

# STCE Newsletter

5 Aug 2013 - 11 Aug 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.

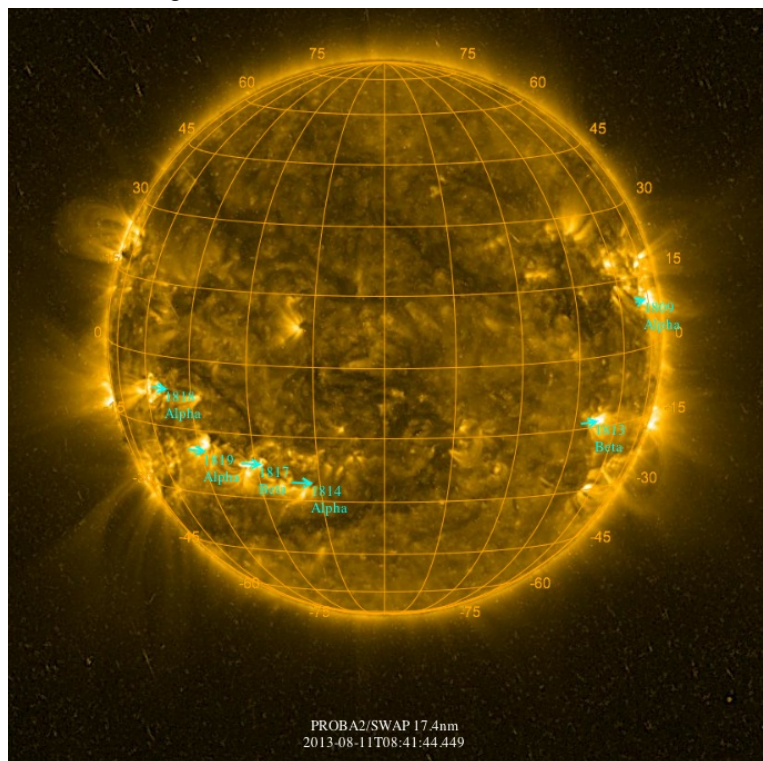
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Final Editor : Petra Vanlommel  
Contact : R. Van der Linden, General Coordinator STCE,  
Ringlaan - 3 - Avenue Circulaire, 1180 Brussels,  
Belgium

# 1. Review of solar and geomagnetic activity (5 Aug 2013 - 11 Aug 2013)

## Solar Activity

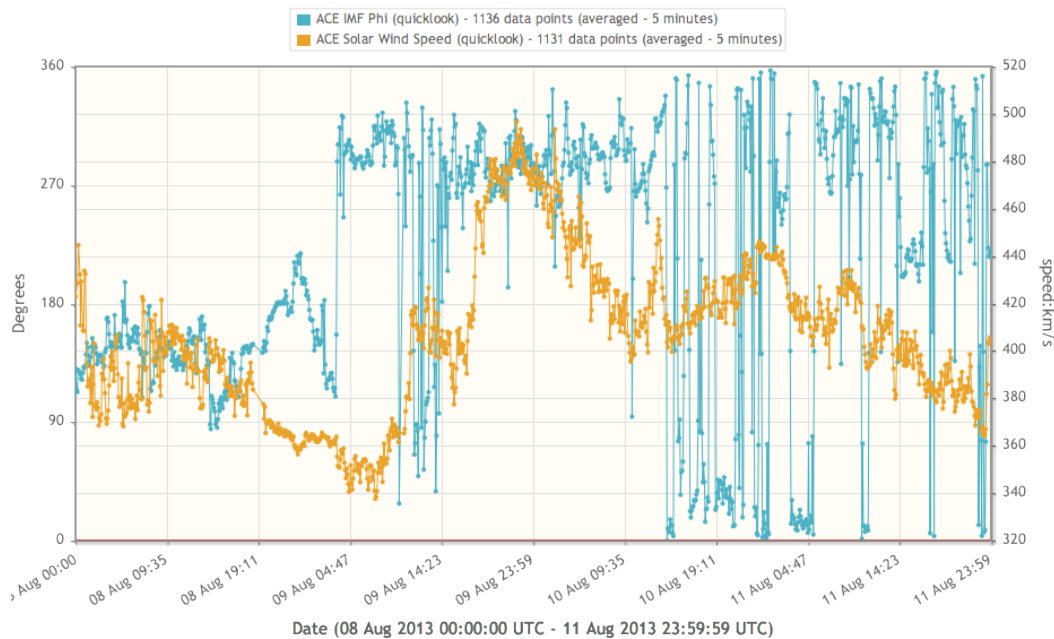
Solar activity was very low during the first part of the week. From Aug 9 until Aug 11, NOAA AR 1817, 1818 and 1819 were responsible for 9 C-flares. NOAA AR 1817 dominated and was responsible for an M-flare on Aug 12 - more about this next week.



## Geomagnetic Activity

The solar wind was around 540 km/s in the beginning of the week. The Earth was at that moment under the influence of a northern coronal hole. This was discussed in the previous STCE Newsletter. On Aug 5, the geomagnetic conditions were still at the minor storm level with Kp equals 5.

The solar wind gradually slowed down to 340 km/s. The geomagnetic conditions were conform: quiet. However, a small coronal hole made the solar wind to speed up again to values just below 500 km/s from Aug 9. In the morning of Aug 9, the interplanetary magnetic field flipped from pointing away from the Sun to pointing towards the Sun, these are the open magnetic field lines of the coronal hole. Phi, an indicator of the direction of the interplanetary magnetic field, changed from an angle between 90-180 degrees to an angle of 270-360 degrees.



The interaction of the slow and fast solar wind associated with the small coronal hole had no geomagnetic consequence on the planetary level: Kp became only 3 on Aug 9. The rest of the week was again quiet with Kp equals or less than 2.

## 2. PROBA2 Observations (5 Aug 2013 - 11 Aug 2013)

Solar (flaring) activity evolved from \*very low\* to \*low\* during the week, strongly increasing to C8.4 during the week-end. Most of the stronger flares originated from AR 11817.

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/WeeklyReportMovies/WR176\\_Aug05toAug11/2013\\_08\\_05\\_00\\_00\\_55\\_2013\\_08\\_11\\_23\\_19\\_15\\_SWAP\\_174-hq.mp4](http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR176_Aug05toAug11/2013_08_05_00_00_55_2013_08_11_23_19_15_SWAP_174-hq.mp4) (SWAP174; HelioViewer.org).

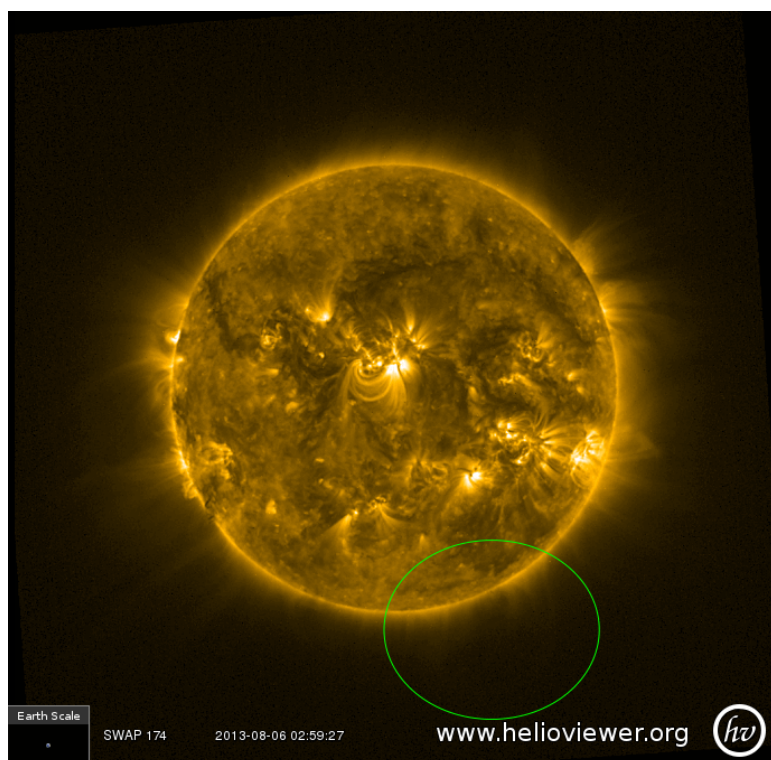
Details about some of this week's events, can be found further below.

**Tuesday August 6th:**

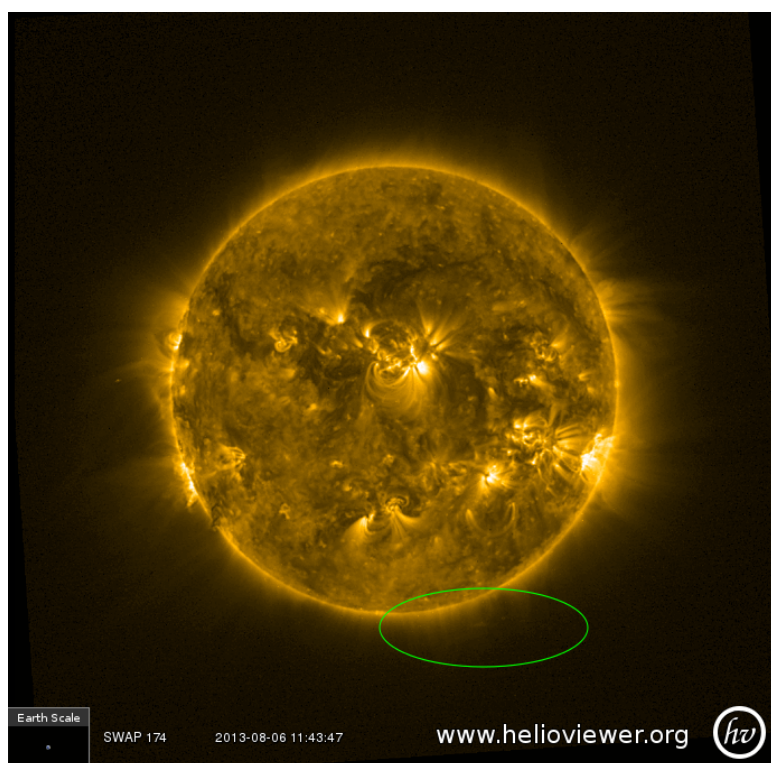


B4.5 flare eruption in North East Quadrant + Prominence Eruption on West Limb @ 01:50 - SWAP difference image

Find a movie of this event here: [http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR176\\_Aug05toAug11/Events/20130806\\_EruptionNorthEast\\_0150\\_swap\\_diff.mp4](http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR176_Aug05toAug11/Events/20130806_EruptionNorthEast_0150_swap_diff.mp4) (SWAP difference movie)



Prominence Eruption on South West Limb @ 02:59 - SWAP normal colorized image



Prominence Eruption on South West Limb @ 11:43 - SWAP normal colorized image



**Wednesday August 7th:**

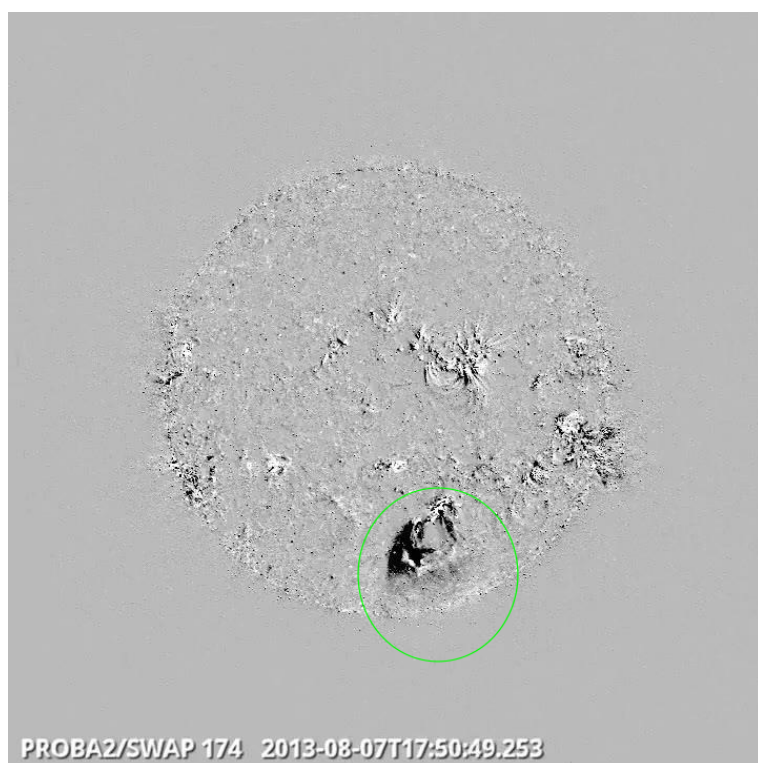


Prominence Eruption on South East Limb @ 19:56 - SWAP difference image

Find a movie of the event here: [http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR176\\_Aug05toAug11/Events/20130807\\_EruptionSouthEastLimb\\_1956\\_swap\\_diff.mp4](http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR176_Aug05toAug11/Events/20130807_EruptionSouthEastLimb_1956_swap_diff.mp4) (SWAP difference movie)



B4.8 flare eruption in South West Quadrant - AR 11810 @ 14:59 - SWAP difference image



B6.3 Eruption in South West Quadrant - AR 11810 @ 17:50 - SWAP difference image

Find a movie of the event here: [http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR176\\_Aug05toAug11/Events/20130807\\_EruptionSouthWest\\_1750\\_swap\\_diff.mp4](http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR176_Aug05toAug11/Events/20130807_EruptionSouthWest_1750_swap_diff.mp4) (SWAP difference movie)

### Thursday August 8th:



B4.2 flare eruption in South West Quadrant - AR 11810 @ 18:11 - SWAP difference image

Find a movie of the event here: [http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR176\\_Aug05toAug11/Events/20130808\\_EruptionSouthWest\\_1811\\_swap\\_diff.mp4](http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR176_Aug05toAug11/Events/20130808_EruptionSouthWest_1811_swap_diff.mp4) (SWAP difference movie)



**Friday August 9th:**



Eruption on East limb @ 20:26 - SWAP difference image

Find a movie of the event here: [http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR176\\_Aug05toAug11/Events/20130809\\_Eruption\\_EastLimb\\_2026\\_swap\\_diff.mp4](http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR176_Aug05toAug11/Events/20130809_Eruption_EastLimb_2026_swap_diff.mp4) (SWAP difference movie)

**Saturday August 10th:**



Prominence Eruption in South West Quadrant @ 08:45 - SWAP difference image

Find a movie of the event here: [http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR176\\_Aug05toAug11/Events/20130810\\_PromEruption\\_SouthWestQuad\\_0845\\_swap\\_diff.mp4](http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR176_Aug05toAug11/Events/20130810_PromEruption_SouthWestQuad_0845_swap_diff.mp4)  
(SWAP difference movie)

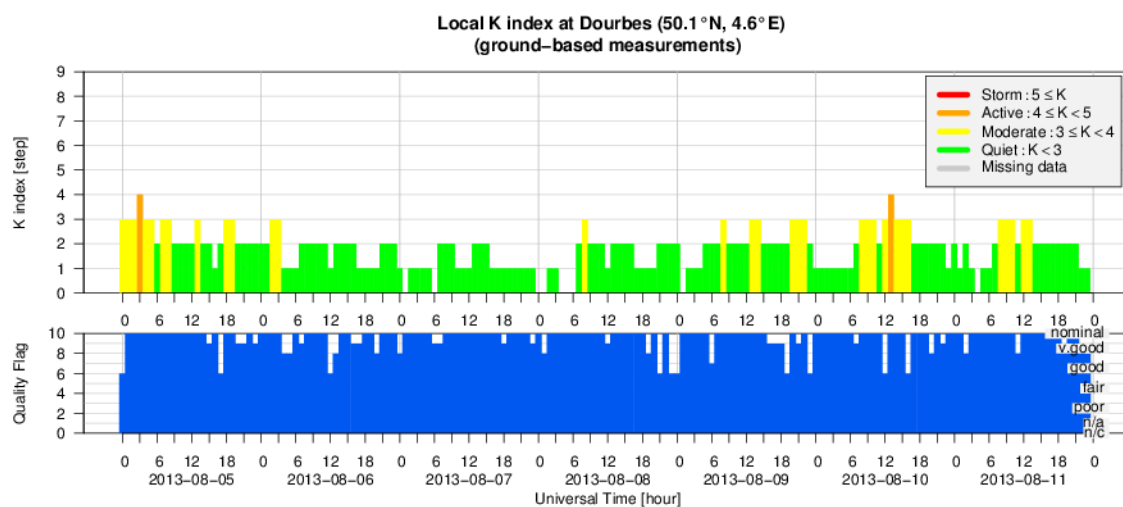
**Sunday August 11th:**



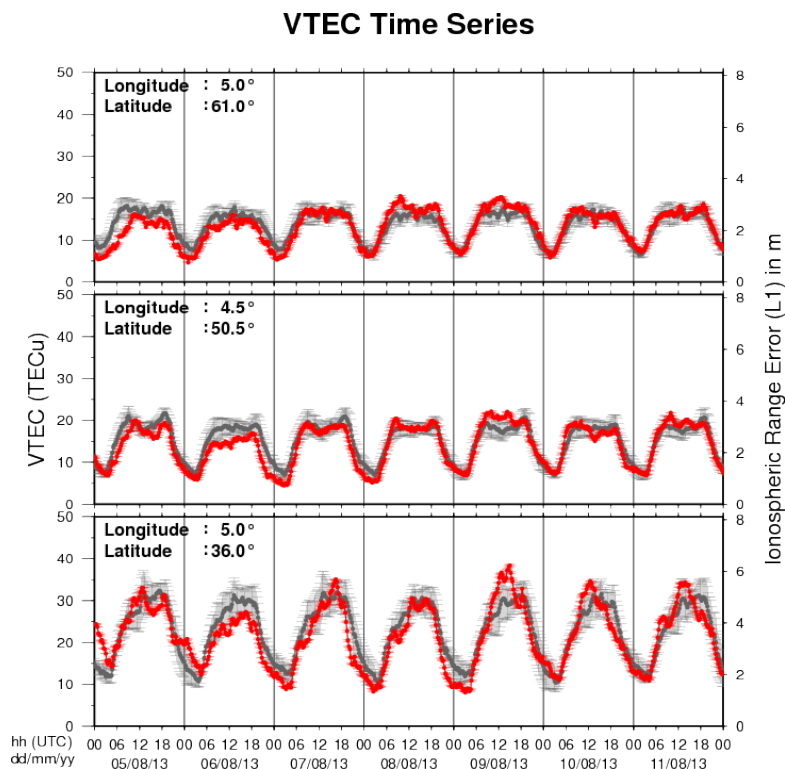
C8.4 Flare eruption in South East Quadrant - AR 11817 @ 21:54 - SWAP difference image

Find a movie of the event here: [http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR176\\_Aug05toAug11/Events/20130811\\_C84\\_Eruption\\_SouthEastQuad\\_AR11817\\_0147\\_swap\\_diff.mp4](http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR176_Aug05toAug11/Events/20130811_C84_Eruption_SouthEastQuad_AR11817_0147_swap_diff.mp4) (SWAP difference movie)

### 3. Geomagnetic Observations at Dourbes (5 Aug 2013 - 11 Aug 2013)



### 4. Review of ionospheric activity (5 Aug 2013 - 11 Aug 2013)



The figure shows the time evolution of the Vertical Total Electron Content (VTEC) (in red) during the last week at three locations:

- in the northern part of Europe(N61°, 5°E)
- above Brussels(N50.5°, 4.5°E)
- 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](http://stce.be/newsletter/GNSS_final.pdf) for some more explanations ; for detailed information, see [http://gnss.be/ionosphere\\_tutorial.php](http://gnss.be/ionosphere_tutorial.php)

## **5. Future Events**

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

### **Solar Physics and Space Weather Instrumentation V in San Diego, CA (USA)**

Start : 2013-08-25 - End : 2013-08-29

This conference will focus on instrumentation, observatories, space missions, and programs for observations from the Sun to Earth's upper atmosphere and space environment. The aim is to bring together diverse communities working on all elements of solar physics and space weather instrumentation.

Studying solar phenomena and monitoring space weather requires observations using both space- and ground-based instrumentations covering the different regions of the Sun-Earth system, the Sun, interplanetary medium, magnetosphere, ionosphere, and thermosphere. Papers are solicited concerning all instrumentation-supporting solar physics and space weather. This includes, but is not limited to, concepts, designs, fabrication processes, calibration, data trending, information technologies, solar data mining, instrument modeling, and satellite lifetime prediction modeling. We are also interested in all past, current, and future solar space missions and satellite and ground constellations of space weather instrumentation with a strong focus on Space Situational Awareness.

This conference is intended to provide the solar physics community and that of Earth's space environment with a forum for discussing the latest updates on instrumentation, observation techniques, and programs in their respective fields, and for proposing innovative ideas for future Sun-Earth coordinated observations.

Website: <http://spie.org/op423>

### **2013 Meeting of the Italian Community in Solar and Heliospheric Physics in Catania, Italy**

Start : 2013-09-04 - End : 2013-09-06

The purpose of the meeting is to provide a forum for the Italian scientists in the field (some of which are abroad) to consolidate on-going collaborations and establish new ones, for example in future projects such as Solar Orbiter and EST, where several of us are involved.

The meeting is obviously open to scientists from all the countries!

Website:

<http://www.oact.inaf.it/weboac/SoHe2013/>

### **7th International Workshop on Solar Polarization in Kunming, China**

Start : 2013-09-09 - End : 2013-09-14

We gain information about the universe through analysis of the spectra from celestial objects. However, while the intensity spectrum represents a scalar quantity but electromagnetic radiation occurs in the form of transverse waves, the polarized spectrum provides us with a 4-vector, the Stokes vector. The increased amount of information space opens new windows to the universe, in particular for the



exploration of magnetic fields. It is well recognized that the magnetic field is a primary agent responsible for structuring and the source of all variability on intermediate time scales, which manifests itself in all forms of solar and stellar activity.

It is therefore not surprising that every year there are many scientific meetings organized with the objective of studying the role of magnetic fields in cosmic objects. What is largely missing in these meetings is however an in-depth investigation of the fundamental aspects of how magnetic fields can be determined by the means of spectro-polarimetry, our main gateway to cosmic magnetism. The primary aim of our series of Workshops is to address these fundamental aspects, with less emphasis on the morphological and physical properties of cosmic magnetic fields.

Website: <http://spw7.ynao.ac.cn/>

## **2nd UK-Ukraine meeting on Solar Physics and Space Science (UKU SPSS) in Kiev, Ukraine**

Start : 2013-09-16 - End : 2013-09-20

The meeting will cover a broad range of aspects of solar physics, space science and solar-terrestrial relations. We aim to include every side of solar and space research, including observations, theory, and numerical modelling. The main idea behind the meeting is to treat the entire solar-terrestrial domain as one system, rather than each region independently.

The topics to be covered are:

- \* advanced solar observations
- \* waves and flows in the Solar atmosphere
- \* structure and dynamics of solar magnetic fields
- \* connecting analytical theory and modern numerical simulations to observations
- \* new physics in numerical modelling
- \* linking solar interior with heliosphere
- \* particle acceleration in the Sun and heliosphere
- \* non-linear phenomena in space plasmas
- \* physics of magnetosphere and ionosphere

Website:

[http://swat.group.shef.ac.uk/Conferences/Ukraine\\_UK\\_2013/index.html](http://swat.group.shef.ac.uk/Conferences/Ukraine_UK_2013/index.html)

## **Space science training week: data driven modeling and forecasting in Leuven, Belgium**

Start : 2013-09-16 - End : 2013-09-19

This summer school targets to introduce a generation of young researchers (advanced master students, PhDs, and junior postdoctoral researchers) to the diverse aspects of space weather related research.

It will introduce theoretical approaches to space weather and its drivers, present modern solar data analysis tools, and cover state-of-the-art solar and space science simulations. Participants will learn about forecasting aspects and their quality control for space weather events, but also experience hands-on training in scientific proposal writing and receive do-and-don't tips for scientific presentations.

The scientific program is enriched by a public evening lecture on the solar influence on our climate, and the lecturers are invariably expert scientists with international standing.

The school is open to a maximum of 40 participants, and can benefit from its embedding within two international research network activities: an Interuniversity Attraction Pole P7/08 CHARM connecting heliospheric to astrophysical communities with 7 partner institutes, and a European FP7 Project eHeroes with 15 different partner institutes. Participation from outside both network activities is strongly encouraged. Within Belgium, the school links up expertise from universities (KU Leuven, ULB, Gent University) to federal research institutes (the Solar-Terrestrial Centre of Excellence, the Royal Observatory of Belgium and the Belgian Institute for Space Aeronomy).

Website:

<http://wis.kuleuven.be/CHARM/events/school/SSTW2013/>

## **STEREO/WAVES & WIND/WAVES workshop on Solar Radio Emissions on Santorini, Greece**

Start : 2013-10-07 - End : 2013-10-11

The aim of the workshop is to review the "state of the art" theories about generation and propagation of Solar radio burst and discuss the observational constraints and results that have been provided in this area by the WIND & STEREO missions during the last 20 years. Furthermore the STEREO & WIND observations will be put in the context of other missions such as RHESSI and ground based observatories. Finally, the preparation for the future explorations foreseen with Solar Orbiter and Solar Probe Plus will be discussed.

Website:

<http://type3stereo.sciencesconf.org/>

## **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 Heliograph, 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 Workshop 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 Framework 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 physicists 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/>

### **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](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/>

### **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/>

### **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/>

## **6. New documents in the European Space Weather Portal Repository**

See <http://www.spaceweather.eu/en/repository>

**eHEROES - Interaction process of the CME-CME event from February 14-15, 2011**

<http://www.spaceweather.eu/en/repository/show?id=476>

**eHEROES - In-situ density of (I)CMEs versus CME geometry and mass derived from remote sensing data**

<http://www.spaceweather.eu/en/repository/show?id=477>