

# STCE Newsletter

11 Mar 2013 - 17 Mar 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.

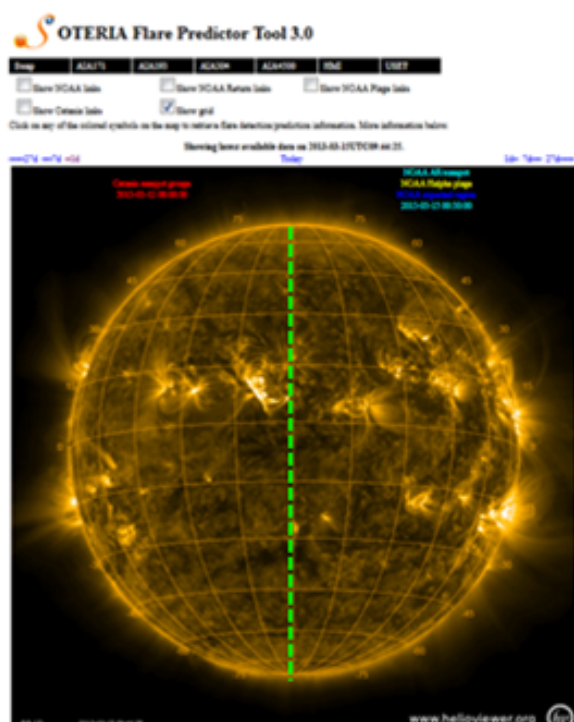
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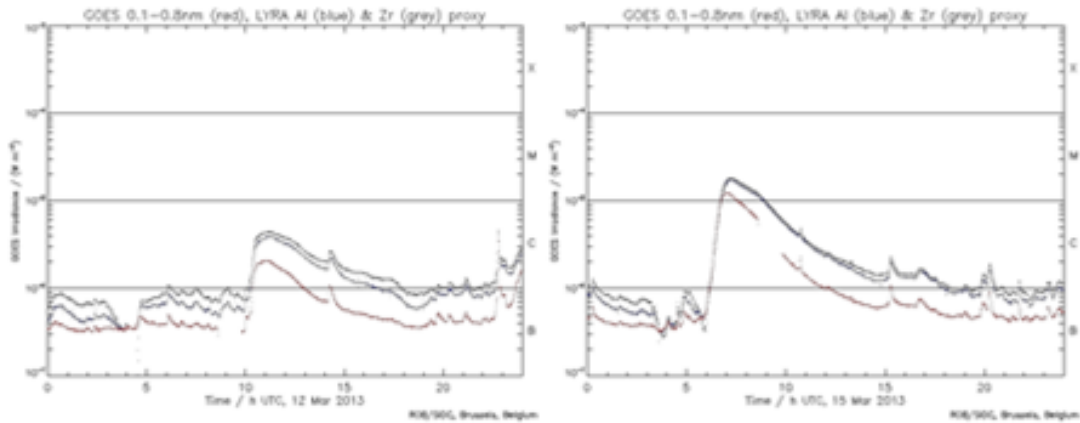
## 1. Ready... Aim... Fire!... (11 Mar 2013 - 17 Mar 2013)

The Sun took a good aim at Earth this week.

Indeed, on two occasions, an eruption took place very near the central meridian of the Sun. The central meridian is a fixed, imaginary line on the Sun running from the north to the south solar pole. Scientists use this line all the time to unambiguously determine positions of sunspot groups and other solar features on the Sun. The distance to this central meridian is called the "Central Meridian Distance" (CMD). The CMD is negative to the east of the Sun, and positive to the west, and varies between  $-90^\circ$  and  $+90^\circ$ . If an eruption occurs with a CMD of about  $0^\circ$ , it means the eruption took place very near the central meridian and usually also that it is directed straight towards Earth. Solar orientation grids can be found at various websites, e.g. at SIDC/Soteria (<http://www.sidc.oma.be/>), Solar Monitor (<http://www.solarmonitor.org/>) and at MEES Solar Observatory (<http://www.solar.ifa.hawaii.edu/>). Underneath an example from the SIDC/Soteria page, with the central meridian added as a green dashed line.

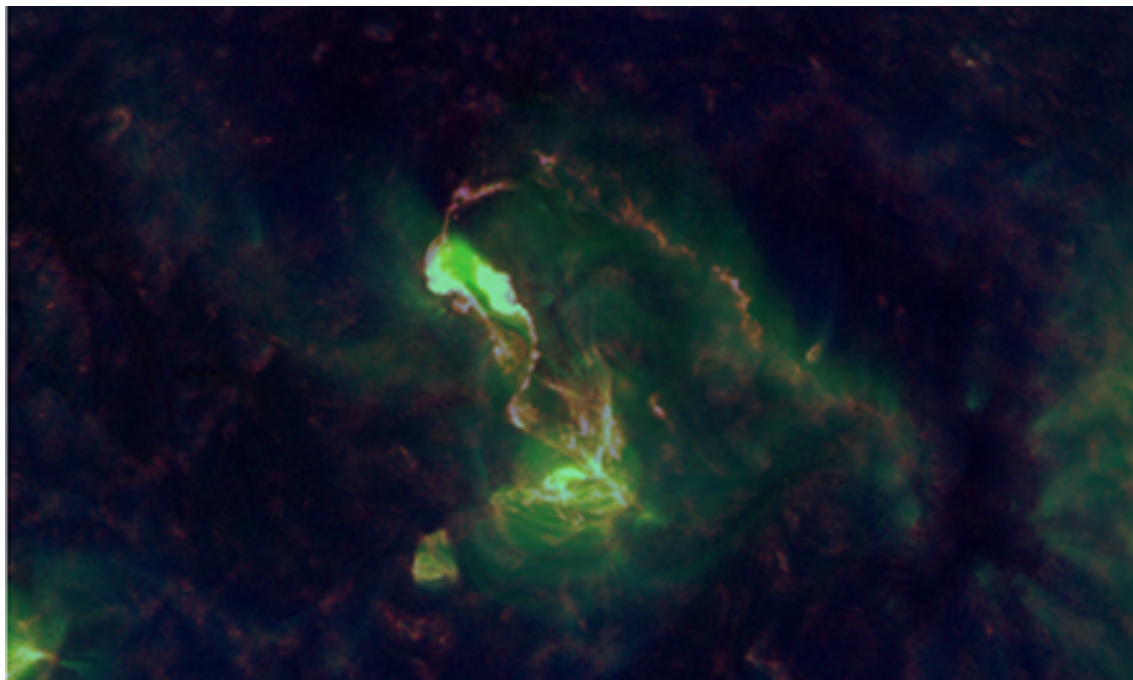


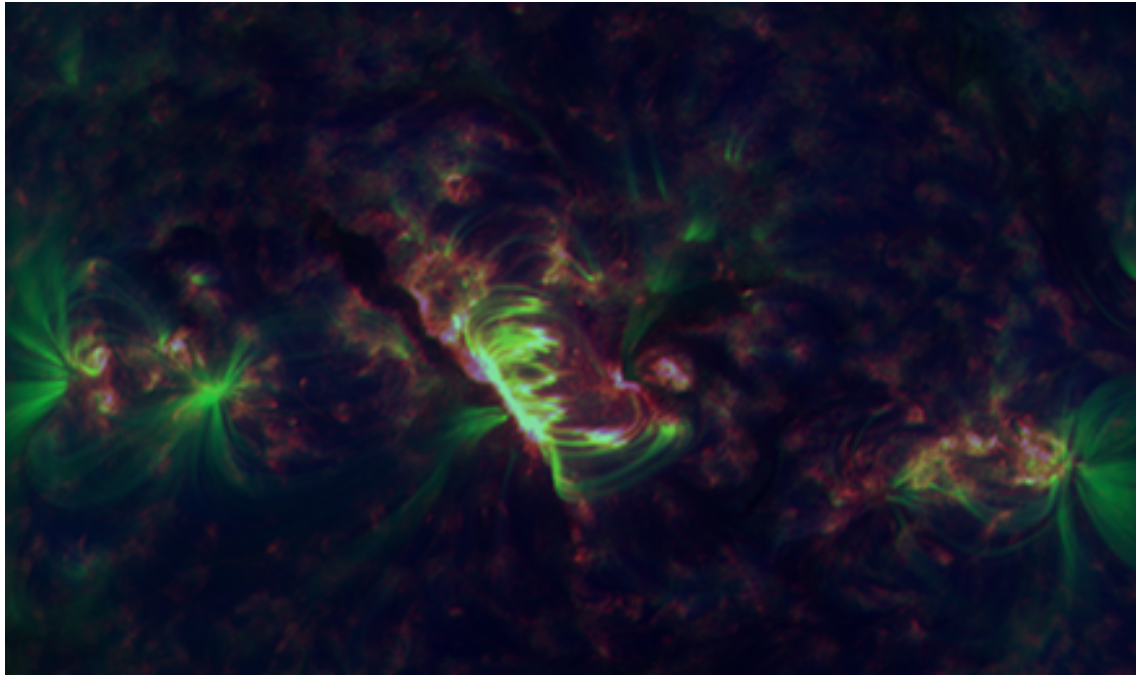
The 12 March eruption was associated with a C2-flare that started at 10:17UT and ended only at 12:27UT, making this a long duration event (LDE). The filament belonged to a small sunspot region NOAA 1690. The eruption was at relatively northern latitudes ( $\pm 25^\circ$ ), but part of the ejected material was still directed towards the Earth. From STEREO-B data, it was determined that a coronal mass ejection (CME) had left the Sun with a speed of at least 530 km/s. As predicted, Earth received a glancing blow from this CME resulting in unsettled geomagnetic conditions during the early morning hours of 15 March.



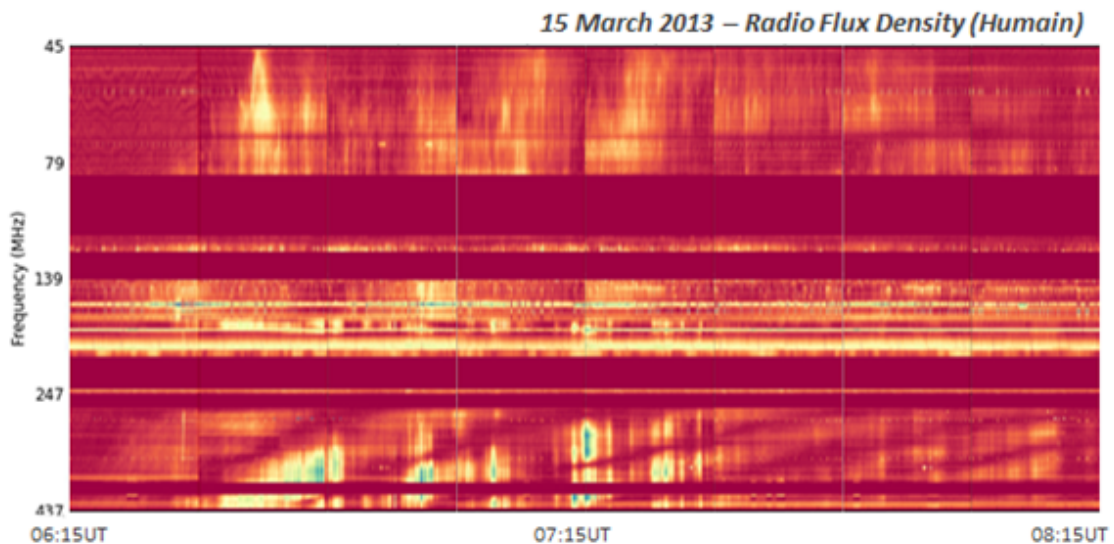
The second eruption occurred on 15 March and started at 05:46UT. It ended at 08:35UT, making it again an LDE. The flare was associated with a filament eruption located very close to sunspot region NOAA 1692, which had already erupted previously during the night of 12-13 March (impulsive C3-flare located about  $-40^\circ$  CMD) However, the 15 March flare concerned a M1-flare (weak proton event) located only  $10^\circ$  east of the central meridian, and also a lot closer to the solar equator.

A movie of both eruptions can be seen at <http://www.youtube.com/watch?v=P0R20h0B9Yk> There is a slight interruption in the movies of the second flare, due to the Earth passing in-between the Sun and SDO. Images underneath depict the respective flares in the combined light of SDO/AIA 335/171, 193, and 304 (corona and transition zone). They show the flares resp. on 12 March at 10:35UT (onset; eruption in progress) and on 15 March at 9:29UT (post-flare coronal loops).



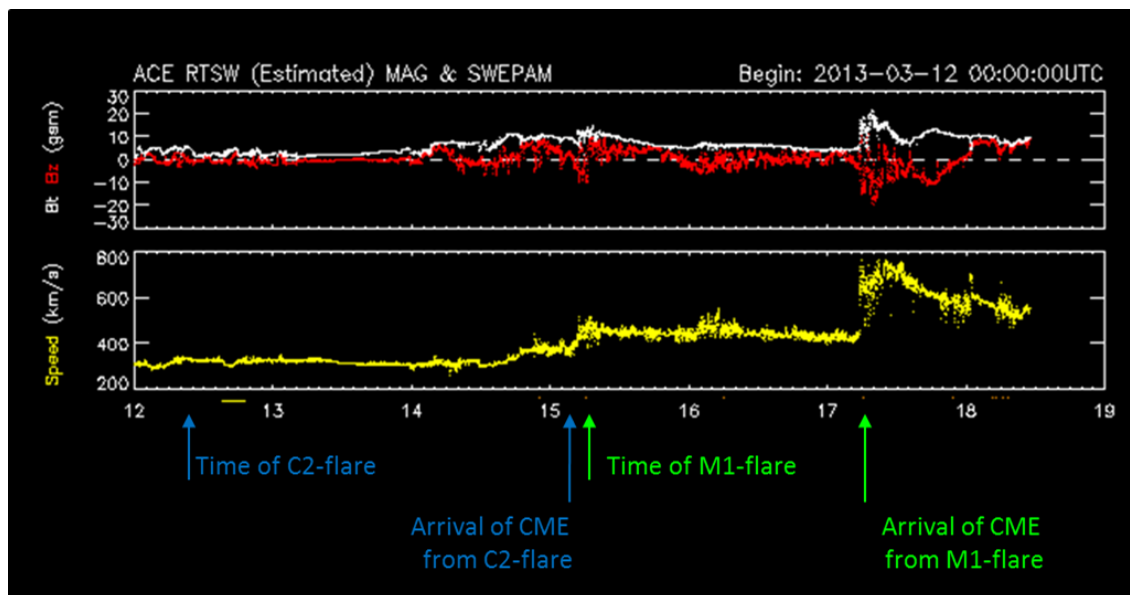


The eruption was accompanied by a considerable solar radio-disturbance that was recorded by the Humain Solar Radio Observatory (image below). It concerns a typical Type IV burst, which is long lasting radio noise due to energetic electrons being trapped in the post-flare loops forming in the aftermath of the eruptive event. Note that the diagonal stripes near the bottom of the figure are due to ground "interference". Indeed, at Humain, the Sun was still at a low elevation in the sky at the time of the event. As such, radio emissions reached the antenna directly and by reflection on the ground, creating these "fringes".



The associated CME had a speed of at least 950 km/s and was of the halo-type, meaning it was heading straight towards Earth. The CME struck our planet in the early morning hours of 17 March, with the speed of the solar wind jumping from about 400 km/s to 750 km/s. More importantly, the CME's magnetic field

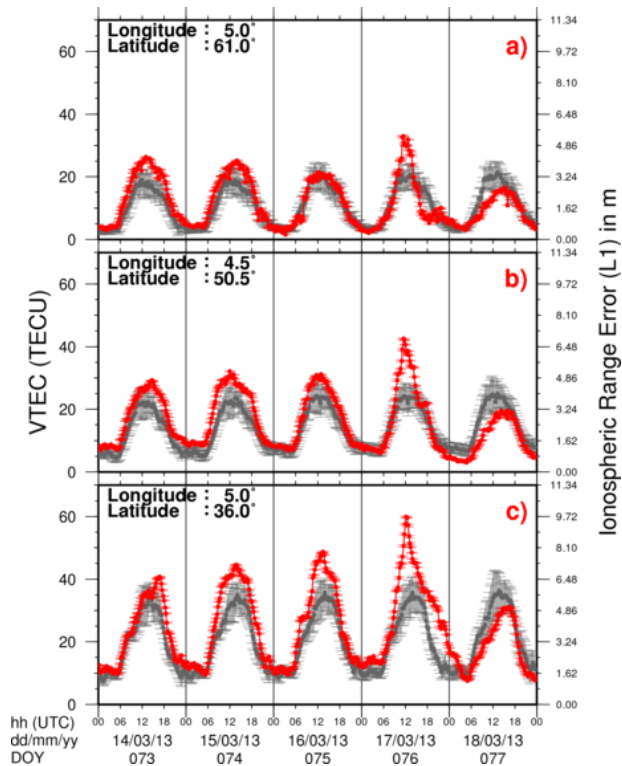
was quite strong and oriented southward, favoring moderate geomagnetic storming for a good part of the day. The region of good visibility of polar light was limited to the usual places (Scandinavia, Canada, Alaska and northern USA).



Credits - Data, images and movies for this topic were taken from SDO (<http://sdo.gsfc.nasa.gov/>), PROBA2/SWAP and LYRA (<http://proba2.oma.be/>), SOHO/Lasco C3 (<http://sohowww.nascom.nasa.gov/>), SIDC (<http://www.sidc.oma.be/>), STEREO-Behind (<http://stereo.gsfc.nasa.gov/>), ACE (<http://www.swpc.noaa.gov/ace/>) and Humain Solar Radio Observatory (<http://sidc.oma.be/humain/index.php>).

## 2. Ionospheric event on March 17

The Total Electron Content in the ionosphere was disturbed over Europe on March 17, 2013.

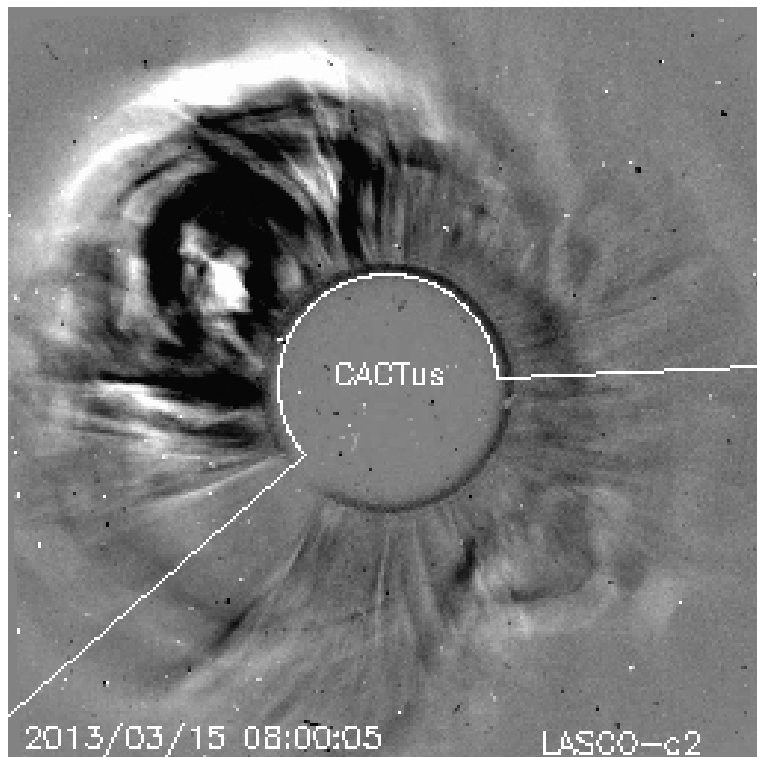


The magnetosphere of the Earth was also disturbed: the planetary index K reached 5 and 6, this is a major geomagnetic storm. The cause was from solar origin and could be traced back to a CME arrival (see both sections on solar and geomagnetic activity).

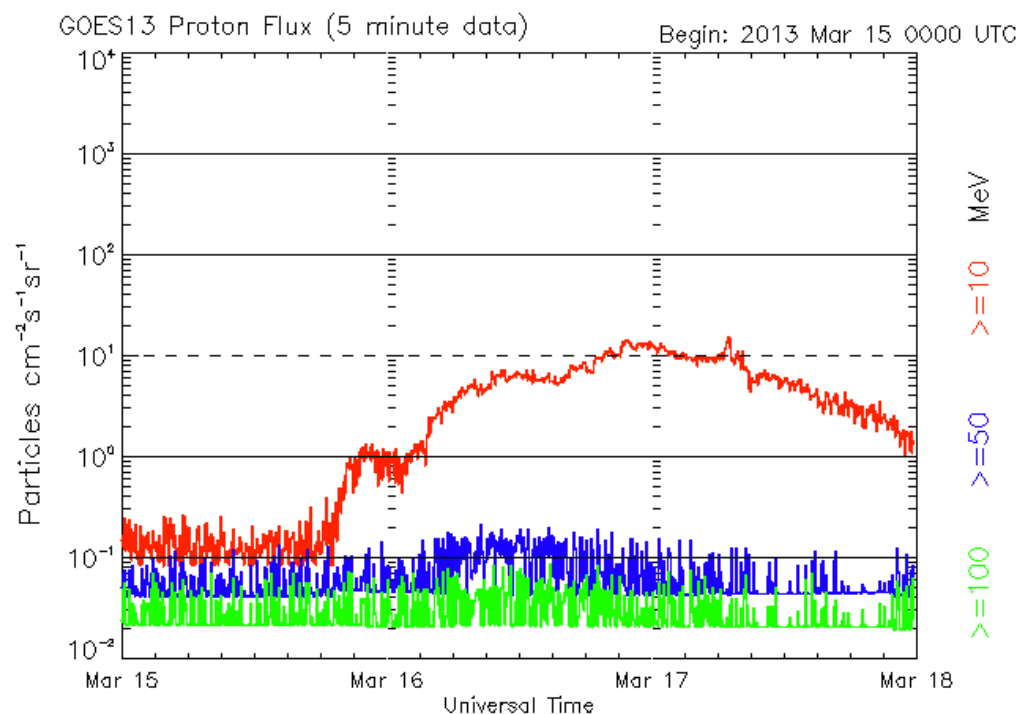
Read more: [http://gnss.be/Atmospheric\\_Maps/ionospheric\\_event\\_17032013.php](http://gnss.be/Atmospheric_Maps/ionospheric_event_17032013.php)

### 3. Review of solar activity (11 Mar 2013 - 17 Mar 2013)

The week started on March 11 with quiet conditions. On Tuesday March 12, the solar activity became eruptive featuring a partial halo Earth bound CME associated with a long duration C2.0 flare from NOAA 1690. On Friday March 15th an M1.2 flare occurred and was accompanied by a full halo CME towards Earth. You can check CACTus, the software that detects automatically CMEs in SOHO/LASCO-C2 coronagraph: [http://sidc.oma.be/cactus/catalog/LASCO/2\\_5\\_0/qkl/2013/03/CME0048/CME.html](http://sidc.oma.be/cactus/catalog/LASCO/2_5_0/qkl/2013/03/CME0048/CME.html)

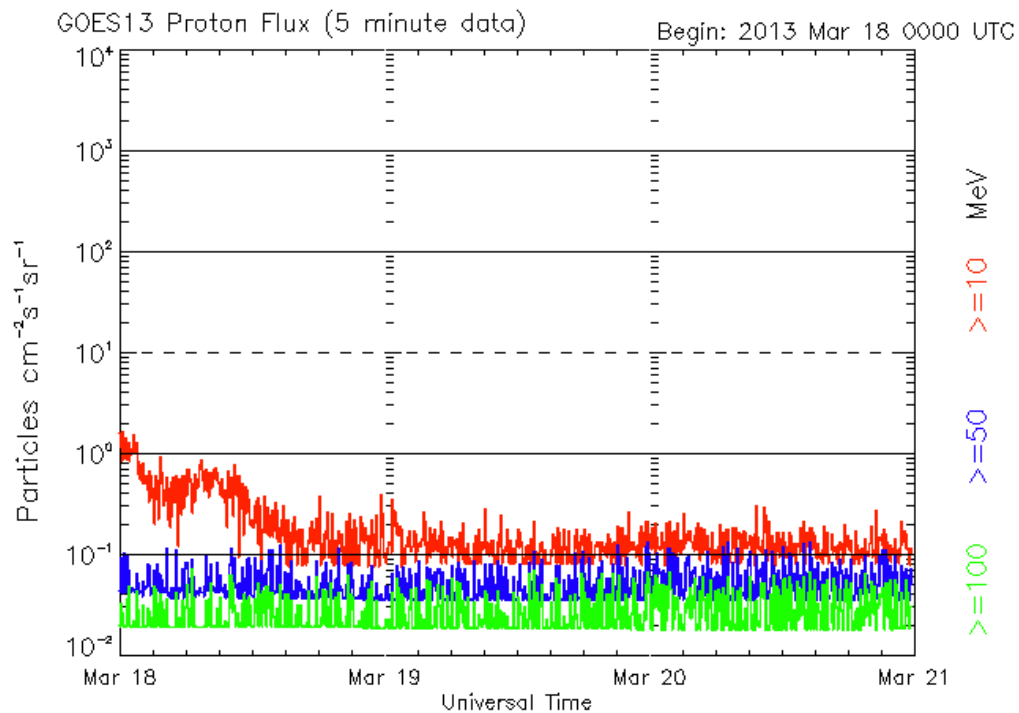


The GOES proton flux ( $\geq 10$  MeV) levels increased accordingly on March 15 from 20:00UT and just passed the threshold of 10 pfu on March 16th around 20:00 UT. The flux dropped below the 10 pfu threshold on March 17th around 08:30 UT. It reached normal levels during the second part of March 18.



Updated 2013 Mar 17 23:56:02 UTC

NOAA/SWPC Boulder, CO USA



Updated 2013 Mar 20 23:56:02 UTC

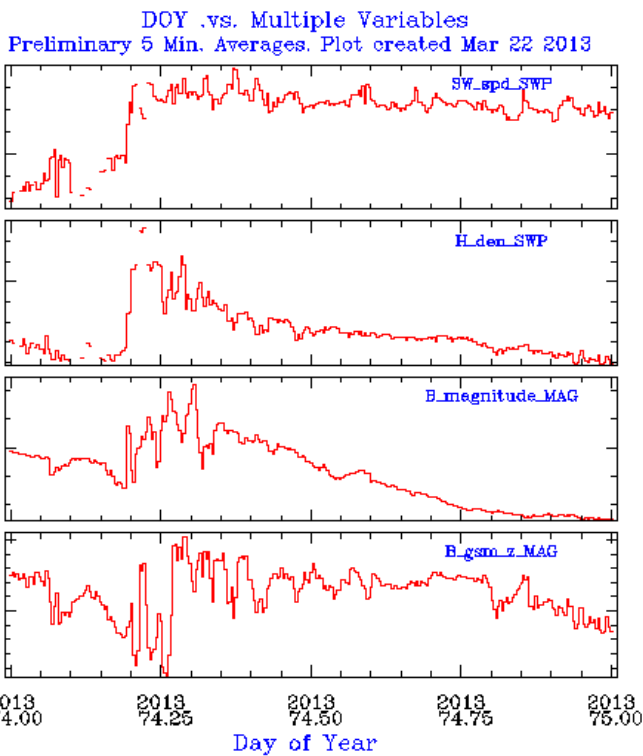
NOAA/SWPC Boulder, CO USA

#### 4. Review of geomagnetic activity (11 Mar 2013 - 17 Mar 2013)

Geomagnetic activity was quiet to moderate during the week.

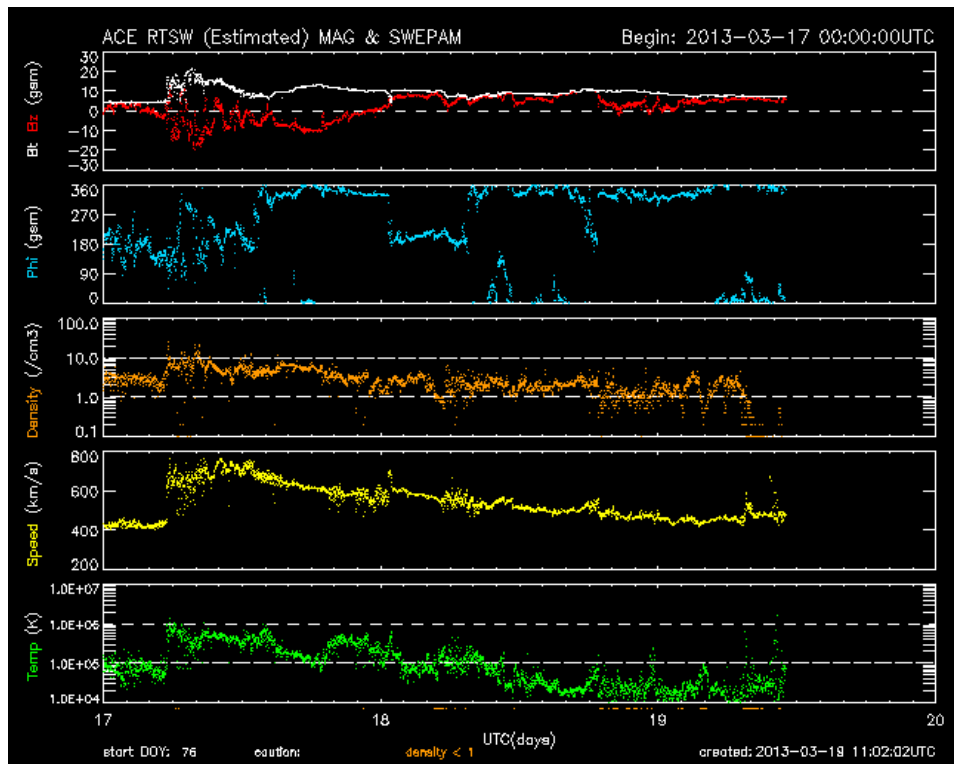
Even on Friday March 15 when the CME that left the Sun on Tuesday March 12th arrived. Only a small jump in the solar wind speed, density and temperature was measured by ACE. The Bz component of the interplanetary magnetic field stayed mainly positive. This was the reason why the geomagnetic influence stayed limited. The graph below shows the in situ measurements done by ACE of 4 solar wind parameters on March 15. The top panel is the solar wind speed, the second is the plasma density, the third shows the total magnetic field and the bottom panel shows the Bz component of the IMF.





However, the conditions changed on March 17 when the full halo CME of Friday March 15th arrived on Earth.

The CME passed the spacecraft ACE just before 3UT: see the graph below. The jump in the magnetic field (top panel), the density (third panel), solar wind speed (fourth panel) and plasma temperature (bottom panel) is a sign that a shock passed. The shock is followed by the post-shock sheath in which Bt (white curve in the top panel) and Bz (red curve in the top panel) fluctuate. At a certain point, Bz turns slowly from negative to positive values: the magnetic field rotates from 1 direction to the opposite direction. This is the magnetic cloud, the actual CME.



The geomagnetic activity reached storm conditions with K values of 5 and 6 measured in Dourbes from Sunday March 17th 09:00UT until Monday March 18th 03:00 UT.

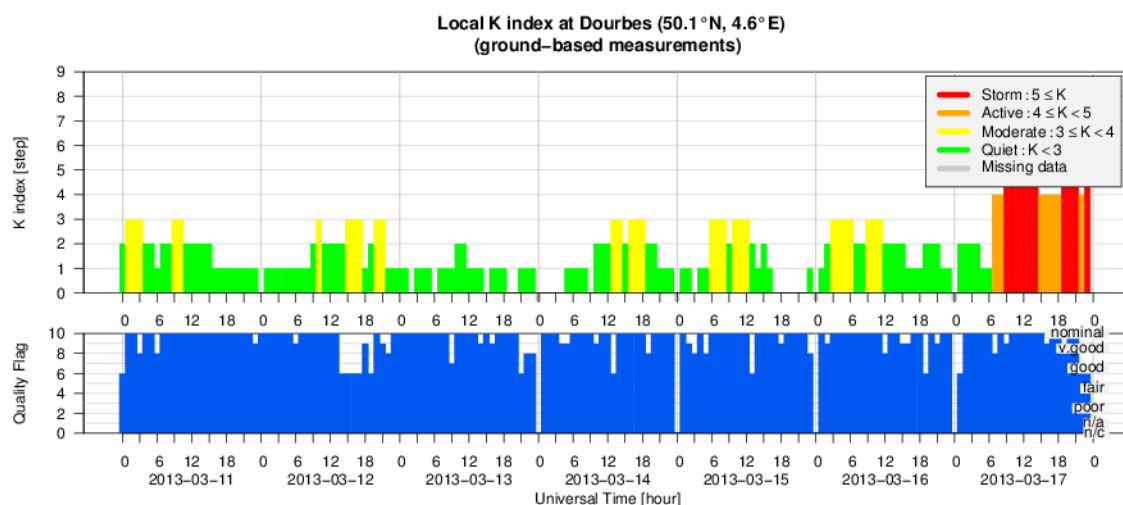
### 5. Noticeable Solar Events (11 Mar 2013 - 17 Mar 2013)

DAY	BEGIN	MAX	END	LOC	XRAY	OP	10CM	TYPE	Cat	NOAA	NOTE
15	0546	0658	0835	N11E12	M1.1	1F	150	IV/2	16	1692	Full halo CME

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 (11 Mar 2013 - 17 Mar 2013)



## 7. PROBA2 Observations (11 Mar 2013 - 17 Mar 2013)

Solar (flaring) activity was low during most of the week, except on Friday, when an M1.1 flare erupted at 5:46.

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/WR155/2013\\_03\\_11\\_00\\_00\\_31\\_2013\\_03\\_17\\_22\\_52\\_31\\_SWAP\\_174\\_\\_AIA\\_304-hq.mp4](http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR155/2013_03_11_00_00_31_2013_03_17_22_52_31_SWAP_174__AIA_304-hq.mp4) (SWAP174/AIA304 combination; HelioViewer.org).

Details about some of the events in this movie can be found further below (limited to SWAP imaging).

During the week, several interesting events occurred, some of which are presented below.

Tuesday 12th:

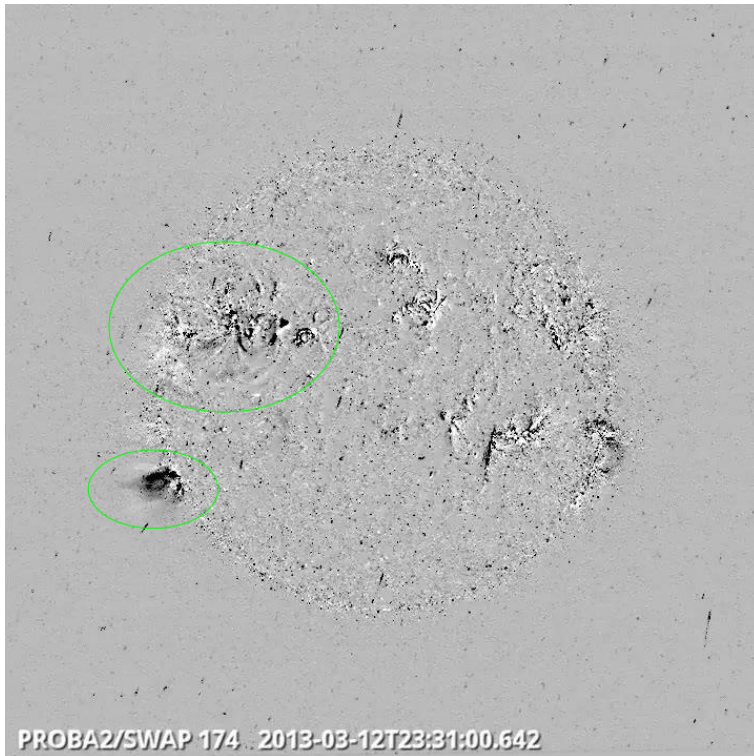


Eruption on the South West limb @ 09:47 - SWAP difference image



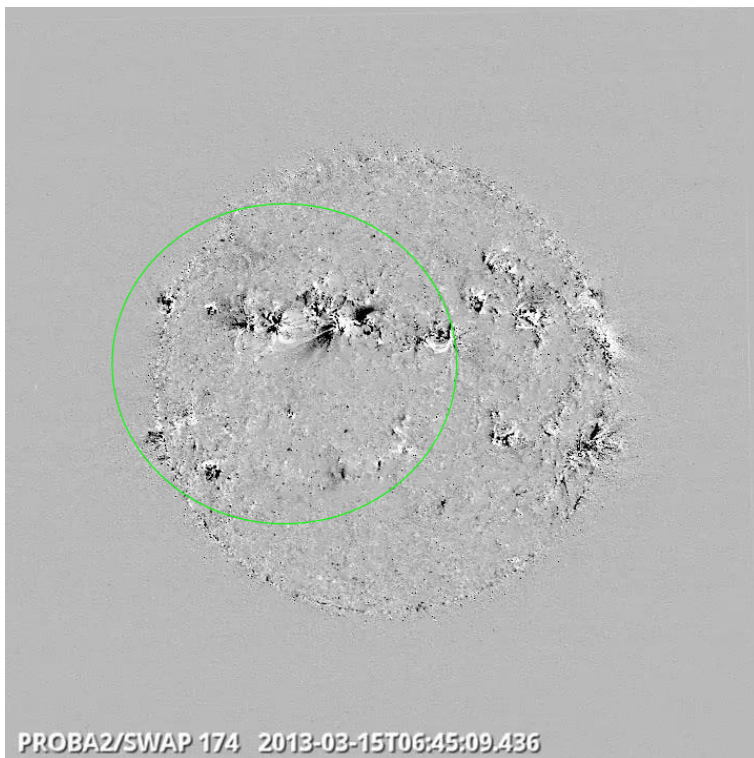
Eruption (C2.0 flare) North Center @ 10:30 - SWAP difference image

Click here for a movie: [http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR155/Events/12Mar2013\\_Eruption\\_C2\\_1030\\_NorthCenter.mp4](http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR155/Events/12Mar2013_Eruption_C2_1030_NorthCenter.mp4).



Double Eruption; East limb (C3.6 flare) and East Center @ 23:31 - SWAP difference image

On Friday 15th, an M1.1 flare occurred in AR 11692, slightly north east of the center of the solar disk:



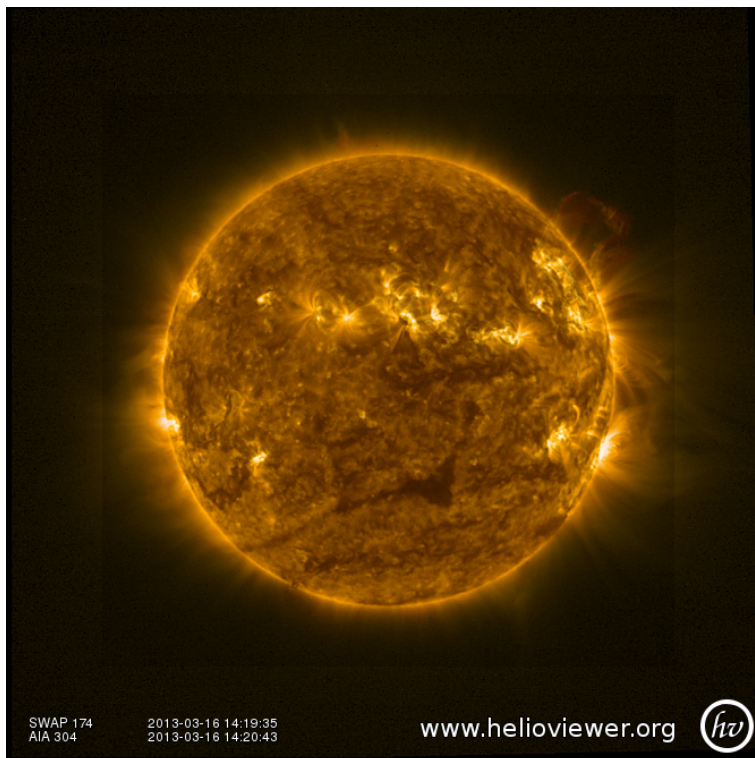
M1.1 flare in AR 11692 @ 06:45 - SWAP difference image

Click here for a movie: [http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR155/Events/SWAP\\_15032013\\_M11flare.mp4](http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR155/Events/SWAP_15032013_M11flare.mp4).

On Saturday 16th, a big filament eruption occurred:



Prominence Eruption @ 14:26 - SWAP difference image



Prominence Eruption @ 14:26 - SWAP + AIA, color - HelioViewer image

For a movie, click here: [http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR155/Events/SWAP\\_16032013\\_BIGPromEruption\\_NWQuadrant.mp4](http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR155/Events/SWAP_16032013_BIGPromEruption_NWQuadrant.mp4)(SWAP difference) or here: [http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR155/Events/2013\\_03\\_16\\_11\\_21\\_19\\_2013\\_03\\_16\\_17\\_20\\_07\\_SWAP\\_174\\_\\_AIA\\_304-hq.mp4](http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR155/Events/2013_03_16_11_21_19_2013_03_16_17_20_07_SWAP_174__AIA_304-hq.mp4) (SWAP+AIA color - HelioViewer)

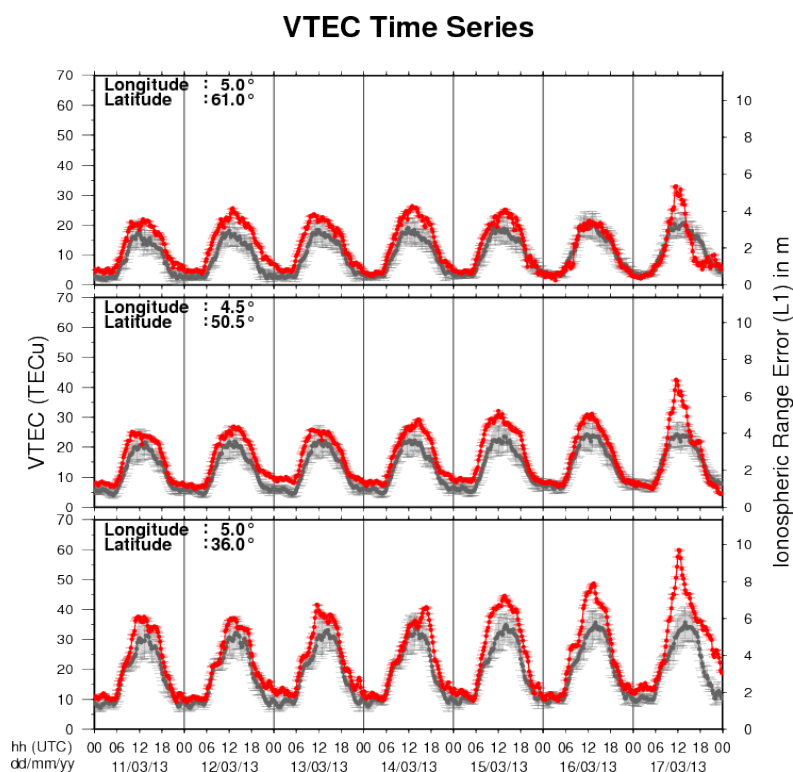
Sunday 17th:



Prominence Eruption @ 17:35, South East Quadrant - SWAP difference image

Click here: [http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR155/Events/SWAP\\_17032013\\_Eruptions\\_SouthEastQuadrant\\_Plus\\_NorthEastQuadrant.mp4](http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR155/Events/SWAP_17032013_Eruptions_SouthEastQuadrant_Plus_NorthEastQuadrant.mp4), for a movie of this eruption, followed by another eruption in the northeast quadrant.

## 8. Review of ionospheric activity (11 Mar 2013 - 17 Mar 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)

## 9. Future Events

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

### 1st Solar Probe Plus Workshop in Pasadena, CA (USA)

Start : 2013-03-26 - End : 2013-03-29

The first Solar Probe Plus Workshop will take place at the Beckman Institute auditorium, California Institute of Technology, Pasadena, from March 26th to 29th, 2013. SPP1 will introduce the Heliophysics



community to the mission and prepare for the exciting discoveries that the Solar Probe Plus mission will make. The Workshop will explore the scientific objectives of the Solar Probe Mission and how the direct exploration of the corona and inner heliosphere will lead to advances in our understanding of coronal heating and solar wind acceleration, the magnetic and plasma structure of the heliosphere, and the acceleration of energetic particles at shocks and flares. The workshop will inspire research that will make use of the SPP observations within the context of the NASA Heliophysics Observatory System and identify key areas for preparatory research. Synergistic observations from other ground based and space based assets will also be addressed.

Website:

<http://www.solarprobeplus.org/>

### **European Geosciences Union General Assembly 2013 in Vienna, Austria**

Start : 2013-04-07 - End : 2013-04-12

The EGU General Assembly 2013 will bring together geoscientists from all over the world into one meeting covering all disciplines of the Earth, Planetary and Space Sciences. Especially for young scientists, it is the aim of the EGU to provide a forum where they can present their work and discuss their ideas with experts in all fields of geosciences. The EGU is looking forward to cordially welcoming you in Vienna.

Website:

<http://www.egu2013.eu/home.html>

### **Causes and Consequences of the Extended Solar Minimum Between Solar Cycles 23 and 24 (4CESM) in Key Largo, FL (USA)**

Start : 2013-04-08 - End : 2013-04-12

The most recent solar minimum, solar cycle 23-24 minimum, was unusually long (266 spotless days in 2008, the most since 1913), and the magnetic field at the solar poles was approximately 40% weaker than the last cycle; and unusually complex (the solar wind was characterized by a warped heliospheric current sheet, HCS, and fast-wind streams at low latitudes: the fast-wind threads the ecliptic more commonly in 2008 than 1996.) This complexity resulted in many effects observed from Sun to Earth, with many observations indicating unusual conditions on the Sun, in the heliosphere, and in the magnetosphere, ionosphere, and upper atmosphere of the Earth.

This remarkable set of conditions provide the scientific community with an exceptional opportunity to assess the nature and structure of a very quiet Sun, and an upper atmosphere relatively devoid of solar influences, helping to provide a better understanding of the relative roles of solar activity and internal variability in the dynamics of the Earth's upper atmosphere and ionosphere. Such an understanding requires a multidisciplinary approach.

The main goal of the conference is to bring together the solar, heliospheric, magnetospheric, upper atmosphere, and ionospheric communities to debate and discuss interdisciplinary work and reach a better understanding of the nature and structure of a very quiet Sun, and of an upper atmosphere relatively devoid of solar influences, and in doing so, to help clarify the role of solar activity in the dynamics and variability of the Earth's upper atmosphere and ionosphere relative to the internal variations.

Website:

<http://chapman.agu.org/solarminimum/>

### **The physics of flares in the lower solar atmosphere in London, UK**

Start : 2013-04-12 - End : 2013-04-12

Solar flares are impulsive releases of energy in the Sun's corona and yet it is emission from the lower atmosphere (the photosphere and chromosphere) that contains the bulk of the energy. This radiation also provides some of the best diagnostics of the flaring process. The availability of optical, UV/EUV and hard X-ray observations, made with the current fleet of space-based (SDO, Hinode, RHESSI, etc.) and ground-based (ROSA, IBIS, Big Bear, etc.) observatories, combined with recent developments in flare modelling, presents a timely opportunity to study the cause and effect of energy deposition in the lower solar atmosphere. The combination of multi-wavelength observations with advanced numerical

simulations can provide key insights into the processes of particle acceleration, plasma heating, energy transport, and wave propagation.

This Royal Astronomical Society discussion meeting will focus on work investigating the response of the solar and stellar atmospheres during a flare's impulsive phase and we welcome contributions from both observation and theory.

Website:

[http://www.astro.gla.ac.uk/?page\\_id=827](http://www.astro.gla.ac.uk/?page_id=827)

### **Space Weather Workshop 2013 in Boulder, CO (USA)**

Start : 2013-04-16 - End : 2013-04-19

The 2013 Space Weather Workshop will be held April 16 - 19, in Boulder, Colorado. This meeting will bring together the customer, forecaster, vendor, and research communities to focus on the impacts of space weather, on forecasting techniques, and on recent scientific advances in predicting conditions in the space environment.

The program will highlight space weather impacts in several areas, including ionospheric disturbances, geomagnetic storms and their solar drivers, radiation belts, and solar energetic particles. Representatives from industries impacted by space weather will be invited to attend, including those from commercial airline, electric power, satellite operations, and navigation/communication industries.

Website:

<http://www.swpc.noaa.gov/sww>

### **Synoptic Network Workshop in Boulder, USA**

Start : 2013-04-22 - End : 2013-04-24

The workshop is being held to discuss and gather community input on science requirements, capabilities and instrumentation for a next-generation synoptic network of solar observing instruments. It is highly probable that such a network should obtain multi-wavelength data, and the intended targets include space weather, helioseismology and solar magnetic fields.

Website:

<https://www2.hao.ucar.edu/synoptic-network-workshop>

### **Space Weather And Plasma in Space in Tel Aviv, Israel**

Start : 2013-04-28 - End : 2013-05-03

Space weather is a new emerging field of space science focused on understanding societal and technological impacts of the solar-terrestrial relations. The Sun has tremendous influence on Earth's space environment, releases energy in the form of electromagnetic and particle radiation that can damage or destroy satellite, navigation, communication and power distribution systems, influence on atmosphere state, magnetosphere and ionosphere activity. Our workshop IsraSWAPS-2013 will be dedicated to the origin, evolution and predictability of physical processes that lead to the space weather hazards. Particular attention will be devoted to application of plasma physics methodologies and achievements to space weather problems. The meeting will also focus on using of plasma understanding as a test bed for astrophysics and space physics. Contributions in observations, theory, numerical simulations, and experiment are welcome.

Website:

[http://www.tau.ac.il/institutes/advanced/cosmic/Conferences/20013\\_IsraSWAPS/SWAPS-2013.htm](http://www.tau.ac.il/institutes/advanced/cosmic/Conferences/20013_IsraSWAPS/SWAPS-2013.htm)

### **Solar Storms Seminar at IET London, UK**

Start : 2013-04-30 - End : 2013-04-30

The IET will hold its second, case-study driven solar storms seminar on 30th April 2013. The extended title of this seminar is: 'Building a business case to protect and prepare ground based infrastructure against geomagnetic storms'. This is an event for science and business come together to grapple with the challenges of solar storm forecasting to culminate in engineering solutions that can withstand the effects of solar storms.

Website:

<http://conferences.theiet.org/solar-storms/index.cfm?origin=/solar-storms>

### **5th EISCAT\_3D User Meeting in Uppsala, Sweden**

Start : 2013-05-06 - End : 2013-05-08

The 5th EISCAT\_3D User Meeting is intended to focus on data analysis and management, while on Tuesday and Wednesday pre-noon (May 7-8) all science topics to be studied by EISCAT\_3D shall be covered.

Website:

[http://www.space.irfu.se/workshops/EISCAT-3D\\_User2013/](http://www.space.irfu.se/workshops/EISCAT-3D_User2013/)

### **NSO Workshop #27: 50 Years of the Seismology of the Sun and Stars in Sunspot, NM (USA)**

Start : 2013-05-06 - End : 2013-05-10

In the last 50 years, helioseismology has made significant contributions to the knowledge of the Sun's interior physics and has led the way to asteroseismology. We have now reached an era where more sophisticated questions are being asked to understand the subtle properties of the Sun and other stars due to the synoptic and high-resolution observations available from BISON, GONG and space missions such as SOHO , SDO, CoRot and Kepler.

On this occasion, a workshop on the theme of '50 years of the seismology of the Sun and stars' is being organized to reflect the progress that has been made as well as to focus on future goals. We plan to bring together helio- and asteroseismologists, theorists and observers in a journey that will take us from the interior of the Sun and its magnetism towards the structure of distant stars and activity cycles.

Website:

<http://www.nso.edu/workshops/2013>

### **AGU Meeting of the Americas, in Cancun, Mexico**

Start : 2013-05-14 - End : 2013-05-17

Welcome to the Meeting of the Americas, a Joint Assembly that covers topics in all areas of the geophysical sciences. Join your colleagues, including Earth and space scientists, educators, students, and other leaders at the Cancun Center in Cancun, Mexico, 14-17 May 2013 as they connect to present groundbreaking research. Sandy beaches and turquoise waters together with Mexican hospitality make this a unique site for another successful Joint Assembly!

Session 'SH10: Solar eruptions from the photosphere to the heliosphere' focuses on observational, modeling and theoretical studies of coronal mass ejections (CMEs) from their formation and initiation at the Sun to their interaction with the solar wind and other eruptions in the interplanetary medium. We are particularly interested in recent advancements on i) the formation or pre-existence of flux ropes as revealed by numerical simulations and SDO observations, ii) the rotation, expansion, deflection, deformation and deceleration of CMEs as they propagate in the corona and heliosphere as revealed by STEREO, IPS and radio observations and simulations, and, iii) the understanding and predicting of CME geo-effectiveness and how it could be improved by future missions.

Website:

<http://moa.agu.org/2013/scientific-program/sessions/sh10/>

### **SPENVIS User Workshop in Brussels, Belgium**

Start : 2013-05-22 - End : 2013-05-24

The SPENVIS User Workshop will be held at the Royal Library of Belgium, Belgium's national and scientific library. It is one of the most important libraries in Europe since its history goes back to the 15th century. It is located in the heart of Brussels at walking distance from the Central Railway Station.

The main objective of this event is to bring the SPENVIS users together to share their experience and to identify their requirements. The workshop will focus on the current and the forthcoming Next Generation SPENVIS systems.

Topics include:

\* Current and future SPENVIS overview

- \* Space Radiation Models and their accuracy
- \* Space Environment Effects (charging, SEE, degradation, micro-particle impacts)
- \* Geant4 Tools
- \* Educational use of SPENVIS
- \* SPENVIS and other tools

Website:

<http://www.spervis.oma.be/workshop/2013/>

## **2013 UAHuntsville Space Weather Summer School in Huntsville, Alabama, USA**

Start : 2013-05-29 - End : 2013-06-07

Website:

<http://swssuah2013.pbworks.com/w/page/60509553/FrontPage>

## **Meeting on Solar Wind Turbulence in Kennebunkport, Maine, USA**

Start : 2013-06-04 - End : 2013-06-07

Our goal is somewhat different from more familiar conferences and is designed with the SHINE model in mind. We are inviting very few speakers who we are asking to give review and introductory talks for each topic we hope to discuss. Those invited review talks will be largely non-controversial and focus upon agreed-upon results. They are also likely to contain challenges for the participants to explain. Then, the bulk of the time is left unscheduled and we ask the participants to give short, focused talks that lead to discussion and debate on the fundamental aspects of the subject at hand.

We expect that everyone who attends will have ample opportunity to enter into the debate and we hope to stimulate a lively discussion of fundamental physics.

We hope you will join us. Bring multiple 5-minute talks that attempt to make specific points so you can enter into the debate clearly and propel the discussion forward. No one is expected to be given a large block of time to speak. The goal is meaningful and focused debate. Remember, you may not convince everyone, but there will be many participants who want to understand your point of view. Our goal is to debate and illuminate, providing inspiration to all.

Website:

<http://www-ssg.sr.unh.edu/mag/Kennebunkport2013/Kennebunkport2013.html>

## **Space Climate Symposium-5 in Oulu, Finland**

Start : 2013-06-11 - End : 2013-06-15

Space Climate is an interdisciplinary science that deals with the long-term change in the Sun, and its effects in the heliosphere and in the near-Earth environment, including the atmosphere and climate. A special focus will be on studies of the causes, consequences and implications of the present, unusually low solar activity since solar cycle 23 that, most likely, indicates the imminent end of the Modern Grand Maximum of solar activity. Other topics include solar dynamo, solar irradiance variations, solar wind, geomagnetic field and activity, cosmic rays and cosmogenic isotopes, and solar effects on different layers of the atmosphere and on local and global climate, as well as possible solar effects on human health and on the development of human cultures.

Website:

<http://www.spaceclimate.fi/>

## **ISEST (International Study for Earth-Affecting Solar Transients) Workshop in Hvar, Croatia**

Start : 2013-06-17 - End : 2013-06-20

The workshop is to improve the scientific understanding of the origin and propagation of solar transients, and develop the prediction capacity of these transients' arrival and potential impact on the Earth.

This workshop is the activity of the ISEST program in CAWSES-II / Task Group 3. The workshop engages coordinated international activities in observation, theory and modeling, and involves scientists in both developed and developing countries, and provides an online platform for educational opportunities for students.

Website:

<http://spaceweather.gmu.edu/meetings/ISEST/Home.html>

### **SWWT Plenary Meeting**

Start : 2013-06-19 - End : 2013-06-19

The SWWT is a forum open to European experts in a variety of both scientific and application oriented fields relating to space weather. The SWWT plays an important role in advising ESA in space weather strategy and acts as a forum for discussion amongst the European space weather community. The SWWT is responsible for promoting coordinated European space weather activities at both national and industry levels. The SWWT seeks to identify and discuss potential collaborations and/or synergies with other structures or organisations such as the EC FP7 & COST programmes and others.

Each year they organise a Plenary Meeting.

### **Atomic physics, plasma spectroscopy, and space solar physics: Celebrating the achievements of Alan Gabriele at Orsay, France**

Start : 2013-06-20 - End : 2013-06-20

This conference aims at presenting the status of atomic physics, plasma spectroscopy, and solar physics from space, put in the perspective of the achievements made with SOHO and the missions that followed. In addition, our friend and colleague Alan Gabriel will celebrate his 80th birthday. In anticipation of this, it will be an excellent opportunity to celebrate his many (and continuing) contributions to science in various fields. They range from atomic physics and plasma spectroscopy (theta-pinch machine) to solar and space physics - from Skylab, SMM (PI of XRP), Spacelab2, to SOHO (GOLF, CDS, EIT, SUMER ) - as well as science management, including RAL (UK), IAS (France), ESA SSWG (and SSAC), NASA/ESA Solar Orbiter/Sentinels.

Presentations addressing new results in atomic physics, plasma spectroscopy and solar physics are welcome, along with reminiscences related to Alan, which are warmly encouraged.

Website:

<http://www.ias.u-psud.fr/AHG/>

### **ILWS Science Workshop in Irkutsk, Russia**

Start : 2013-06-23 - End : 2013-06-29

The 2013 ILWS Science Workshop will take place June 23-29, 2013 in Irkutsk, Russia and will be hosted by the Institute of Solar-Terrestrial Physics of the Russian Academy of Sciences

Website:

[http://en.iszf.irk.ru/ILWS\\_2013](http://en.iszf.irk.ru/ILWS_2013)

### **Asia Oceania Geosciences Society (AOGS) Annual Meeting in Brisbane (Australia)**

Start : 2013-06-24 - End : 2013-06-28

Asia Oceania Geosciences Society (AOGS) was established in 2003 to promote geosciences and its application for the benefit of humanity, specifically in Asia and Oceania and with an overarching approach to global issues.

Asia- Oceania region is particularly vulnerable to natural hazards, accounting for almost 80% human lives lost globally. AOGS is deeply involved in addressing hazard related issues through improving our understanding of the genesis of hazards through scientific, social and technical approaches.

AOGS holds annual conventions providing a unique opportunity of exchanging scientific knowledge and discussion to address important geo-scientific issues among academia, research institution and public. Recognizing the need of global collaboration, AOGS has developed good co-operation with other international geo-science societies and unions such as the European Geosciences Union (EGU), American Geophysical Union (AGU), International Union of Geodesy and Geophysics (IUGG), Japan Geo-science Union (JpGU), and Science Council of Asia (SCA).

Website:

<http://www.asiaoceania.org/aogs2013/public.asp?page=home.htm>

## **2013 Radiation Belts Workshop at Island of Santorini, Greece**

Start : 2013-06-30 - End : 2013-07-04

The 2013 Radiation Belts Workshop is the first of a series of radiation belt meetings that are planned to be held in the Aegean islands.

As its title conveys, this first workshop includes sessions on radiation belt research and specification. The workshop focuses, in particular, on the properties of low frequency electromagnetic waves and their effects on radiation belts dynamics. The other highlight of the workshop is the ongoing international effort on improvement of the AE9/AP9 Next Generation Radiation Specification Models. These sessions will be complemented with presentations of the progress achieved by a most relevant FP7-Space project titled MAARBLE (Monitoring, Analyzing and Assessing Radiation Belt Loss and Energization).

Website:

<http://www.space.noa.gr/rbw13/>

## **2013 Heliophysics Summer School in Boulder, Colorado (USA)**

Start : 2013-07-12 - End : 2013-07-19

Applications are invited for the 2013 Heliophysics Summer School, which will be held in beautiful Boulder, Colorado. We are seeking students and undergraduate level teachers and instructors to join us this coming summer for a unique professional experience. Students and teachers will learn about the exciting science of heliophysics as a broad, coherent discipline that reaches in space from the Earth's troposphere to the depths of the Sun, and in time from the formation of the solar system to the distant future. At the same time, a goal of the Summer School is for the group of instructors to develop materials from Heliophysics that can be applied in their classes.

The Heliophysics Summer School focuses on the physics of space weather events that start at the Sun and influence atmospheres, ionospheres and magnetospheres throughout the solar system. The solar system offers a wide variety of conditions under which the interaction of bodies with a plasma environment can be studied: there are planets with and without large-scale magnetic fields and associated magnetospheres; planetary atmospheres display a variety of thicknesses and compositions; satellites of the giant planets reveal how interactions occur with subsonic and sub-Alfvénic flows whereas the solar wind interacts with supersonic and super-Alfvénic impacts.

Encompassed under a general title of comparative magnetospheres are processes occurring on a range of scales from the solar wind interacting with comets to the interstellar medium interacting with the heliosphere. The school will address not only the physics of all these various environments but will also go into the technologies by which these various environments are being observed. The program is complemented with considerations of the societal impacts of space weather that affects satellites near Earth and elsewhere in the solar system.

The school will be based on lectures, laboratories, and recitations from world experts, and will draw material from the three textbooks Heliophysics I-III, published by Cambridge University Press.

Several teachers along with about 35 students will be selected through a competitive process organized by the UCAR Visiting Scientist Programs. The school lasts for eight days, and each participant receives full travel support for airline tickets, lodging and per diem costs.

Website:

<http://www.vsp.ucar.edu/Heliophysics/>

## **Space weather summer school in Alpbach, Austria**

Start : 2013-07-16 - End : 2013-07-25

The Summer School Alpbach enjoys 36 years of tradition in providing in-depth teaching on different topics of space science & technology, featuring lectures and concentrated working sessions on mission studies in self-organised working groups. 60 young highly qualified European science and engineering students converge annually for stimulating 10 days of work in the Austrian Alps. 4 teams compete to design a space mission judged by a jury of experts. Students learn how to approach the design of a satellite mission and explore new and startling ideas supported by experts. The Summer School 2013 will focus on Space Weather .

The purpose of the Summer School is to foster the practical application of knowledge derived from lectures, to develop organisational and team-work skills and to encourage creativity. Teams will compete to design the best project, judged by an independent jury. The teams themselves are responsible for the selection of the subject of the project and for the team structure and working methods.

Website:

<http://www.summerschoolalpbach.at/>

### **2013 CISM Summer School, in Boulder, Colorado, USA**

Start : 2013-07-22 - End : 2013-08-02

The CISM Summer School is intended to give students a comprehensive immersion in the subject of space weather: what it is, what it does, and what can be done about it. Space weather is many things: beautiful when seen through the eyes of a sun-viewing telescope, fascinating when studied for its alien worlds of magnetic structures and phenomena, awesome when witnessed as a solar eruption or auroral storm, and devastating to the users of services it disrupts. Space weather links the Sun, the Earth, and the space in between in a branching chain of consequences. Weather systems on the Sun can spawn interplanetary storms of colossal size and energy that envelop the whole planet in electrical hurricanes. Such storms attack high-tech, complex, and expensive technological systems that provide much of the infrastructure that allows modern society to function.

Website:

<https://www2.hao.ucar.edu/docs/2013-cism-summer-school>

### **1st SOLARNET Workshop, 3rd EAST/ATST meeting: 'Synergies between ground- and space-based solar research', in Oslo, Norway**

Start : 2013-08-05 - End : 2013-08-08

The goal of this workshop is to foster collaborations between ground and space solar projects. This workshop is expected 1) to provide a forum to discuss the use of current and future observational solar facilities, and how to optimise their scientific returns; 2) to identify the potentially paradigm-shifting observations that will become possible with the next generation ground- and space-based solar telescopes and their advanced instrumentation; 3) to foster collaborations between researchers working at the development of ground- and space-based projects and creation of synergies between research programs at different wavelength bands.

A workshop webpage and more information will follow shortly - the purpose of this pre-announcement is to enable early bookings in your calendar.

### **XIIIth IAGA Scientific Assembly in Merida, Yucatan, Mexico**

Start : 2013-08-16 - End : 2013-08-31

The Local Organising Committee and the Mexico National Committee of IUGG have the great pleasure to welcome you to the 11th Scientific Assembly of the International Association of Geomagnetism and Aeronomy (IAGA) which is held in Mérida Yucatán, Mexico from 26 to 31 August 2013 with the motto: "Living on a Magnetic Planet". Our Magnetic Planet Capricious (Changeable or Unpredictable) Field.

In order to increase the visibility and attractiveness of IAGA to young researchers, to motivate them to play active role within IAGA and to create (and enhance) their awareness of IAGA and sense of belonging to IAGA, the first IAGA Summer School will be organized just prior the Assembly. The summer school will provide overview of the activities carried out within all the IAGA divisions, with subjects from paleomagnetism and magnetic anisotropy through observatories and geomagnetic field modeling to ionospheric and aeronomic research. At least 20 young scientists from all around the world will be invited based on the nominations from Working Groups and Divisions. Special call and more information will be published before the end of 2012.

Website: <http://iaga2013.org.mx/>

### **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>

### **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://stce.be/SpSTraining/>

## **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/>

## **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.cospas-assembly.org/>

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

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