STCE Newsletter

7 Oct 2013 - 13 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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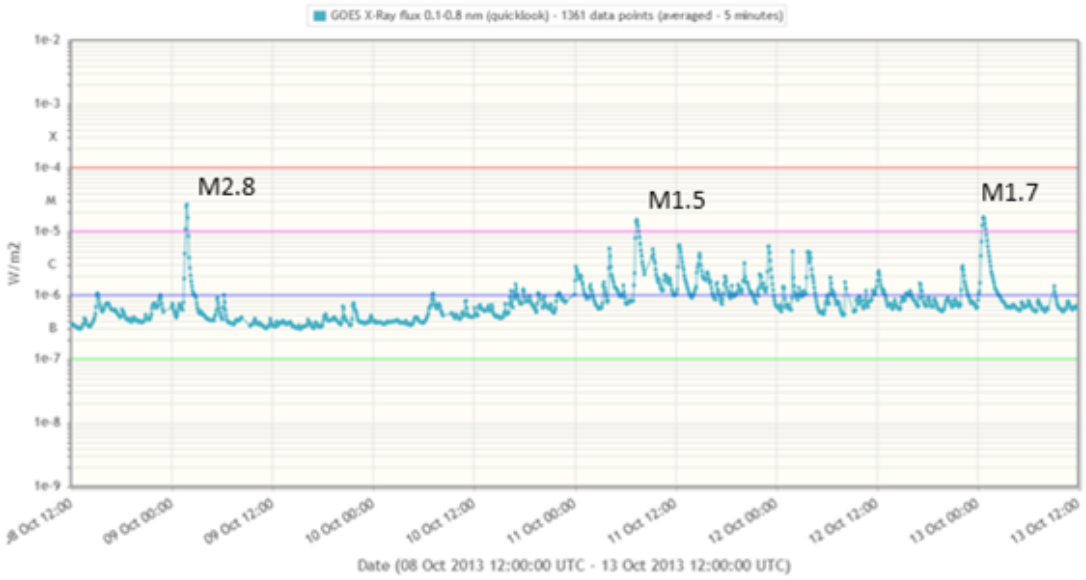
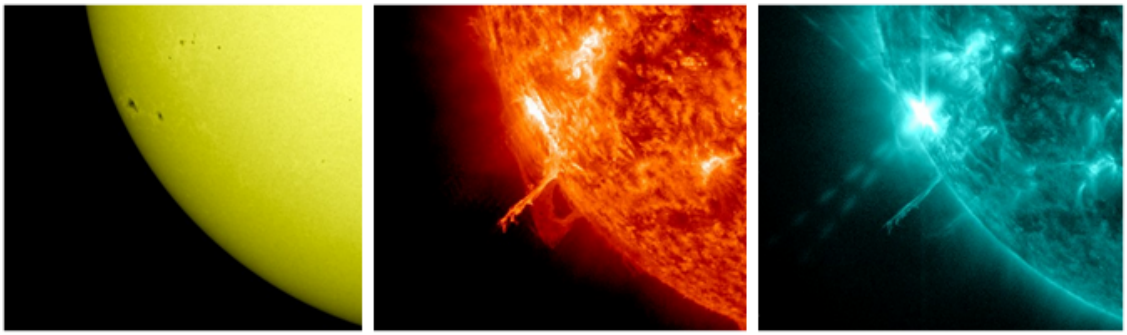
1. It's alive!... It's alive!... (7 Oct 2013 - 13 Oct 2013)

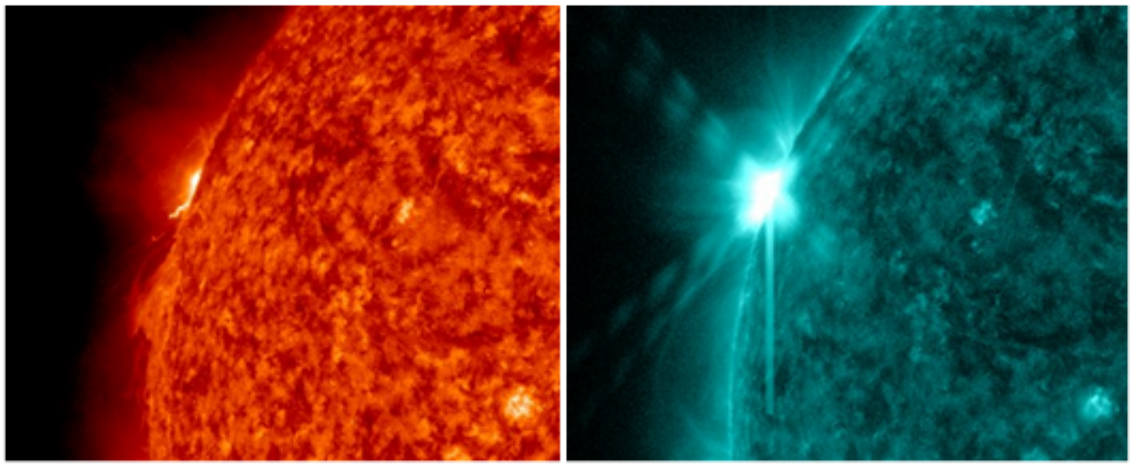
On 9, 11 and 13 October, the Sun produced an M-class solar flare each day. These three medium-sized eruptions were the first since mid-August, ending a nearly comatose period of solar activity.



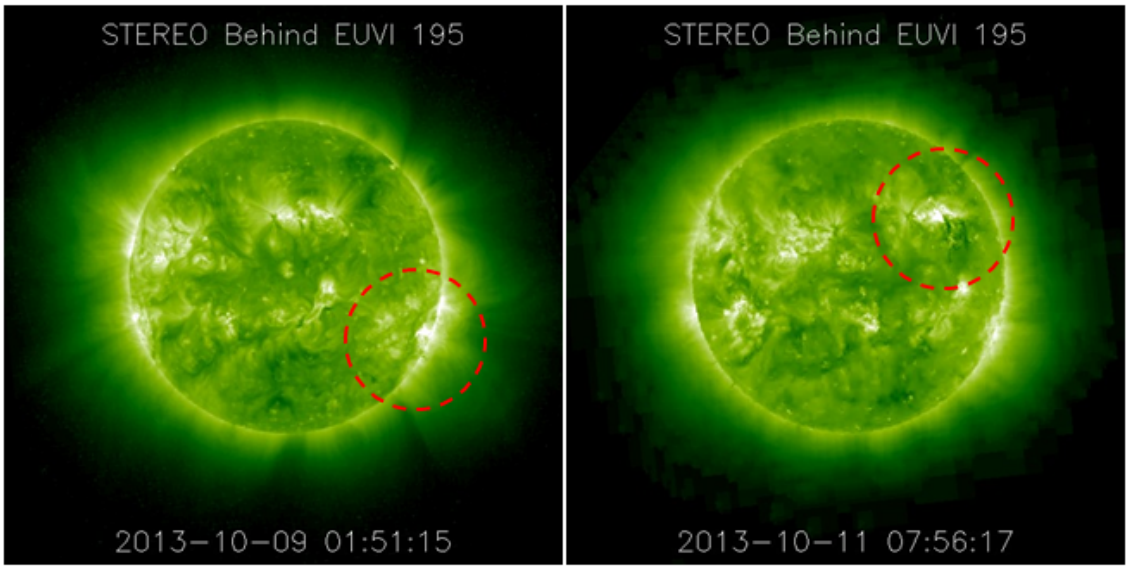
The 9 October M2.8 flare lasted 33 minutes and peaked at 01:48UT. It originated in sunspot group NOAA 1865. As this sunspot group was still close to the southeastern limb, it was difficult to predict the (strength of the) eruption due to the very oblique angle space weather forecasters had at that moment. The SDO-images underneath show the sunspot groups in visual light, as well as through filters near 80,000 degrees (AIA304, middle) and several million degrees (AIA 131, right). The three images were taken near the time of maximum brightness in x-rays.

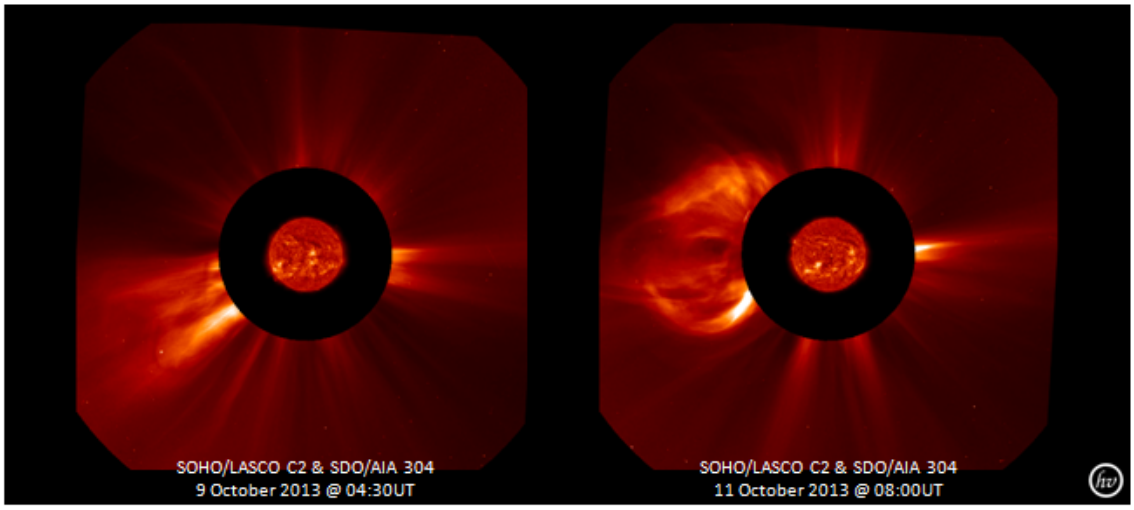


The 11 October M1.5 flare lasted 44 minutes and peaked at 07:25UT. It originated in a sunspot group which was at the time still well behind the northeastern solar limb. This suggests that the true strength of the eruption was probably higher than the measured M1.5.

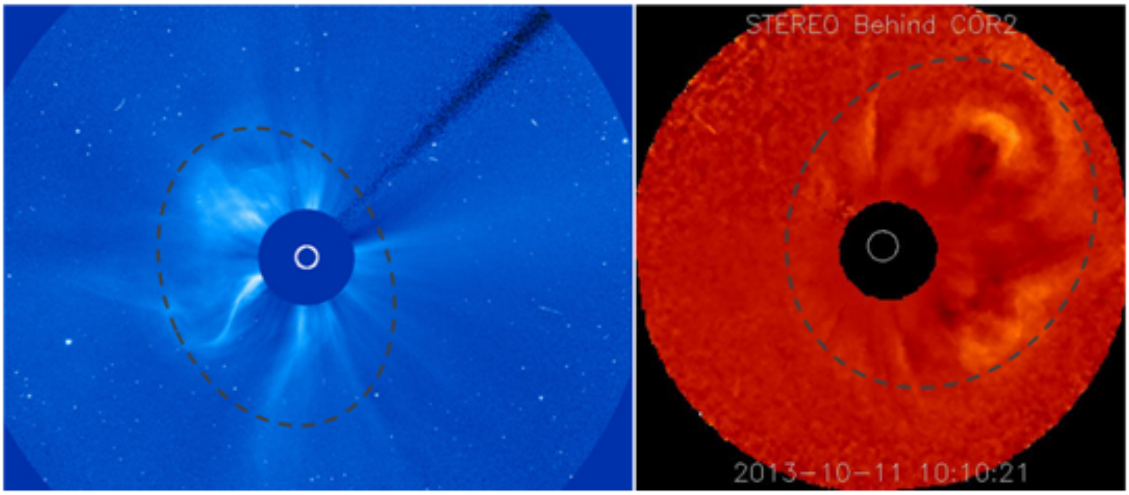


Both flares were visible from the STEREO-B spacecraft, which is currently well on the other side of the Sun as seen from Earth. In particular the two small, transient coronal holes from the 11 October event are obvious as dark patches to the south of the bright active region. These holes are the result from material being flung through the corona during the eruption. By the end of the day, these temporary punctures had disappeared.

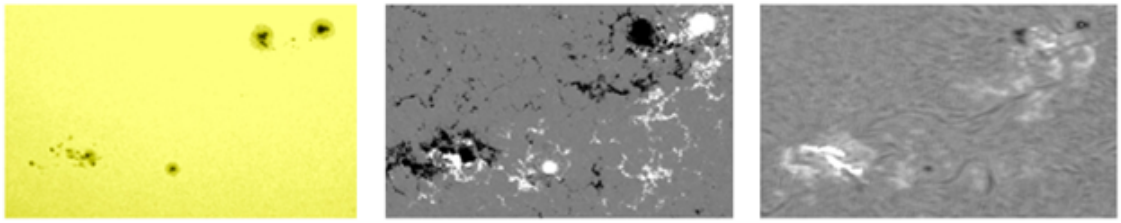




Both eruptions were accompanied by coronal mass ejections (CMEs), but none was Earth directed. The 9 October one was not very impressive, in contrast to the CME from 11 October (see SOHO images above). The latter was halo-like as seen by both the SOHO and the STEREO-B spacecraft. Due to the position of the active region at the time of the explosion, the CME was directed towards STEREO-B, and away from Earth. This is called a backside halo CME. See images underneath by SOHO (left, 10:18UT) and STEREO-B (right, 10:10UT).



The 13 October M1.7 flare peaked at 00:43UT and took also place in active region NOAA 1865. Seen in the red light of Hydrogen-alpha, it concerned a parallel ribbon flare running east-to-west along the magnetic neutral line of the sunspot group. See the visual image and magnetogram from SDO (resp. left and middle), and the H-alpha image by GONG (right). The flaring region is at the bottom left in each image. Clearly, the upper ribbon is hovering over the black polarity (inward oriented magnetic field) sunspots, while the lower ribbon is hovering over the opposite, white polarity (outward oriented) sunspots. The CME associated to this eruption was mainly directed towards the south of the Earth.



Credits - Images were taken from the GONG H-alpha network (http://halpha.nso.edu/), SDO (http://sdo.gsfc.nasa.gov/), STEREO-B (http://stereo.gsfc.nasa.gov/) and SOHO (http://sohowww.nascom.nasa.gov/).

2. Helioviewer shut down

Surfing from the Sun through space

Surfing from the solar surface through the solar atmosphere is possible nowadays. The online tool Helioviewer brings the sun and its inner heliosphere to your home computer. Helioviewer is an intuitive interface and novel technology that presents heterogeneous solar physics data at one glance.

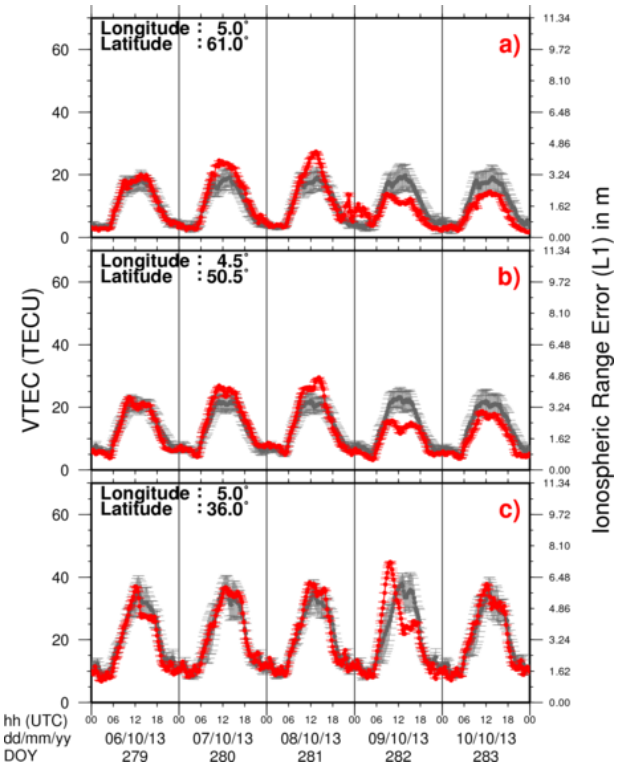
Helioviewer emergency

Due to the partial shutdown of the US federal government, the main Helioviewer server at NASA-GSFC which provides helioviewer.org and the application JHelioviewer has been inaccessible since Oct 1 2013. There is a plan B: users of Helioviewer services can switch to a newly created redundant server at the Royal Observatory of Belgium. This server provides a growing number of data sources, selected for their use in real-time space weather monitoring.

For the helioviewer.org service, please visit http://swhv.oma.be/helioviewer/

3. Troubles in the ionosphere (7 Oct 2013 - 13 Oct 2013)

The ionosphere was disturbed in the northern part of Europe during the night of the 8th of October. During the day of the 9th of October, a strong increase of Total Electron Content (TEC) occurred in the southern part until 10:00 AM before depletion, whereas in the northern part only a decrease of TEC w.r.t. the median of the 15 previous days was observed. For more info about the TEC: http://gnss.be/ionosphere_tutorial.php#x2-30000



The top figure shows the time evolution of the Vertical TEC (VTEC) (in red) extracted from the near-real time VTEC maps at 3 different locations shown in the second figure: a) Northern part (top), b) Brussels (middle) and c) Southern part (bottom). Also shown, the model based on the median from the 15 previous days (in grey).

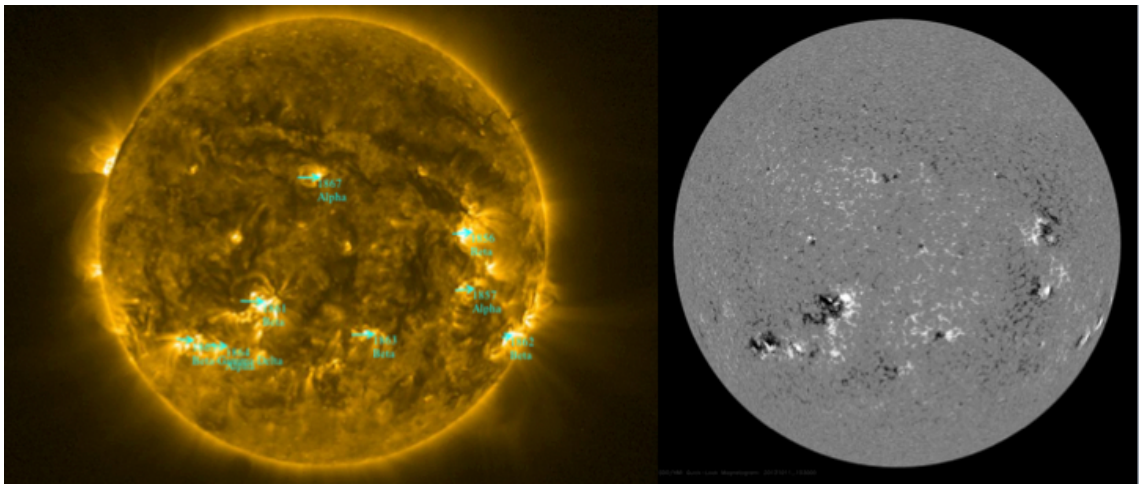
Blame the sun

These ionospheric disturbances were most probably associated with the halo CME observed on the sun on the 6th of October which was mentioned in the space weather bulletin of October 7: A C1.1 flare occurred on October 6, in Catania region 95, east of NOAA AR 1859. Peaking at 1424 UT, it was associated with a dimming and a faint halo CME observed in LASCO C2. An interplanetary shock wave was indeed detected by ACE and SOHO/CELIAS around 20:00 UT on October 8. The solar wind speed in the post-shock solar wind flow reached 700 km/s, and the interplanetary magnetic field (IMF) magnitude reached 35 nT, with brief intervals of strong (up to -20 nT) southward fields.

4. Review of solar and geomagnetic activity (7 Oct 2013 - 13 Oct 2013)

SOLAR ACTIVITY

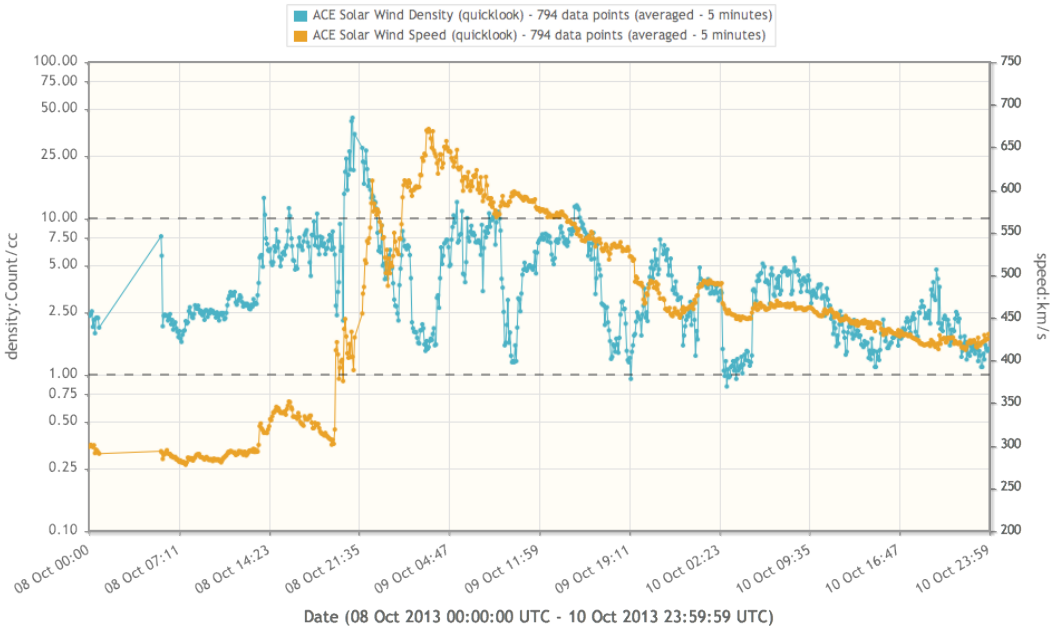
Solar activity has been eruptive to active in the past week with a series of C and M flares. Two active regions, NOAA AR 1861 and NOAA AR 1865 were the most prominent regions, with complex magnetic configurations and moderate to fast evolution. The picture on the left is taken by the EUV imager SWAP onboard of PROBA2: the bright parts are active regions and have a NOAA number. The picture on the right is a magnetogram from the HMI instrument onboard of SDO. A magnetogram shows how strong the magnetic field is at the surface of the sun: black/white indicates that there is a strong inward/outward pointing magnetic field. The black/white areas correspond with the bright active regions.

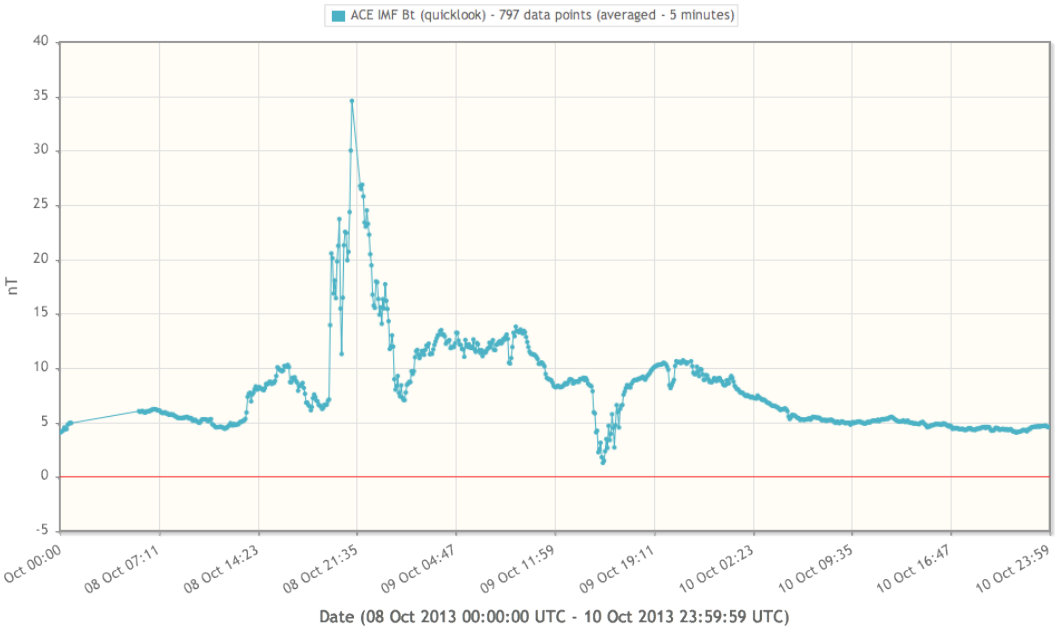


Three M flares occurred during the week, 2 in NOAA AR 1865, and one in a region behind the East limb at the time of the event. CMEs were observed in association with these flares, but only the last one associated with an M1.7 event (Oct 13. 0043 UT peak time, in AR 1865) was denoted as a halo CME.

GEOMAGNETIC ACTIVITY

Geomagnetic activity was quiet most of the week, except on late October 8, when minor storm conditions (Kp=5) were observed at planetary levels, decreasing to active conditions (Kp=4) by October 9 mid-day. The cause of this disturbed conditions was the much-sooner-than-expected arrival of an interplanetary shock, linked to an ICME. Interplanetary measurements by the ACE spacecraft showed an elevated solar wind speed of 700 km/s, strong compression of the magnetic field up to 35 nT and fair negative excursions of the Bz component (down to -20 nT). The graphs below show shock as a sharp increase in wind speed, density and total magnetic field between 19 and 20UT. The source of this event was a CME, which occurred on October 6.





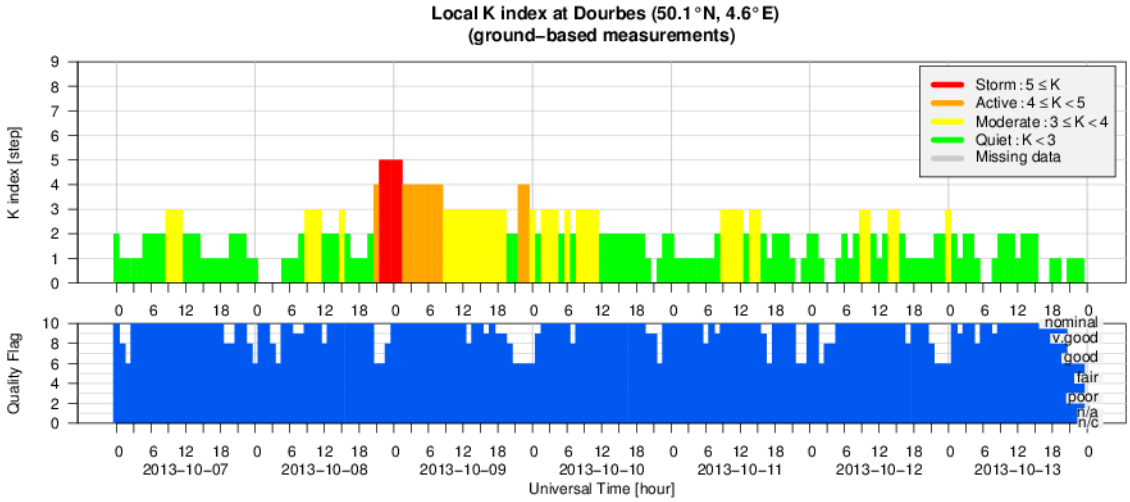
5. Noticeable Solar Events (7 Oct 2013 - 13 Oct 2013)

DAY	BEGIN	MAX	END	LOC	XRAY	OP	10CM	TYPE	Cat	NOAA
09	0123	0148	0156		M2.8			VI/1III/1II/1IV	1	1865
11	0701	0725	0745		M1.5		160	II/2IV/2III/2		
13	0012	0043	0105	S22E17	M1.7	SF		VI/2II/1	5	1865

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

6. Geomagnetic Observations at Dourbes (7 Oct 2013 - 13 Oct 2013)



7. PROBA2 Observations (7 Oct 2013 - 13 Oct 2013)

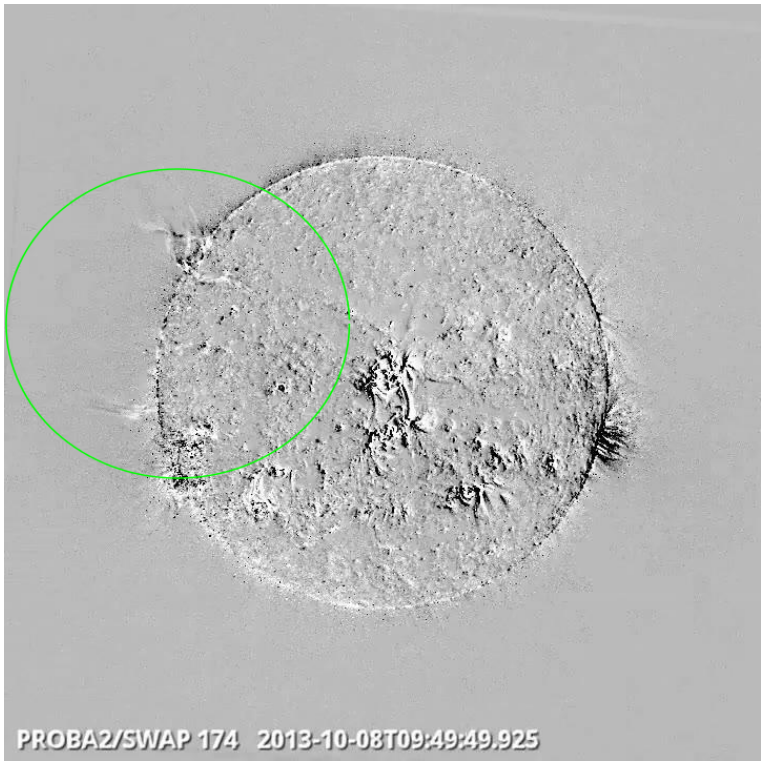
Solar Activity

Solar (flaring) activity increased slightly from low to moderate during the week. The highest level M-flare was a M2.8 on the 9th Wednesday.
In order to view the activity of this week in more detail, we suggest visiting 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.

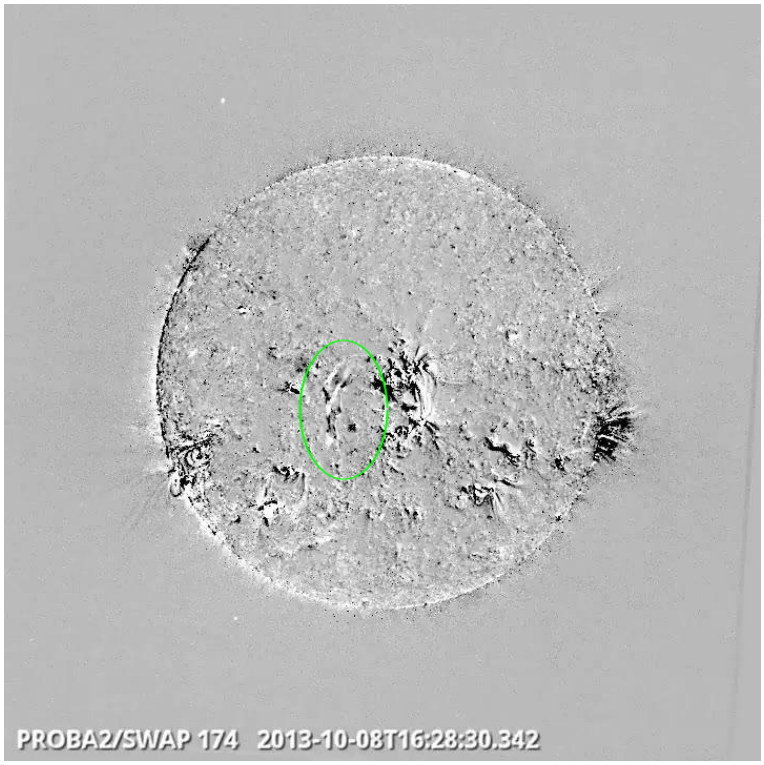
A weekly overview movie can be found here (SWAP week 185).
http://p2web.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR185_Oct07_Oct13/weekly_movie_2013_10_7.mp4

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

Tuesday October 08th:



Large scale long duration filament eruption on the east half @ 09:49 - SWAP difference image



Flow on the south east quad @ 16:28 - SWAP difference image
Find a movie of this event and the large filament eruption shown above this picture here (SWAP difference movie)
http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR185_Oct07_Oct13/Events/20131008_LargeScaleLongDurationFilamentEruption_East_0949_Flow_SouthEastQuad_1628_swap_diff.mp4

Wednesday October 09th:

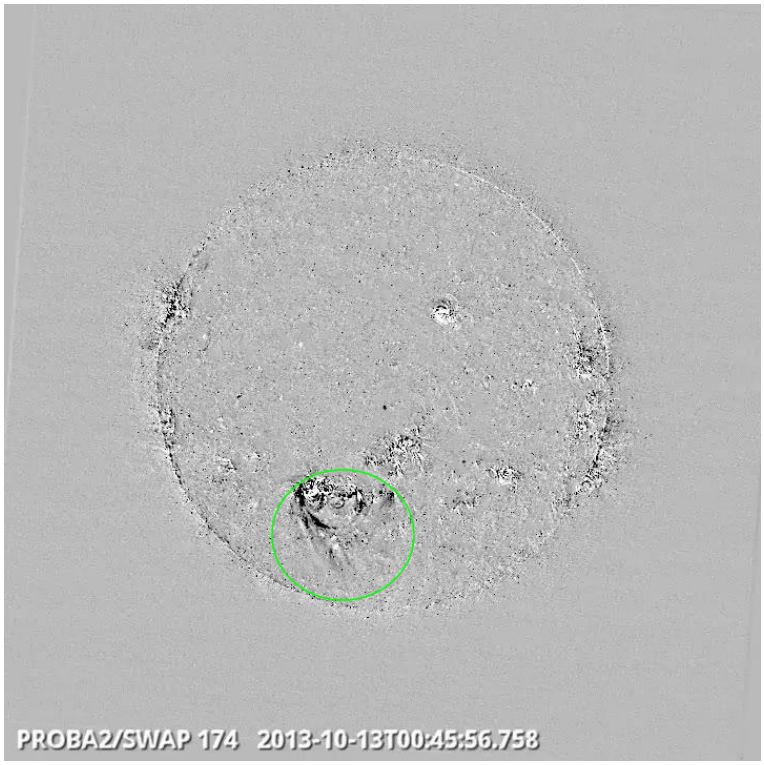
Eruption on south east limb @ 01:45 - SWAP difference image
Find a movie of the complete event here (SWAP difference movie)
http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR185_Oct07_Oct13/Events/20131009_Eruption_SouthEast_0145_swap_diff.mp4

Friday October 11th:

Eruption on east limb @ 07:25 - SWAP difference image
Find a movie of the complete event here (SWAP difference movie)
http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR185_Oct07_Oct13/Events/20131011_Eruption_EastLimb_0725_swap_diff.mp4

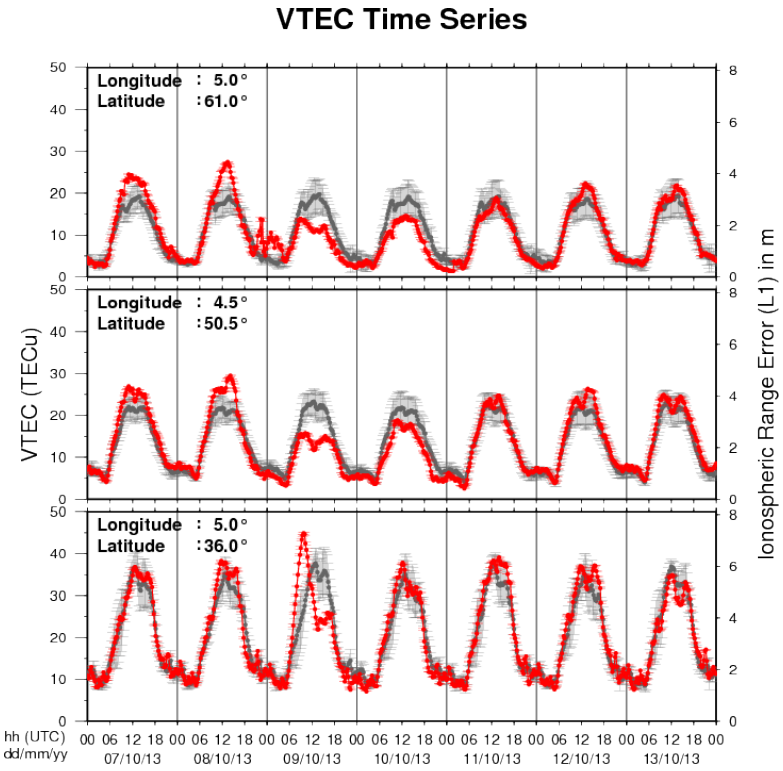
Eruption on south east quad @ 12:26 - SWAP difference image

Sunday October 13th:



Eruption on south east quad @ 00:45 - SWAP difference image
Find a movie of the complete event here (SWAP difference movie)
http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR185_Oct07_Oct13/Events/20131013_Eruption_SouthEastQuad_0045_swap_diff.mp4

8. Review of ionospheric activity (7 Oct 2013 - 13 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

9. Future Events

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

2nd Asian-Pacific Solar Physics Meeting, in Hangzhou, China

Start : 2013-10-24 - End : 2013-10-26
Initiated by Profs. Fang and Choudhury, the first Asian-Pacific Solar Physics Meeting (APSPM) was held in Bangalore two years ago. During the meeting, a consensus was achieved that it might be a good idea to have the APSPM every three years. Somehow the second APSPM was proposed to be held by mainland China in 2013. APSPM is aimed to exchange the recent research results in solar physics in the emerging asian-pacific region.
Asian-pacific regions are getting more and more active in solar physics, as signified by the construction of big facilities, including the Hinode satellite (Japan), SOXS (India), Chinese Solar Radio Heliogragh, and Optical & Near-Infrared Solar Eruption Tracer (ONSET). Therefore, colleagues have agreed to hold regional solar physics meetings regularly. The first Asian-Pacific Solar Physics Meeting (APSPM) was held in Bangalore during March 22-24 2011. During the meeting, a consensus was achieved that it might be a good idea to have the APSPM every three years. Somehow the second APSPM was proposed to be held by mainland China in 2013. APSPM is aimed to exchange the recent research results in solar physics in the emerging asian-pacific region.
Website:
http://sdac.nju.edu.cn/~solar/

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

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