December 2023 was an active month in the sense of solar activity. A number of 167 CMEs has been spotted (source: http://sidc.oma.be/cactus/catalog.php), ten CMEs with angular width 90° < da < 180°, none CME with angular width 180° < da < 270° and two HALO CMEs were recorded in this month. These CMEs together with the high-speed streams of solar wind resulted to a distinct modulation of the galactic cosmic rays during this month. A number of 26 M-class and 2 X-class solar flares were spotted (https:// solarmonitor.org), the most energetic one being an X5.0 flare on 31.12.2023 at 21:55 UT (peak time) from the AR 3536 (Figure 1).

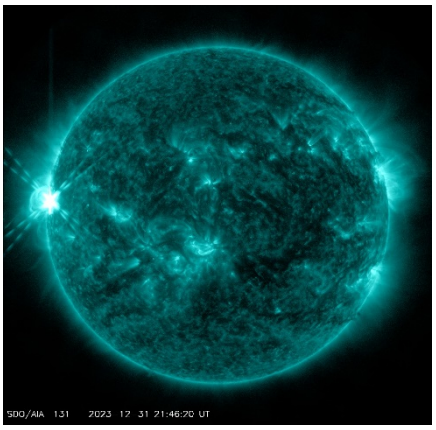

Figure 1: The X5.0 solar flare of 31/12/2023 at 21:55 UT peak time (from https://sdo.gsfc.nasa.gov/data/aiahmi/)

During this month two geomagnetic storms took place. The first one was recorded on 01.12.2023 due to effects from CME observed on the Sun on 28.11.2023 in which the storm reached to moderate storm (G2) levels. The second one was recorded as minor storm (G1) on 17.12.2023 due to effects from CME observed on the Sun on 14.12.2023. The results of these events during this month were spotted on the cosmic ray intensity, recorded at Athens Neutron Monitor Station (cut-off rigidity 8.53 GV) (Figure 2).

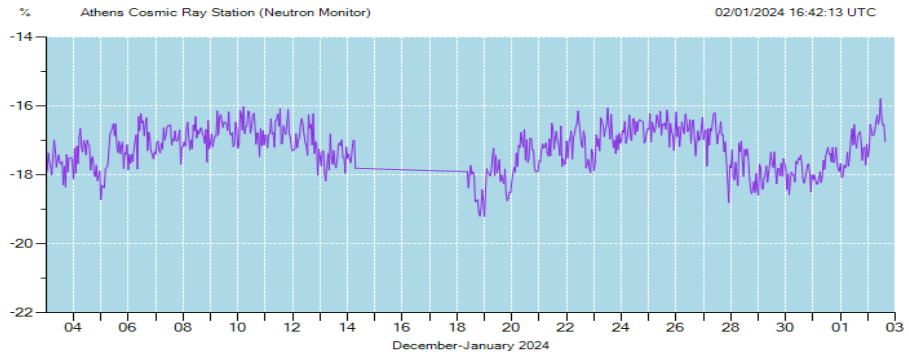

Figure 2: The counting rate of the Athens Neutron Monitor Station during December 2023.

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