

# STCE Newsletter

12 Dec 2016 - 18 Dec 2016



*Published by the STCE - this issue : 22 Dec 2016. Available online at <http://www.stce.be/newsletter/>.*

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.

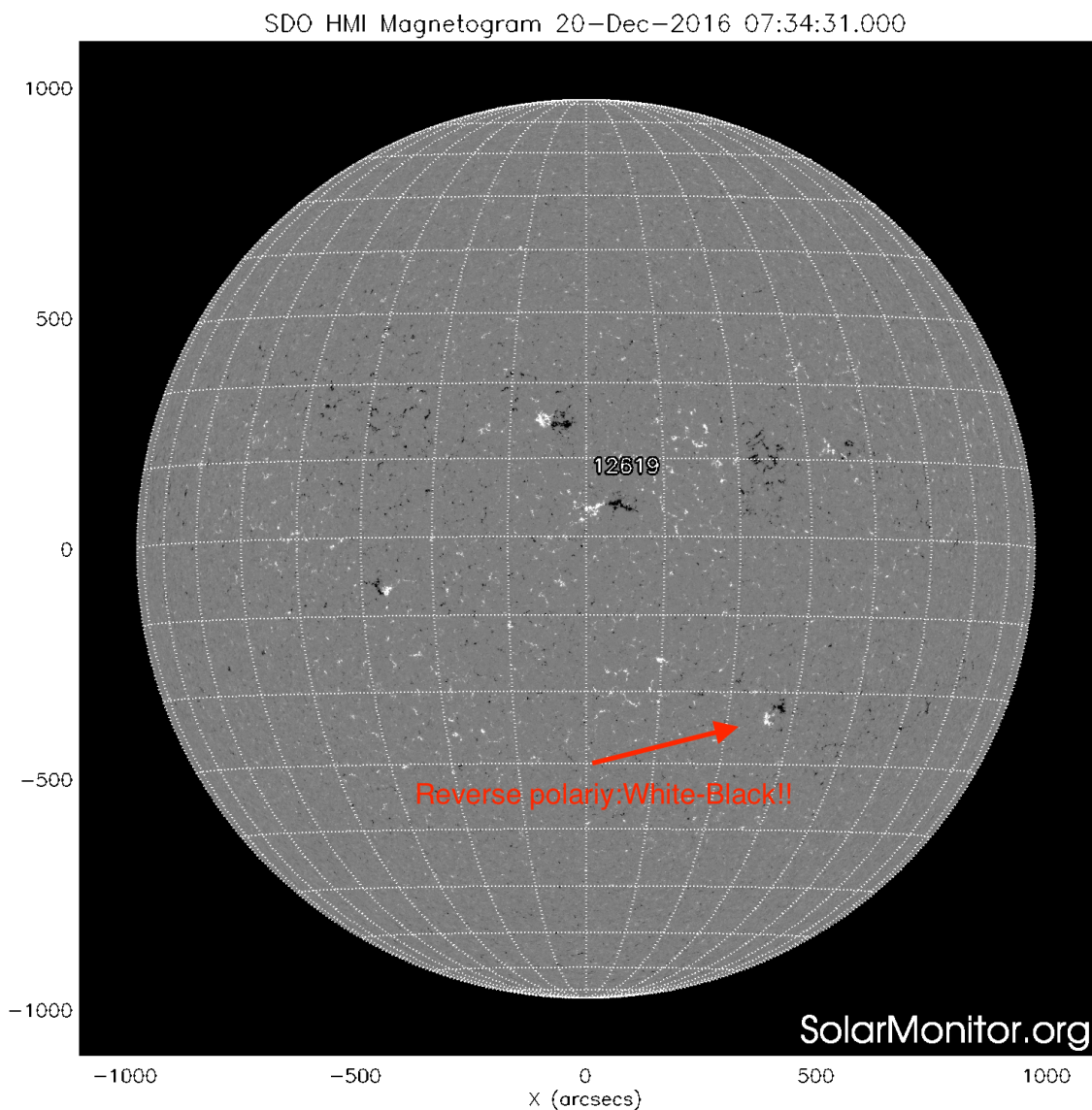
<b>Content</b>	<b>Page</b>
1. The first sunspot of cycle 25 is seen!	2
2. ESWW14 - call for sessions	3
3. PROBA2 Observations (12 Dec 2016 - 18 Dec 2016)	5
4. Review of solar activity	6
5. The International Sunspot Number	8
6. Review of geomagnetic activity	8
7. Geomagnetic Observations at Dourbes (12 Dec 2016 - 18 Dec 2016)	10
8. Review of ionospheric activity (12 Dec 2016 - 18 Dec 2016)	11
9. Future Events	12

Final Editor : Petra Vanlommel  
Contact : R. Van der Linden, General Coordinator STCE,  
Ringlaan - 3 - Avenue Circulaire, 1180 Brussels,  
Belgium

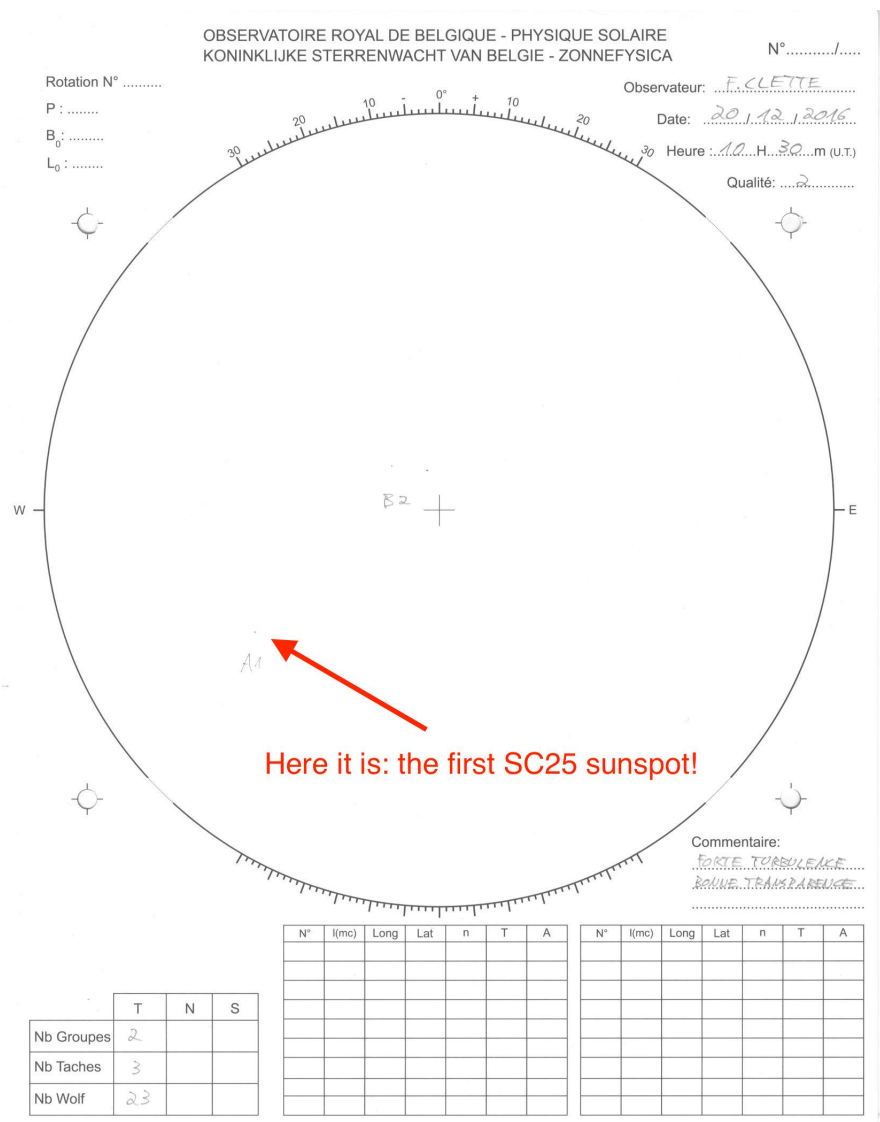
# 1. The first sunspot of cycle 25 is seen!

Breaking news that couldn't wait : May we present to you the very first sunspot of solar cycle 25!

An attentive sunspot observer from USET spotted on December 19 a particular interesting structure in magnetograms. It differed from the other present structures because of its position on the solar disk and the leading black instead of white area. By its high latitude ( $23^\circ$ ) and reverse polarity, the small magnetic dipole definitely belonged to the next sunspot cycle. If it would get strong enough to produce sunspots, it would make it the very first sunspot group of cycle 25.



And it did! On December 20, 10:30 UT, 2016, an USET observer made a drawing of sunspot A1.



It doesn't mean that cycle 24 ended. Usually sunspot cycles overlap, up to 4 year. And this is what happens: cycle 24 is heading down and simultaneously, cycle 25 pops up in a very cautious way.

In fact, to be fully realistic, the preparation for a next sunspot cycle starts as soon as the first magnetic fields are generated near the poles. This happens already before the sunspot peak of the ongoing cycle! However, in terms of solar activity, it is only when the cycle generates magnetic fields that are strong enough to produce sunspots that the new sunspot cycle begins.

Typically, the first spots of a cycle emerge at much higher latitudes than the spots of the co-existing previous cycle, which is in its final declining phase, with spot latitudes around 10°.

Exciting!

**2. ESWW14 - call for sessions**

European Space Weather Week 14  
Belgium, November 27 – December 1, 2017

<http://www.stce.be/esww14>

Call for Sessions – first announcement

Dear colleagues,

Each year, during the European Space Weather Week (ESWW) conference, people from all over the world gather to discuss the newest insights in space weather and try to find appropriate answers to the challenges and threats that space weather imposes. Science, data exploitation, observations, service development, operational models, engineering, industrial challenges, etc. are all relevant aspects of space weather.

One of the strengths of the conference is that the participants can contribute largely to its content. We start filling the ESWW14 programme with formal sessions that are organised by a fixed format, see: <http://www.stce.be/esww14/session.php>

We would like to invite and encourage you and your colleagues to submit proposals for sessions on ESWW14.

The ESWW Programme Committee (PC) will decide which of the submitted sessions are accepted. Accepted sessions will be allocated a 2h timeslot for orals and the PC assigns immediately a date. Session conveners will be notified mid February.

Session proposals can be submitted from January 16 onwards at <http://www.stce.be/esww14/call4sessions.php>.

The deadline for submission is January 26, 2017 5PM (CET).

With kind regards

Mauro Messerotti and Petra Vanlommel, on behalf of the ESWW PC



### 3. PROBA2 Observations (12 Dec 2016 - 18 Dec 2016)

#### Solar Activity

Solar flare activity has been very low throughout the week.

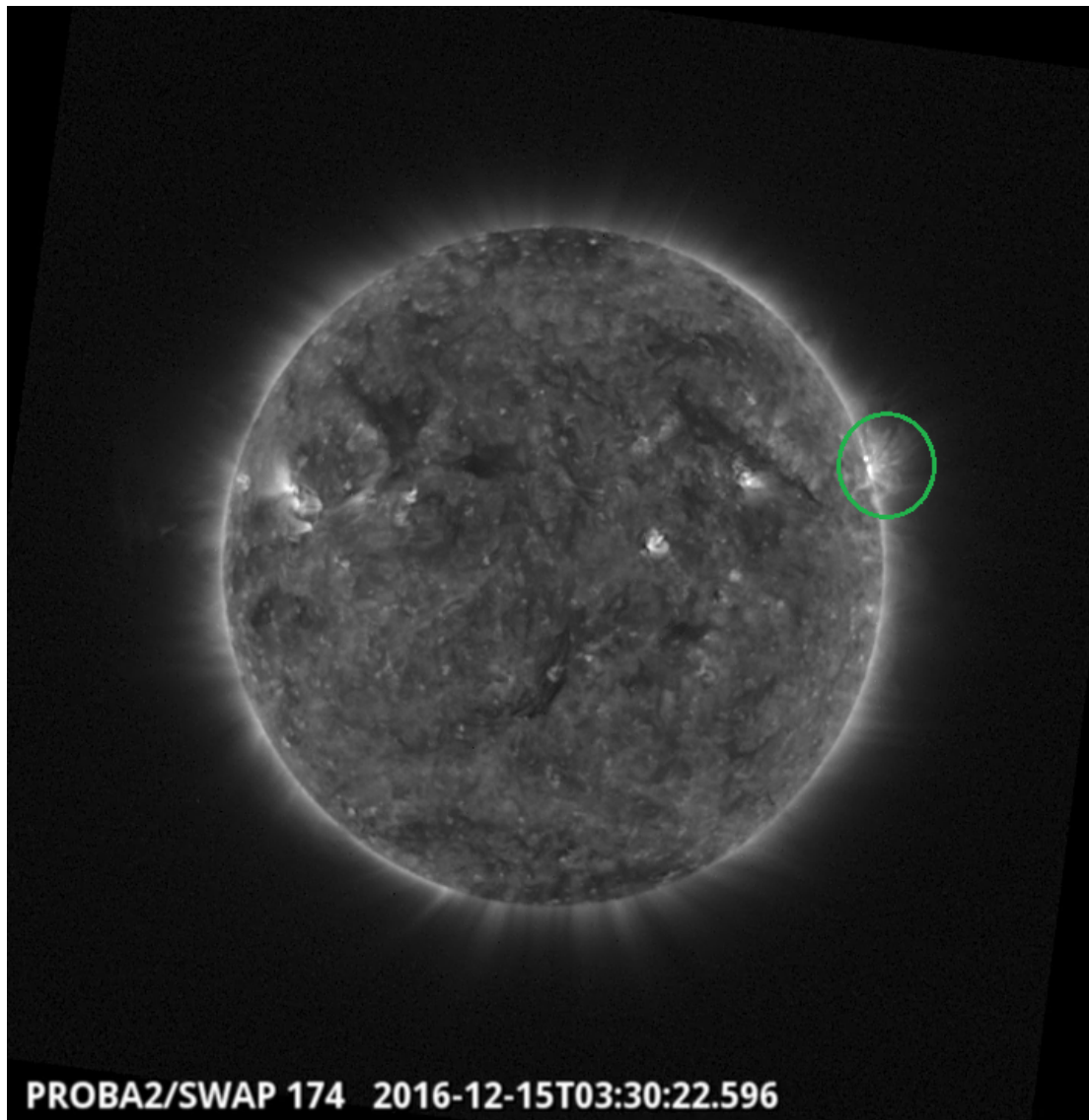
In order to view the activity of this week in more detail, we suggest to go to the following website from which all the daily (normal and difference) movies can be accessed: <http://proba2.oma.be/ssa>  
This page also lists the recorded flaring events.

A weekly overview movie can be found here [http://proba2.oma.be/swap/data/mpg/movies/weekly\\_movies/weekly\\_movie\\_2016\\_12\\_12.mp4](http://proba2.oma.be/swap/data/mpg/movies/weekly_movies/weekly_movie_2016_12_12.mp4)(SWAP week 351).

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 [http://proba2.oma.be/swap/data/mpg/movies/weekly\\_movies/](http://proba2.oma.be/swap/data/mpg/movies/weekly_movies/)

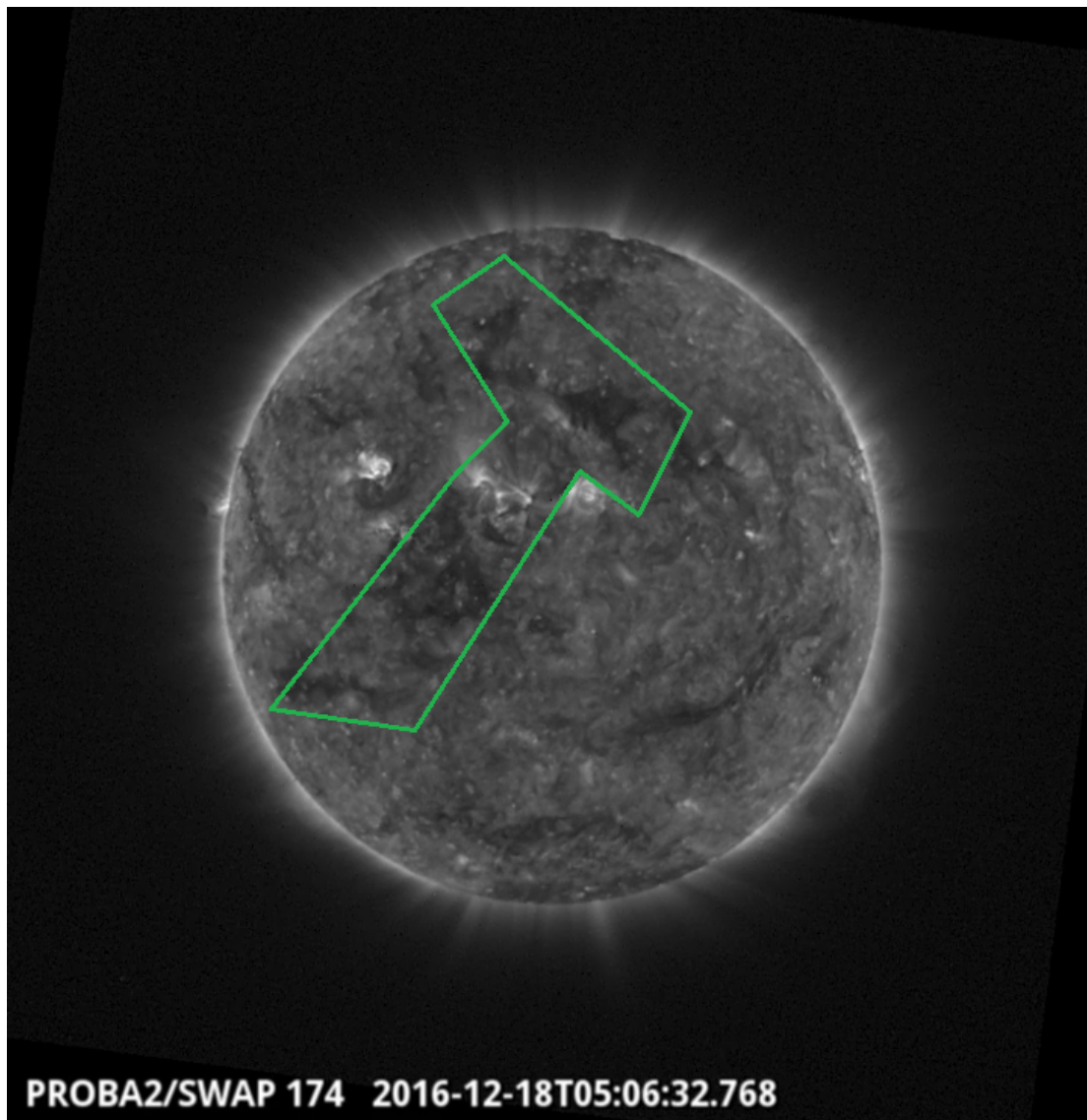
#### Thursday Dec 15



An eruption occurred on the North West Limb at 03:30 on December 15th.

Find a movie of the event here [http://proba2.oma.be/swap/data/mpg/movies/20161215\\_swap\\_movie.mp4](http://proba2.oma.be/swap/data/mpg/movies/20161215_swap_movie.mp4) (SWAP movie)

## Sunday Dec 18

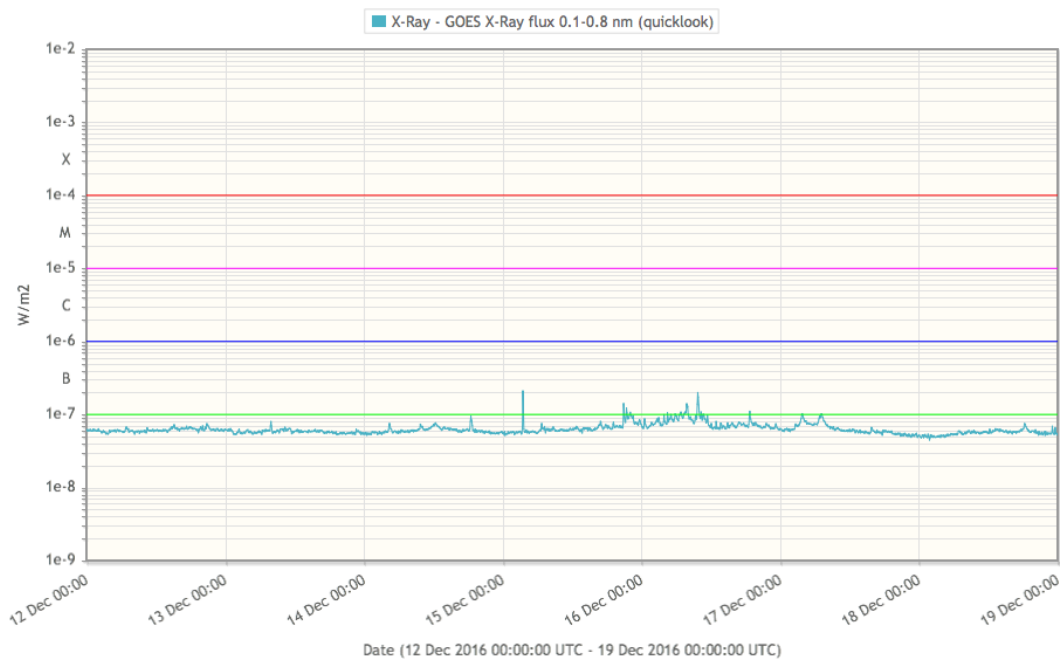


A coronal hole stretching from the north pole to south of the equator has dominated the solar disk since Dec 14.

Find a movie of the event here [http://proba2.oma.be/swap/data/mpg/movies/20161218\\_swap\\_movie.mp4](http://proba2.oma.be/swap/data/mpg/movies/20161218_swap_movie.mp4) (SWAP movie)

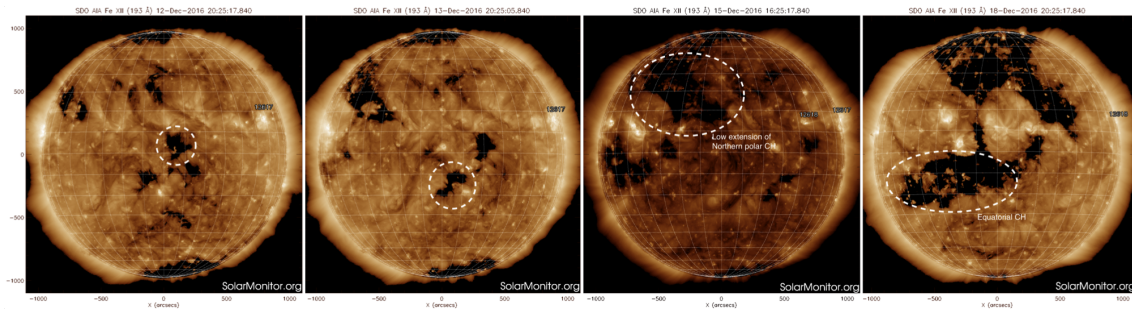
## 4. Review of solar activity

Solar activity was extremely low with only five B-class flares and without C-class flares reported.

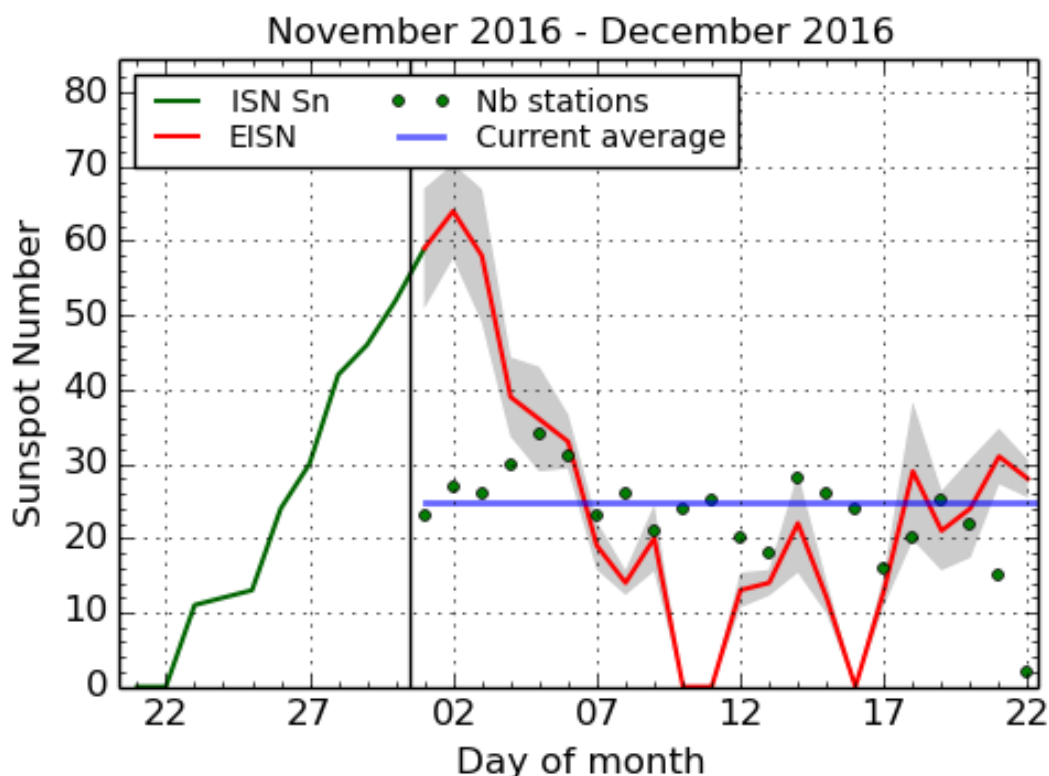


There were only several CMEs observed this week and all except one were narrow (up to 100 degrees of angular width), slow and not Earth directed. The only wide CME observed was a partial halo CME, first seen in the SOHO LASCO C2 field of view at 03:36 UT on December 17. STEREO observations show that the CME was a back side event and will therefore not arrive to the Earth.

There were four coronal holes (CH) observed this week. Two of them were rather small; the equatorial coronal hole which reached the central meridian in the morning of December 12, and the coronal hole (located between S08 and S12) which reached the central meridian early on December 13. The other two coronal holes observed this week were; the large low latitude extension of the northern polar coronal hole which reached central meridian in the afternoon of December 15, and the large equatorial coronal hole (extending to about S25) which reached central meridian in the midday of December 18.



## 5. The International Sunspot Number



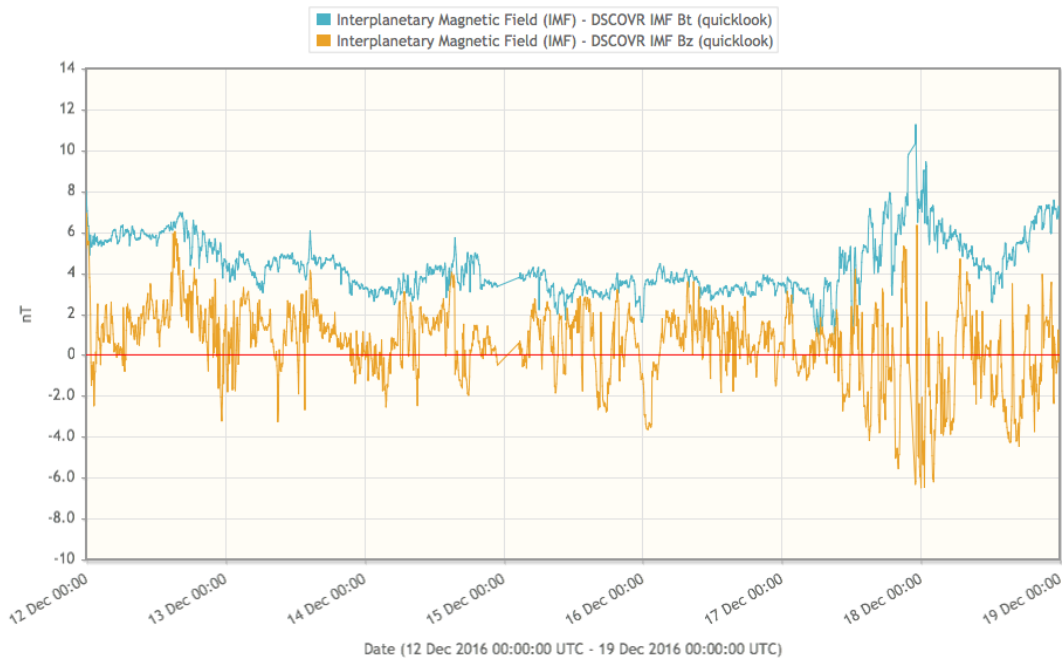
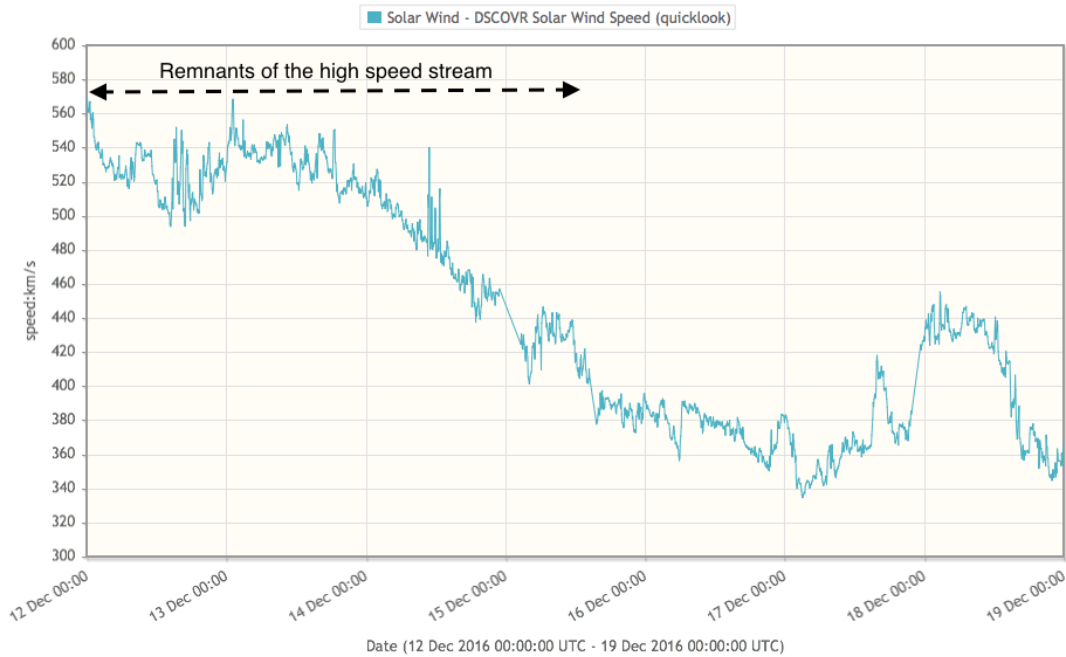
SILSO graphics (<http://sidc.be/silso>) Royal Observatory of Belgium, 2016 December 22

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.

## 6. Review of geomagnetic activity

First two days of the week the solar wind speed was slowly decreasing from about 550 km/s to 400 km/s (remnants of the high speed stream). The rest of the week solar wind speed was mostly fluctuating around 400 km/s.

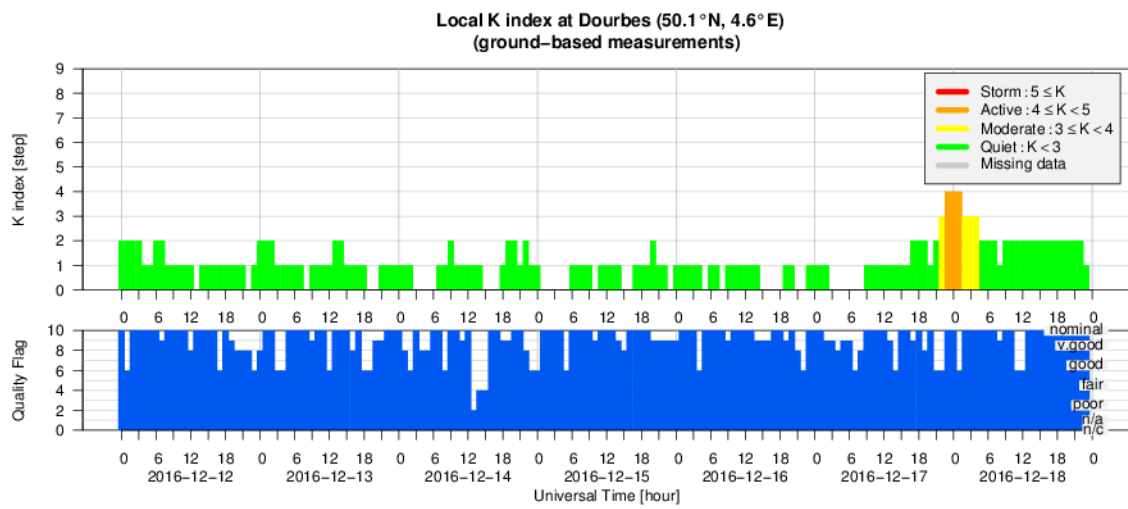




During the whole week, except one isolated interval of couple of hours, the geomagnetic conditions were quiet.

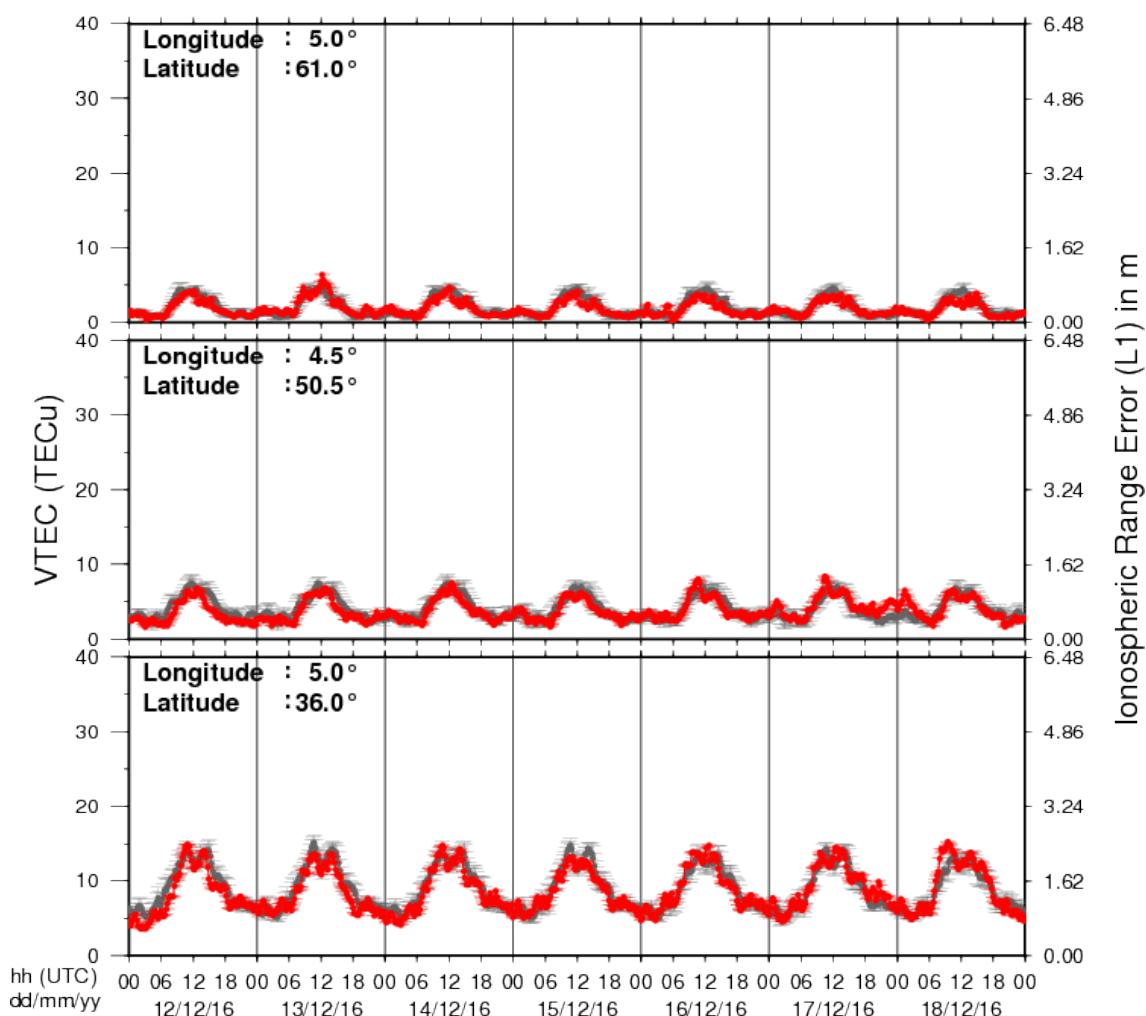
Due to longer intervals of negative value of the Bz component of the interplanetary magnetic field (down to -8nT) and slight increase of the solar wind speed (up to about 450 km/s), active geomagnetic conditions were reported around midnight of December 17 and early morning of December 18 (local station at Dourbes reported K=4).

## 7. Geomagnetic Observations at Dourbes (12 Dec 2016 - 18 Dec 2016)



## 8. Review of ionospheric activity (12 Dec 2016 - 18 Dec 2016)

### VTEC Time Series



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  $\text{TECu} = 10^{16}$  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](http://stce.be/newsletter/GNSS_final.pdf) for some more explanations ; for detailed information, see [http://gnss.be/ionosphere\\_tutorial.php](http://gnss.be/ionosphere_tutorial.php)

## **9. Future Events**

**For more details, see <http://www.spaceweather.eu/en/event/future>**

### **4th SOLARNET Meeting: The Physics of the Sun from the Interior to the Outer Atmosphere, in Lanzarote (Spain)**

Start : 2017-01-16 - End : 2017-01-20

The IV SOLARNET MEETING 'The physics of the Sun from the interior to the outer atmosphere' will take place in Lanzarote (Spain) from 16th to 20th of January 2017, organized by the Instituto de Astrofísica de Canarias (IAC).

SOLARNET (High-resolution Solar Physics Network) is an EU-FP7 project coordinated by IAC with the aim of bringing together and integrating the major European research infrastructures in the field of high-resolution solar physics. SOLARNET involves all pertinent European research institutions, infrastructures, and data repositories. Networking activities, access to first-class infrastructures and joint research and development activities are being covered under SOLARNET to improve, in quantity and quality, the service provided by this European community.

The purpose of this conference is to provide a coherent picture of the Sun as a single physical system playing all the underlying physical processes measured and observed in the solar atmosphere to date.

Website:

<http://www.iac.es/congreso/solarnet-4meeting/>

### **Solar Orbiter Workshop 7: Exploring the solar environs in Granada, Spain**

Start : 2017-04-03 - End : 2017-04-06

This event will be hosted by the Instituto de Astrofísica de Andalucía - CSIC. Please mind that on April 7th the 20th SWT meeting will take place at the same venue.

Website: Unkown