8 flare on 28.11.2023 at 19:50 U.T (peak time) from AR 3500 (S16W00).

During this month three geomagnetic storms took place. The first one was recorded on 05.11.2023 due to effects from CME observed on the sun on 03.11.2023 in which the storm reached strong levels (G3), as it is given in Figure 1. The second one was noticed on 22.11.2023 as a result of the interaction of a high-speed solar wind stream from coronal hole with the Earth's magnetosphere and reached minor storm (G1) levels. The last recorded as moderate storm (G2) on 25.11.2023 due to effects from CME observed on the sun on 22.11.2023.

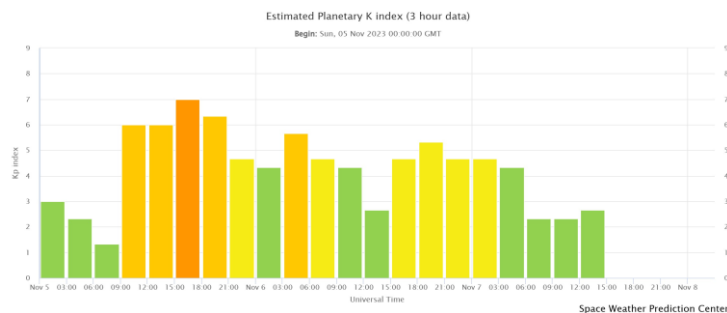


Figure 1: The Kp index values during the strong G3 geomagnetic storm on 05.11.23 (<http://www.swpc.noaa.gov/products/planetary-k-index>)

The results of these events during this month were spotted on the cosmic ray intensity and were recorded at Athens Neutron Monitor Station (cut-off rigidity 8.53 GV) (Figure 2). On 5-6 November 2023 a geomagnetic effect was recorded in the neutron monitor stations of the NMDB database even in the polar stations! It is important to note that an aurora phenomenon was also observed in the north regions of Greece.

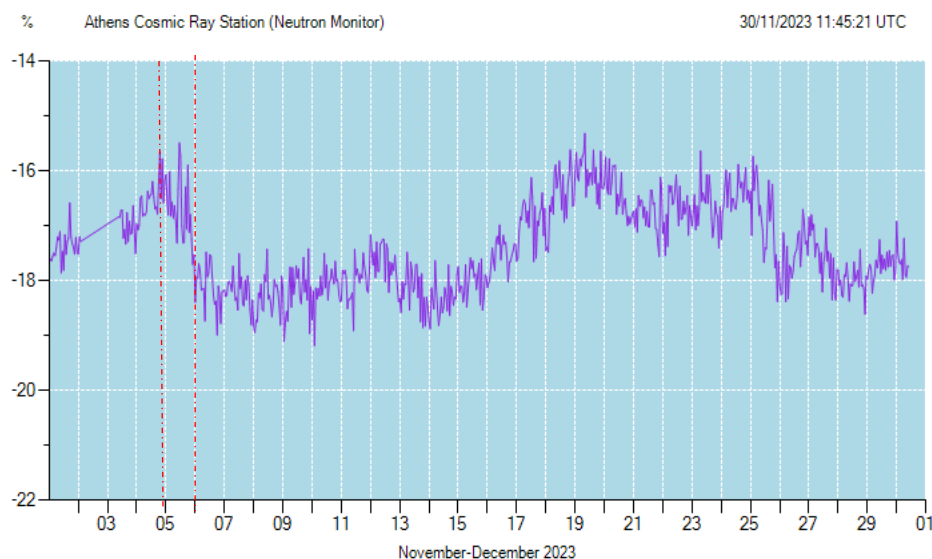


Figure 2: The counting rate of the Athens Neutron Monitor Station from 01-30.11.2023. A series of Forbush decreases occurred in this month is obvious.

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