# **STCE Newsletter**

# 5 Dec 2016 - 11 Dec 2016



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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. ESWW13 Forecasts: the movies

Space weather forecast services are a way to mitigate space weather impacts. At ESWW13, 5 forecast centers gave the participants a live space weather update over the previous 24h and a forecast for the next 24 hours.

Here are the movies: http://www.stce.be/esww13/liveforecast.php

with in the leading role: SeNMEs, SIDC, BGS, SWPC and MOSWOC.



#### 2. PROBA2 Observations (5 Dec 2016 - 11 Dec 2016)

#### Solar Activity

Solar flare activity fluctuated between very low and 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: 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\_05.mp4(SWAP week 350).

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/

Thusday Dec 06



on 2016-Dec-06, an eruption was observed by SWAP in the west part of the Sun at 19:10. This active region is the most active one this week.

Find a movie of the event here (SWAP movie)http://proba2.oma.be/swap/data/mpg/ movies/20161206\_swap\_movie.mp4

Friday Dec 09



A coronal hole stretching from the northern hemisphere to the south pole has dominated the solar disk during the whole week.

Find a movie of the event here (SWAP movie)http://proba2.oma.be/swap/data/mpg/ movies/20161209\_swap\_movie.mp4

Saturday Dec 10



On Dec 10, an eruption was observed on the West Limb at 17h15. Find a movie of the event here (SWAP movie)http://proba2.oma.be/swap/data/mpg/ movies/20161210\_swap\_movie.mp4

#### 3. Review of solar activity

Solar activity was low with 2 C class flares. The largest was a C4.0 class flare at 17:15 UT on 10 December.



Active Region 2615 has been the most active region producing both C class flare. See the SDO/HMI image from 5 December in visible light:



Region 2615 rotated over the solar limb on 10 December leaving the photospheric solar disk spotless.

Solar protons have remained at background levels over the past week. No Earth directed CMEs were detected over the past week.

#### 4. The International Sunspot Number



SILSO graphics (http://sidc.be/silso) Royal Observatory of Belgium, 2016 December 16

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.

## 5. Review of geomagnetic activity

The solar wind speed has fluctuated between 275 and 750 km/s over the past week. The total magnetic field strength has fluctuated between 2 and 20 nT, peaking on 8 December. The Bz component fluctuated between -10 and +20 nT.

Geomagnetic conditions ranged between Kp index 1-5 (NOAA) and local K index 0-5 (Dourbes) over the past week, and have been enhanced throughout the week due to the negative Bz and high speed solar wind generated from a large Southern polar trans-equatorial coronal hole (CH) with a negative polarity (in-ward, Phi between 270 and 360°).

This region created enhanced solar wind conditions due to influences from the associated Co-Rotating-Interaction Region (CIR) with a magnetically and particle-wise compressed plasma and the subsequent CH High Speed Stream (HSS).

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### 7. Review of ionospheric activity (5 Dec 2016 - 11 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 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

#### 8. 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 AstrofÃ-sica 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 Astrofisica de Andalucia - CSIC. Please mind that on April 7th the 20th SWT meeting will take place at the same venue. Website: Unkown