

QUARTERLY REPORT ON PAST SPACE WEATHER

Q4 2021

16.9.2021 – 15.12.2021

SUNSPOT NUMBERS

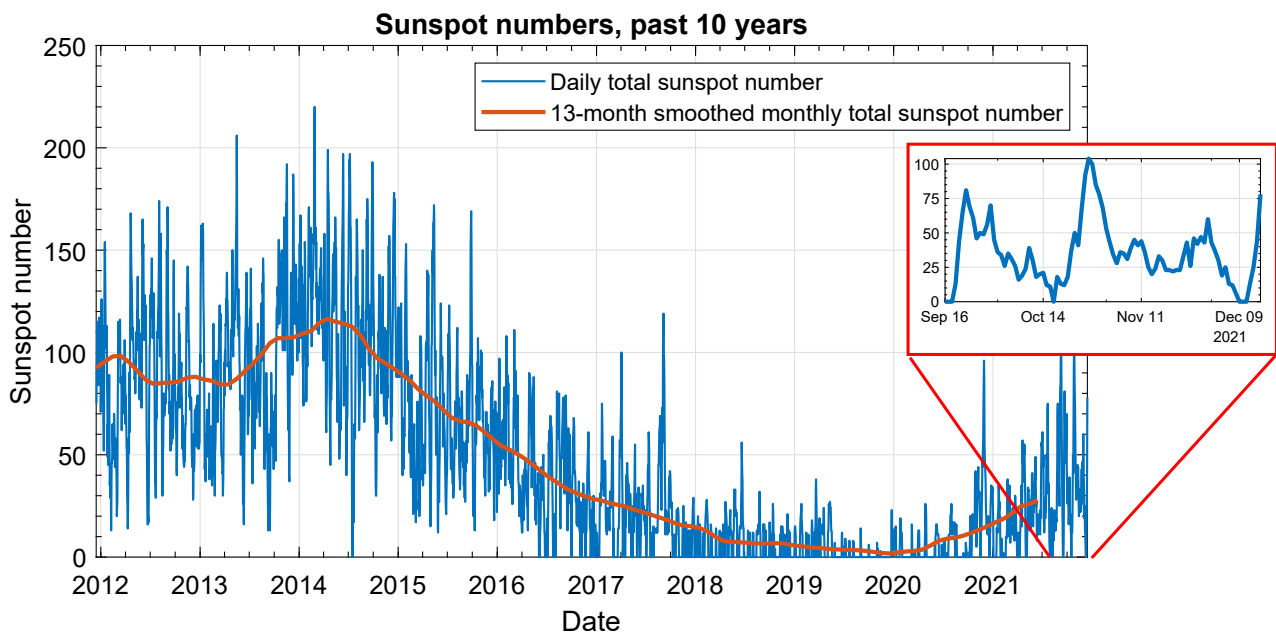


Figure 1: Sunspot numbers for the past 10 years and the last quarter. (Data from SILSO)

FLARES

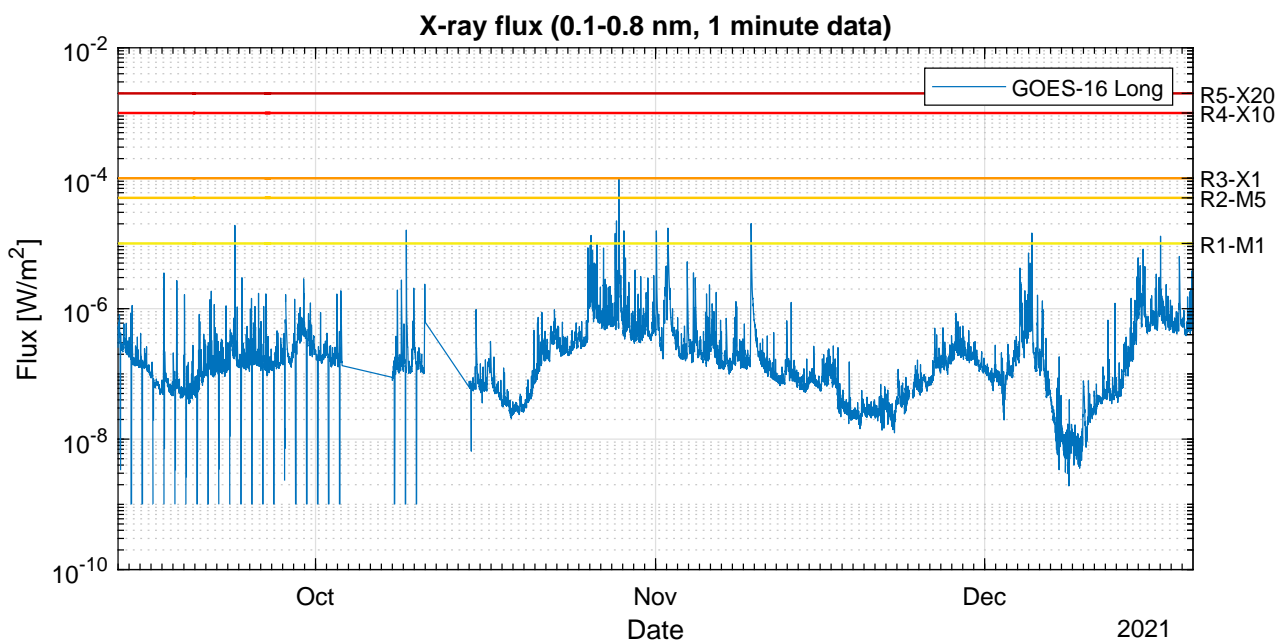


Figure 2: GOES X-ray flux (GOES – SWPC/NOAA) together with the NOAA Space weather scale thresholds for radio blackouts. (For more information on the NOAA Space Weather Scales, see <https://www.swpc.noaa.gov/noaa-scales-explanation>)

SOLAR ENERGETIC PARTICLES

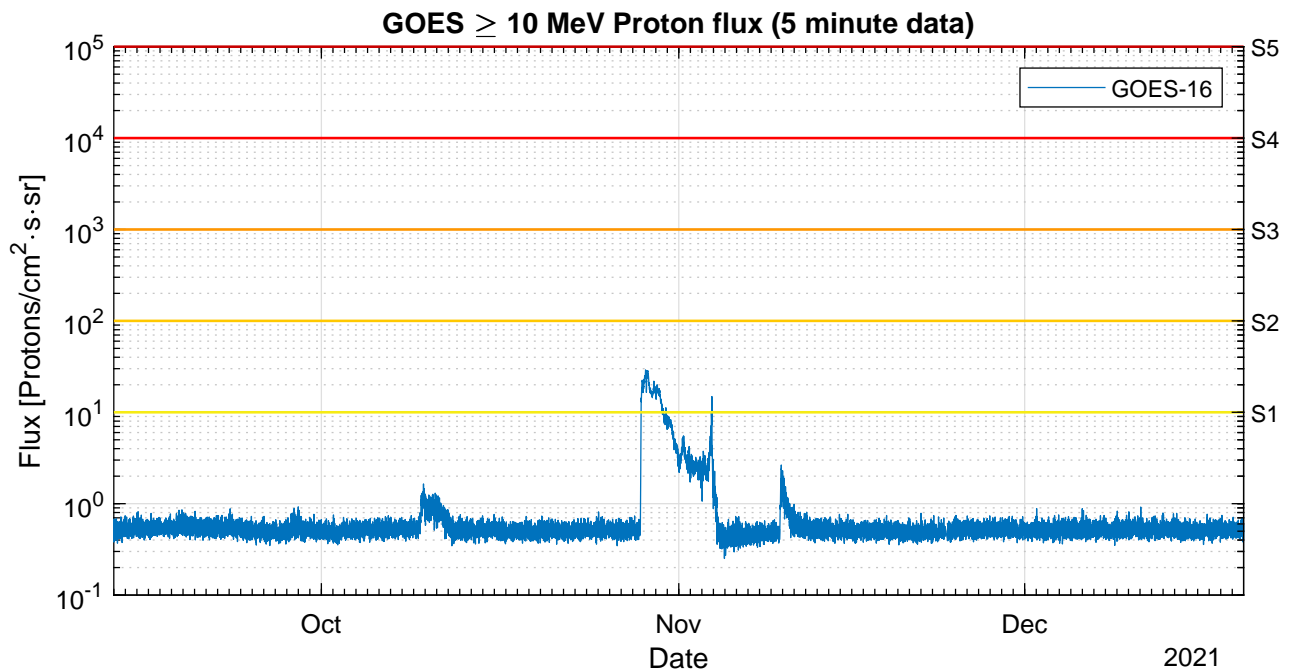


Figure 3: GOES proton flux (GOES - SWPC/NOAA) together with the NOAA Space weather scale thresholds for Solar Radiation Storms. (For more information on the NOAA Space Weather Scales, see <https://www.swpc.noaa.gov/noaa-scales-explanation>)

SOLAR WIND

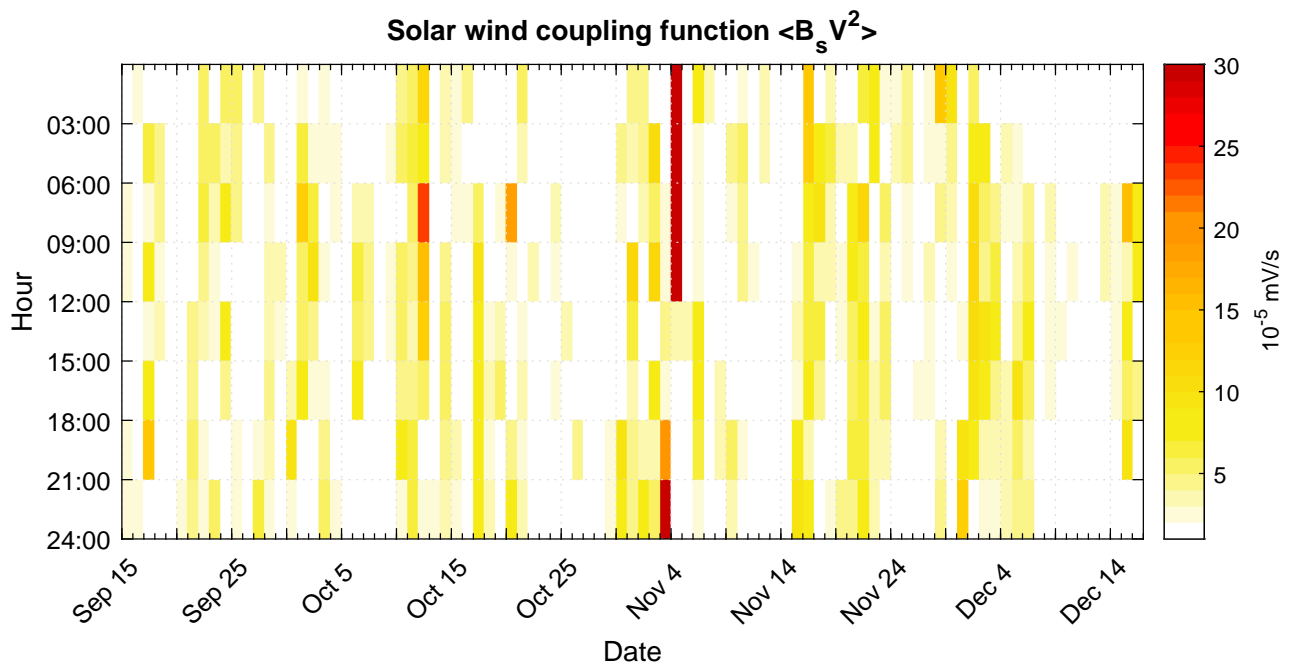


Figure 4: 3-hourly mean values of the Solar wind coupling function $\langle B_s V^2 \rangle$ based on ACE data. (NOAA/SWPC)

GEOMAGNETIC CONDITIONS

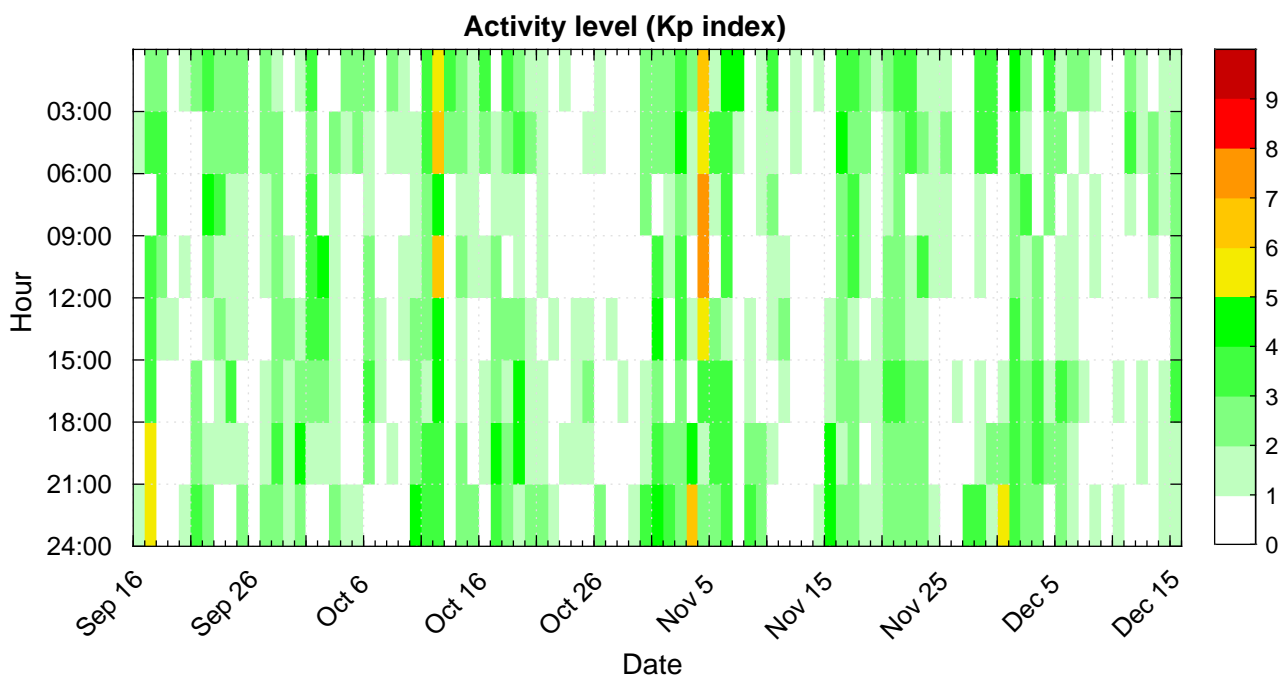


Figure 5: Kp index. (Data from GFZ Potsdam.)

CMES

This reporting period saw several Earth-directed CMEs with arrival on 17. September, 23. September, 27. September, 30. September, 12. October, 31. October, 3. November and 27. November, four of which caused significant geomagnetic activity: On 17. September geomagnetic activity reached minor storm level with Kp 5, 12. October it reached moderate storm levels with Kp 6, on 31. October it did reach minor storm level with Kp 5 and on 3. November it did reach major storm levels with Kp 7.

(Source: Solar Influences Data analysis Center – RWC Belgium)

ACKNOWLEDGEMENTS

Data from:

SILSO - <http://www.sidc.be/silso/>

GOES - <https://www.ngdc.noaa.gov/stp/satellite/goes/index.html>

DONKI - <https://kauai.ccmc.gsfc.nasa.gov/DONKI/>

DSCOVR/ACE – NASA/NOAA /SWCP - <https://www.ngdc.noaa.gov/dscovr/portal/index.html#/>

GFZ Potsdam - <https://www.gfz-potsdam.de/en/kp-index/>