STCE Newsletter

2 Dec 2019 - 8 Dec 2019

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The Solar-Terrestrial Centre of Excellence (STCE) is a collaborative network of the Belgian Institute for Space Aeronomy, the Royal Observatory of Belgium and the Royal Meteorological Institute of Belgium.

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1. GLE, TID, ACE, LUF, GPS, GCR, PCA - do you know where it stands for?

All the participants of the December Space Weather Introductory Course are now certified experts in space weather abbreviations and acronyms and can explain, draw and mimic all of them.

GLE, TID, ACE, LUF, GOES, IMF, CME, GPS, CH, HSS, TEC, Bz, SEP, GNSS, PCA, MUF, GCR, SSA, SDO, K, VTEC, DSCOVR ...

Can you?

2. Review of solar and geomagnetic activity

SOLAR ACTIVITY

Solar activity was very low: no flares, no observations of earth-directed coronal mass ejections (CMEs), the greater than 10 MeV proton flux below 1 sfu.
A weak negative polarity coronal hole in the southern solar hemisphere transited the central meridian on 5 December.

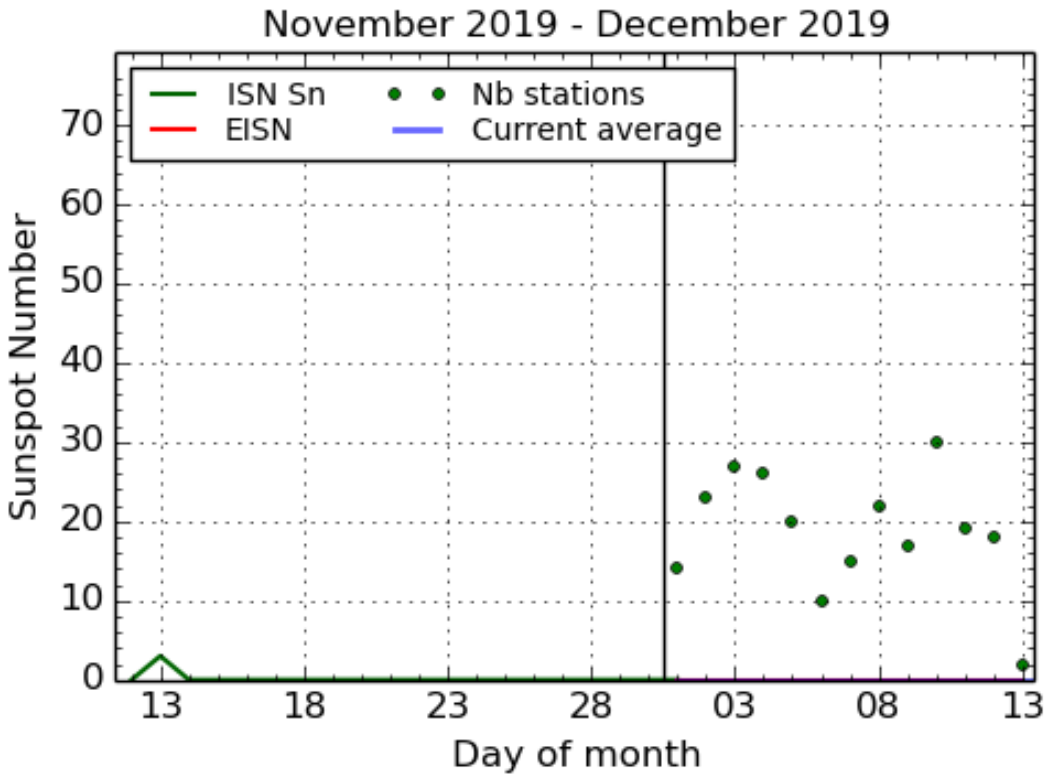
GEOMAGNETIC ACTIVITY

The solar wind speed at L1 ranged between 290 and 400 km/s. The interplanetary magnetic field (phi angle) was directed mostly towards the Sun (negative sector) but had an extended deviation into the positive sector on December 3 and 4. Bz was weak throughout the weak and varied between -5 and +5 nT.

Geomagnetic activity was quiet throughout the week, where the Kp index (NOAA) and the local k index (Dourbes) recorded values of between 0-2.

3. The international Sunspot Number by SILSO

Almost an EISN graph with all Sunspot Numbers equal to zero. November 13 2019 decided to jump out.



SILSO graphics (http://sidc.be/silso) Royal Observatory of Belgium, 2019 December 13

The daily Estimated International Sunspot Number (EISN, red curve with shaded error) derived by a simplified method from real-time data from the worldwide SILSO network. It extends the official Sunspot Number from the full processing of the preceding month (green line). The plot shows the last 30 days (about one solar rotation). The horizontal blue line shows the current monthly average, while the green dots give the number of stations included in the calculation of the EISN for each day.

4. PROBA2 Observations

Solar Activity

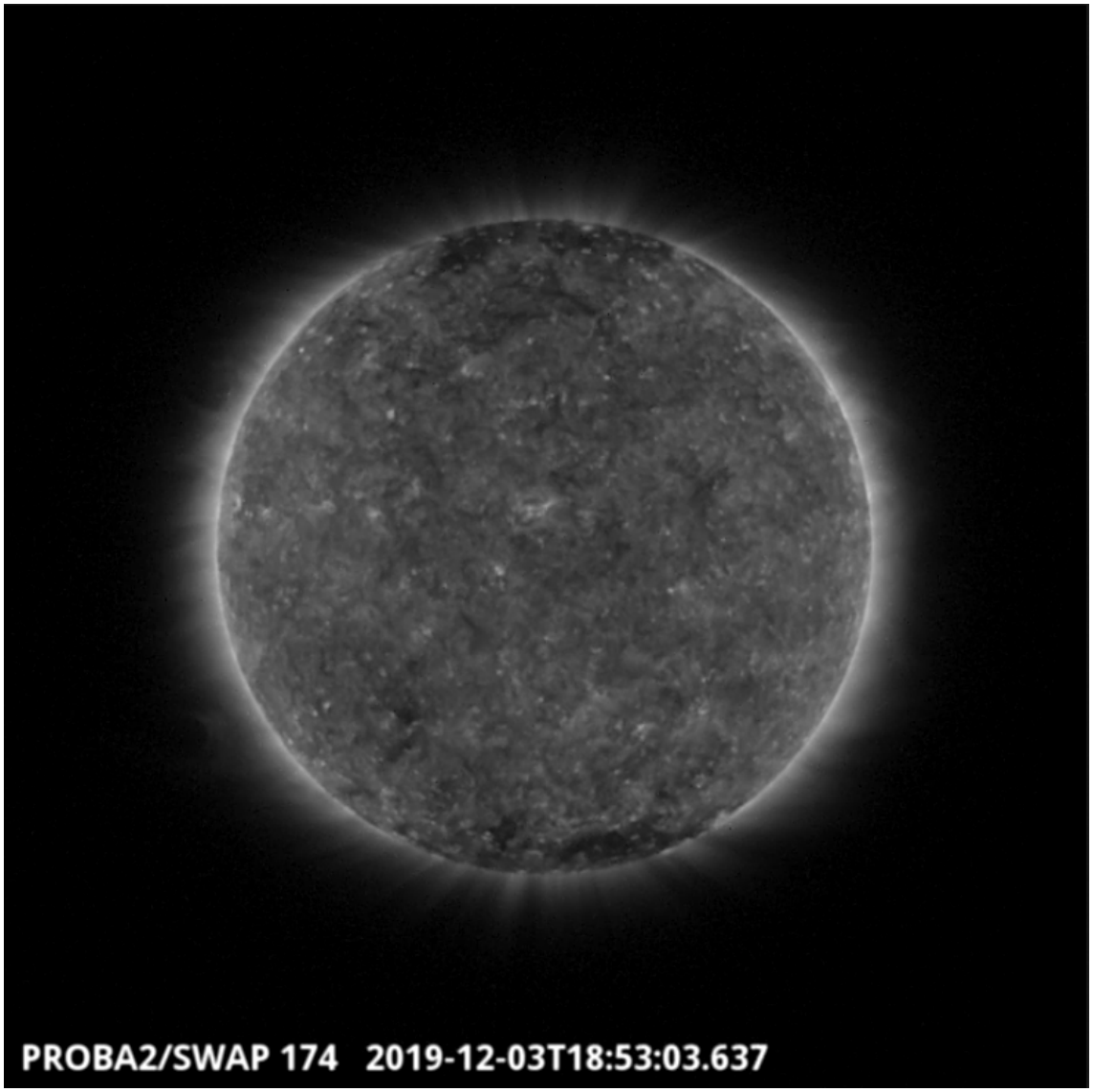
Solar flare activity remained very low during the week.
In order to view the activity of this week in more detail, we suggest to go to the following website from which all the daily (normal and difference) movies can be accessed: https://proba2.sidc.be/ssa
This page also lists the recorded flaring events.

A weekly overview movie can be found here (SWAP week 506): https://proba2.sidc.be/swap/data/mpg/movies/weekly_movies/weekly_movie_2019_12_02.mp4

Details about some of this week's events can be found further below.

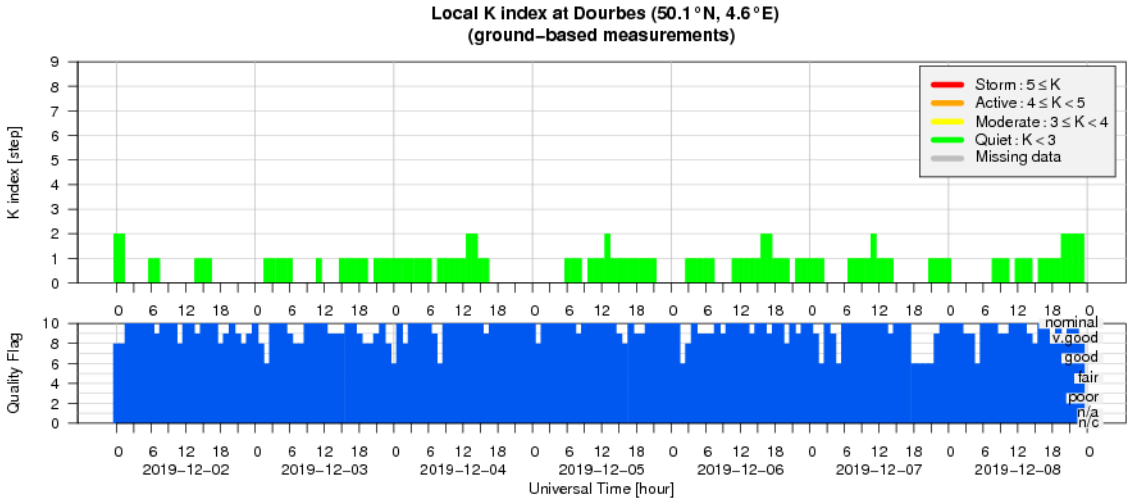
If any of the linked movies are unavailable they can be found in the P2SC movie repository here: https://proba2.oma.be/swap/data/mpg/movies/

Tuesday Dec 03



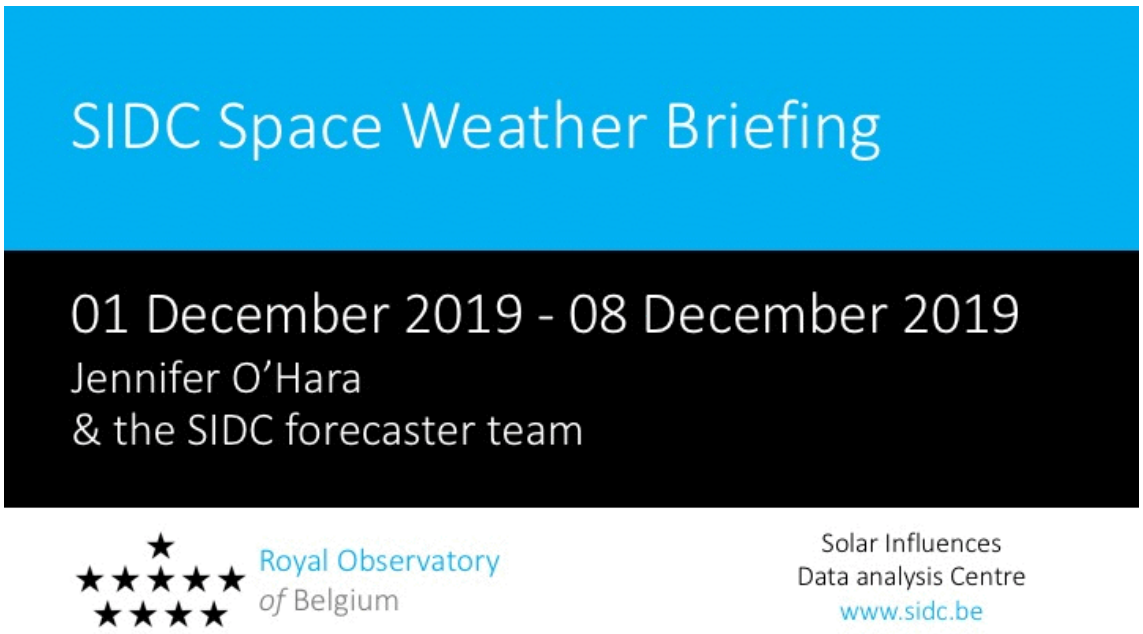
A small eruption was observed by SWAP on 2019-Dec-03, visible in the SWAP image above off the south-east limb.
Find a movie of the event here (SWAP movie): http://proba2.oma.be/swap/data/mpg/movies/20191203_swap_movie.mp4

5. Geomagnetic Observations at Dourbes



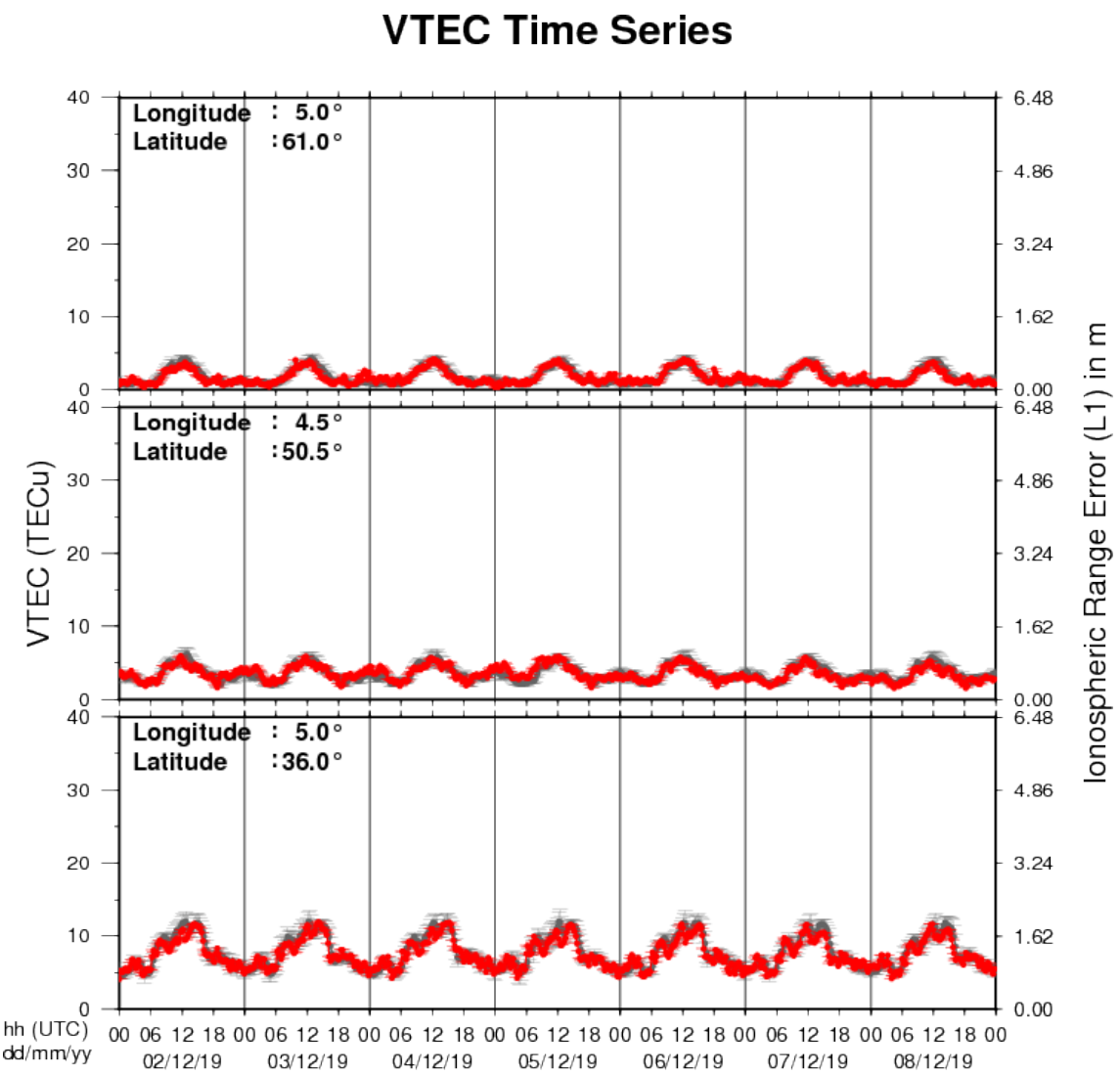
6. The SIDC space weather Briefing

The Space Weather Briefing presented by the forecaster on duty from Dec 1 to 8. It reflects in images and graphs what is written in the Solar and Geomagnetic Activity report.



The pdf-version: http://www.stce.be/briefings/20191209_SWbriefing.pdf
The automatically running presentation: http://www.stce.be/briefings/20191209_SWbriefing.ppsm

7. Review of ionospheric activity



The figure shows the time evolution of the Vertical Total Electron Content (VTEC) (in red) during the last week at three locations:
a) in the northern part of Europe(N61°, 5°E)
b) above Brussels(N50.5°, 4.5°E)
c) in the southern part of Europe(N36°, 5°E)
This figure also shows (in grey) the normal ionospheric behaviour expected based on the median VTEC from the 15 previous days.

The VTEC is expressed in TECu (with TECu=10^16 electrons per square meter) and is directly related to the signal propagation delay due to the ionosphere (in figure: delay on GPS L1 frequency).
The Sun's radiation ionizes the Earth's upper atmosphere, the ionosphere, located from about 60km to 1000km above the Earth's surface.The ionization process in the ionosphere produces ions and free electrons. These electrons perturb the propagation of the GNSS (Global Navigation Satellite System) signals by inducing a so-called ionospheric delay.

See http://stce.be/newsletter/GNSS_final.pdf for some more explanations ; for detailed information, see http://gnss.be/ionosphere_tutorial.php