STCE Newsletter

2 Sep 2013 - 8 Sep 2013

Published by the STCE - this issue : 12 Sep 2013. Available online at http://www.stce.be/newsletter/ .

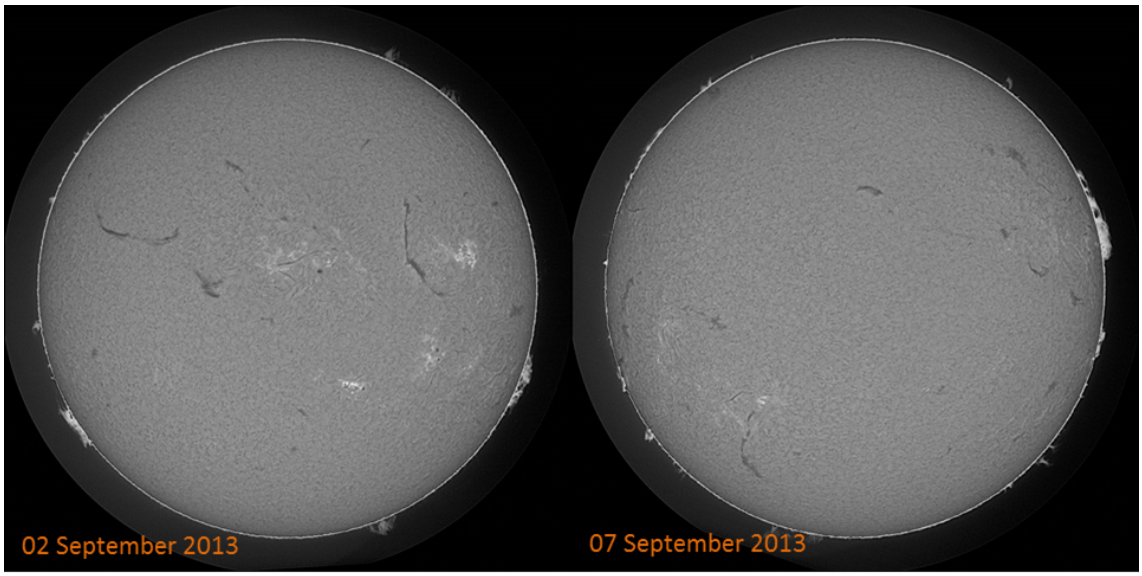
The Solar-Terrestrial Centre of Excellence (STCE) is a collaborative network of the Belgian Institute for Space Aeronomy, the Royal Observatory of Belgium and the Royal Meteorological Institute of Belgium.

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

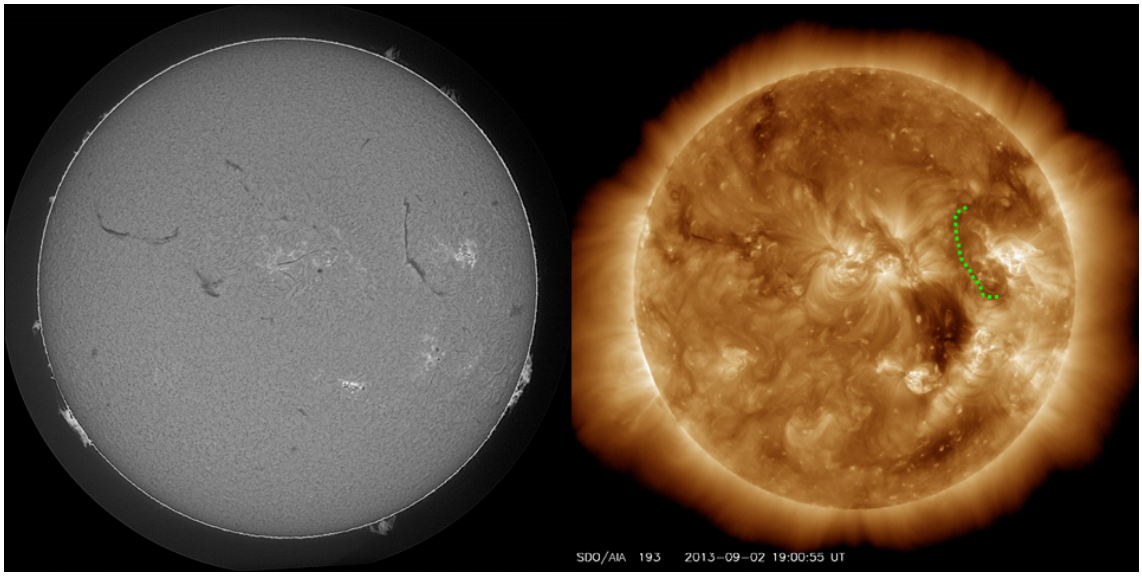
1. A filament seen in profile (2 Sep 2013 - 8 Sep 2013)

Solar filaments are clouds of ionized gas above the solar surface squeezed between magnetic regions of opposite polarity. Being cooler and denser than the plasma underneath and their surroundings, they appear as dark lines when seen on the solar disk using special filters, such as Hydrogen-alpha that shows the "cold" inner atmosphere of the Sun ("chromosphere").

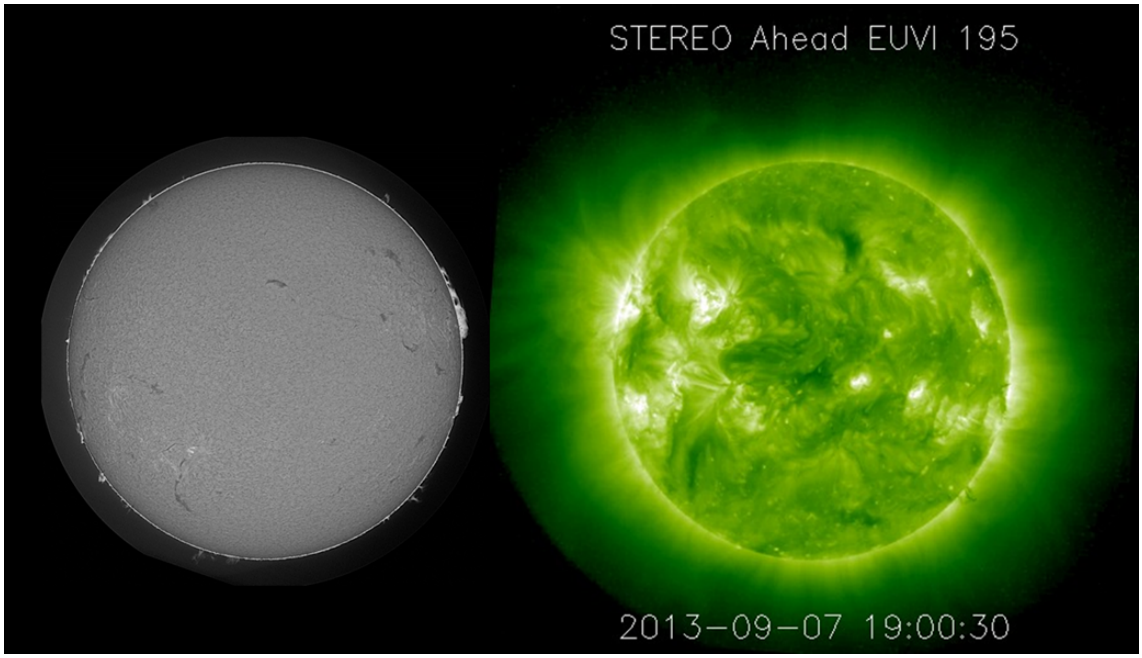
Early September, a rather long filament transited the solar disk, measuring about 260,000 km in length or more than 6 times the Earth's circumference. Around 6 September, the filament started to rotate over the western solar limb (movie at http://www.youtube.com/watch?v=Ad8o8PWSCNc from 2 till 8 September). No longer was it visible as a dark line. Instead, it showed itself as a brilliant stretched bulge, as it was now seen from aside (in profile). Though it is still the same solar feature, its appearance is so different that scientist in the past gave it a different name: prominence, a name that is still used today. The height of the prominence was measured to be about 35,000 km, or nearly 3 Earth diameters.



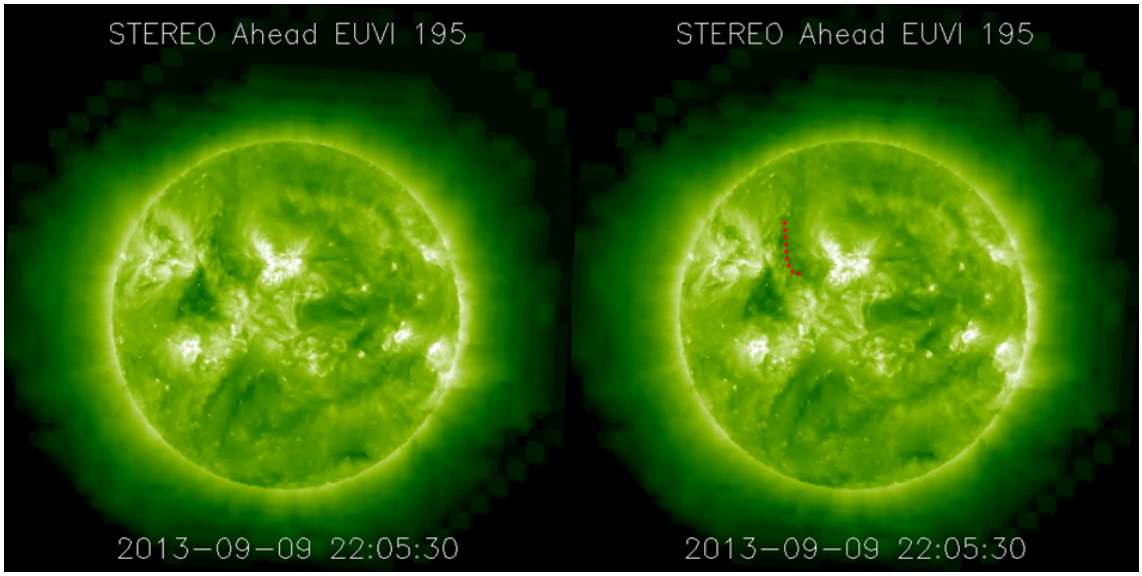
The long filament was squeezed between 2 (quiet) sunspot groups and a (small) coronal hole, as can be seen in EUV images made by SDO. Both as a filament and as a prominence, the feature was highly dynamical, but did not catastrophically erupt.



For STEREO-A, a spacecraft monitoring the Sun's backside, this blob of ionized gas became first visible as a prominence at the east limb. Then, as the solar rotation gradually moved it onto the solar surface visible for STEREO-A, it became a filament (dark line) once again.



The filament remained very active, but there has not been any eruption yet. So, it will be interesting to see whether or not the filament survives its trip over the Sun's backside, and -for viewers from Earth- will become visible once again as a prominence, this time at the eastern limb of the Sun.

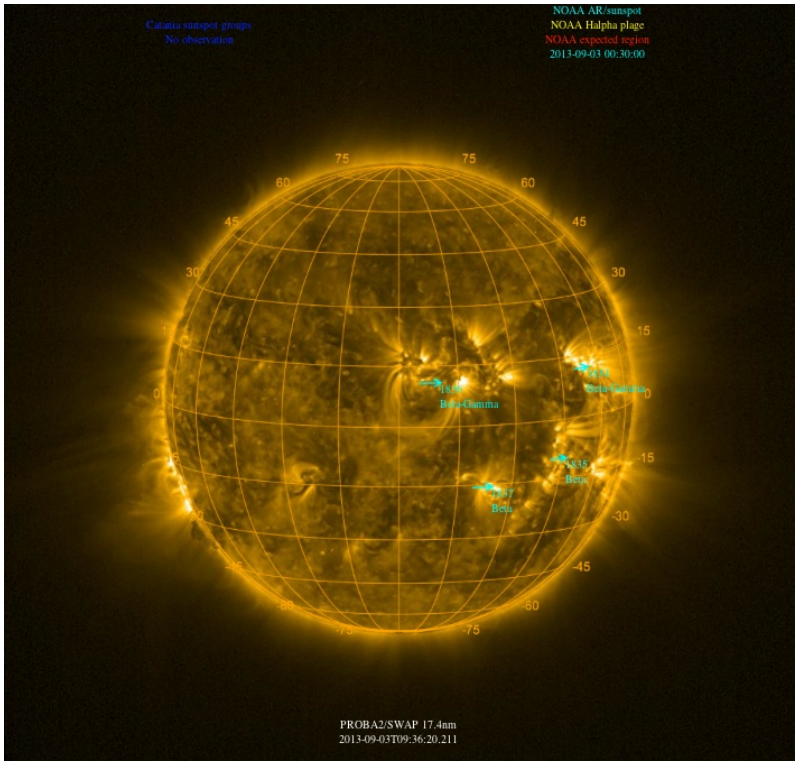


Credits - Imagery was taken from the GONG H-alpha network (http://halpha.nso.edu/), SDO (http://sdo.gsfc.nasa.gov/) and STEREO (http://sdo.gsfc.nasa.gov/).

2. Review of solar activity (2 Sep 2013 - 8 Sep 2013)

SOLAR ACTIVITY

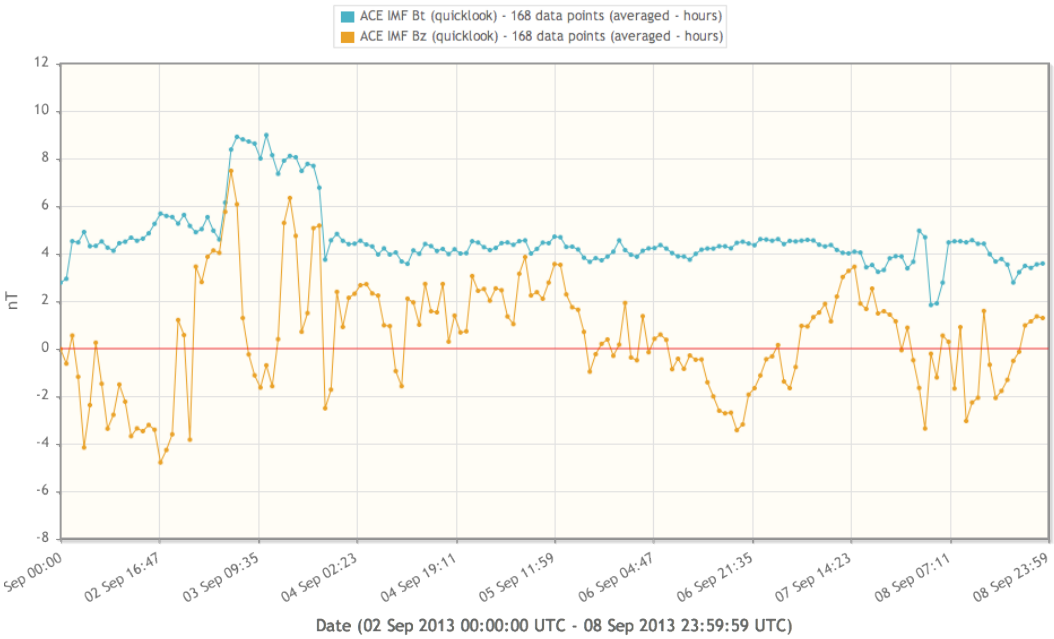
Solar activity was quiet to eruptive, with thirteen C flares being recorded throughout the week. The main active regions were NOAA AR 11834, 11836, and 11837.



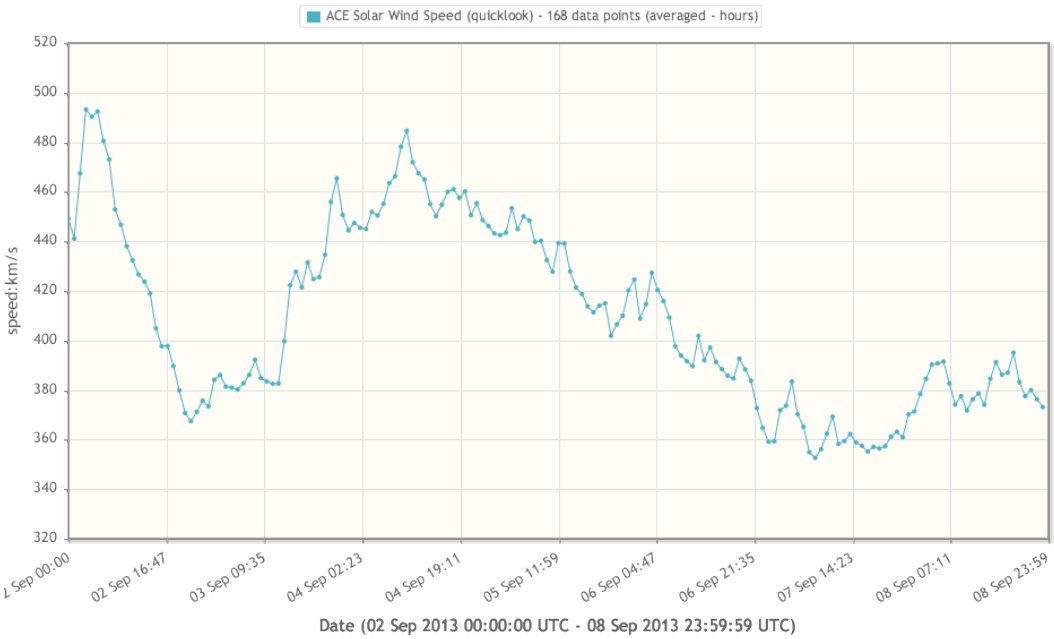
Previous week, on September 1, a coronal hole crossed the central meridian. The hole was situated between 20°S and 5°N. Compared to the previous solar rotation, the coronal hole had grown significantly, but as you can read below, it didn't cause any trouble.

GEOMAGNETIC ACTIVITY

The geomagnetic field was at quiet levels throughout the week. On September 3, a co-rotating interaction region linked with the coronal hole mentioned above arrived: the magnetic field became stronger. This is visible in the graph where the total interplanetary magnetic field (IMF) and the z-component of the magnetic field are shown. These parameters are measured by ACE at the L1 point. Especially Bz determines if the IMF interacts more or less strong with the earth magnetic field: large negative values favour strong interactions. This was definitely not the case here.

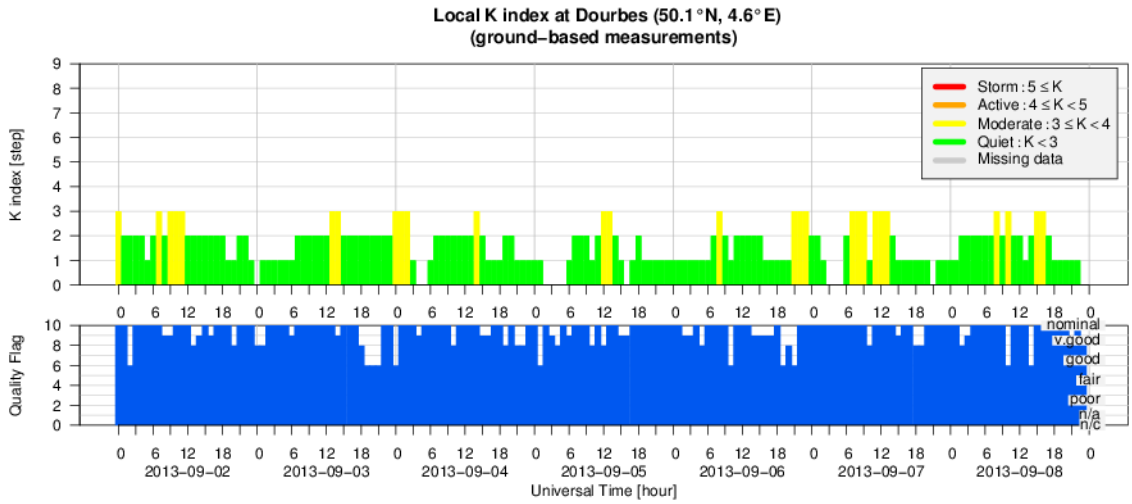


The solar wind associated with this coronal hole had a speed of almost 500 km/s and peaked on September as can be seen in the graph below: it shows the solar wind speed measured by ACE.

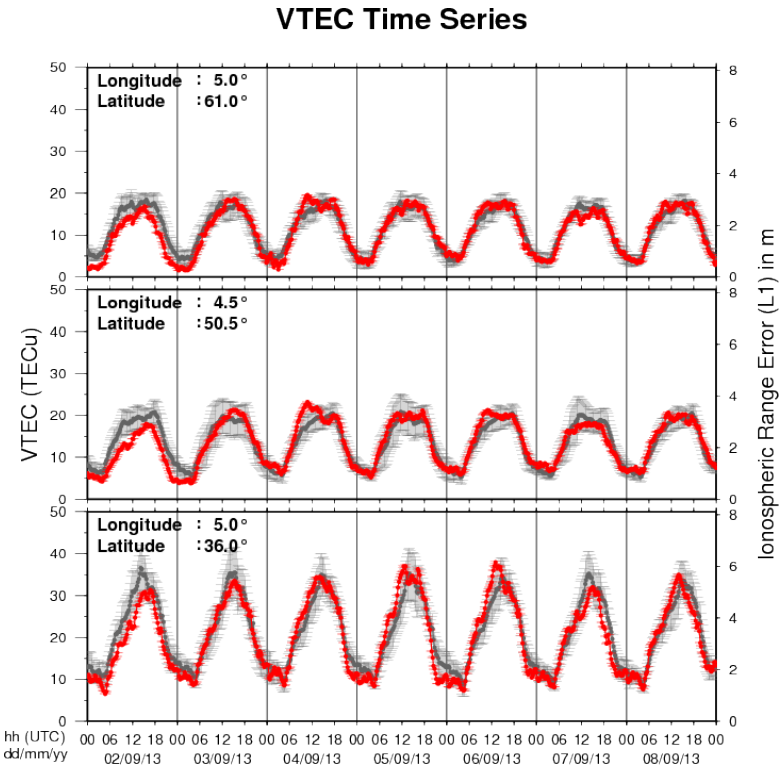


The coronal hole did leave a signature in ACE-data, but noticeable geomagnetic consequences on the planetary level were absent.

3. Geomagnetic Observations at Dourbes (2 Sep 2013 - 8 Sep 2013)



4. Review of ionospheric activity (2 Sep 2013 - 8 Sep 2013)



The figure shows the time evolution of the Vertical Total Electron Content (VTEC) (in red) during the last week at three locations:
a) in the northern part of Europe(N61°, 5°E)
b) above Brussels(N50.5°, 4.5°E)
c) in the southern part of Europe(N36°, 5°E)
This figure also shows (in grey) the normal ionospheric behaviour expected based on the median VTEC from the 15 previous days.

The VTEC is expressed in TECu (with TECu=10^16 electrons per square meter) and is directly related to the signal propagation delay due to the ionosphere (in figure: delay on GPS L1 frequency).
The Sun's radiation ionizes the Earth's upper atmosphere, the ionosphere, located from about 60km to 1000km above the Earth's surface.The ionization process in the ionosphere produces ions and free electrons. These electrons perturb the propagation of the GNSS (Global Navigation Satellite System) signals by inducing a so-called ionospheric delay.

See http://stce.be/newsletter/GNSS_final.pdf for some more explanations ; for detailed information, see http://gnss.be/ionosphere_tutorial.php

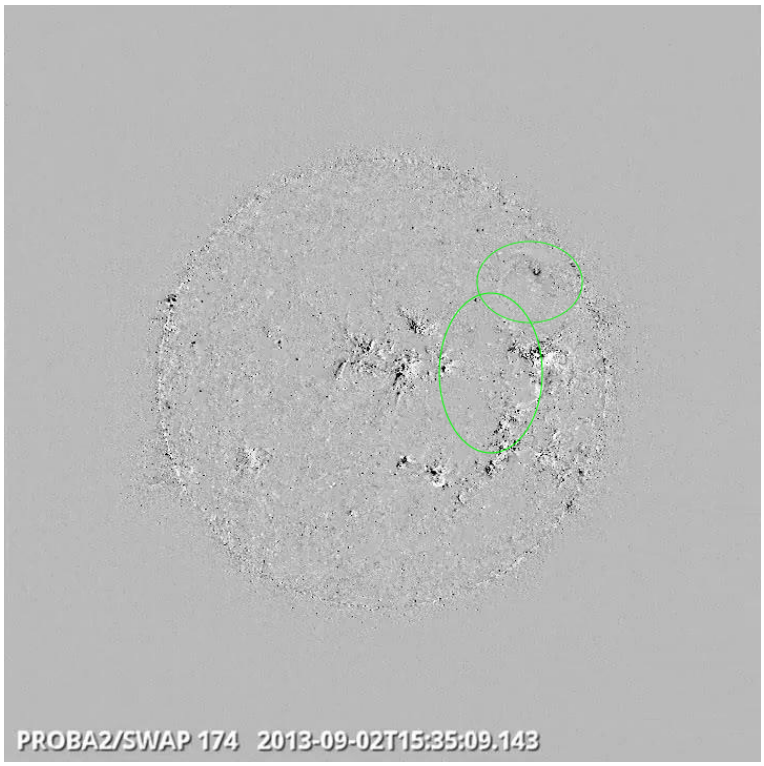
5. PROBA2 Observations (2 Sep 2013 - 8 Sep 2013)

Solar (flaring) activity fluctuated between low and very low during the week.

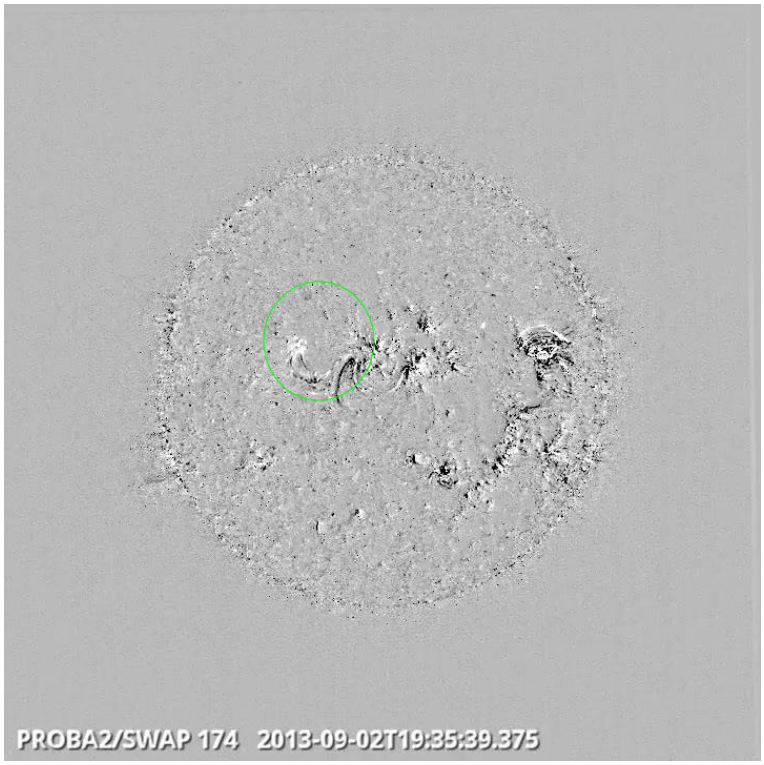
In order to view the activity of this week in more detail, we suggest to go to the following website from which all the daily (normal and difference) movies can be accessed: http://proba2.oma.be/ssa.
This page also lists the recorded flaring events.

A weekly overview movie can be found here: http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR180_Sep02_to_Sep08_2013/2013_09_02_00_01_18_2013_09_08_23_17_08_SWAP_174-hq.mp4 (SWAP174, HelioViewer.org).
Details about some of this week's events, can be found further below.

Monday September 02



Flows on the Equator in Western Hemisphere, followed by a filament eruption in the North East Quadrant @ 15:35 (SWAP difference image). Find a movie of the events here: http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR180_Sep02_to_Sep08_2013/Events/20130902_FlowsandFilamentEruption_NorthWestQuad_1535_swap_diff.mp4 (SWAP difference movie).



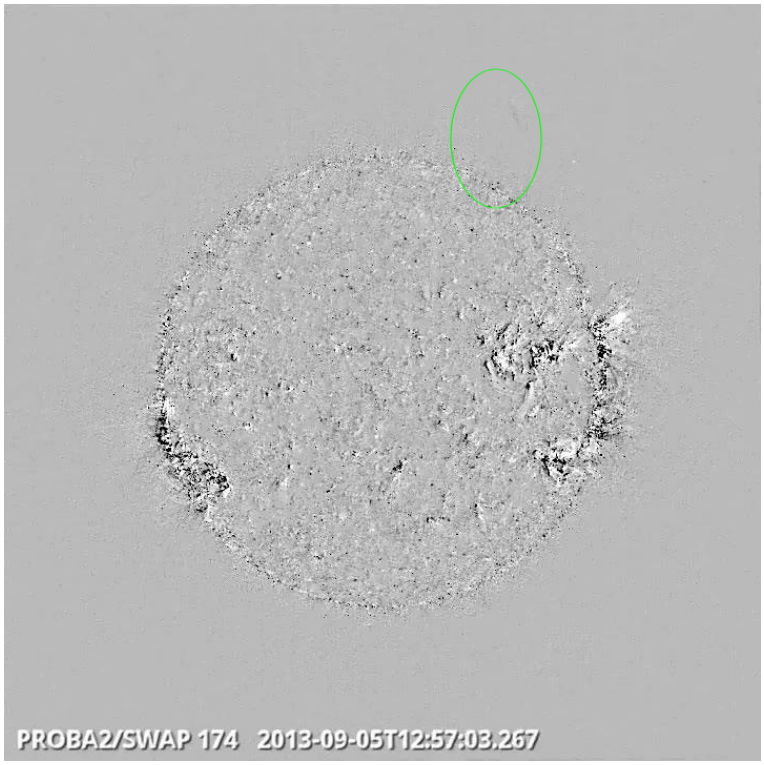
Flows in North Western Quadrant @ 19:35 (SWAP difference image). Find a movie of the events here: http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR180_Sep02_to_Sep08_2013/Events/20130902_FlowsNorthCenterRegion_1935_swap_diff.mp4 (SWAP difference movie).

Wednesday September 04

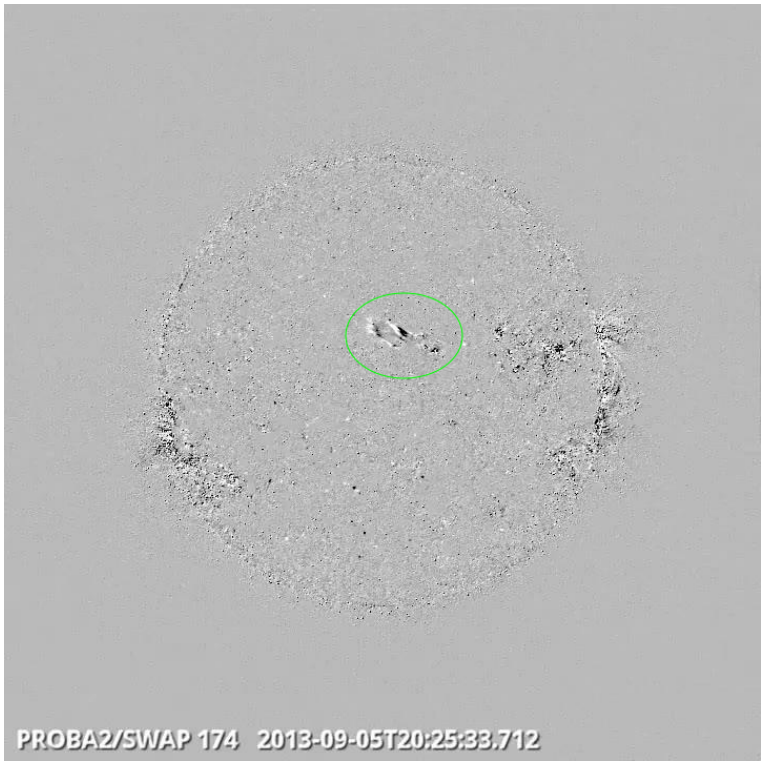
Flow on South East Limb @ 05:08 (SWAP difference image). Find a movie of the event here: http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR180_Sep02_to_Sep08_2013/Events/20130904_FlowSouthEastLimb_0508_swap_diff.mp4 (SWAP difference movie).

Eruption on South East Limb @ 22:43 (SWAP difference image). Find a movie of the event here: http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR180_Sep02_to_Sep08_2013/Events/20130904_EruptioinSouthEastLimb_2243_swap_diff.mp4 (SWAP difference movie).

Thursday September 05

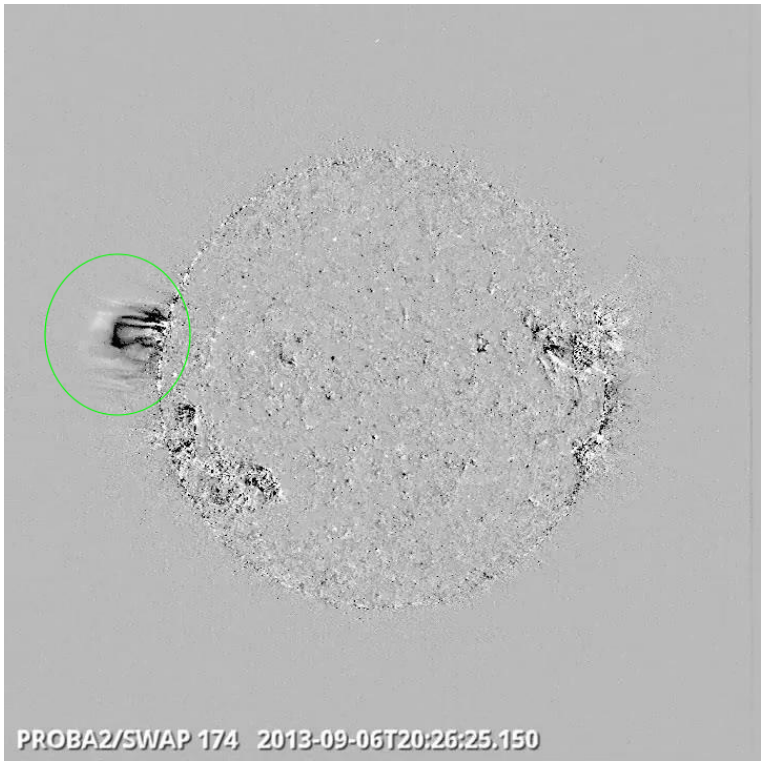


Prominence Eruption on North West Limb @ 12:57 (SWAP difference image). Find a movie of the event here: http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR180_Sep02_to_Sep08_2013/Events/20130905_FilamentEruptionNorthWestLimb_1257_swap_diff.mp4 (SWAP difference movie).



Eruption in Center of North Hemisphere @ 20:25 (SWAP difference image).

Friday September 06



Eruption on North East Limb @ 20:26 (SWAP difference image). Find a movie of the event here: http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR180_Sep02_to_Sep08_2013/Events/20130906_Eruption_NorthEastLimb_2026_swap_diff.mp4 (SWAP difference movie). A few, less violent, eruptions occurred in that area, before and after this eruption.

6. Future Events

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

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

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 constrains 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 Heliogragh, and Optical & Near-Infrared Solar Eruption Tracer (ONSET). Therefore, colleagues have agreed to hold regional solar physics meetings regularly. The first Asian-Pacific Solar Physics Meeting (APSPM) was held in Bangalore during March 22-24 2011. During the meeting, a consensus was achieved that it might be a good idea to have the APSPM every three years. Somehow the second APSPM was proposed to be held by mainland China in 2013. APSPM is aimed to exchange the recent research results in solar physics in the emerging asian-pacific region.
Website:
http://sdac.nju.edu.cn/~solar/

Helicity Thinkshop on Solar Physics in Beijing, China

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

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

Start : 2013-10-28 - End : 2013-11-02
The Worshop and School on Radio Sun in Beijing and Inner Mongolia during Oct.28 - Nov. 2, 2013 is the first international academic seminar supported by the International Research Staff Exchange Scheme of the Seventh Fromework Programme of the European Union (FP7-IRSES-295272-RADIOSUN).
The primary aim of this programme is to establish close research interaction and collaboration between the key research groups involved in CSRH, SSRT, and ALMA projects and in development of relevant theory and data analysis tools, through the systematic research staff and knowledge exchange, joint research efforts exploiting existing data and facilities, and preparing the future world-class partnership in exploitation of the upcoming facilities.

The Workshop and School welcome all solar physicsts and students who are interested in solar radio astronomy to participate. We will discuss and exchange the scientific frontier problems, including the new-generation radio instruments (CSRH, Siberian multi-frequency radioheliograph, LOFAR, ALMA, and other new instruments), recent achievements and their scientific goals; methods and techniques of data processing (for example, software, radio image reconstructions, and method for studying various types of solar radio fine structures); and the objectives of new observational data and new mathematical methods.
Website:
http://beijingradiosun.csp.escience.cn/

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

Start : 2013-11-11 - End : 2013-11-22
Magnetic fields play an important role in many astrophysical processes. But magnetic are difficult to detect and to model or understand, since the fundamental equations describing the behavior of magnetized plasmas are highly non-linear. Hence, magnetic fields are often an inconvenient subject which is overlooked or simply neglected. Such difficulty burdens the research on magnetic fields, which has evolved to become a very technical subject, with many small disconnected communities studying specific aspects and details.
The school tries to amend the situation by providing a unifying view of the subject. The students would have a chance to understand the behavior of magnetic fields in all astrophysical contexts, from cosmology to the Sun. From star-bursting regions to AGNs in galaxies. The school will present a balanced yet complete review of our knowledge. Extensions into the unknown are also important to indicate present and future lines of research.
The Winter School will bring together in a relaxed working atmosphere a number of the leading scientists in this field, PhD students and recent postdocs. The conditions for a successful interaction will be granted, including two special sessions for those students that want to present their own work.
Website:
http://www.iac.es/winterschool/2013/

7th Hinode science meeting in Takayama, Japan

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

Space Weather: the importance of observations in London, UK

Start : 2013-11-13 - End : 2013-11-13
Most space weather occurs due to the Sun's emissions which can affect the Earth's space environment. Modern society is ever more dependent upon ground-based & spaceborne technology which can be vulnerable to space weather. Satellites, GPS, aviation & the electric power industry are all at risk from this & hence space weather is now included on the UK's National Risk Register. It is important to have

long-running, continuous observations for forecasting, nowcasting & for research in space weather. This public meeting, held during the peak of the 11 year solar cycle, addresses the deficiency in continuous, long-term observations & how this might be overcome.
Website:
http://www.rmets.org/events/space-weather-importance-observations

International CAWSES-II Symposium in Nagoya, Japan

Start : 2013-11-18 - End : 2013-11-22
This International CAWSES-II Symposium hosted by SCOSTEP (Scientific Committee on Solar-Terrestrial Physics) will provide an excellent opportunity to discuss the scientific accomplishments of CAWSES-II and look forward to SCOSTEP's future programs at a moment toward the end of its five-year period. The symposium will cover the six major themes of CAWSES-II tasks: 1) What are the solar influences on the Earth's climate?, 2) How will geospace respond to an altered climate?, 3) How does short-term solar variability affect the geospace environment?, 4) What is the geospace response to variable inputs from the lower atmosphere?, 5) Capacity Building, 6) Informatics and eScience. The main functions of CAWSES-II are to help coordinate international activities in observations, modeling, and applications crucial to achieving this understanding, to involve scientists in both developed and developing countries, and to provide educational opportunities for students of all levels. The symposium offers keynotes/lectures that will be interesting for all participants every morning and more specific sessions of presentations in the afternoon. We welcome all those who are involved and/or interested in CAWSES-II to Nagoya in the autumn when we will have the pleasure of being surrounded by beautiful colorful leaves of this season.
Website:
http://www.cawses.org/CAWSES/leaflet_CAWSES-II_120229.pdf

European Space Weather Week in Belgium

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

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/

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

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

14th European Solar Physics Meeting in Dublin, Ireland.

Start : 2014-09-08 - End : 2014-09-12
The European Solar Physics Meetings aim to highlight all aspects of modern solar physics, including observation and theory that span from the interior of the Sun out into the wider heliosphere. These meetings provide a broad, yet stimulating, environment for European and international scientists to share their research in solar physics.
The meeting will mostly comprise of contributed talks and poster presentations, with several invited review talks (typically one per session). Posters will be on display for the whole meeting in close proximity to the lecture theatre. Refreshments will be served in the poster viewing area during two dedicated coffee/poster breaks on each full day.
Website: http://www.espm14.ie/

Solar Wind 14 in Weihai, China

Start : 2015-06-22 - End : 2015-06-26
The Fourteenth International Solar Wind Conference will be held for the first time ever in China, from 22 to 26 June 2015, at Weihai in the Shandong province. It will be jointly organized by the School of Earth and Space Sciences of Peking University and the newly-established Institute of Space Sciences of Shandong University. The meeting will take place in the Space Science Building of Shandong University, a venue located within walking distance to the beautiful Weihai International Bathing Beach, one of the most popular scenic areas of northern China.
The conference will cover all aspects of solar wind physics, with invited reviews and contributed papers that examine the current research and outline the future research in all the relevant solar wind fields.
Website: not available yet

7. New documents in the European Space Weather Portal Repository

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

SPENVIS Single Event Effects Modelling

In this tutorial I show step by step how to calculate the single event upset rate for a planned mission with the SPENVIS SEE tool.
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 turial I give an overview of the radiation environment models and effect tools available in SPENVIS.
http://www.spaceweather.eu/en/repository/show?id=480