STCE Newsletter

26 Jun 2017 - 2 Jul 2017

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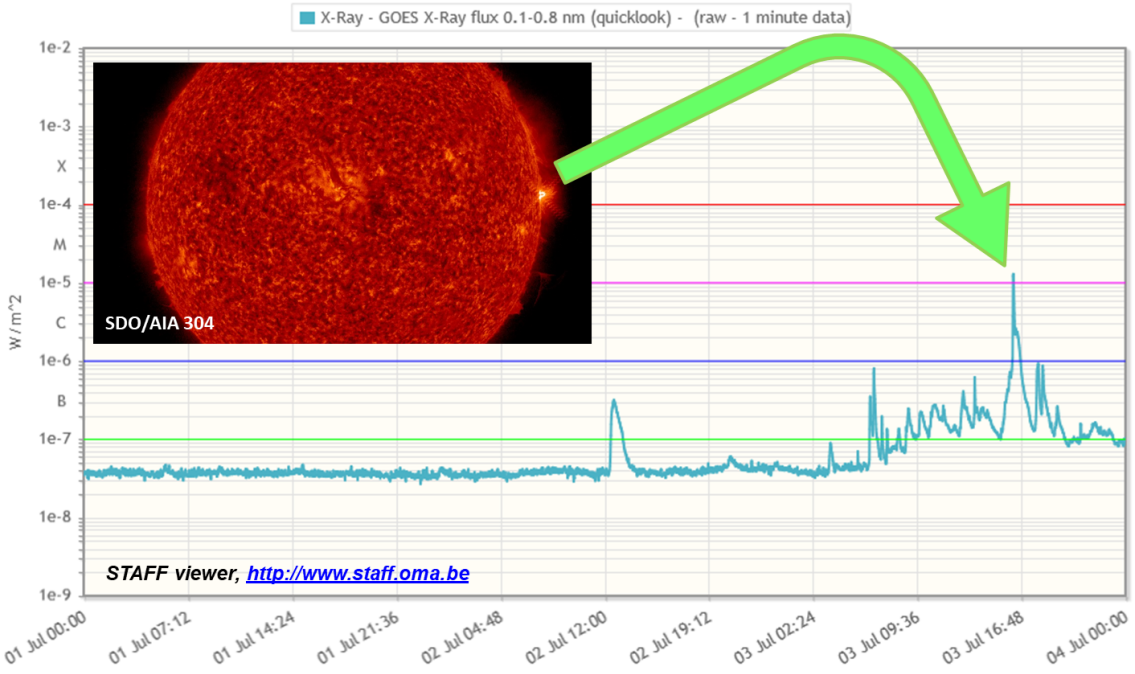
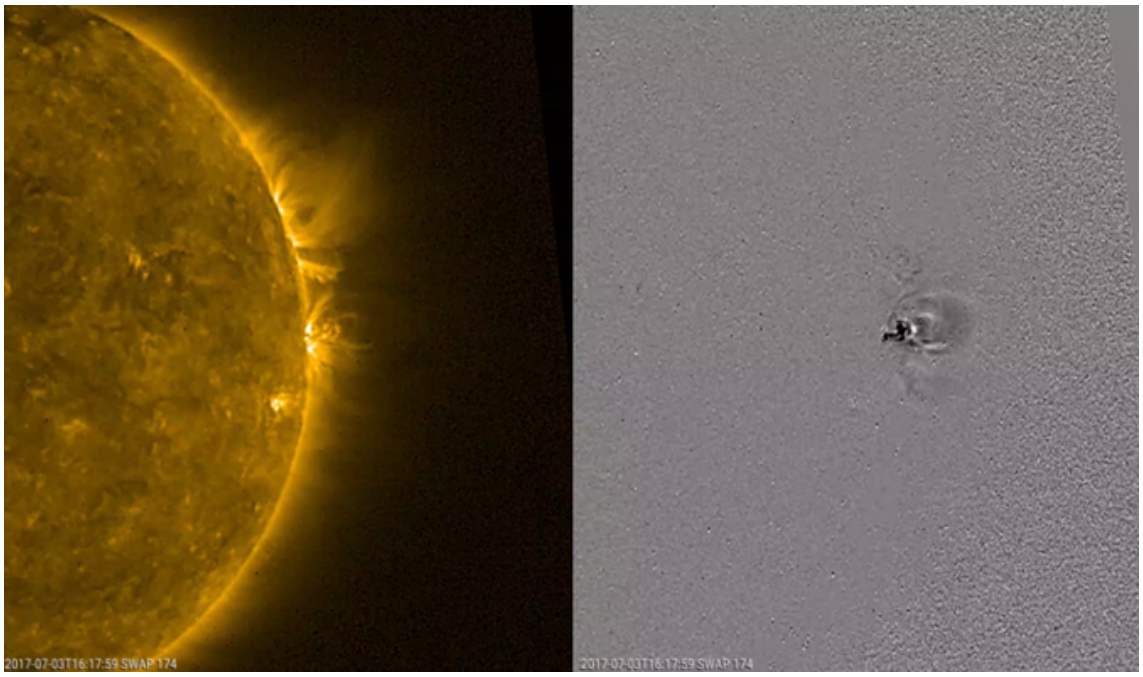
The Solar-Terrestrial Centre of Excellence (STCE) is a collaborative network of the Belgian Institute for Space Aeronomy, the Royal Observatory of Belgium and the Royal Meteorological Institute of Belgium.

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

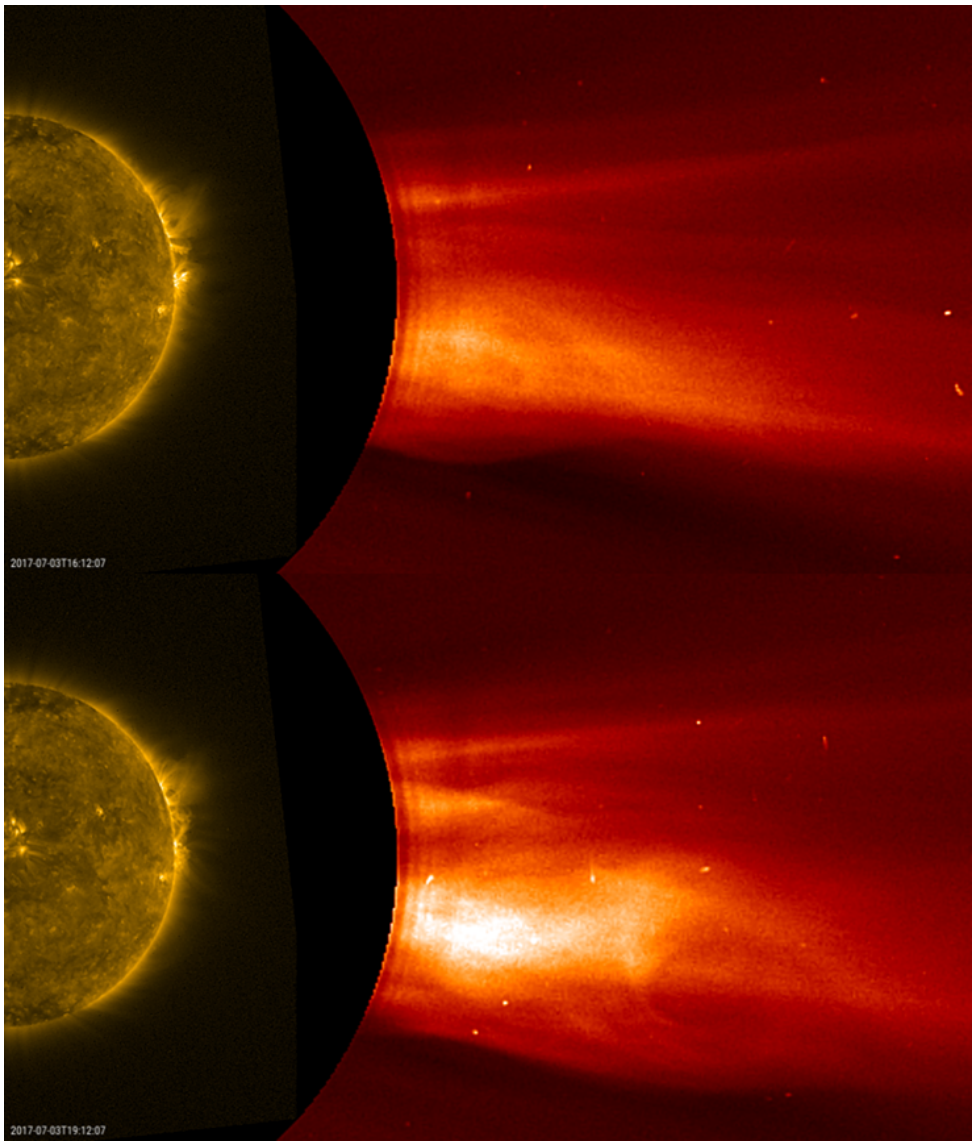
1. An eruptive surprize

Solar observers were readying themselves for a spotless Sun (see SILSO at http://sidc.oma.be/silso/spotless) when early on 3 July a small but very active sunspot group developed almost right on the Sun's west limb. Only a few sunspots could be distinguished before the region rotated out of view. Hence, it did not get a NOAA number. The region was not NOAA 2664, which also rotated off the west limb but about 15 degrees higher in latitude. The new region was the source of an M1.3 flare that peaked at 16:15UT. Underneath a combination of an x-ray flux chart (STAFF; http://www.staff.oma.be/) with an extreme ultraviolet (EUV) image by SDO/AIA (https://sdo.gsfc.nasa.gov/) at the time of this medium flare.





As usual, also PROBA2 (http://proba2.oma.be/ssa) was on solar watch duty, and its EUV instruments did not miss the eruption. Its wide-angle EUV camera SWAP clearly showed the dynamics in the area and material being ejected into space. The above image shows a SWAP EUV image on the left and a SWAP difference image (one image subtracted from the previous one) on the right, highlighting the eruption. The associated particle cloud became visible as a slow moving (CACTus; http://www.sidc.oma.be/cactus/) coronal mass ejection (CME) in SOHO coronagraphic imagery (https://sohowww.nascom.nasa.gov/) about an hour later. The imagery underneath shows a combined PROBA2/SWAP - SOHO/LASCO C2 image at the time of the flare peak (top) and three hours later (right) showing the CME travelling to the west and away from Earth.

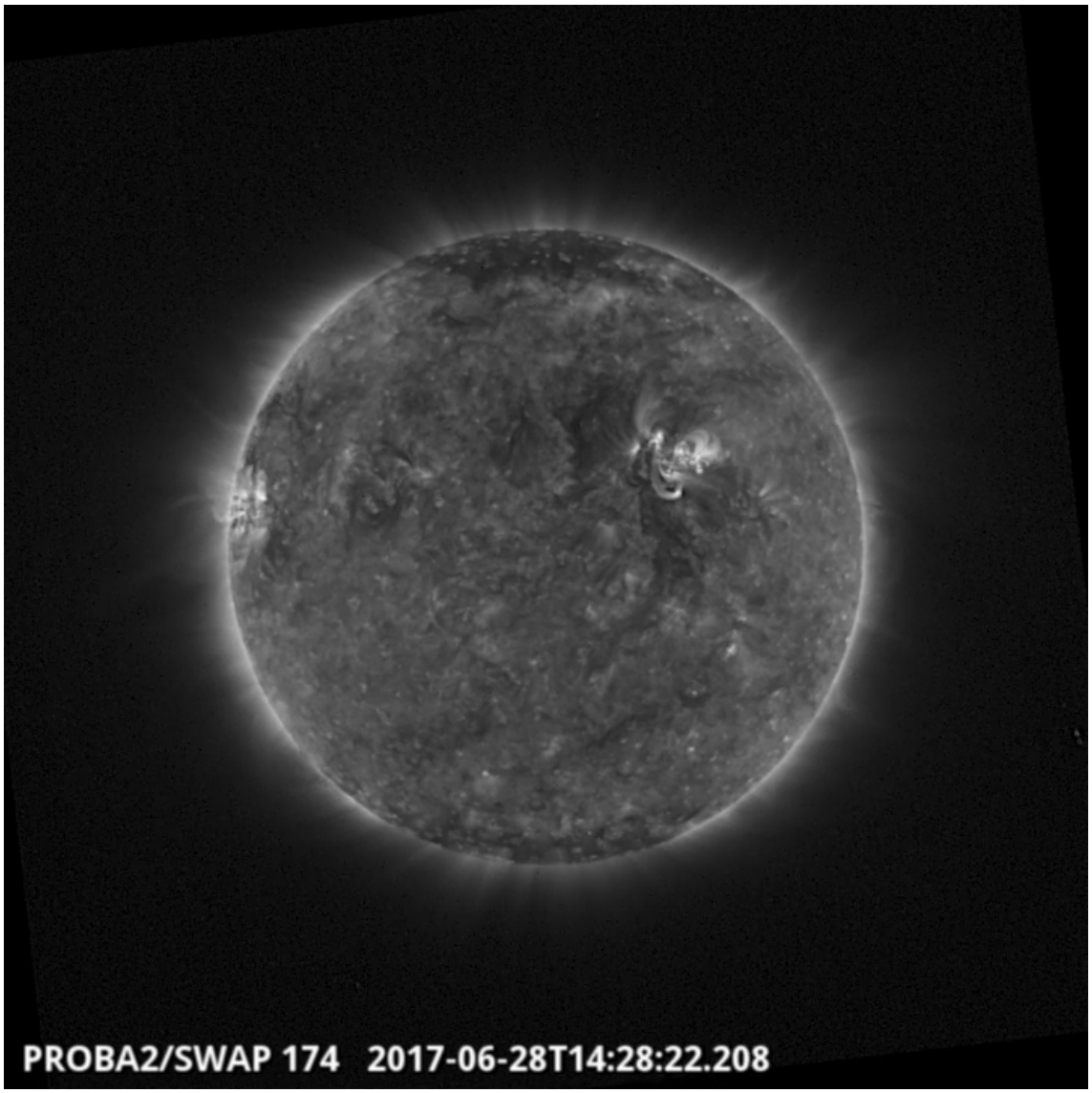


2. PROBA2 Observations (26 Jun 2017 - 2 Jul 2017)

Solar Activity

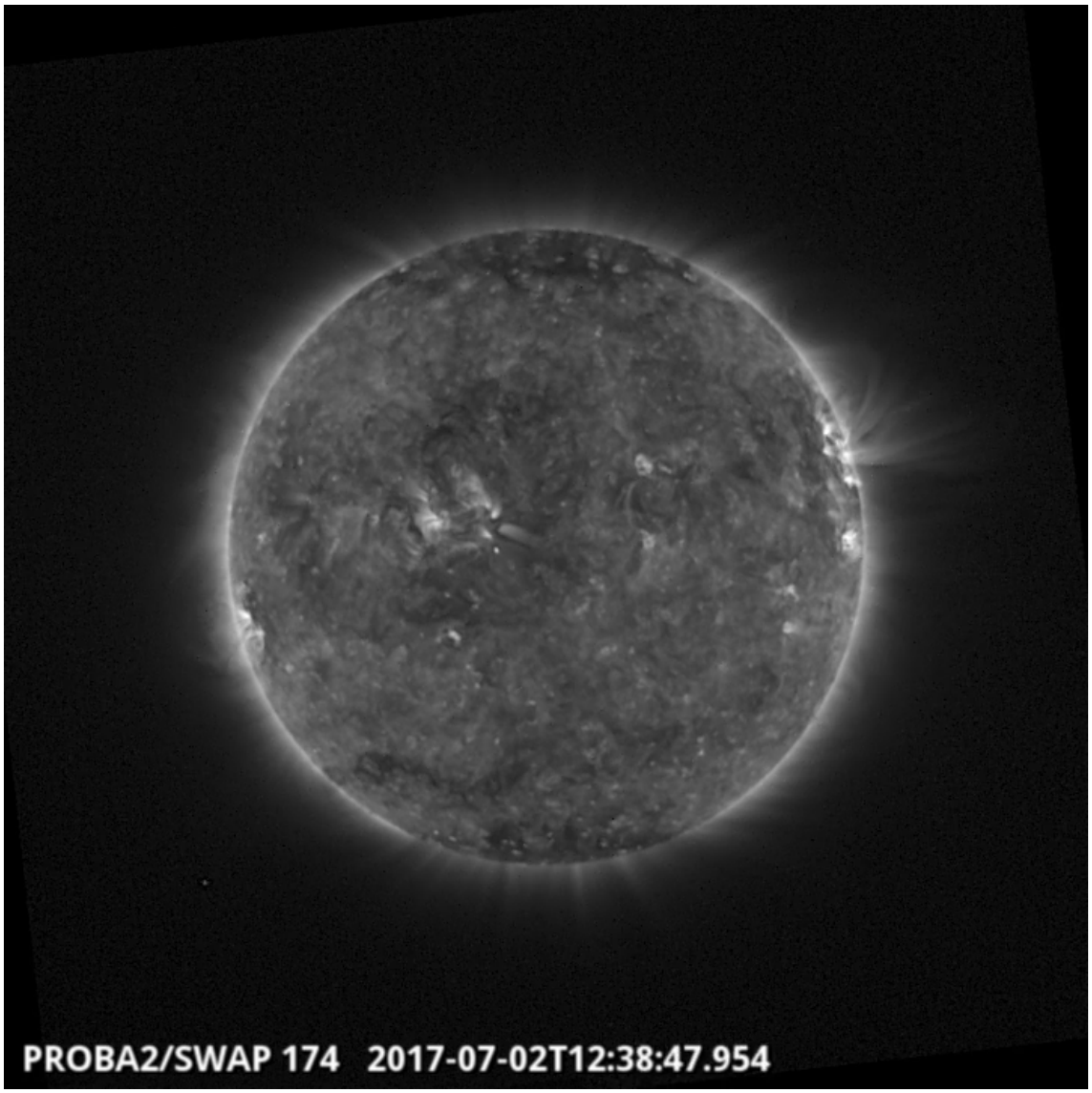
Solar flare activity was very low during the week.
In order to view the activity of this week in more detail, we suggest to go to the following website from which all the daily (normal and difference) movies can be accessed: http://proba2.oma.be/ssa
This page also lists the recorded flaring events.
A weekly overview movie can be found here (SWAP week 379).
http://proba2.oma.be/swap/data/mpg/movies/weekly_movies/weekly_movie_2017_06_26.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 http://proba2.oma.be/swap/data/mpg/movies/

Friday Jun 28



A long duration B1.3 event on 2017-Jun-28, starting at 12:27 UT and ending at 18:35 UT produced by the NOAA active region 2664 is visible in the north-west quadrant of the Sun in the SWAP image above. It was associated with a slow partial halo coronal mass ejection
Find a movie of the events here (SWAP movie)
http://proba2.oma.be/swap/data/mpg/movies/20170628_swap_movie.mp4

Sunday Jul 02



The largest flare of the week was a B3.1 class flare, peaking at 12:39 UT on 2017-Jul-02 produced by the NOAA active region 2664, which is visible in the north-west quadrant of the Sun. This can be seen in the of the SWAP image above.
Find a movie of the events here (SWAP movie)
http://proba2.oma.be/swap/data/mpg/movies/20170702_swap_movie.mp4

3. Review of solar and geomagnetic activity

Solar Activity

Solar activity was very low all week. NOAA 2664 was the only sunspot region on disk and was about to rotate over the west limb by the end of the period. This already small region decreased in size and magnetic complexity after a long duration B1.3 event on 28 June, starting at 12:27UT and ending at 18:35UT. It was associated with a slow partial halo coronal mass ejection (CME; estimated true speed of around 275 km/s).

No other earth-directed CMEs were obvious in available coronagraphic imagery.

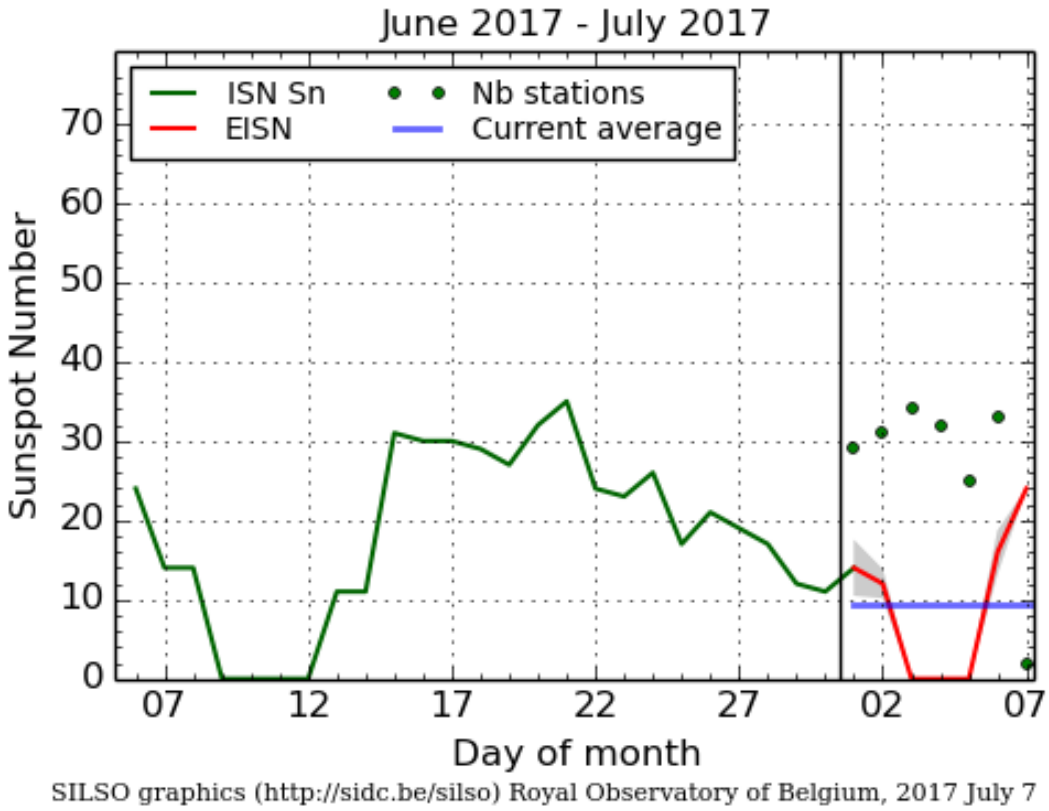
The greater than 10MeV proton flux was at nominal levels. A small positive equatorial coronal hole (CH) transited the central meridian (CM) on 25/26 June, and a stretched negative equatorial CH transited the CM on 30 June-02 July.

Geomagnetic Activity

At the beginning of the week, the earth environment was under the waning influence of a wind stream from the extension of a positive northern polar coronal hole (CH). Wind speed declined from about 610 km/s around noon on 26 June to 330 km/s around noon on 30 June.
Solar wind parameters then gradually became variable with a small shock observed at 16:27UT on 01 July, likely from a transient structure. Wind speed increased abruptly from about 365 km/s to 410 km/s, and total magnetic field strength Bt from 10.5 to 17 nT. Solar wind speed ranged between 310 and 550 km/s, and Bz between -10 and +15 nT for the rest of the period.
The phi angle was mostly directed away from the Sun ("positive").

Geomagnetic conditions were mostly quiet to unsettled until the arrival of the transient structure on 01 July, when active conditions were observed. Kp was at minor storming on 02 July during the 06-09UT interval.

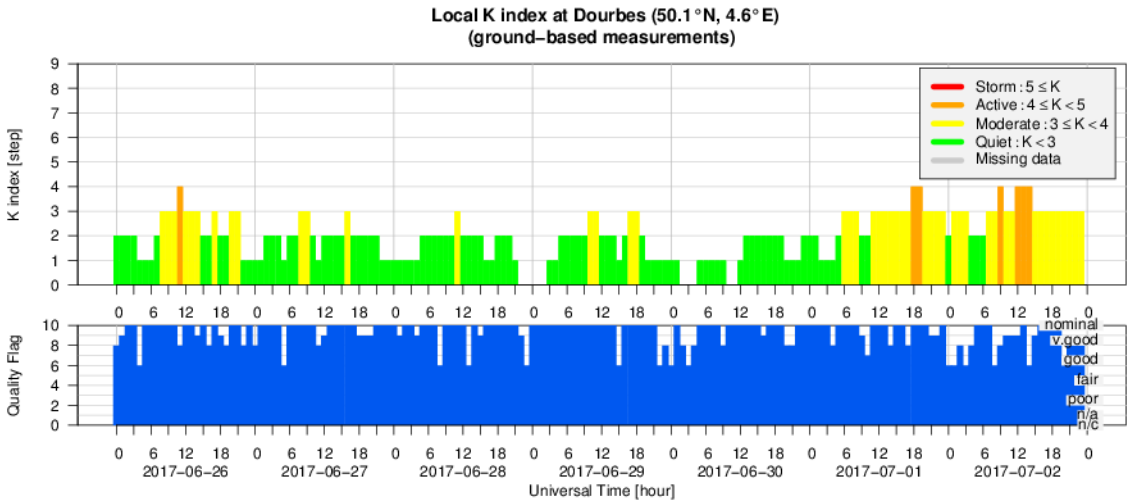
4. The International Sunspot Number



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

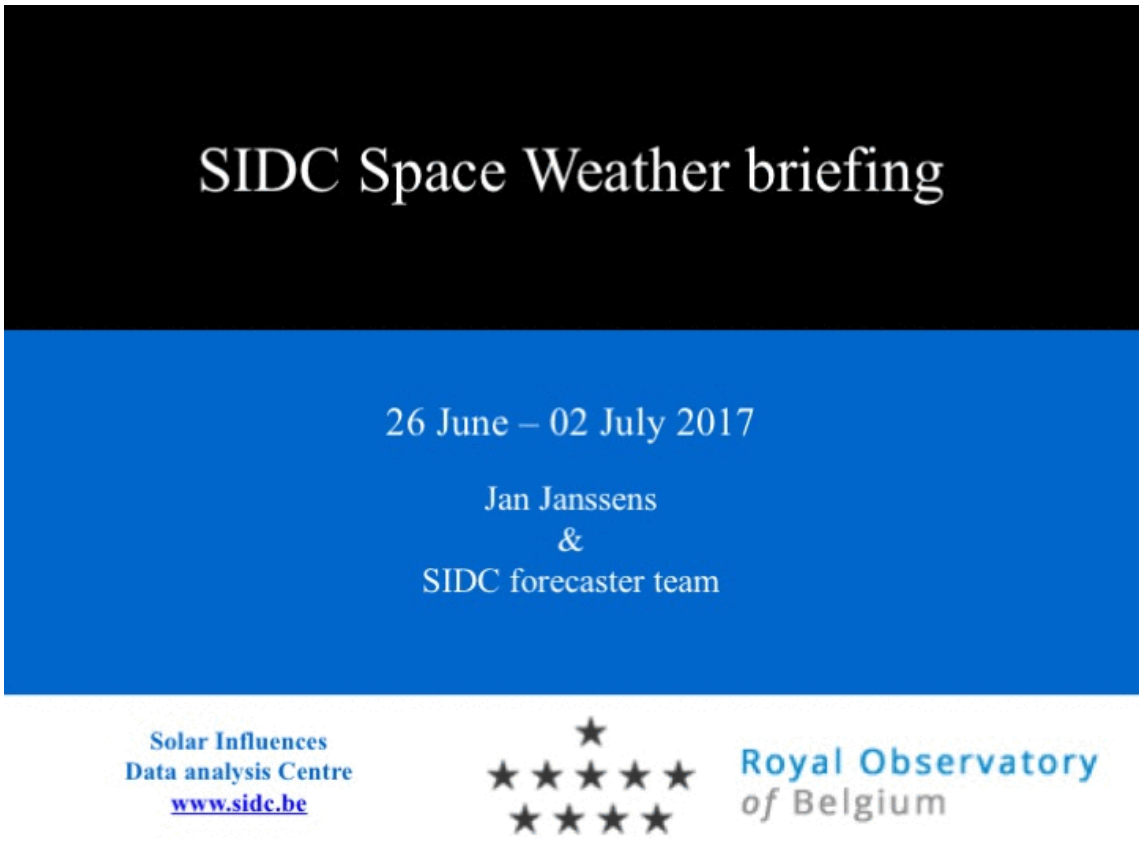
(about one solar rotation). The horizontal blue line shows the current monthly average, while the green dots give the number of stations included in the calculation of the EISN for each day.

5. Geomagnetic Observations at Dourbes (26 Jun 2017 - 2 Jul 2017)



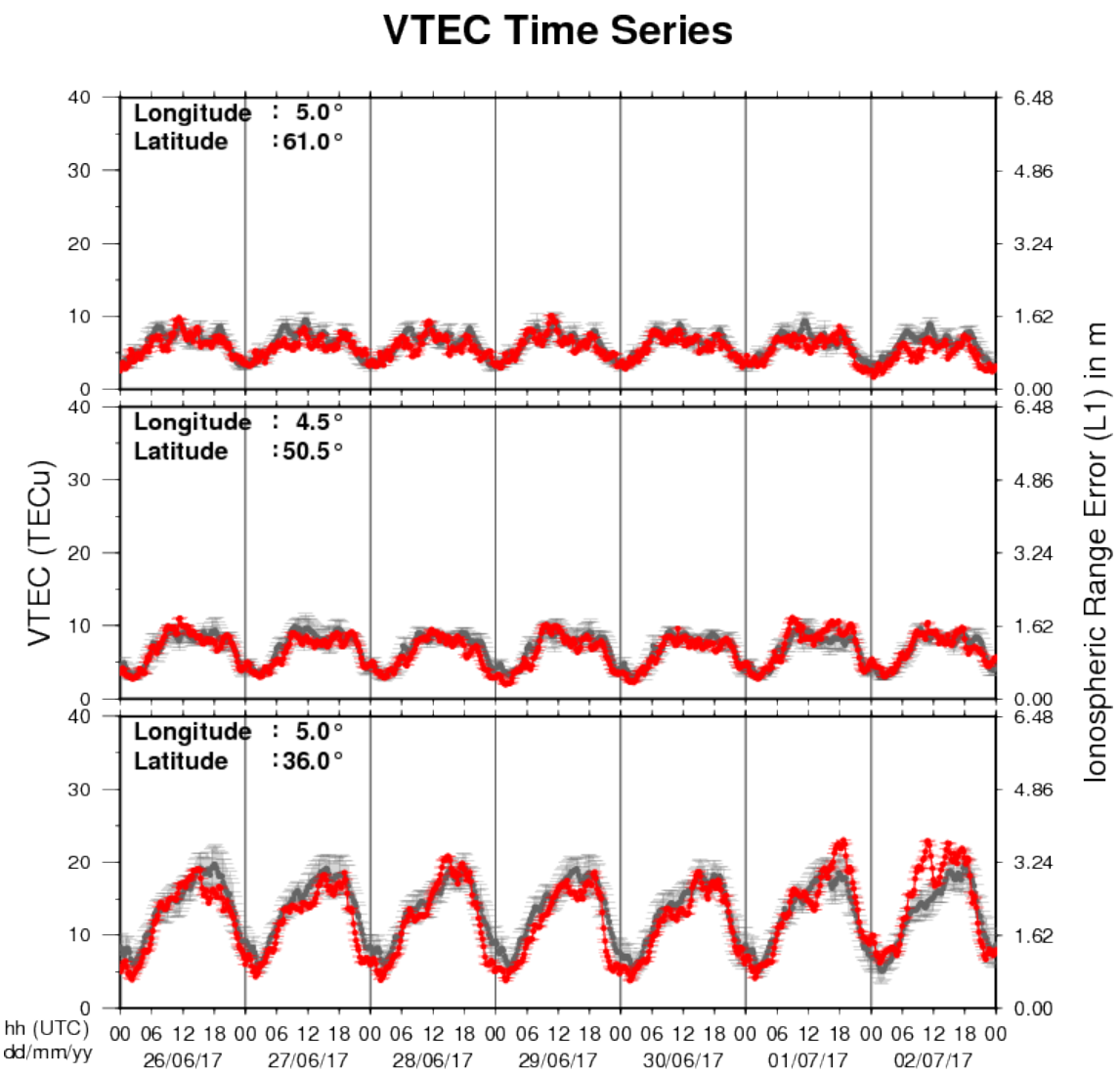
6. SIDC Space Weather Briefing

The Space Weather Briefing presented by the forecaster on duty from June 26 to July 2 It reflects in images and graphs what is written in the Solar and Geomagnetic Activity report.



Movie on the evolution of Active Region 2664: http://www.stce.be/newsletter/movies/JHV_2017-06-27_09.42.57.mp4
Movie on the long duration event: http://www.stce.be/newsletter/movies/JHV_2017-06-29_09.45.36.mp4

7. Review of ionospheric activity (26 Jun 2017 - 2 Jul 2017)



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

United Nations/United States of America Workshop on the International Space Weather Initiative in Massachusetts (USA)

Start : 2017-07-31 - End : 2017-08-04
This workshop marks the 10th anniversary of the International Heliophysical Year, which led to the genesis of the International Space Weather Initiative. It is organized jointly by the Office for Outer Space Affairs, the National Aeronautics and Space Administration (NASA) and Boston College to highlight the achievements made over the past ten years and to show-case the worldwide development of science, capacity building, and outreach.
The UN Workshops on ISWI have been aimed at providing a global forum for space weather experts from developed and developing countries, including representatives of the major instrument operators and data providers. In particular the Workshop will focus on recent advances made in scientific research by utilizing ISWI instrument data in conjunction with space mission data in adding significant new knowledge on space weather phenomena near Earth and interplanetary space.
The workshop will begin with a high level international forum on the economic and societal effects of extreme space weather. This forum will include keynote speakers from major international organizations followed by a panel session to discuss issues and policies for acknowledging space weather as a global challenge.
The workshop is also held in preparation for UNISPACE+50 in 2018, the 50th anniversary of the first UN Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE), held in Vienna in 1968. The three components of the Workshop will also help develop a coherent international policy towards an appropriate response to space weather.
Website: https://iswi2017.bc.edu/

URSI General Assembly in Montreal, Canada

Start : 2017-08-19 - End : 2017-08-26
For the thirty-second time since the inception of URSI, Radio Scientists from across the world will get together for the URSI General Assembly and Scientific Symposium. This triennial gathering will take place from 19th to 26th of August 2017, in Montreal, Canada. This conference is a unique opportunity to learn about recent advances in all fields of Radio Science, as covered by all ten URSI Commissions. Among the different sessions, please note:
* 'Radio Science for Space Weather' Conveners: M. Messerotti, V. Pierrard
* 'Remote Sensing and Modeling of the Earth's Plasmasphere and Plasmapause' Conveners: A. M. Jorgensen, V. Pierrard, B. Heilig
The abstract deadline is 30 January 2017
Website: http://www.ursi2017.org

2017 Joint IAPSO-IAMAS-IAGA Assembly in Cape Town, South Africa

Start : 2017-08-27 - End : 2017-09-01
The Joint IAPSO-IAMAS-IAGA Assembly, endorsed by the University of Cape Town and the South African Department of Science and Technology, will take place from 27 August to 1 September 2017 at the Cape Town International Convention Centre (CTICC). Several IAGA and IAMAS sessions are of Space Weather interests as well as the joint session 'Space Weather throughout the Solar System: Bringing Data and Models together'.
Website:
http://iapso-iamas-iaga2017.com/index.php

Workshops on Radiation Monitoring for the International Space Station in Torino, Italy

Start : 2017-09-05 - End : 2017-09-07
The Workshop on Radiation Monitoring for the International Space Station is an annual meeting to discuss the scientific definition of an adequate radiation monitoring package and its use by the scientific community on the ISS. Types of instruments and research topics need to be defined in order to optimise the radiation safety of the ISS crew.
Website: http://wrmiss.org/

International Workshop on Solar, Heliospheric & Magnetospheric Radioastronomy in Meudon, France

Start : 2017-11-06 - End : 2017-11-10
Jean-Louis Steinbeg has been one of the major pioneers in radioastronomy. Co-founder of the NanÃ§ay Observatory, he has actively participated to, an inspired a large number of radio instruments on many international space missions. Jean-Louis Steinberg is the founder of the Space Radioastronomy laboratory of the Paris Observatory in 1963. Later on, this laboratory widened its science interests and became the DESPA (1971) and then the current LESIA (2002) which is one of the major space sciences laboratories in France. The aim of this workshop is to cover the science topics which Jean-Louis Steinberg has promoted during his career, focusing on Solar, Heliospheric & Magnetospheric radioastronomy & physics. This will be done by covering both observations from either ground facilities (NDA, RH, LOFAR, Artemis etc ...) or space missions (ISSEE, Ulysses, WIND, CLUSTER, STEREO, CASSINI, JUNO etc ...) and models/theories. A series of invited talks is also foreseen to cover the new developments in the discipline which may come with the future facilities such as Solar Orbiter, Solar Probe Plus, JUICE, JUNO, LOFAR+, SKA etc ....
This workshop will also be the opportunity to remember both the extraordinary personal & professional lifes of Jean-Louis Steinberg especially for new generation of scientists. At the occasion of this workshop it is also expected that the Building 16 (historical Space Sciences building) on the Meudon campus will be renamed "Building Jean-Louis Steinberg".
Website:
https://jlsworkshop.sciencesconf.org/

European Space Weather Week 14

Start : 2017-11-27 - End : 2017-12-01
The ESWW is the main annual event in the European Space Weather calendar. It is the European forum for Space Weather as proven by the high attendance to the past editions. The agenda will be composed of plenary/parallel sessions, working meetings and dedicated events for service end-users. The ESWW will again adopt the central aim of bringing together the diverse groups in Europe working on different aspects of Space Weather.
Website:
http://www.stce.be/esww14/