

STCE Newsletter

9 Jan 2017 - 15 Jan 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.

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1. Patrick S. McIntosh (1940-2016)

Patrick S. McIntosh died on 16 October 2016. He is well known for the famous sunspot classification he developed (<http://adsabs.harvard.edu/abs/1990SoPh..125..251M>) and which is still actively used by professional and amateur solar observers worldwide. He stood also at the cradle of the space weather forecasting. The obituary underneath was written by David Webb and published in SolarNews (<http://spd.aas.org/SolarNews/>), the Electronic Newsletter of the American Astronomical Society (Solar Physics Division) at http://spd.aas.org/SolarNews/2017/20170115.html#section_webb



Long-time solar researcher Patrick McIntosh died on October 16, 2016 after developing symptoms of Alzheimer's disease about 2010. He is survived by his son Daniel McIntosh, daughter Elisabeth Schmidt and grandsons Taylor and Walker Schmidt, brothers Michael McIntosh and John Wesley "Jack" McIntosh, sister Becky Adams, along with two nieces and two nephews.

Pat McIntosh was born November 19, 1940 in Robinson, Illinois, to Margaret and Carl Kirkwood and later was adopted by his mother's second husband, Virgil L. McIntosh. He graduated from Robinson High School in 1958, where he was first in the state Bausch and Lomb science competition for his research

into sunspots. He was awarded a scholarship to Harvard University and graduated in 1962 with a degree in astronomy. One of his 15 minutes of fame was to be a roommate of the infamous Unabomber in one of the Harvard houses!

After graduation, Pat returned to Illinois and married his childhood sweetheart Judy in 1963. From 1960 to 1965 Pat was a Research Assistant at Sacramento Peak Observatory in New Mexico. He worked there under the tutelage of Henry and Elske Smith, John Evans, and Frank Orrall. He and his wife moved there in 1963 after their wedding. While at Sac Peak he and Dr. Orrall established the world's first continuous, full-disk white-light patrol for study of the birth and evolution of sunspots, and for the detection of white-light flares.

Pat can be considered one of the founding Fathers of what is now called Space Weather. In 1965 he became a research space scientist with the Space Environment Laboratory (SEL - now the Space Weather Prediction Center) at the National Oceanic and Atmospheric Administration's (NOAA) Environmental Research Laboratories in Boulder, CO. He was one of the first three operational solar forecasters when regular solar-terrestrial services began on December 1, 1965. He trained many of the early NOAA and United States Air Force forecasters and observers, gave invited training sessions for the NASA astronauts who flew on the three Skylab missions in 1973–1974, and was one of the NOAA on-site forecasters in Houston during the Apollo and Skylab missions. He also established the Boulder Solar Observatory for SEL in 1966, which was expanded in 1967 as a NASA Space Physics Analysis Network (SPAN) instrument.

During his career, Pat studied the sun, tracking its solar cycles and documenting sunspots, solar flares and predicting solar activity. He developed a new system of sunspot classification in 1966, which was named after him. The McIntosh classification system modified the Zurich evolutionary sequence of sunspot class and added descriptions of the largest spot and the degree of spottedness in the group interior, to define 60 distinct types of sunspot groups. This system is still widely used today.

In the late 1960s he developed methods for inferring solar magnetic fields from H-alpha imaging observations. He began producing these as H-alpha synoptic charts and, in 1973, they began to be published in NOAA's Solar-Geophysical Data (SGD) Reports, the famous "Yellow books". The McIntosh synoptic maps were unique in that they traced magnetic polarity inversion lines, and connected widely separated filaments, fibril patterns, plage corridors and coronal hole boundaries to reveal the large-scale organization of the solar magnetic field. Pat's legacy will continue as his nearly 45 years of synoptic maps are currently being scanned, digitized and archived under a project led by NCAR/HAO (National Center for Atmospheric Research/High Altitude Observatory) and Boston College, ISR (Institute for Scientific Research). The final, searchable versions of the maps, called the McIntosh Archives, are being made publicly available at NOAA's National Centers for Environmental Information.

His experience with sunspot evolution and solar flares led to him being used as the "expert" cloned in a solar flare prediction expert system, Theo, in 1985. Pat became a senior member of the research staff in 1983, and retired in 1995 after 30 years at NOAA. During his career he traveled extensively to many countries including South America, China, Europe and Australia. Around 1990 he spent 18 months in Australia as a visiting scientist, working with colleagues but also enjoying touring around Australia. He spent several months in China and Australia helping set up early warning systems to detect sunspot disruptions to communications systems.

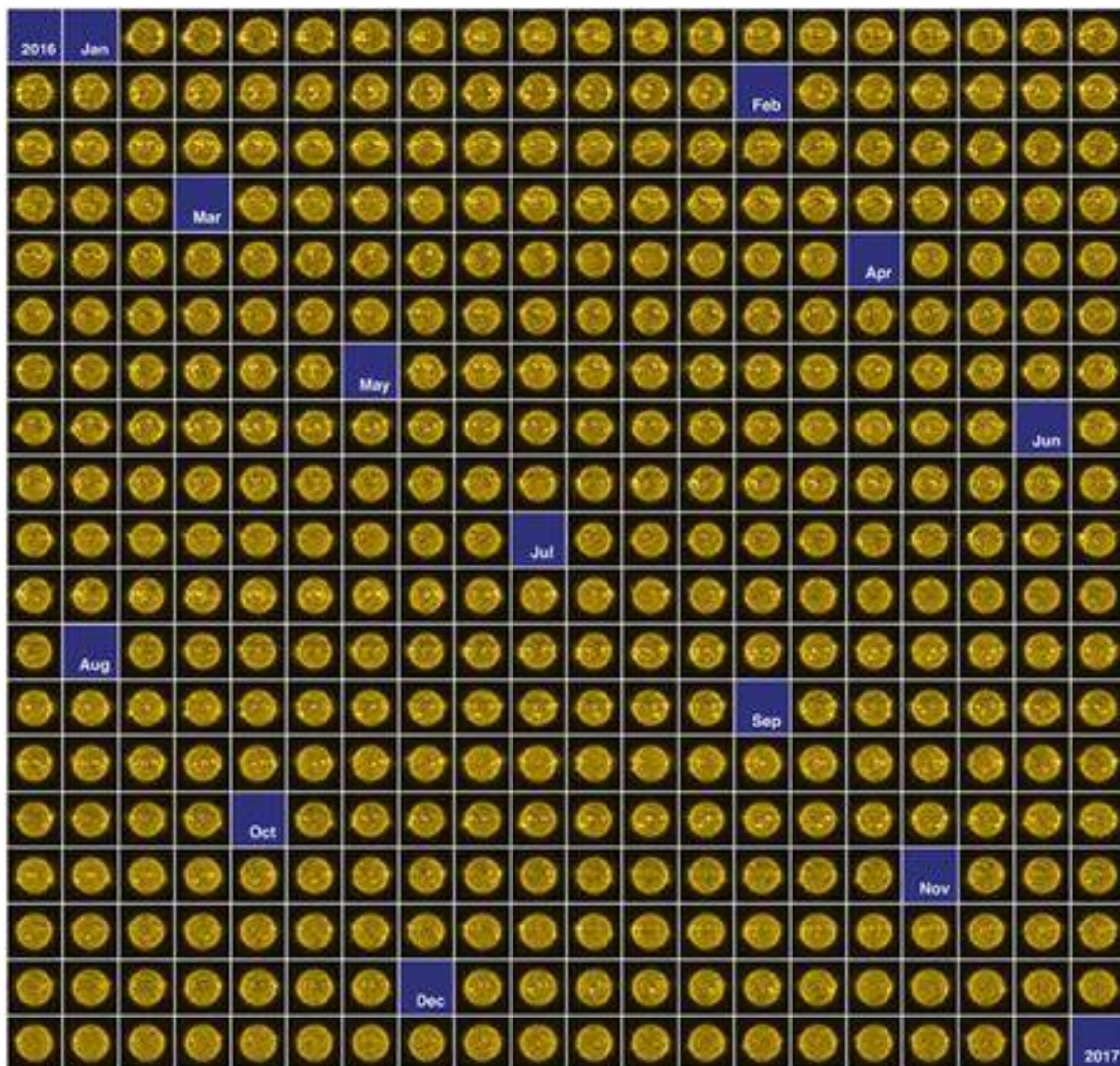
Pat was a long-time member of the American Astronomical Society, the American Geophysical Union and Sigma Xi. He was a Visiting Scientist to the Australian IPS (Ionosphere Prediction Service) Radio and Space Services from 1989 to 1990, and an invited touring lecturer for the Chinese Academy of Sciences in 1990. He was co-convenor and session chairman for the first conference on solar predictions: AIAA Solar Activity Observations and Predictions, Huntsville, AL, 1970, and co-edited with Murray Dryer the book of contributions, MIT Press, 1972.

Pat was Working Group chairman for each of the subsequent International Solar-Terrestrial Predictions Workshops: Boulder, 1979; Meudon, France, 1984; Leura, Australia, 1989; Ottawa, Canada, 1992. He was also Working Group leader in each of the International Solar Cycle Workshops: Big Bear Lake, CA, 1986; Fallen Leaf Lake, 1987; Sydney, Australia, 1989; Sacramento Peak Observatory, NM, 1991. He was an organizer of The Physics of Sunspots workshop at Sacramento Peak Observatory, NM, in 1981.

After his retirement in 1995 Pat incorporated two businesses, HelioSynoptics, Inc. to continue his synoptic mapping, and McIntosh Graphics, Inc. through which he pursued his second passion, photography and graphic design. Throughout his career Pat's enthusiasm for solar physics and astronomy was an inspiration to his colleagues. He will be missed.

2. The Sun in 2016

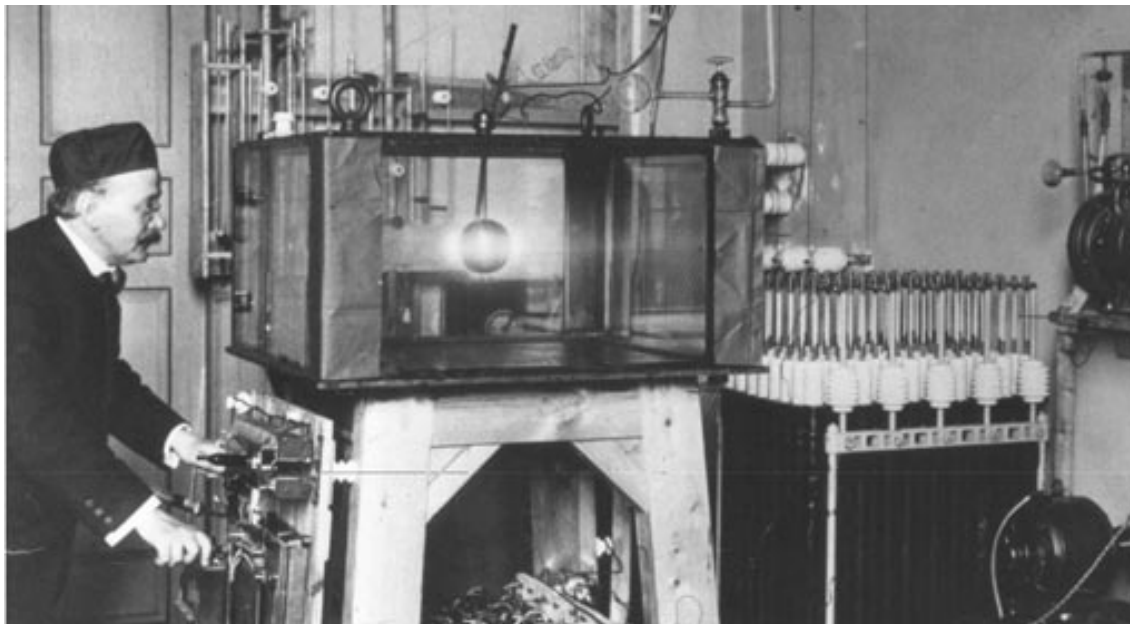
SWAP, the extreme ultraviolet (EUV) telescope aboard ESA's PROBA2 solar satellite, has been observing the Sun on a daily basis in 2016. The folks from the Proba2 Science Centre (<http://proba2.oma.be/>) have made a collage by combining an image for each day into a single poster. The impressive result and some additional explanations are at http://www.esa.int/spaceinimages/Images/2017/01/The_Sun_in_2016



3. Birkeland Jubilee - you are invited

2017 - 150 years after the birth of Kristian Birkeland and 100 years after his death.

The physicist Kristian Birkeland was an excellent scientist with an interest in atmospheric processes like aurora. He was able to create polar lights in a laboratory trying to reveal the secrets behind this natural spectacle.



Kristian Birkeland operating his self-build terrella.

The Faculty of Mathematics and Natural Sciences from the university of Oslo, Norway invites you to 'The Birkeland Jubilee 2017' events: <http://www.mn.uio.no/english/about/news-and-events/events/birkeland-jubilee/index.html>

4. Three Topical Issues for the SWSC Journal

Benefiting from the highly successful ESWW13 (<http://www.stce.be/esww13/>), the open-access Journal of Space Weather and Space Climate (SWSC, <http://www.swsc-journal.org/>) has opened three topical issues (TI), as listed underneath. Questions regarding these topical issues are to be addressed to the respective topical editors-in-chief. For questions concerning the submission process, please contact the Editorial Office (swsc@edpsciences.org). Manuscripts have to be submitted in PDF format via the SWSC online submission tool (<https://articlestatus.edpsciences.org/is/swsc/>) before the respective deadlines.

These topical issues are completely open to all contributors, i.e. they are NOT limited to ESWW13 conference participants.

Topical Issue 1: Flares, coronal mass ejections and solar energetic particles and their space weather impacts

Link to scope and guidelines: <http://www.swsc-journal.org/component/content/article/11-news/261-topical-issue-flares-coronal-mass-ejections-and-solar-energetic-particles-and-their-space-weather-impacts-deadline-30-april-2017>

The Topical Editors-in-Chief are Nicole Vilmer (Nicole.Vilmer@obspm.fr) and Olga Malandraki (omaland@astro.noa.gr).

Deadline for submission: 30 April 2017

Topical Issue 2: Measurement, Specification and Forecasting of the Solar Energetic Particle Environment and GLEs

Link to scope and guidelines: <http://www.swsc-journal.org/component/content/article/11-news/263-topical-issue-measurement-specification-and-forecasting-of-the-solar-energetic-particle-environment-and-gles-deadline-30-april-2017>

The Topical Editors-in-Chief are Piers Jiggins (Piers.Jiggins@esa.int) and Alexander Mishev (alexander.mishev@oulu.fi).

Deadline for submission: 30 April 2017

Topical Issue 3: Developing New Space Weather Tools: Transitioning fundamental science to operational prediction systems

Link to scope and guidelines: <http://www.swsc-journal.org/component/content/article/11-news/266-topical-issue-developing-new-space-weather-tools-transitioning-fundamental-science-to-operational-prediction-systems-deadline-28-april-2017>

The Topical Editors-in-Chief are D. Shaun Bloomfield (shaun.bloomfield@northumbria.ac.uk) and Giovanni Lapenta (giovanni.lapenta@kuleuven.be).

Deadline for submission: 28 April 2017

5. PROBA2 Observations (9 Jan 2017 - 15 Jan 2017)

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 (SWAP week 355)

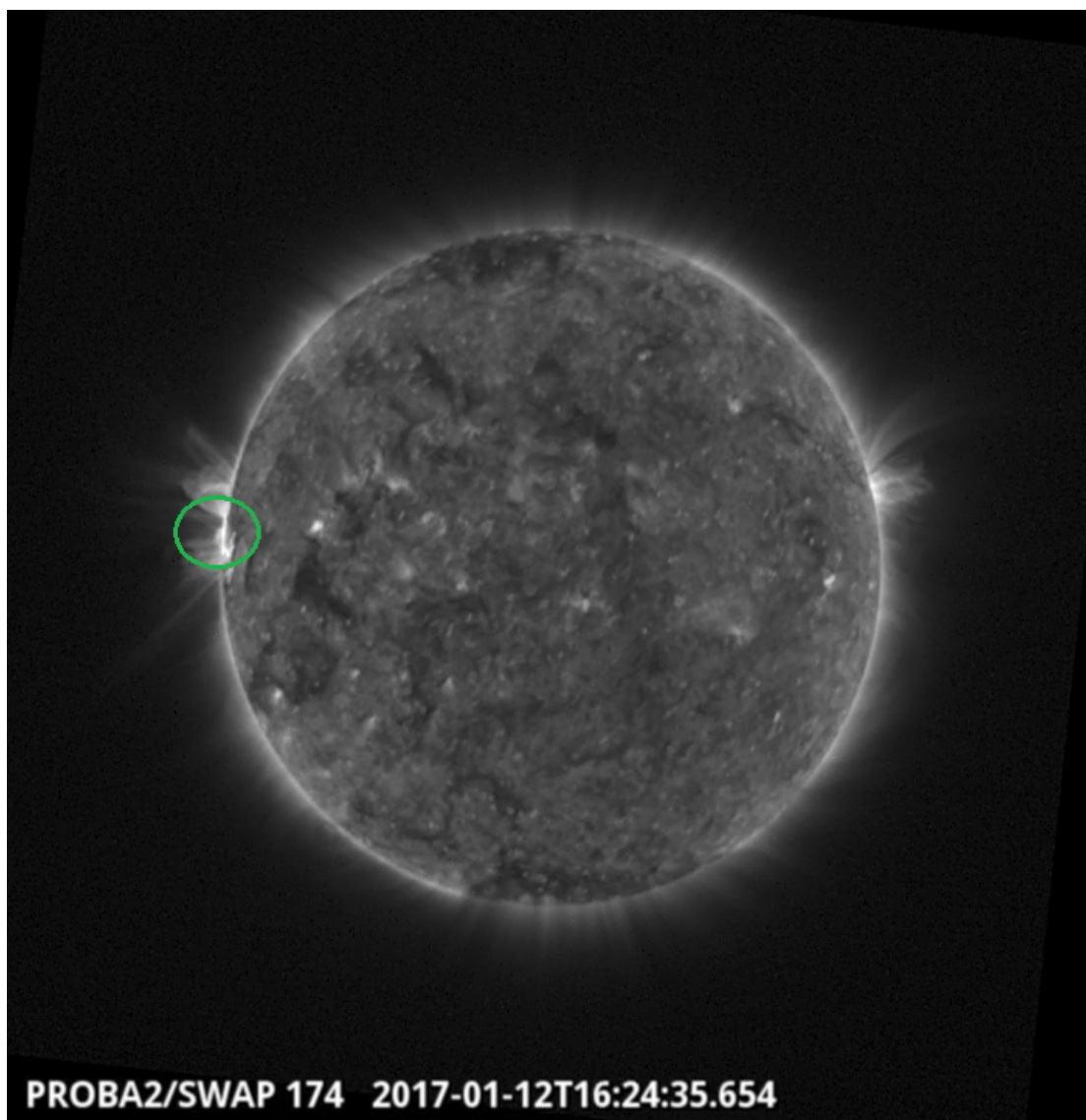
http://proba2.oma.be/swap/data/mpg/movies/weekly_movies/weekly_movie_2017_01_09.mp4

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/>

Thursday Jan 12

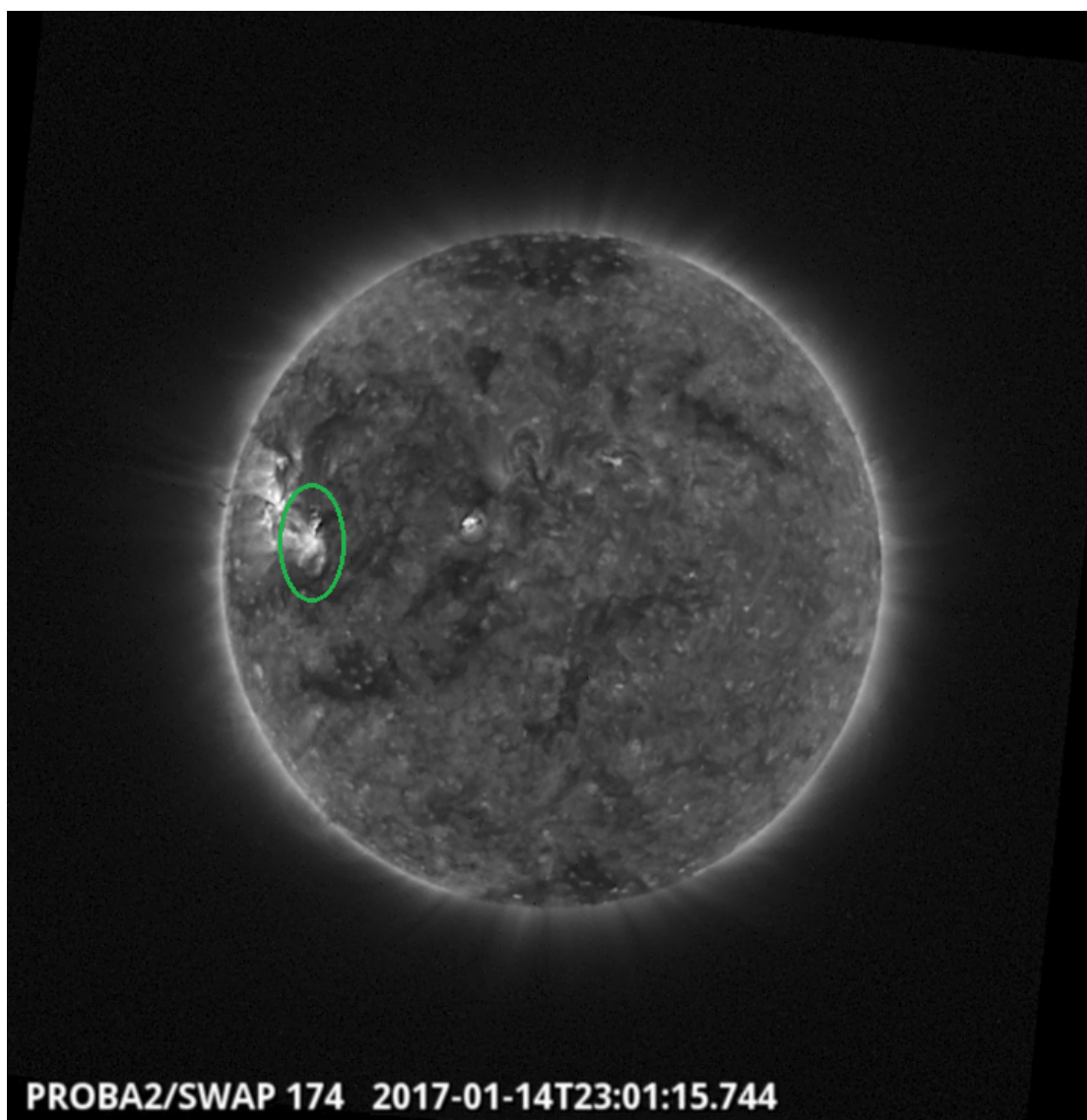


Flare on the Eastern limb at 16:24 - SWAP image

Find a movie of the events here (SWAP movie)

http://proba2.oma.be/swap/data/mpg/movies/20170112_swap_movie.mp4

Saturday Jan 14

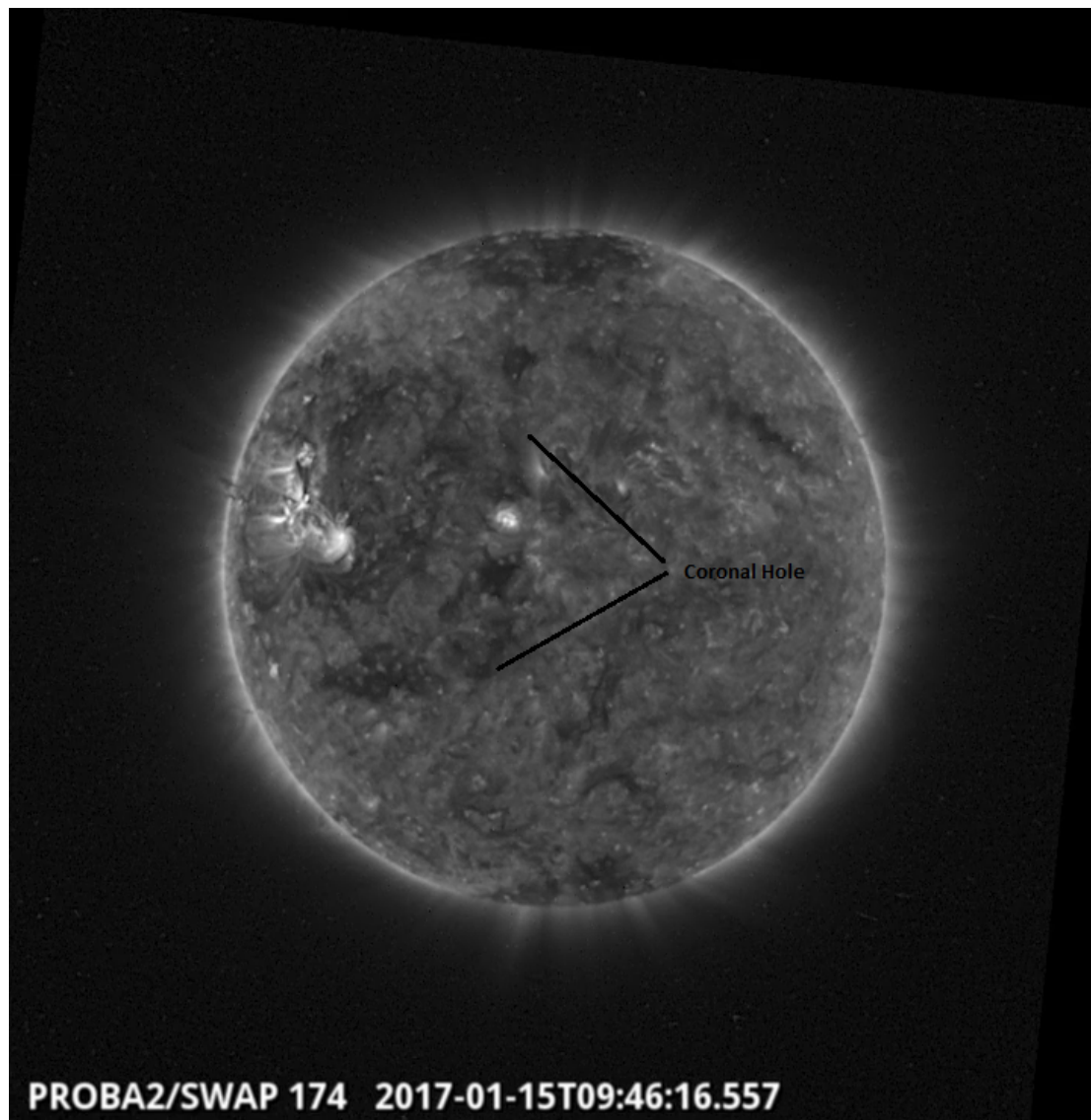


Eruption on the Eastern Hemisphere at 23:01 - SWAP image

Find a movie of the events here (SWAP movie)

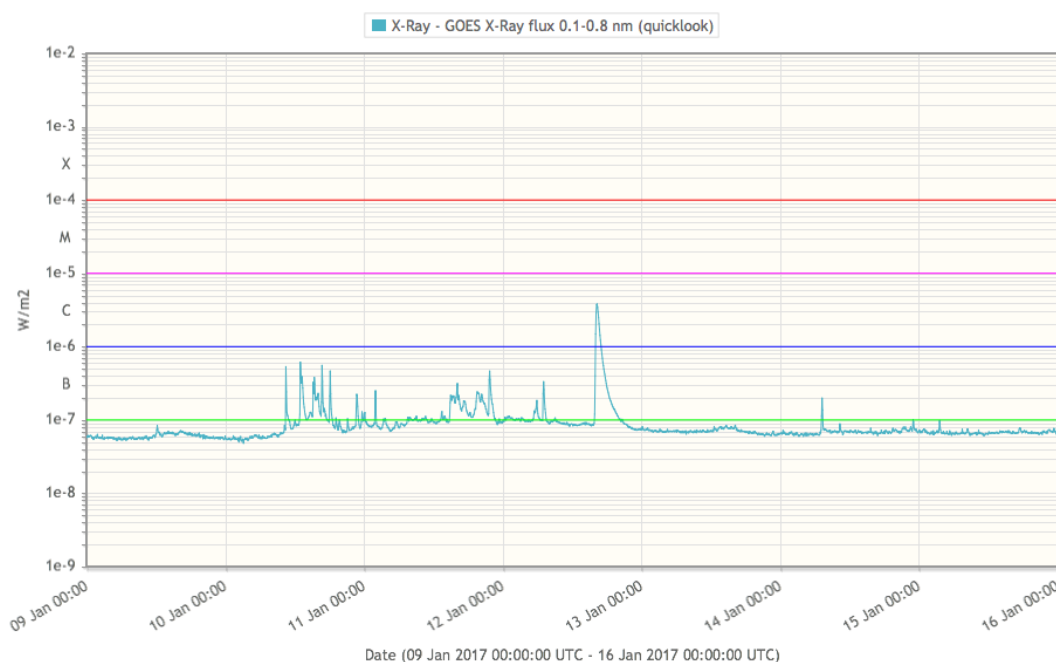
http://proba2.oma.be/swap/data/mpg/movies/20170114_swap_movie.mp4

Sunday Jan 15



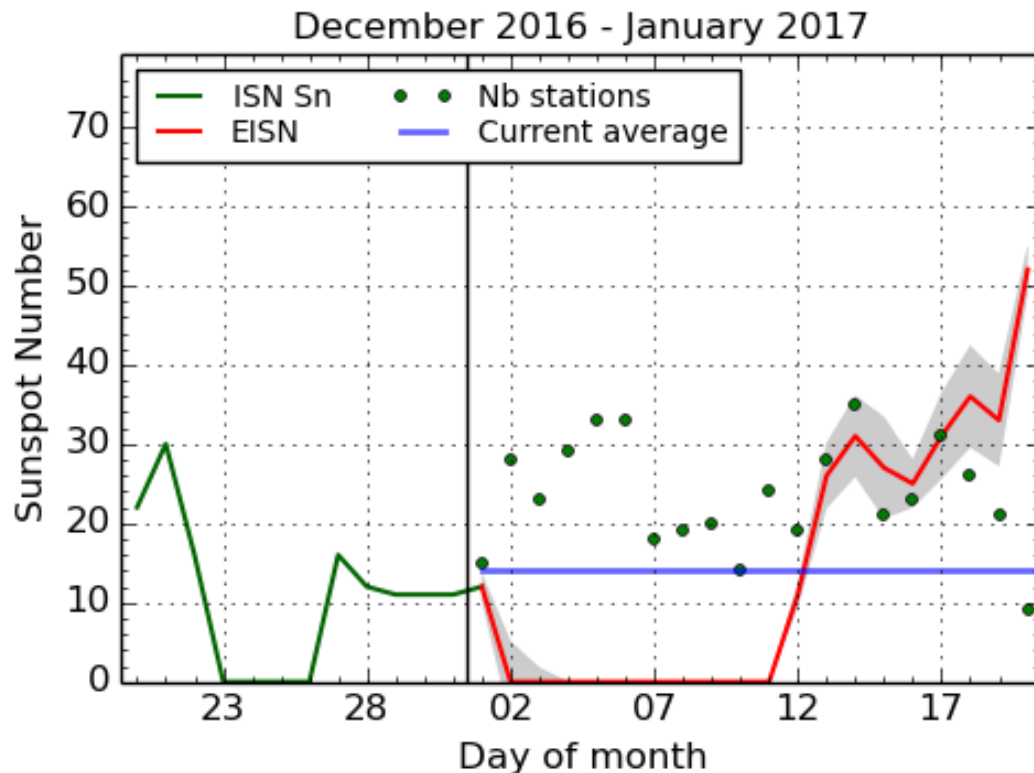
A coronal hole stretching from the northern hemisphere to southern hemisphere has dominated the solar disk since January 13. This is clearly seen on 2017-Jan-15. Find a movie of the event here (SWAP movie)
http://proba2.oma.be/swap/data/mpg/movies/20170106_swap_movie.mp4

6. Review of solar activity



There were no active regions visible at the beginning of the week. On January 12, NOAA AR 2625 (alpha) rotated over the east limb, NOAA AR 2626 (alpha) did so within a day. NOAA AR 2625 produced a C3.8 class flare on January 12, 16:18 UT. This was the first and only C-class flare of the week, and of the year so far. This flare was associated with a limb CME which would not affect the Earth. NOAA AR 2625 developed into beta magnetic field configuration by January 14.

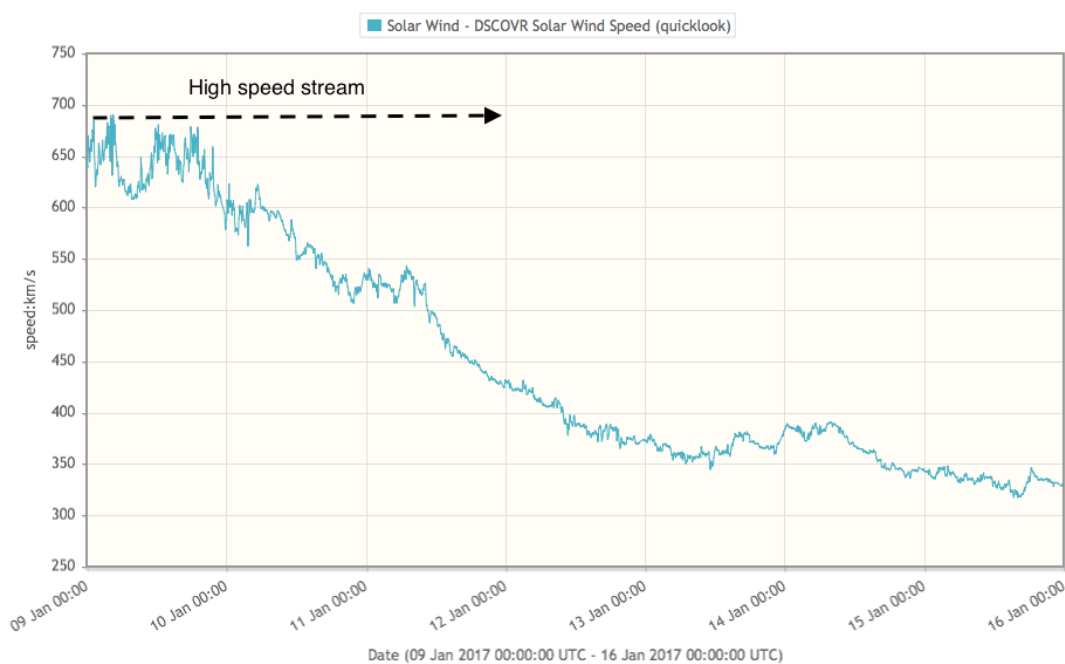
7. The International Sunspot Number



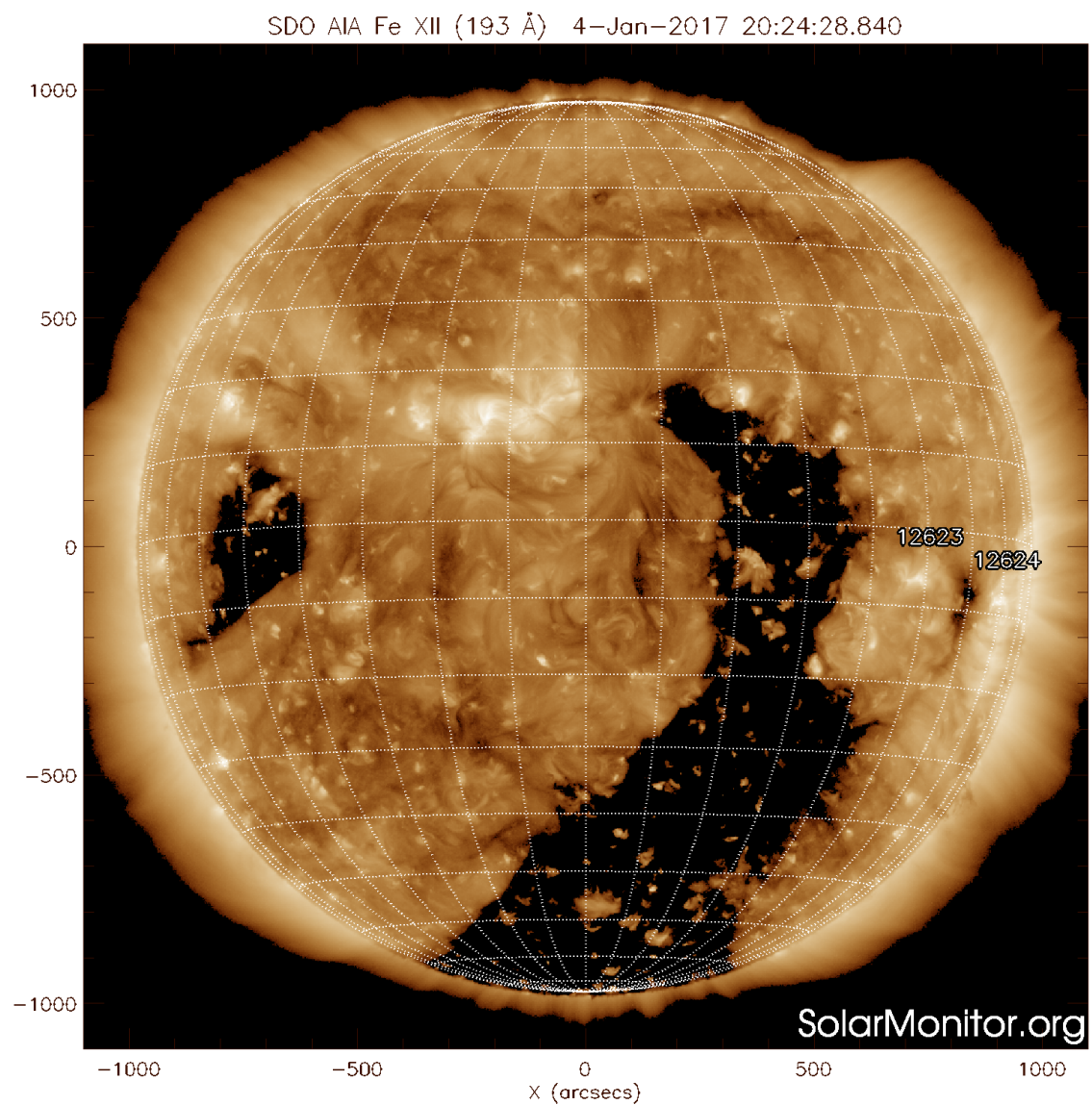
SILSO graphics (<http://sidc.be/silso>) Royal Observatory of Belgium, 2017 January 20

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.

8. Review of geomagnetic activity

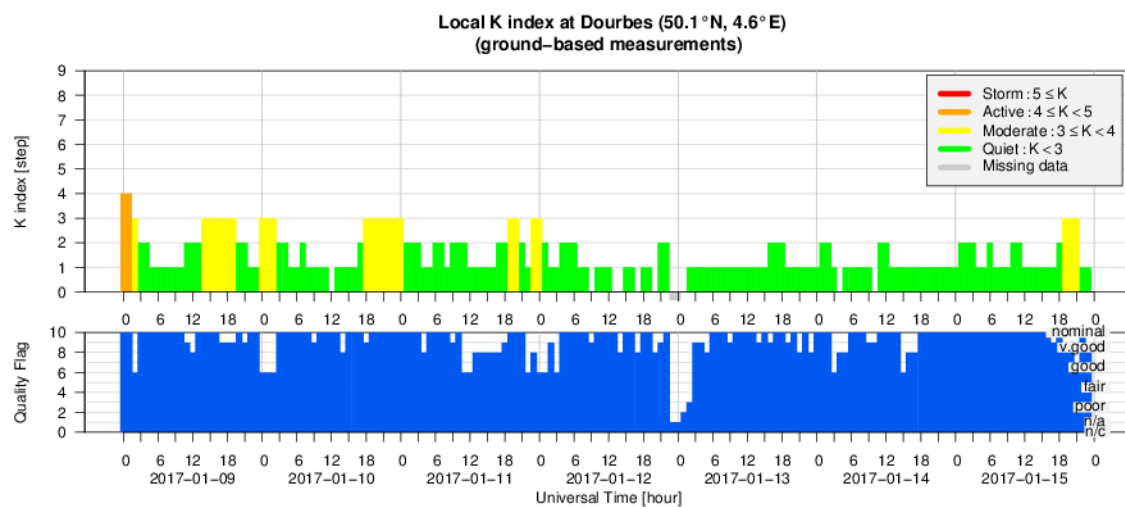


At the beginning of the week (until January 12) the Earth was under the influence of a high speed stream from the BIG southern polar coronal hole which was in the weekly news last week. But to remind you, here it is again:



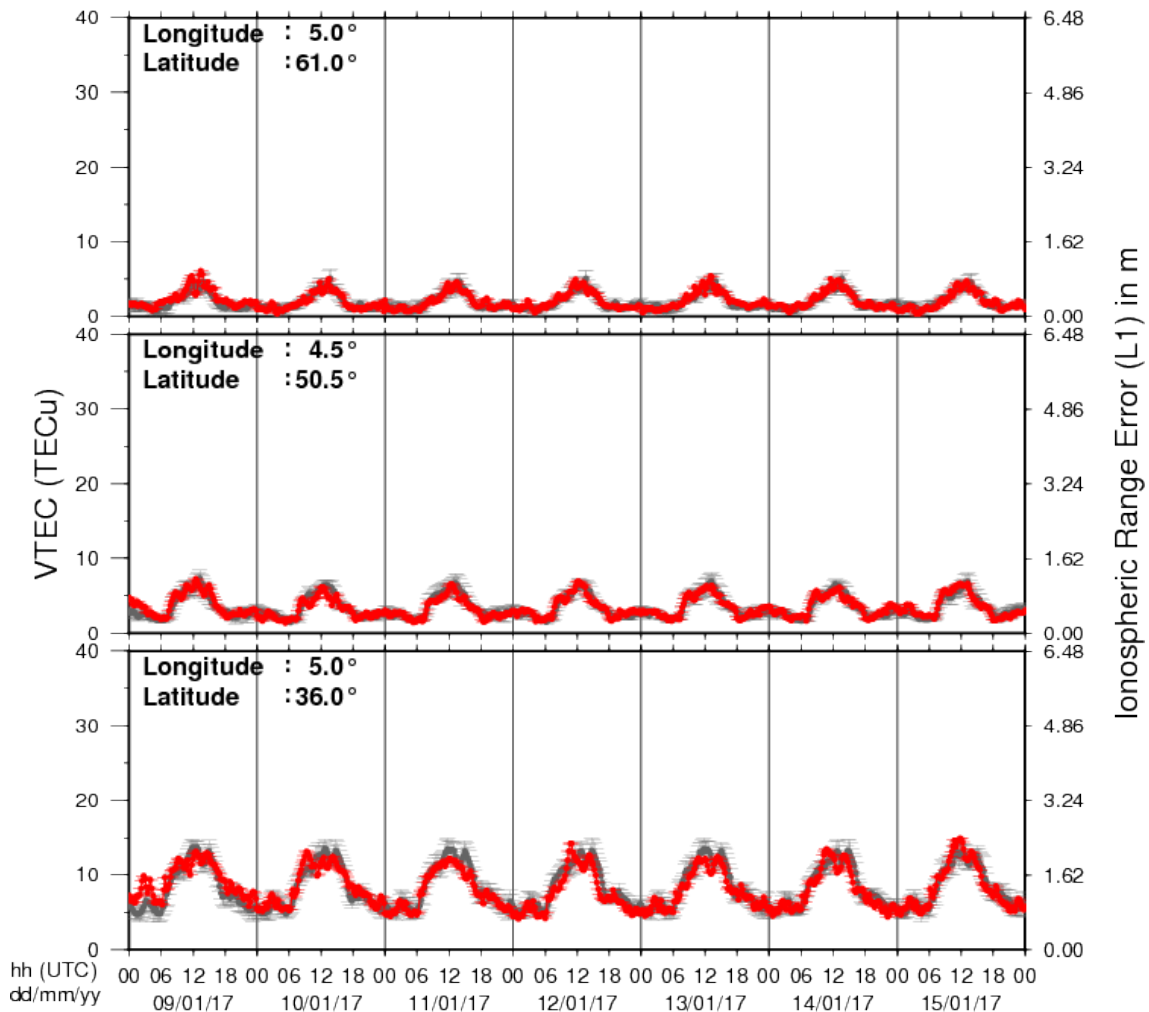
This created geomagnetic conditions leading to K = 4. The rest of the week was quiet with K not going above 2.

9. Geomagnetic Observations at Dourbes (9 Jan 2017 - 15 Jan 2017)



10. Review of ionospheric activity (9 Jan 2017 - 15 Jan 2017)

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 for some more explanations ; for detailed information, see http://gnss.be/ionosphere_tutorial.php

11. Future Events

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

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: Unknown

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 Plasmopause' Conveners: A. M. Jorgensen, V. Pierrard, B. Heilig

The abstract deadline is 30 January 2017

Website: <http://www.ursi2017.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/>