

# STCE Newsletter

26 Aug 2013 - 1 Sep 2013



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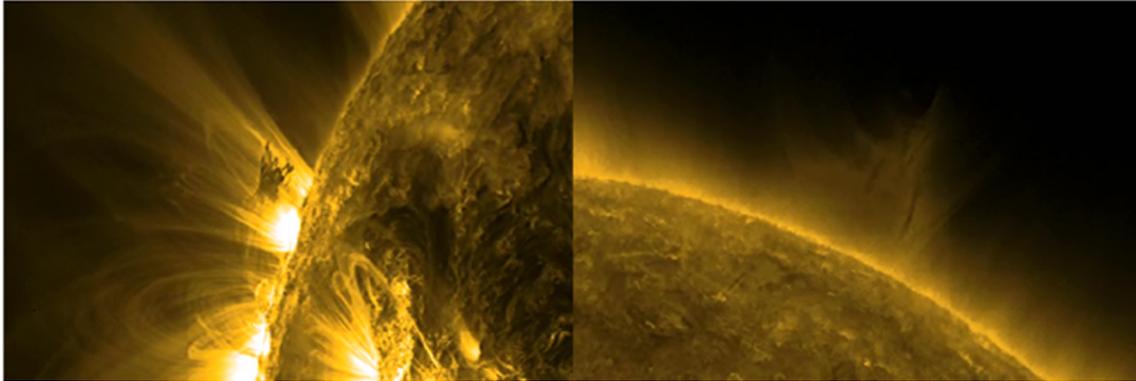
The Solar-Terrestrial Centre of Excellence (STCE) is a collaborative network of the Belgian Institute for Space Aeronomy, the Royal Observatory of Belgium and the Royal Meteorological Institute of Belgium.

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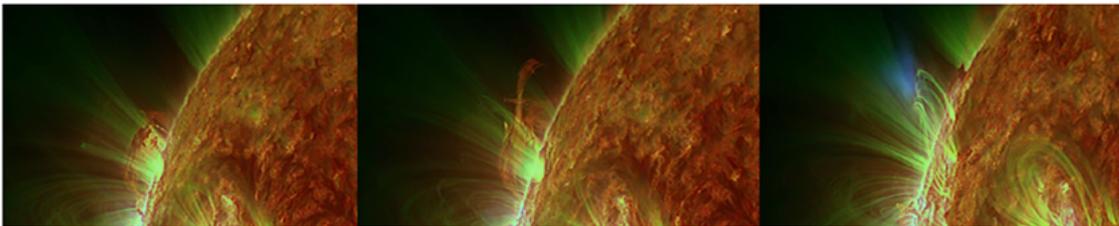
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## 1. Prominences do the twist (26 Aug 2013 - 1 Sep 2013)

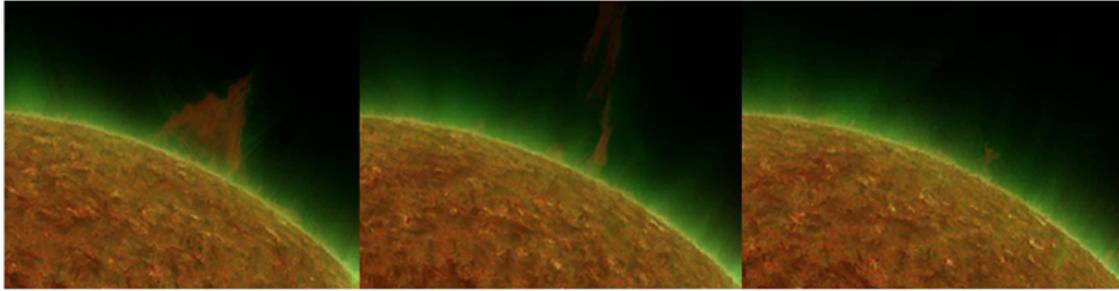
Two active prominences could be seen last week: one at the northeast limb close to the solar equator, the other at the northwest limb close to the Sun's northern pole. This movie at <http://www.youtube.com/watch?v=mKOyZ1uK11o> shows the evolution of the two prominences from 26 till early 29 August. For both features, clips show their evolution at temperatures of around 50,000 (reddish) and 600,000 degrees (yellowish). They are followed by a movie combining the view through the previous 2 filters with that through SDO's AIA 094 filter (bluish; at a temperature of several million degrees). The movie ends with a view through SOHO's coronagraphs.



Both prominences are quite dynamical, but the northeast prominence shows a lot more activity and interaction with its surroundings. It also consists of more "cold" material than the polar prominence. This can be seen in the view through the AIA 171 filter: The northeast prominence consists mainly of dark patches (= much colder than 600,000 degrees; image above left) that follow the twisted magnetic field lines, whereas the polar prominence also contains a lot of "hot" material (not dark, emission; image above right).



The northeast prominence also seems to come to its ending in a more violent way, showing dynamical restructuring. However, no clear ejection of material away from the Sun can be seen. The flaring activity, visible as post flare loops and the bluish glow of hot material (AIA 094; images above), seems not to be related to this prominence activity and is very likely due to other activity coincidentally occurring in the same line-of-sight. Hence, the spectacular coronal mass ejection (CME) is probably a result of this flaring, and not due to the disappearance of the prominence.



The polar prominence seems to have a magnetic field structure that is less well defined. Hence, the material seems to move a bit less dynamically along the magnetic field lines. In the end, the mass of charged particles rises slowly, smoothly reconnecting and graciously leaving the solar surface. No flare-like phenomena were associated with the event, as is evident from the lack of bluish emission in the AIA 094 filter (images above). The accompanying CME is not very impressive (images below).

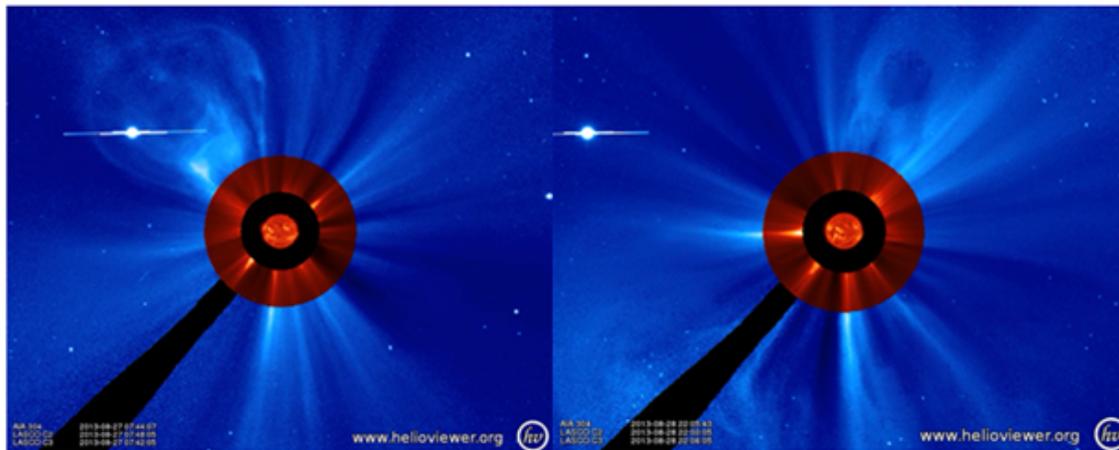
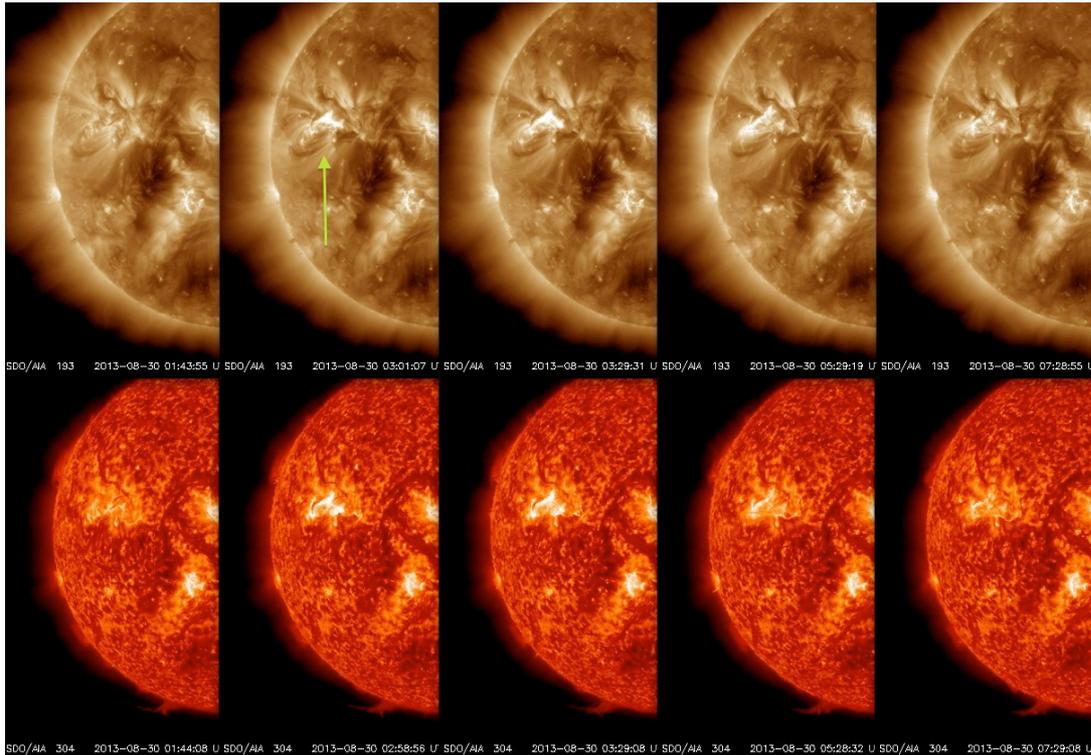


Image credits: SDO (<http://sdo.gsfc.nasa.gov/>), SOHO (<http://sohowww.nascom.nasa.gov/>).

## 2. Review of solar and geomagnetic activity (26 Aug 2013 - 1 Sep 2013)

### Solar Activity

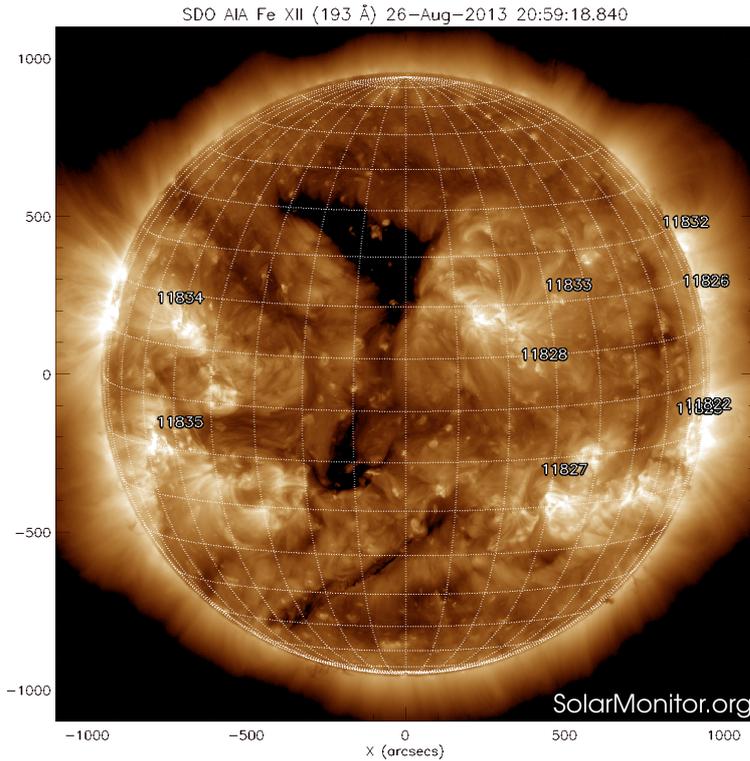
Solar activity started out low for the first three days of the week with no flaring. From Thursday the active regions NOAA 11834, 11835, 11836 became more complex and produced 3 C-class flares with the most powerful one a C8.3 flare originating from AR NOAA 11836 and peak time 02:46 UT on August 30th. The light flash in the pictures below (SDO/AIA 193 and 304) indicates where the flare occurred on the solar disk - search for the green arrow.



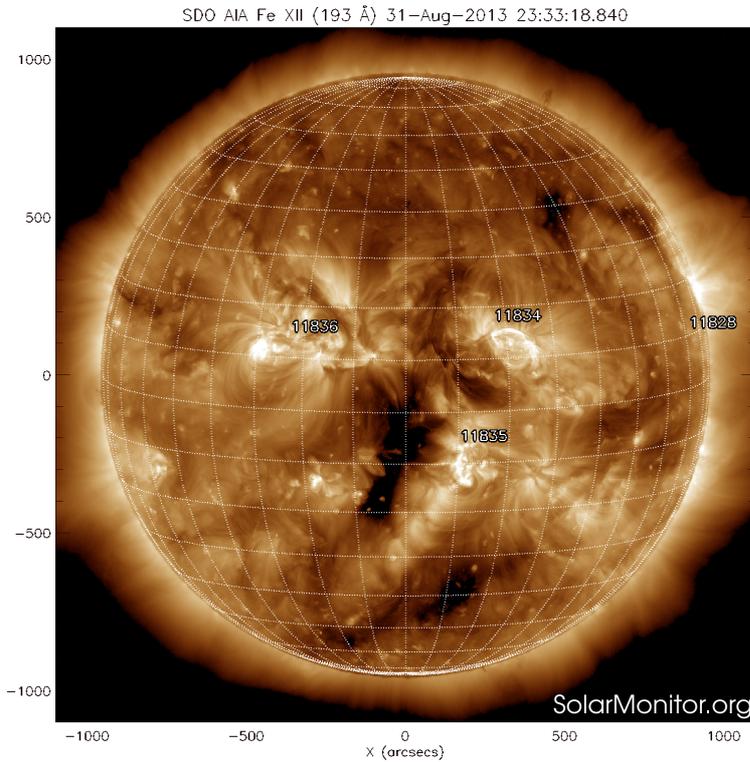
The C8.3 flare was associated with a CME that came into the field of view of the coronagraph LASCO/C2 at 02:48UT. Check the output of CACTus, the software that automatically detects transient features in pictures taken by LASCO/C2: [http://sidc.oma.be/cactus/catalog/LASCO/2\\_5\\_0/qkl/2013/08/CME0140/CME.html](http://sidc.oma.be/cactus/catalog/LASCO/2_5_0/qkl/2013/08/CME0140/CME.html)

The CME was fast, 726 km/s but the plasma was predominantly ejected into the north-east direction.

On August 26, a recurrent coronal hole in the northern hemisphere reached the central meridian.



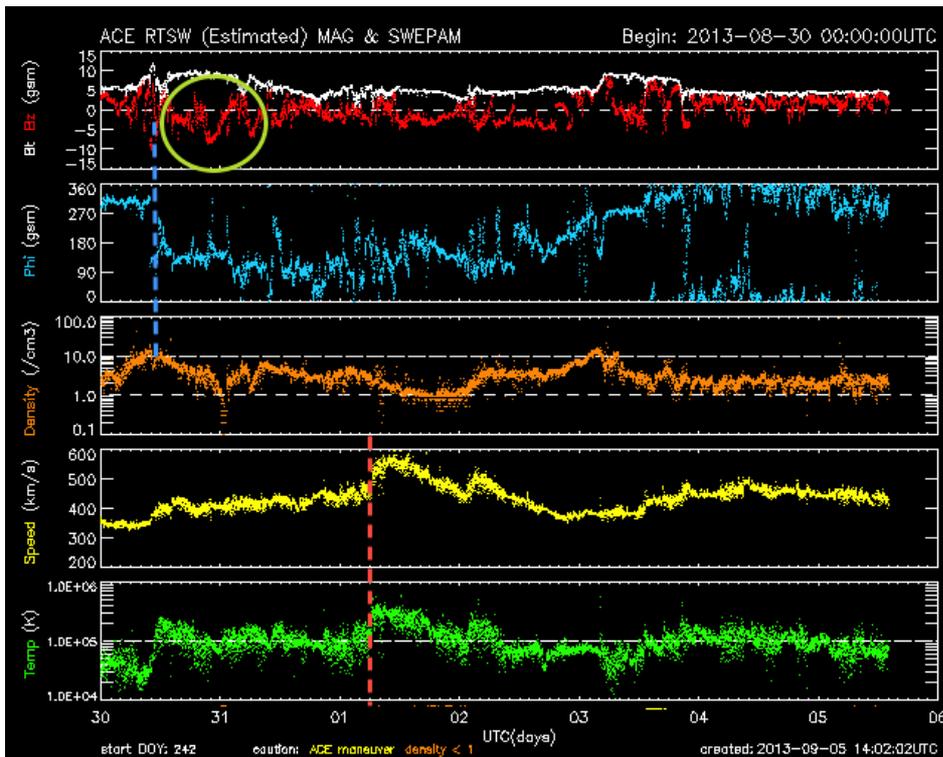
On September 1, another coronal hole crossed the central meridian. The hole was situated between 20°S and 5°N. Compared to the previous solar rotation, the coronal hole had grown significantly.



## Geomagnetic Activity

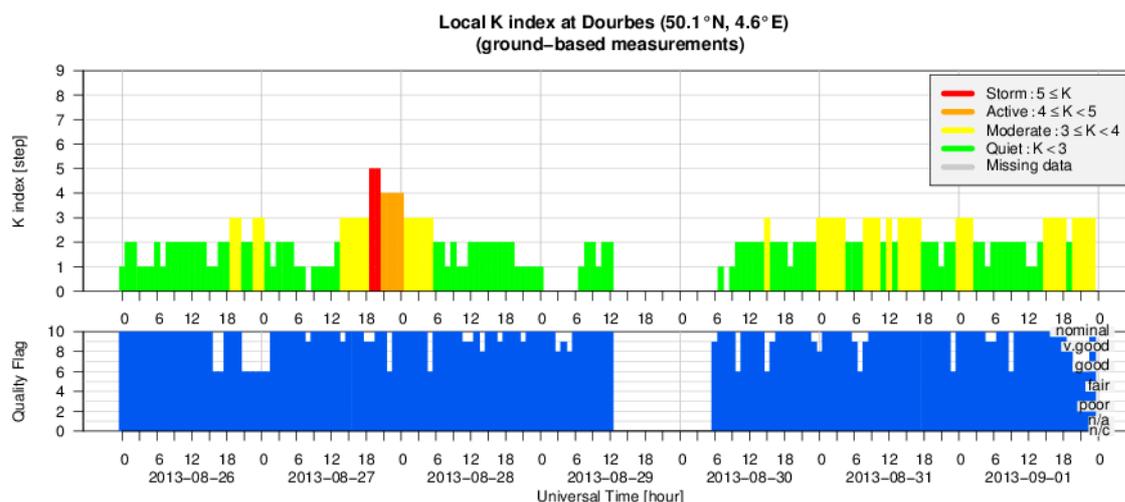
A co-rotating interaction region, i.e. a region where a slow and fast solar wind interact resulting in a more dense plasma with a compressed magnetic field, passed along the spacecraft ACE on August 27. The solar wind increased accordingly and peaked early on August 28 around 500 km/s. The fast solar wind is possibly linked with the coronal hole that passed the central meridian on August 26 (see the section Solar Activity). The plasma and magnetic pressure was strong enough to cause a minor planetary storm with a  $K_p=5$  during one 3-hours interval on Aug 27.

On August 30, the Earth crossed the heliospheric current sheet: Phi (second frame in the ACE graph below, blue dotted line) jumped from a value between  $270^\circ$  and  $360^\circ$  to a value between  $90^\circ$  and  $180^\circ$ . The z-component of the magnetic field became strongly negative (green circle in the top frame) inducing geomagnetic disturbances on the planetary level with two intervals of  $K_p=4$  late August 30 and early August 31.



On September 1, before noon, the solar wind speed increased rather suddenly to almost 600 km/s. This is indicated by the red dotted line in the figure above. It is not clear from the ACE data, but this increase can be probably linked to a glancing blow of the CME that left the Sun on August 30. The magnetosphere of the Earth did not respond on this arrival.

### 3. Geomagnetic Observations at Dourbes (26 Aug 2013 - 1 Sep 2013)



### 4. PROBA2 Observations (26 Aug 2013 - 1 Sep 2013)

Solar (flaring) activity raised slightly from 'very low' to 'low' during the week. The highest level C-flare was a C8.3 on Friday 30th.

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/WR179\\_August26toSeptember01\\_2013/2013\\_08\\_26\\_00\\_01\\_23\\_2013\\_09\\_01\\_23\\_20\\_08\\_SWAP\\_174-hq.mp4](http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR179_August26toSeptember01_2013/2013_08_26_00_01_23_2013_09_01_23_20_08_SWAP_174-hq.mp4) (SWAP174; HelioViewer.org).

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

**Tuesday August 27th:**



Eruption on West Limb @ 16:06 - SWAP difference image

Find a movie of the event here: [http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR179\\_August26toSeptember01\\_2013/Events/20130827\\_Eruption\\_WestLimb\\_1606\\_swap\\_diff.mp4](http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR179_August26toSeptember01_2013/Events/20130827_Eruption_WestLimb_1606_swap_diff.mp4)  
(SWAP difference movie)

**Wednesday August 28th:**



Prominence Eruption on South East Limb @ 15:30 - SWAP difference image

Between Wednesday and Thursday afternoon, the South West limb exhibited continuous activity, including a big filament eruption (see on Thursday).

A movie of this activity can be found in here: [http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR179\\_August26toSeptember01\\_2013/Events/20130829\\_24hrContinuousActivity\\_SouthWestLimb\\_0000\\_swap\\_diff.mp4](http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR179_August26toSeptember01_2013/Events/20130829_24hrContinuousActivity_SouthWestLimb_0000_swap_diff.mp4)

**Thursday August 29th:**



Prominence Eruption on South East Limb @ 05:46 - SWAP difference image



Prominence Eruption on South East Limb @ 06:43 - SWAP difference image

Find a movie of the complete event here: [http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR179\\_August26toSeptember01\\_2013/Events/20130829\\_BigProminenceEruption\\_SouthHemi\\_0546\\_2\\_swap\\_diff.mp4](http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR179_August26toSeptember01_2013/Events/20130829_BigProminenceEruption_SouthHemi_0546_2_swap_diff.mp4) (SWAP difference movie)

### Friday August 30th:



C8.3 Flare Eruption in North East Quadrant @ 02:34 - SWAP difference image

Find a movie of the event here: [http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR179\\_August26toSeptember01\\_2013/Events/20130830\\_C83Flare\\_Eruption\\_NorthEastQuad\\_0234\\_AR11836\\_swap\\_diff.mp4](http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR179_August26toSeptember01_2013/Events/20130830_C83Flare_Eruption_NorthEastQuad_0234_AR11836_swap_diff.mp4) (SWAP difference movie)



<http://www.spaceweather.eu/en/repository/show?id=478>

## **SPENVIS Spacecraft Charging Tools**

In this tutorial I give an overview of the spacecraft charging analysis tools, charging environment models and data sets that are available inside SPENVIS.

<http://www.spaceweather.eu/en/repository/show?id=479>

## **SPENVIS Radiation Package**

In this tutorial I give an overview of the radiation environment models and effect tools available in SPENVIS.

<http://www.spaceweather.eu/en/repository/show?id=480>

## **7. Future Events**

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

### **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/>

### **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](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/>

### **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>

### **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/>

### **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