STCE Newsletter

14 Oct 2013 - 20 Oct 2013

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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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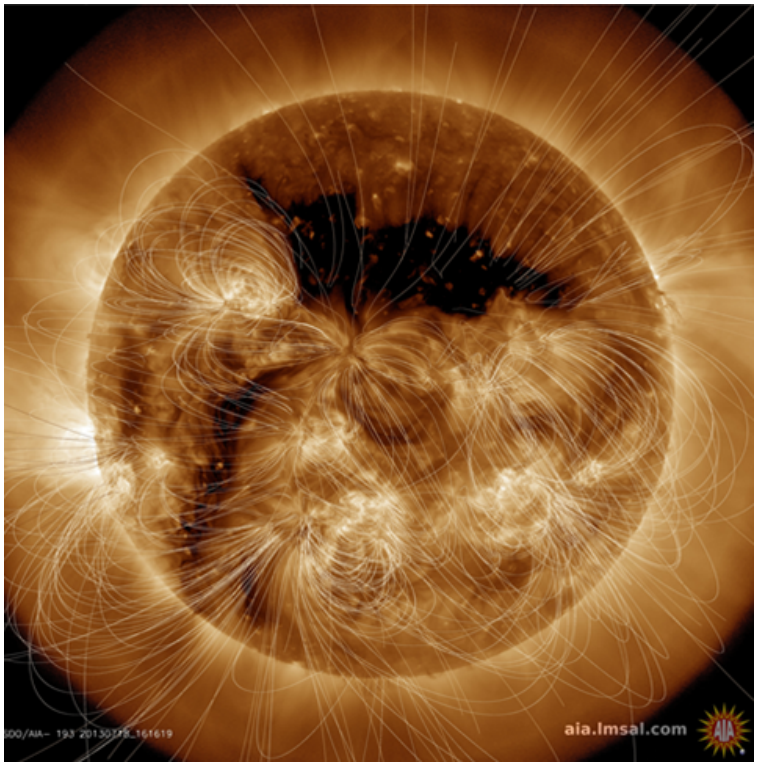
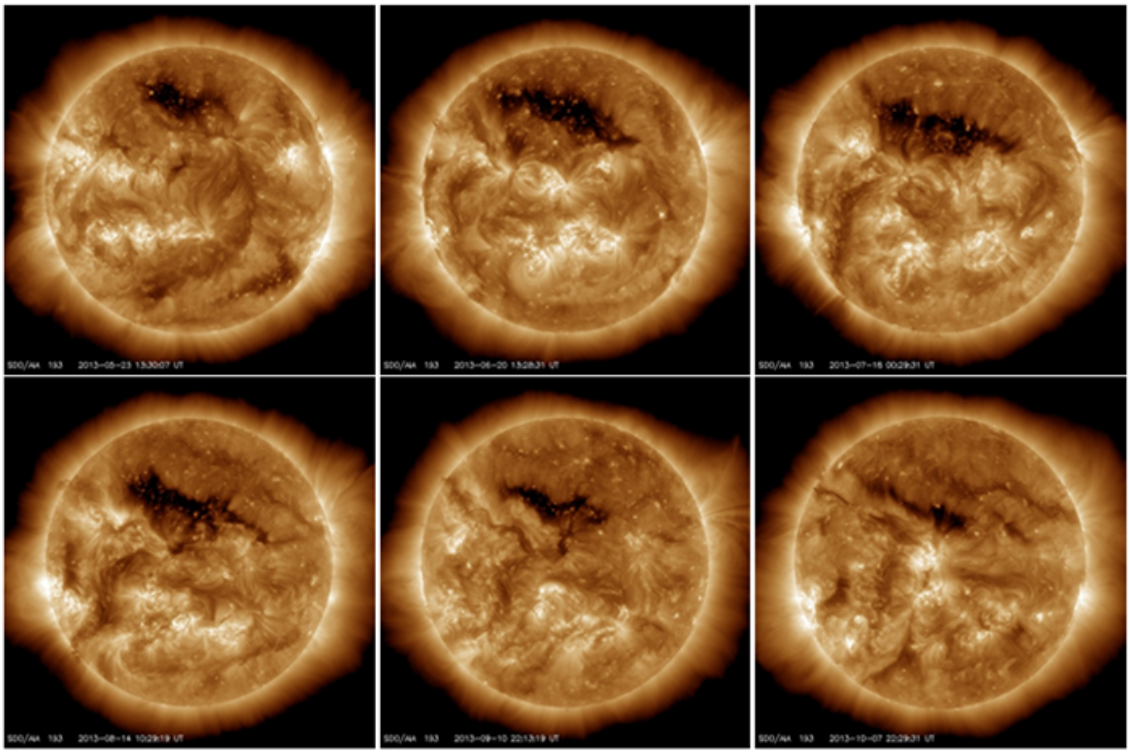
1. Merry-go-round for a coronal hole (14 Oct 2013 - 20 Oct 2013)

Coronal holes (CH) are regions in the hot solar atmosphere ("corona") where the plasma density at that temperature is very low compared to its surroundings, and thus they look like dark shapes in the corona. Linked to unipolar magnetic fields stretching into space, they are the source of the high-speed solar wind and can create geomagnetic disturbances.

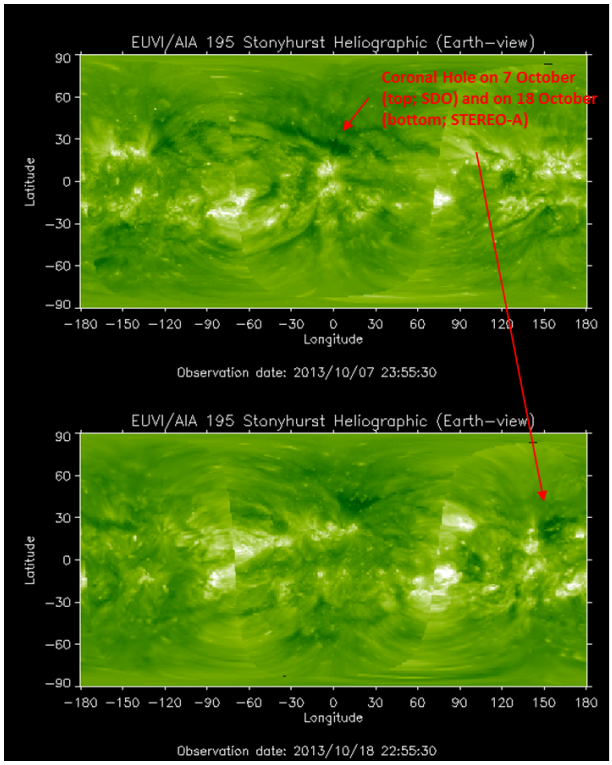
The image underneath is an SDO image (AIA 193) in extreme ultraviolet (EUV) of the solar corona and the coronal hole on 18 July. It is overlaid with white lines that are approximations for the magnetic field lines as deduced from magnetic fields from the solar surface. Clearly, one can see how in the (bright) active regions, the magnetic field lines are bound to the solar surface ("closed" loops), whereas over the coronal hole, the field lines are extending into space ("open").



One of the larger coronal holes so far this solar cycle was visible during the summer months of this year (see e.g. the STCE Newsitem of 25 July at http://stce.be/news/208/welcome.html). In fact, it has made 6 transits across the solar disk. Underneath SDO-images (AIA 193) from 23 May, 20 June, 18 July, 14 August, 10 September and 7 October showing the coronal hole near the Sun's central meridian.

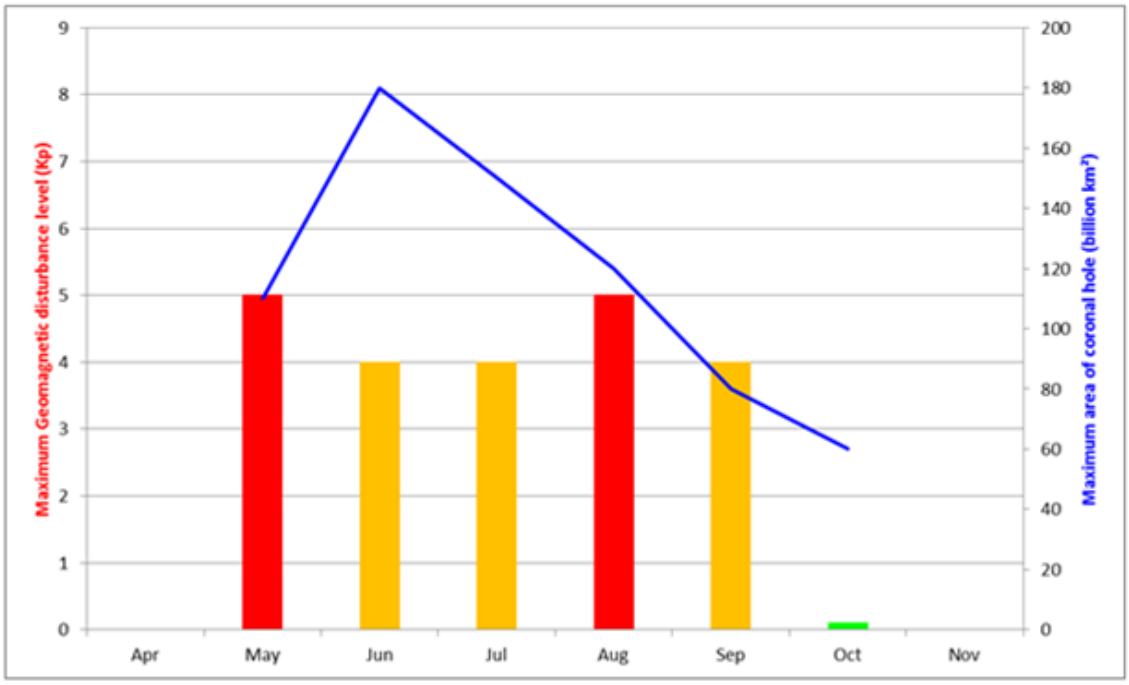


With the STEREO spacecraft observing the backside of the Sun, forecasters have a permanent view on the evolution of active regions and large scale structures such as coronal holes. This movie at http://www.youtube.com/watch?v=67TdulB0Mw8 covers the period from 1 May till 18 October. It shows a projection of STEREO and SDO EUV imagery of the solar surface onto a flat map. All features transit from east to west (left to right), with the part between -90 and +90 degrees being directed to the Earth. One can see the development and subsequent evolution of the coronal hole. It was largest during its second passage (June), during which it had almost 360 times the surface area of the Earth! It is only now, 4 months later, that STEREO-images indicate this CH has almost completely vanished.



A coronal hole's high-speed solar wind stream can produce severe geomagnetic disturbances. However, in this case, the effects of the 700km/s stream were mostly limited to active conditions. Only during its first and fourth transit, a (brief) minor geomagnetic storm was recorded, whereas during its last passage, the CH does not seem to have had any influence at all. It must be noted that Earth was experiencing the effects of a coronal mass ejection at that time (8-9 October), which may have masked some of the CH's influence (if any).

Interestingly, during its first four passages, the high-speed stream brought a whole bunch of high-energy electrons with it (see the STCE Newsletter at http://stce.be/news/207/welcome.html for more details). Satellite operators noted a significant increase in anomalies during these periods, thought to be due to repeated electrostatic discharges. Fortunately, none of the spacecraft was permanently damaged.



Credits - Data and imagery were taken from SDO (http://sdo.gsfc.nasa.gov/), LMSAL (http://sdowww.lmsal.com/suntoday/), STEREO (http://stereo.gsfc.nasa.gov/), Helioviewer (http://www.helioviewer.org/), SWPC (http://www.swpc.noaa.gov/today.html), and SIDC (http://www.sidc.oma.be/index.php).

2. Space Weather Science and Fun at ESWW10

Space Weather describes the conditions in space that affect Earth and its technological systems: this sentence is read in less then a minute. But it takes much more time to learn, understand and act. From November 18-22, 2013, over 300 people will discuss it in Antwerp, Belgium at the 10th European Space Weather Week, ESWW.

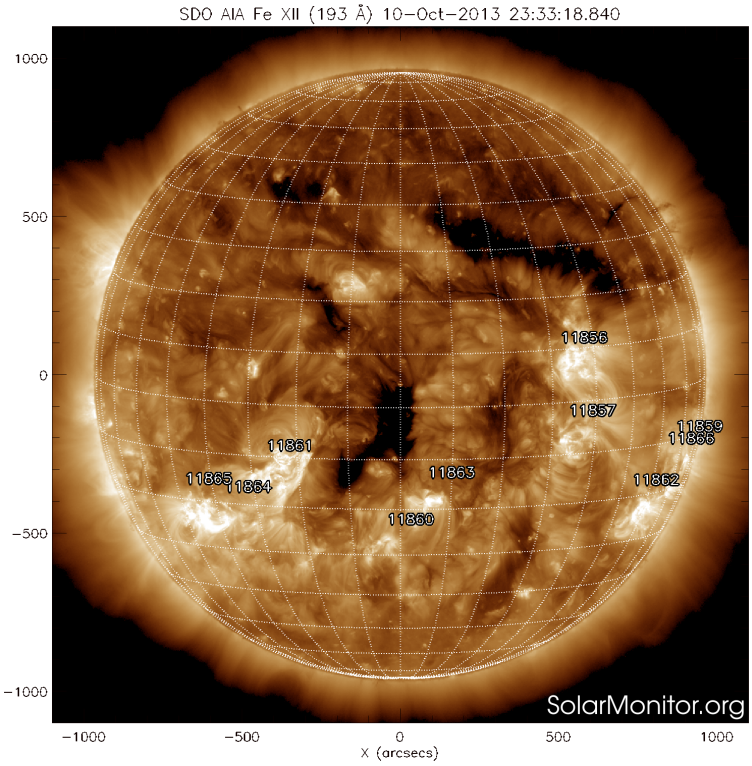
We have plenary sessions, a discussion on 10 full years of ESWW, tutorial, space weather casino, fair, quiz, ... you name it, we got it.

http://www.stce.be/esww10/

3. Review of solar and geomagnetic activity (14 Oct 2013 - 20 Oct 2013)

Solar Activity

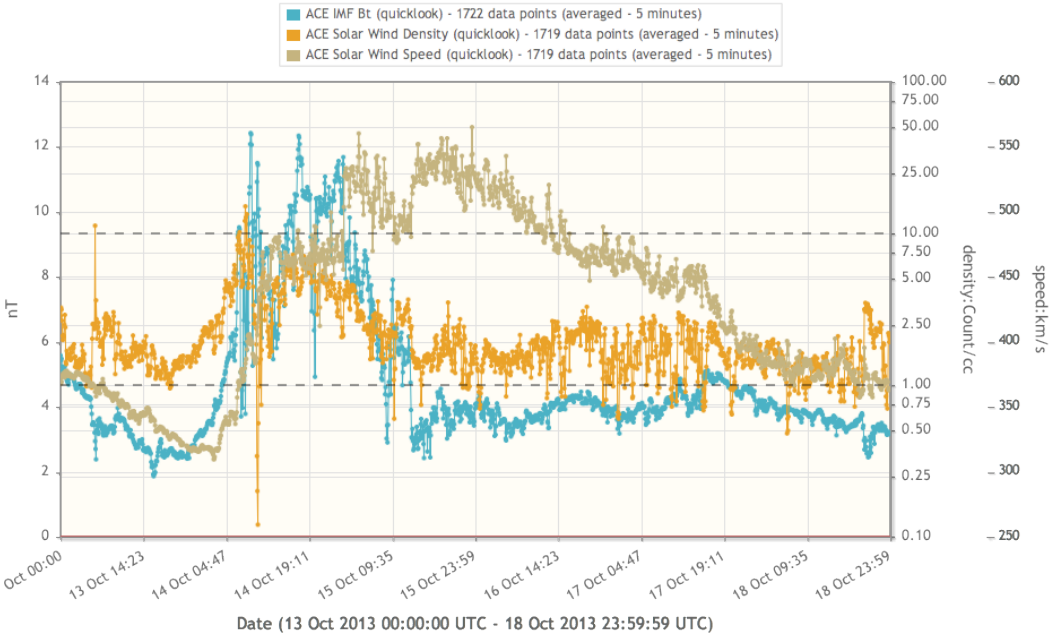
Solar activity was marked by ARs 1861 and 1865 which produced several M-class flares (and countless C-class flares) during the week. The strongest was an M1.8 flare peaking at 08:38 UT on October 15. In the SDO/AIA picture from Oct 10 you see an equatorial coronal hole in the centre of the solar disk, with the two AR behind it.



Geomagnetic Activity

Geomagnetic conditions ranged from quiet to active during October 14 and 15, due to the influence of a fast speed stream from an equatorial coronal hole. The coronal hole was near the central meridian on Oct 10 as can be seen in the picture above.

The in situ solar wind speed, density and total magnetic field strength measured by the ACE are in the graph below: the dense co-rotating interaction region (CIR) with compressed magnetic field is seen as a bump in the blue and orange curve. The solar wind speed increased gradually after the arrival of the CIR: this is the solar wind blowing from the coronal hole itself.



4. PROBA2 Observations (14 Oct 2013 - 20 Oct 2013)

Solar Activity

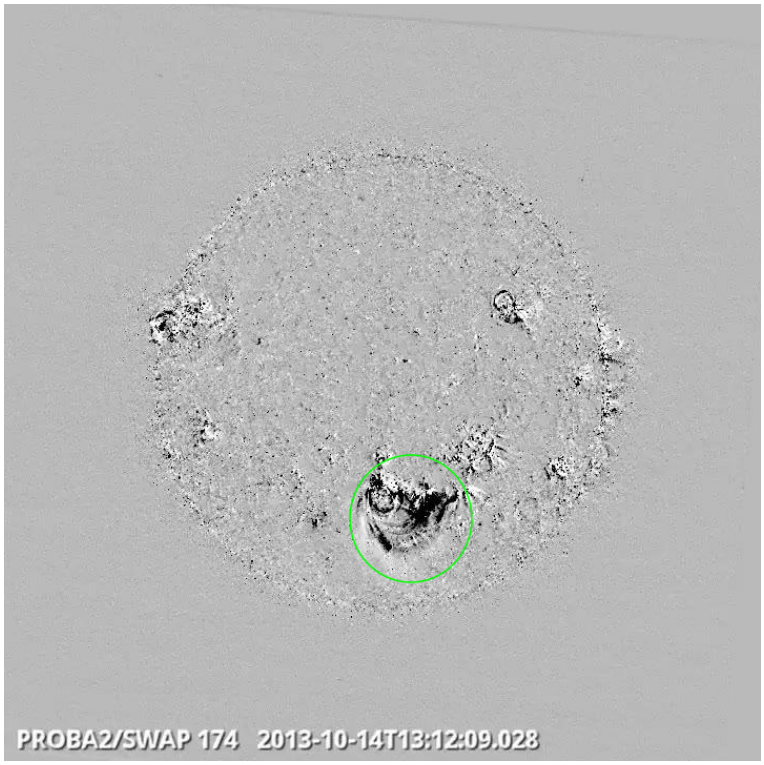
Solar flare activity fluctuated between low and moderate during the week.
In order to view the activity of this week in more detail, we suggest to go to the following website from which all the daily (normal and difference) movies can be accessed: http://proba2.oma.be/ssa

This page also lists the recorded flaring events.
A weekly overview movie can be found here (SWAP week 186).
http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR186_Oct14_Oct20/weekly_movie_2013_10_14.mp4

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

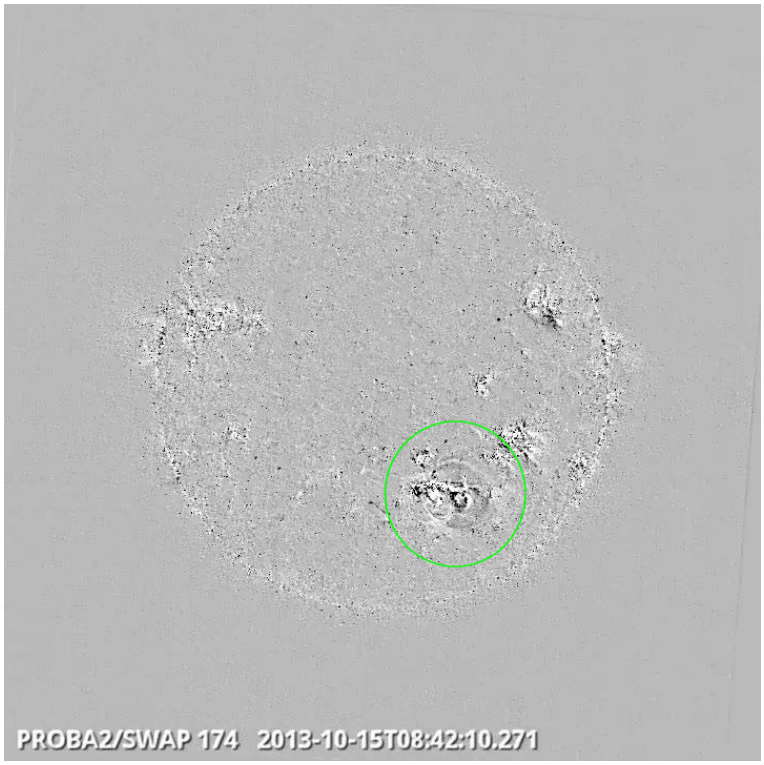
Monday Oct 14

Eruption on the east limb @ 03:29 - SWAP difference image
Find a movie of the events here (SWAP difference movie)
http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR186_Oct14_Oct20/Events/20131014_Eruption_EastLimb_0329_swap_diff.mp4



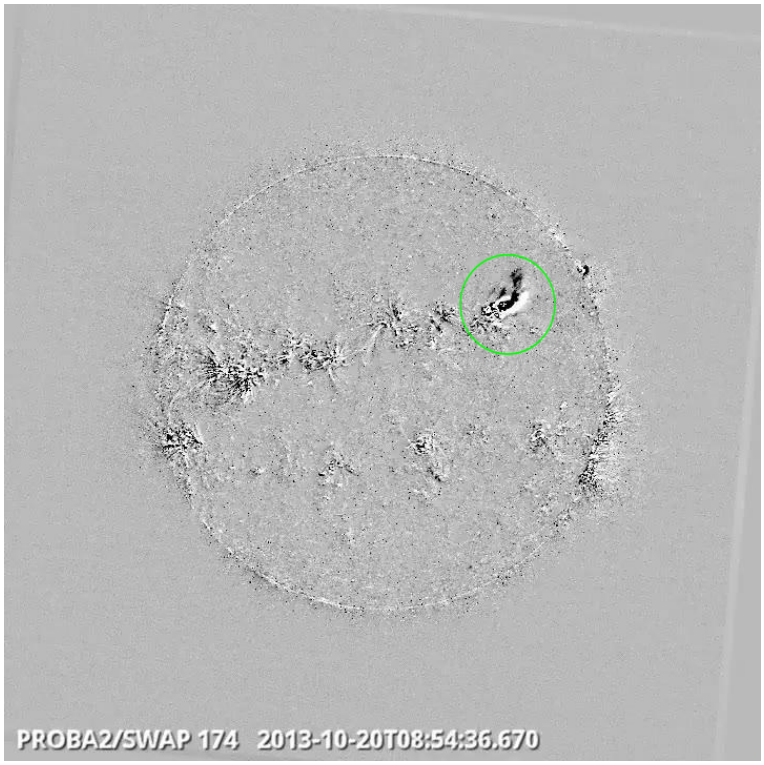
Eruption on the south western quadrant @ 13:12 - SWAP difference image
Find a movie of the events here (SWAP difference movie)
http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR186_Oct14_Oct20/Events/20131014_Eruption_SouthWestQuad_1312_swap_diff.mp4

Tuesday Oct 15



Possible EUV wave on the south western quadrant @ 08:42 - SWAP difference image
Find a movie of the events here (SWAP difference movie)
http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR186_Oct14_Oct20/Events/20131015_PossibleEUVWave_SouthWestQuad_0842_swap_diff.mp4

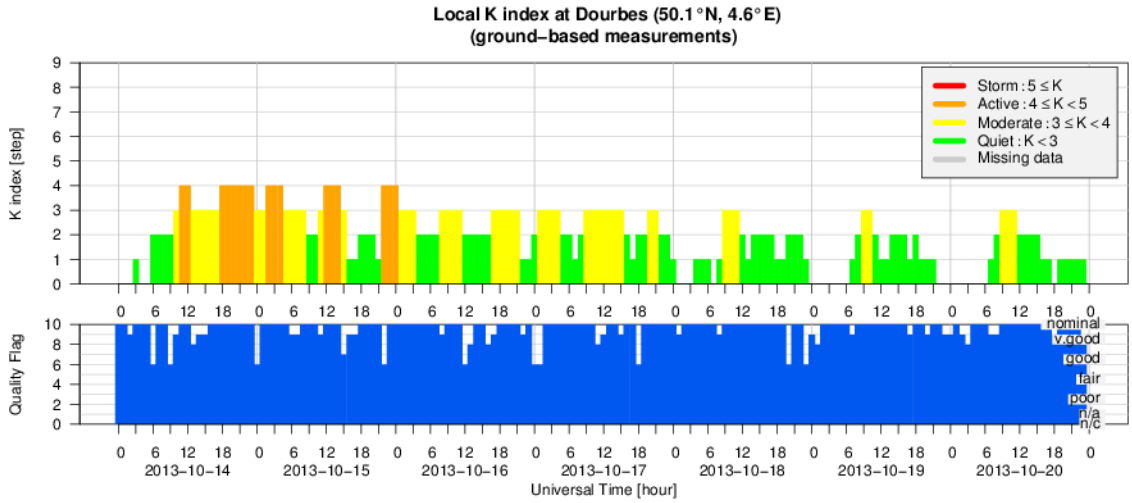
Sunday Oct 20



Large expanding loop on the north western limb @ 06:00 - SWAP difference image
Find a movie of the events here (SWAP difference movie)
http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR186_Oct14_Oct20/Events/20131020_LargeLoop_NorthWestLimb_0600_swap_diff.mp4

Eruption on the north weste quadrant @ 08:54 - SWAP difference image
Find a movie of the events here (SWAP difference movie)
http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR186_Oct14_Oct20/Events/20131020_Eruption_NorthWestQuad_0854_swap_diff.mp4

5. Geomagnetic Observations at Dourbes (14 Oct 2013 - 20 Oct 2013)

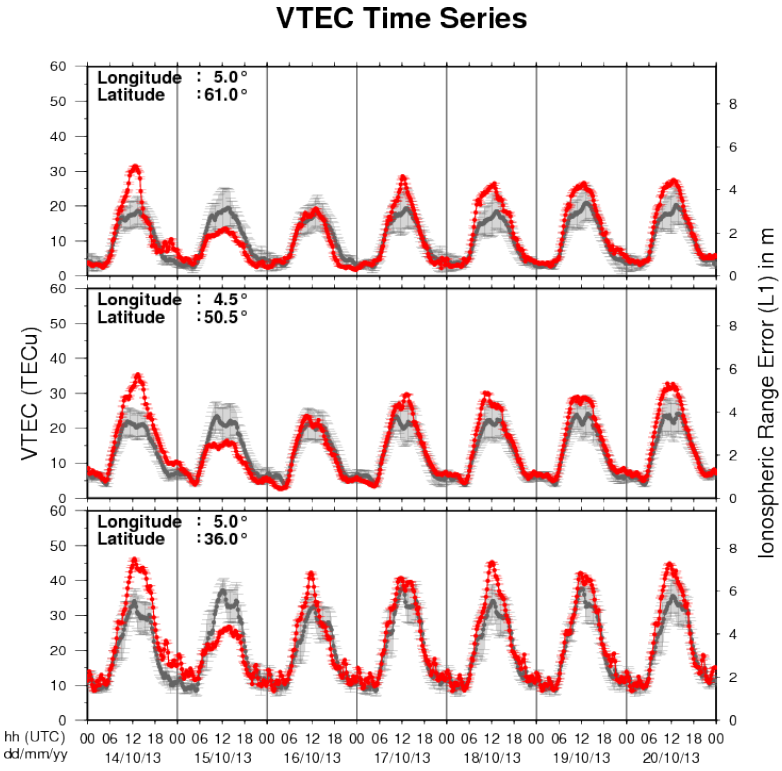


6. Noticeable Solar Events (14 Oct 2013 - 20 Oct 2013)

DAY	BEGIN	MAX	END	LOC	XRAY	OP	10CM	TYPE	Cat	NOAA
15	0826	0838	0848	S22W13	M1.8	SN	87	III/1	5	1865
15	2331	2336	2341	S23W20	M1.3	1F		III/1	5	1865
17	1509	1541	1558		M1.2			III/2	2	1861

LOC: approximate heliographic location
XRAY: X-ray flare class
OP: optical flare class
10CM: peak 10 cm radio flux
TYPE: radio burst type
Cat: Catania sunspot group number
NOAA: NOAA active region number

7. Review of ionospheric activity (14 Oct 2013 - 20 Oct 2013)



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

Helicity Thinkshop on Solar Physics in Beijing, China

Start : 2013-10-27 - End : 2013-10-31
Magnetic helicity has been intensively studied from observational, theoretical, and many other aspects of solar physics. For this meeting we would like to invite solar physicists who are interested in the observational and theoretical studies of the helicity, to encourage thorough discussions on the relevant hot issues. The 1st Helicity Thinkshop was held successfully in 2009, and now the 2nd one will be held on October 27-31, 2013 in Beijing, China.
Website:
http://sun.bao.ac.cn/meetings/HT2013/

Workshop and School on Radio Sun in Zhengxiangbaiqi, Inner Mongolia, and Beijing, China

Start : 2013-10-28 - End : 2013-11-02
The Worshop and School on Radio Sun in Beijing and Inner Mongolia during Oct.28 - Nov. 2, 2013 is the first international academic seminar supported by the International Research Staff Exchange Scheme of the Seventh Fromework Programme of the European Union (FP7-IRSES-295272-RADIOSUN).
The primary aim of this programme is to establish close research interaction and collaboration between the key research groups involved in CSRH, SSRT, and ALMA projects and in development of relevant theory and data analysis tools, through the systematic research staff and knowledge exchange, joint research efforts exploiting existing data and facilities, and preparing the future world-class partnership in exploitation of the upcoming facilities.
The Workshop and School welcome all solar physicsts and students who are interested in solar radio astronomy to participate. We will discuss and exchange the scientific frontier problems, including the new-generation radio instruments (CSRH, Siberian multi-frequency radioheliograph, LOFAR, ALMA, and other new instruments), recent achievements and their scientific goals; methods and techniques of data processing (for example, software, radio image reconstructions, and method for studying various types of solar radio fine structures); and the objectives of new observational data and new mathematical methods.
Website:
http://beijingradiosun.csp.escience.cn/

25th Winter School of Astrophysics: Cosmic Magnetic Fields, in La Laguna, Tenerife, Spain.

Start : 2013-11-11 - End : 2013-11-22
Magnetic fields play an important role in many astrophysical processes. But magnetic are difficult to detect and to model or understand, since the fundamental equations describing the behavior of magnetized plasmas are highly non-linear. Hence, magnetic fields are often an inconvenient subject which is overlooked or simply neglected. Such difficulty burdens the research on magnetic fields, which has evolved to become a very technical subject, with many small disconnected communities studying specific aspects and details.
The school tries to amend the situation by providing a unifying view of the subject. The students would have a chance to understand the behavior of magnetic fields in all astrophysical contexts, from cosmology to the Sun. From star-bursting regions to AGNs in galaxies. The school will present a balanced yet complete review of our knowledge. Extensions into the unknown are also important to indicate present and future lines of research.

The Winter School will bring together in a relaxed working atmosphere a number of the leading scientists in this field, PhD students and recent postdocs. The conditions for a successful interaction will be granted, including two special sessions for those students that want to present their own work.
Website:
http://www.iac.es/winterschool/2013/

7th Hinode science meeting in Takayama, Japan

Start : 2013-11-12 - End : 2013-11-15
Since its launch in Sep-2006, more than 600 refereed papers have been published based on Hinode observations, presenting many new and important findings to the scientific community. However, due to the unexpectedly low levels of solar activity, until now the focus has mainly been on the more quiescent aspects of the solar cycle. With the solar maximum expected this year, through cooperative observations with SDO, IRIS, and ground based observatories, Hinode observations should lead to our understanding of active Sun phenomena, such as solar flares and CMEs, to be greatly improved. Making Hinode-7 an excellent opportunity to discuss solar activity in the current solar cycle and the related science through the use Hinode data, as well as other solar/space weather data. It will also be interesting to use this meeting to broaden our focus to include the solar-stellar connection as a means to deepen our understanding of solar activity.
Momentum is also gaining for Solar-C, which is being developed as an international collaboration between Japan, US and Europe. To further discuss this mission, the Solar-C science meeting will be held on 11-Nov.
Website:
http://www.kwasan.kyoto-u.ac.jp/hinode-7/

Space Weather: the importance of observations in London, UK

Start : 2013-11-13 - End : 2013-11-13
Most space weather occurs due to the Sun's emissions which can affect the Earth's space environment. Modern society is ever more dependent upon ground-based & spaceborne technology which can be vulnerable to space weather. Satellites, GPS, aviation & the electric power industry are all at risk from this & hence space weather is now included on the UK's National Risk Register. It is important to have long-running, continuous observations for forecasting, nowcasting & for research in space weather. This public meeting, held during the peak of the 11 year solar cycle, addresses the deficiency in continuous, long-term observations & how this might be overcome.
Website:
http://www.rmets.org/events/space-weather-importance-observations

International CAWSES-II Symposium in Nagoya, Japan

Start : 2013-11-18 - End : 2013-11-22
This International CAWSES-II Symposium hosted by SCOSTEP (Scientific Committee on Solar-Terrestrial Physics) will provide an excellent opportunity to discuss the scientific accomplishments of CAWSES-II and look forward to SCOSTEP's future programs at a moment toward the end of its five-year period. The symposium will cover the six major themes of CAWSES-II tasks: 1) What are the solar influences on the Earth's climate?, 2) How will geospace respond to an altered climate?, 3) How does short-term solar variability affect the geospace environment?, 4) What is the geospace response to variable inputs from the lower atmosphere?, 5) Capacity Building, 6) Informatics and eScience. The main functions of CAWSES-II are to help coordinate international activities in observations, modeling, and applications crucial to achieving this understanding, to involve scientists in both developed and developing countries, and to provide educational opportunities for students of all levels. The symposium offers keynotes/lectures that will be interesting for all participants every morning and more specific sessions of presentations in the afternoon. We welcome all those who are involved and/or interested in CAWSES-II to Nagoya in the autumn when we will have the pleasure of being surrounded by beautiful colorful leaves of this season.
Website:

http://www.cawses.org/CAWSES/leaflet_CAWSES-II_120229.pdf

European Space Weather Week in Belgium

Start : 2013-11-18 - End : 2013-11-22
The 10th Edition of the European Space Weather Week will take place on 18-22nd November 2013 in Belgium. The venue will be confirmed early next year, but mark your calendars now for the 10th Anniversary of this growing European event.
The ESWW will again adopt the central aim of bringing together the diverse groups in Europe working on different aspects of Space Weather . This includes but isn't limited to the scientific community, the engineering community, applications developers, service providers and service end users. The meeting organisation will again be coordinated by the Belgian Solar-Terrestrial Centre of Excellence (STCE), ESA and the Space Weather Working Team. The local organisation will be done by the STCE.
Website:
http://www.stce.be/esww10/

1st SPRING Workshop in Freiburg, Germany

Start : 2013-11-26 - End : 2013-11-28
The 1st SPRING (Solar Physics Research Integrated Network Group) workshop is being held from November 26 - 28, 2013 at the scenic Brugger's Hotel Park by Titisee hosted by the Kiepenheuer-Institut fÃ¼r Sonnenphysik in Freiburg, Germany.
The purpose of the workshop is to work on the scientific requirements for a new ground-based network of telescopes for full-disk synoptic observations of the Sun.
The desire for such a new network is motivated by new scientific research directions in solar physics, the requirement of real-time context data for high-resolution solar telescopes, and the need of continuous, long-term, consistent, and reliable solar data as foundation for space weather prediction.
Website:
http://www3.kis.uni-freiburg.de/~mroth/spring.html

Space Weather: a Dialogue between Scientists and Forecasters in London, UK

Start : 2013-12-13 - End : 2013-12-13
The inclusion of space weather in the National Risk Assessment in 2012 means that there is now an urgent need for dialogue between those doing the science of space weather and those using the data to forecast, understand and mitigate the risks.
Since the Sun is currently at the peak of its cycle - a time when space weather events become more frequent - we have a timely opportunity to study how a range of solar activity ultimately lead to magnetospheric, ionospheric and ground level disturbances.
The goal of this meeting is to bring together those working across the broad range of space weather activities in the UK to discuss the current status of observations and recent new advances in the theories and models of the phenomena of space weather.
Website:
http://www.mssl.ucl.ac.uk/~lmg/spaceweather/Overview.html

Expert Meeting on Improving Space Weather Forecasting in the Next Decade in Vienna, Austria

Start : 2014-02-10 - End : 2014-02-11
The International Space Weather Initiative (ISWI), with the support of the United Nations Committee for the Peaceful Uses of Outer Space, has been very active in promoting the installation of new ground-based instrumentation in non-traditional locations. In particular, there has been substantial progress in the observation of the equatorial ionosphere, solar transients, and energetic particles from space. In the coming decade these observations will become available in real time and will be an important new data source for the forecasting of space weather events. New instruments are either in the process of deployment, or planned over the next decade. Similarly, the International Living with a Star (ILWS)

program has been very active coordinating the plans of the world's space agencies in the planning of new space missions, and in the development of space weather modeling and forecasting.
Website:
http://newserver.stil.bas.bg/ISWI/Meetings/Cevents.html#item12

Dynamical Processes in Space Plasmas in Israel

Start : 2014-03-16 - End : 2014-03-22
The meeting brings together scientists working in solar physics, space physics, plasma physics, and astrophysics, in theory, simulations, and experiment. The objective is to report and discuss recent progress in our understanding of the fundamental processes in solar, space, and astrophysical plasmas, in view of heliospheric in-situ and remote sensing measurements (Van Allen Probe, Themis, Cluster, Stereo, SDO, Messenger, Cassini, Venus-Express) and remote sensing astrophysical observations (Chandra, XMM-Newton, Swift and Fermi Gamma-ray Telescope).
Website:
http://physics.bgu.ac.il/~gedalin/Isradynamics2014/

Solar and Stellar Flares, in Prague, Czech Republic

Start : 2014-06-23 - End : 2014-06-27
The meeting in honour of Prof. Zdenek Svestka will cover issues of the physics of solar and stellar flares.
Website:
http://solarflares2014.cz/

40th COSPAR Scientific Assembly in Moscow, Russia

Start : 2014-08-02 - End : 2014-08-10
The 40th COSPAR Scientific Assembly will be held in Moscow, Russia from 2 - 10 August 2014. This Assembly is open to all bona fide scientists.
Website:
http://www.cospar-assembly.org/

International Chapman Conference on Low-Frequency Waves in Space Plasmas on Jeju Island, South Korea

Start : 2014-08-31 - End : 2014-09-05
Low-frequency waves (ULF, ELF and VLF) in space plasmas have been studied for many decades. In our solar system, such waves occur in the magnetospheres of planets and in the solar wind; more recently they have also been confirmed on the Sun. In spite of the great differences in the plasma properties of these regions, the overarching schemes are wave generation, wave propagation, and wave dissipation, which are three fundamental aspects of any kind of waves. A fourth aspect of these waves is their application, either with direct benefit to humans or for scientific pursuit. Therefore, this Chapman conference will provide a forum in which various wave communities can come together and discuss recent achievements of observational, theoretical, and modeling studies.
Website:
http://chapman.agu.org/spaceplasmas/

14th European Solar Physics Meeting in Dublin, Ireland.

Start : 2014-09-08 - End : 2014-09-12
The European Solar Physics Meetings aim to highlight all aspects of modern solar physics, including observation and theory that span from the interior of the Sun out into the wider heliosphere. These meetings provide a broad, yet stimulating, environment for European and international scientists to share their research in solar physics.
The meeting will mostly comprise of contributed talks and poster presentations, with several invited review talks (typically one per session). Posters will be on display for the whole meeting in close proximity to the lecture theatre. Refreshments will be served in the poster viewing area during two dedicated coffee/poster breaks on each full day.

Website: http://www.espm14.ie/

Solar Wind 14 in Weihai, China

Start : 2015-06-22 - End : 2015-06-26

The Fourteenth International Solar Wind Conference will be held for the first time ever in China, from 22 to 26 June 2015, at Weihai in the Shandong province. It will be jointly organized by the School of Earth and Space Sciences of Peking University and the newly-established Institute of Space Sciences of Shandong University. The meeting will take place in the Space Science Building of Shandong University, a venue located within walking distance to the beautiful Weihai International Bathing Beach, one of the most popular scenic areas of northern China.

The conference will cover all aspects of solar wind physics, with invited reviews and contributed papers that examine the current research and outline the future research in all the relevant solar wind fields.

Website: not available yet