STCE Newsletter

19 Aug 2013 - 25 Aug 2013

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

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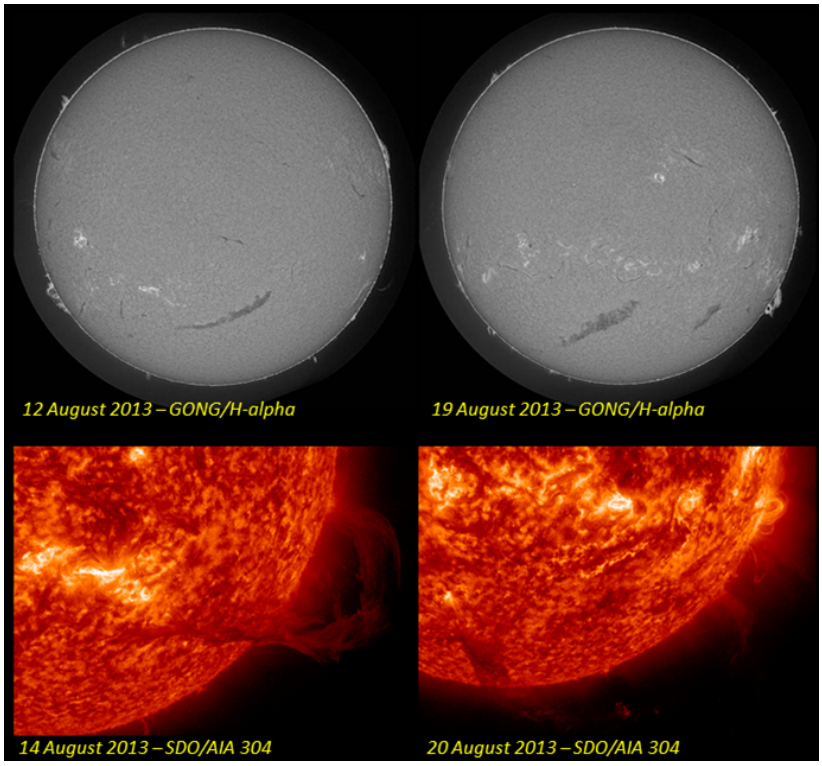
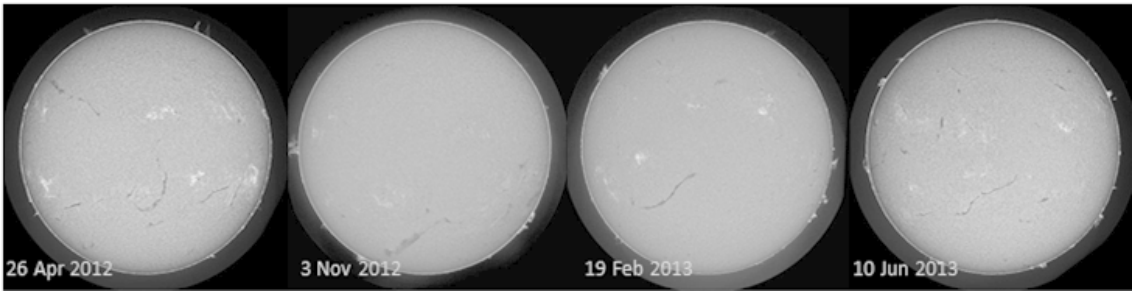
1. Filaments in the southern solar hemisphere (19 Aug 2013 - 25 Aug 2013)

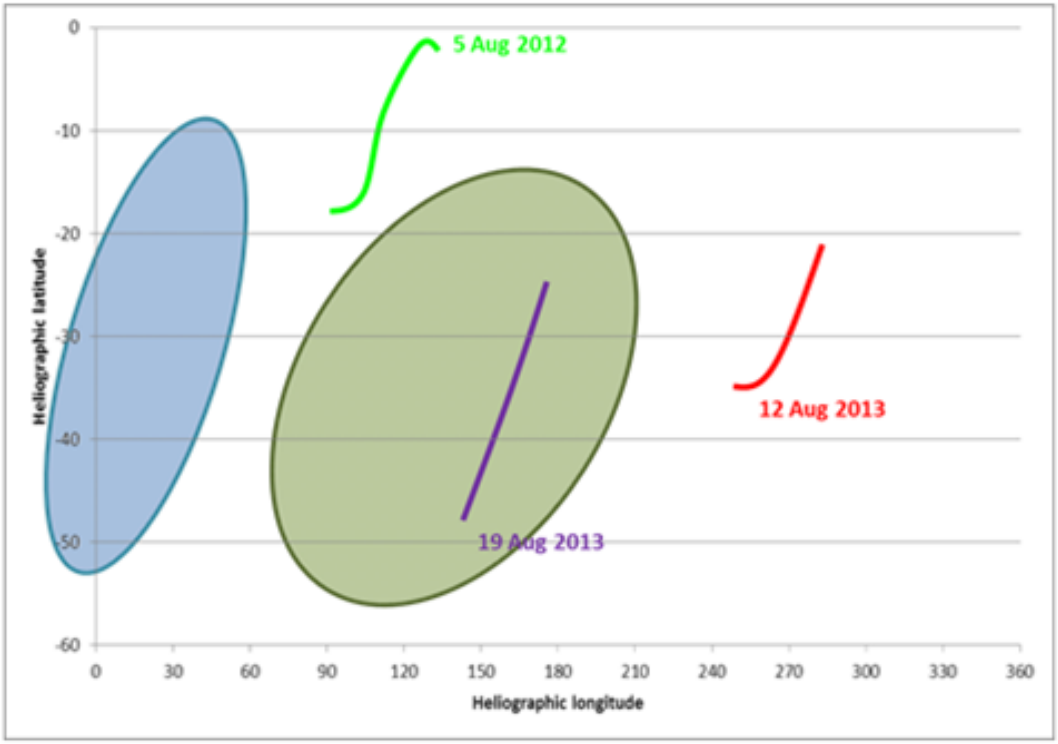
Solar filaments are clouds of ionized gas above the solar surface squeezed between magnetic regions of opposite polarity. Being cooler and denser than the plasma underneath and their surroundings, they appear as dark lines when seen on the solar disk using special filters. Space weather forecasters keep an eye on these filaments. Indeed, as the magnetic regions suspending the filament may become unstable, the filament can erupt and throw a cloud of charged particles towards the Earth where it can cause geomagnetic disturbances. These eruptions are more likely to occur as the filament grows longer, typically around 200,000 km. Such long filaments usually develop outside sunspot groups.



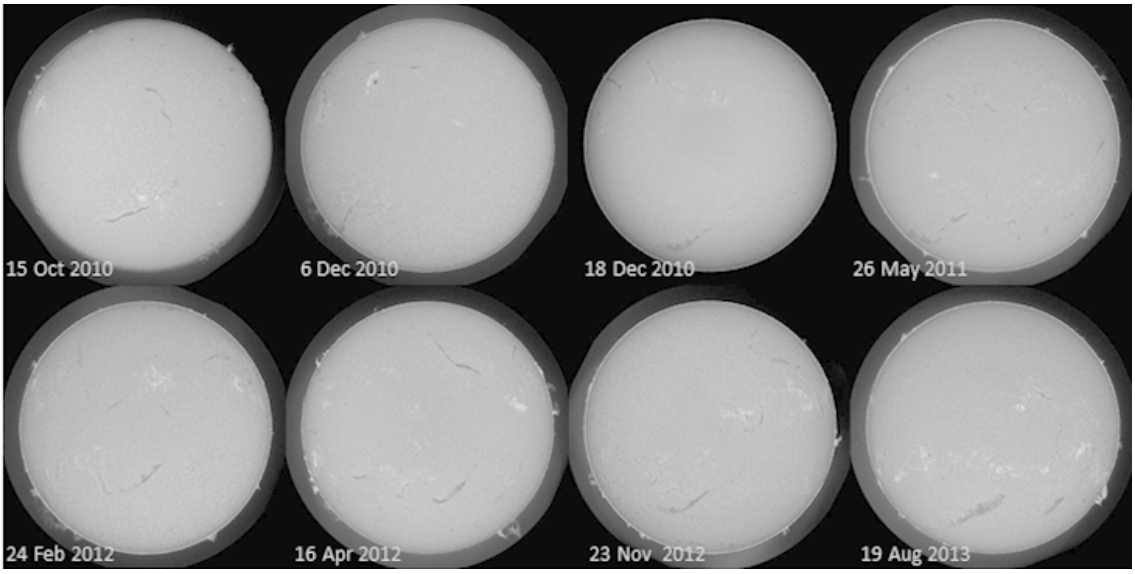
Two such filaments, each about as long as the Earth-Moon distance, have appeared this month on the Sun's southern hemisphere and eventually erupted on 14 and 20 August. This movie at http://www.youtube.com/watch?v=IwXNnQYFOPE shows their transit over the solar disk and final eruption with accompanying coronal mass ejection. The above images show the same filaments in H-alpha and the subsequent eruptions in extreme ultraviolet (EUV). Interestingly, early August 2012, there was also a big solid filament on the southern hemisphere, eventually erupting one solar rotation later (see the STCE Newsletters at http://stce.be/news/155/welcome.html and http://stce.be/news/157/welcome.html for more information).



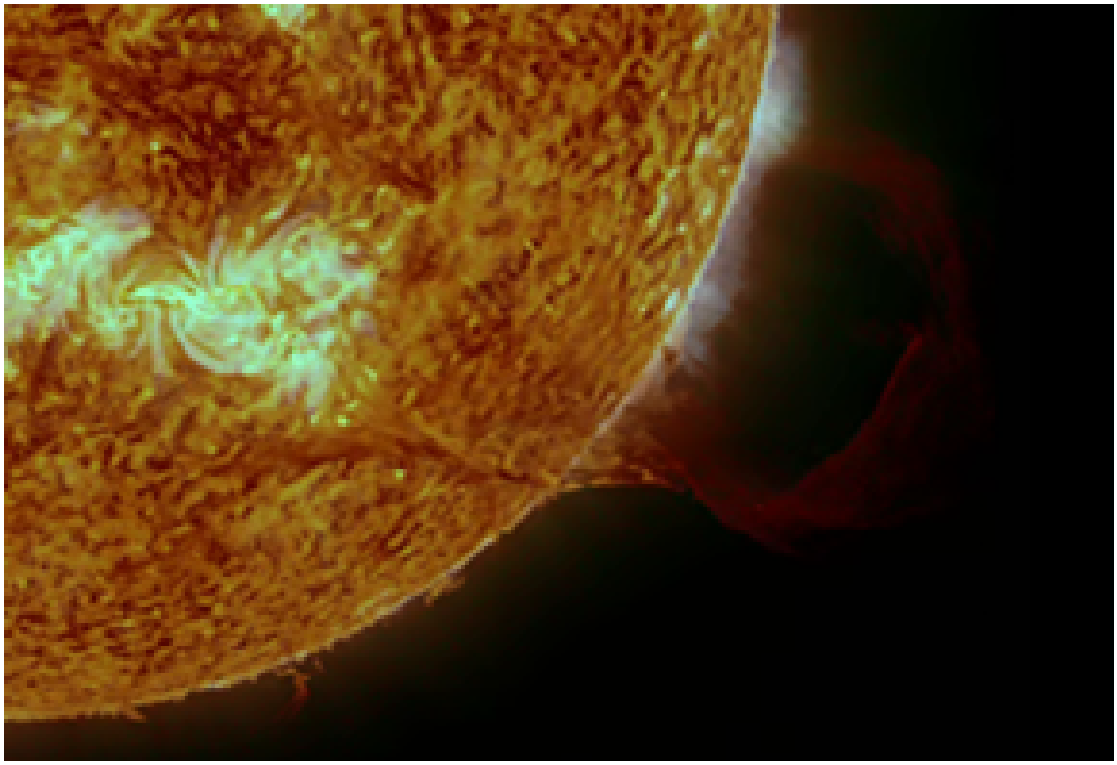
Filaments appear all over the solar surface, but long and dense filaments such as the ones described above are not produced that often. In fact, for the ongoing solar cycle, only 14 were identified on the southern hemisphere (the recurring not included). 4 of those (portrayed above) appeared in a relatively small area only about 60 degrees wide (blue area in sketch underneath). They have been appearing every 4 to 6 months since April 2012.



The other group contains 8 filaments, with 6 of them appearing between October 2010 and April 2012. Outlined by the green area in the sketch above, they are located about 10 degrees further away from the solar equator and have heliographic longitudes between 60 and 210 degrees. The most recent big filament (the one that erupted on 20 August) belonged also to this group, as outlined in purple on the sketch. It ended a 10-month drought of long and solid filaments in this area.
Note that the "presence" of these "groups" may purely be coincidental, due to the small number of filaments and the on-sight selection. A more detailed and profound study, taking into account e.g. the wandering of remnant magnetic fields from the sunspot zone to the polar regions, should clear this out.



The two remaining filaments do not belong to one of these groups. Indicated in fluo-green is the filament of August last year, which is located clearly within the sunspot zone close to the solar equator. The other one is the filament that erupted on 14 August (red line in sketch). Though there have been long (but fragmentary) and various small filaments in this longitude band before, it seems this is the first long and solid filament to appear in this area of the solar surface during this solar cycle.
Interestingly, another long -but not as solid- filament was visible this week and erupted early on 29 August. Its location falls right in between the blue and green shaded areas in the sketch, which is nearly opposite to the position of the 14 August filament.

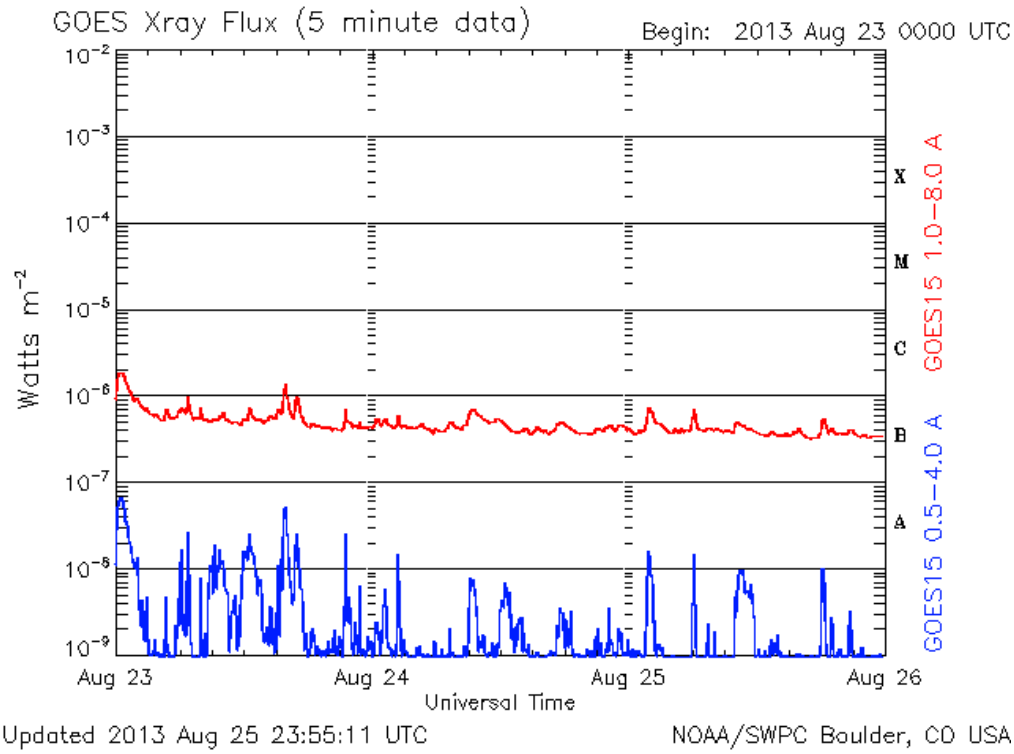


Credits: Kanzelhöhe Solar Observatory (http://cesar.kso.ac.at/), GONG (http://halpha.nso.edu/), SDO (http://sdo.gsfc.nasa.gov/), SOHO (http://sohowww.nascom.nasa.gov/).

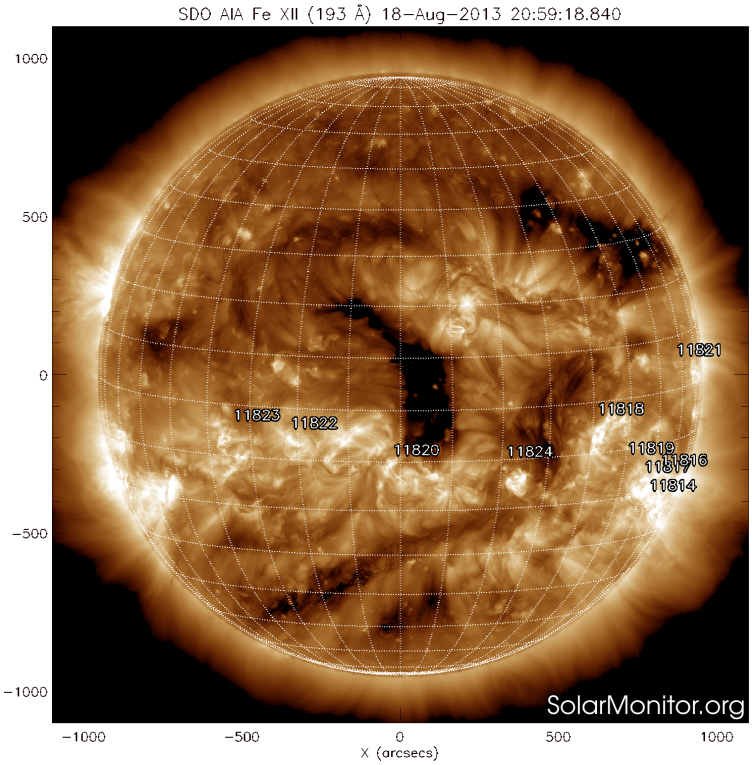
2. Review of solar activity (19 Aug 2013 - 25 Aug 2013)

Solar Activity

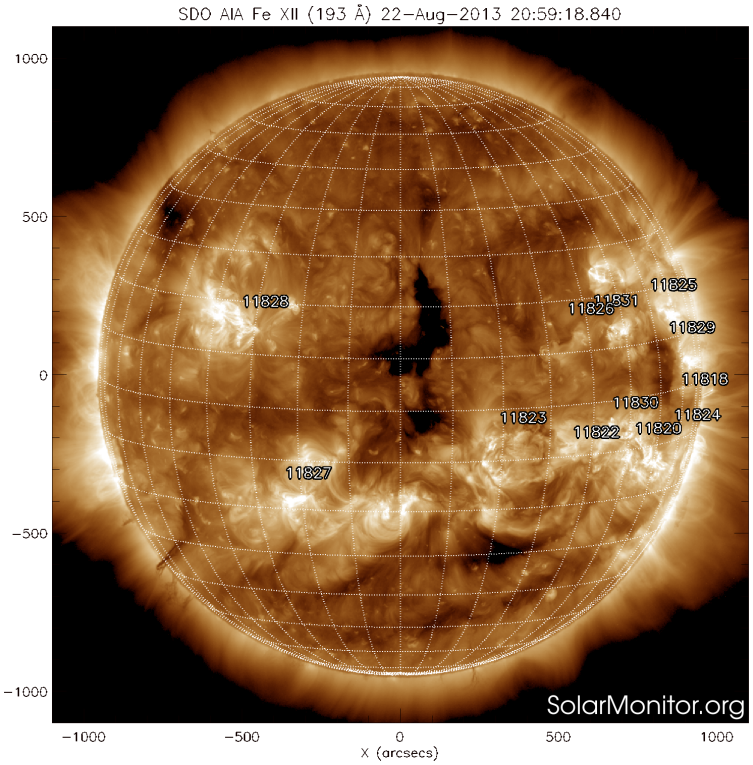
Solar activity was low during the week with only C-class flares. This weeks record was set by NOAA Active Regions, AR 1818 with a total of 5 C-flares. NOAA AR 1820 and 1828 share the second place with each 3 C-flares. NOAA AR 1820 subscribed for the strongest flare of the week: a C4.1 on August 22. From August 24, the peaks in the X-ray radiation measured by GOES could not reach the C-level anymore as can be seen in the red curve below.



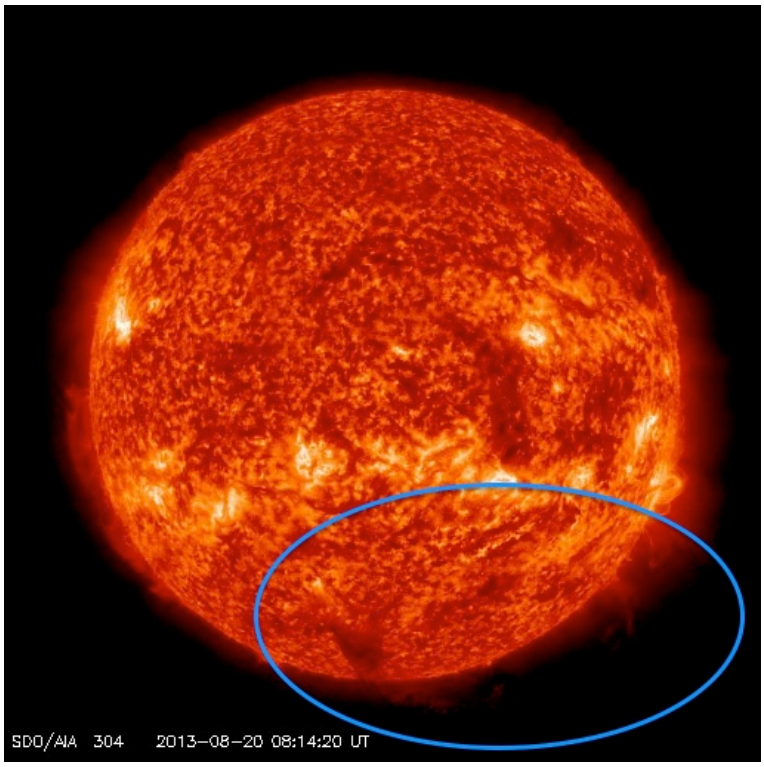
A recurrent equatorial coronal hole, CH reached the central meridian, CM previous week on August 17.



Another CH near the equator in the northern hemisphere crossed the CM on August 22.



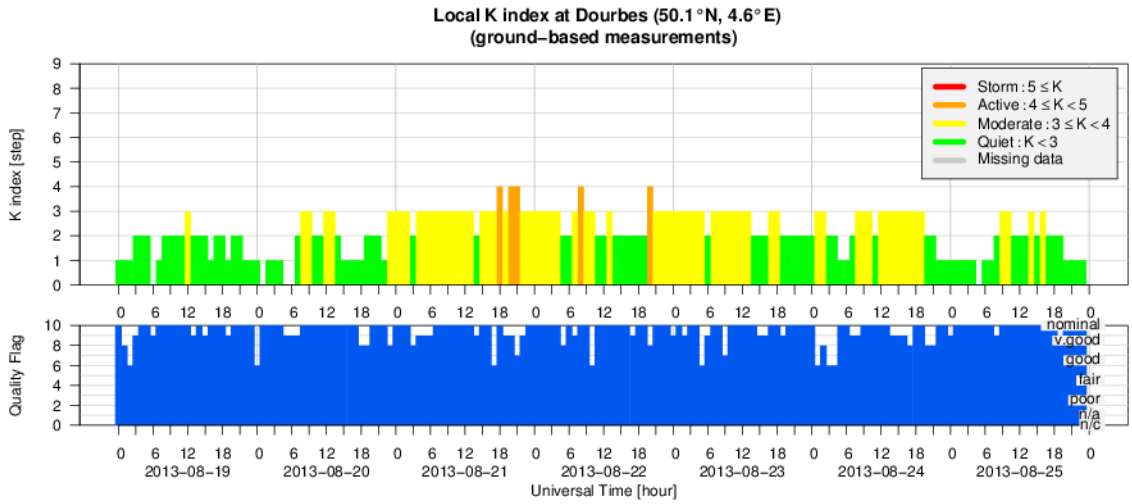
On August 20 a filament in the southern hemisphere erupted around 8:00UT.



Geomagnetic Activity

On Aug 19, the solar wind speed was still decreasing after a peak on Aug 16 due to a coronal hole, CH. On Aug 20, the solar wind had slowed down to a value slightly below 400 km/s. From that moment, it increased again to almost 600 km/s. This increase was caused by the recurrent equatorial CH mentioned above. On 21 and 22 August the local K-index at Dourbes reached the value of 4. This disturbance was due to combined effects of the fast speed stream from the recurrent equatorial CH and possibly a glancing blow of the CME that left the Sun on Aug 17.
Geomagnetic conditions were quiet to unsettled for the rest of the week.

3. Geomagnetic Observations at Dourbes (19 Aug 2013 - 25 Aug 2013)



4. PROBA2 Observations (19 Aug 2013 - 25 Aug 2013)

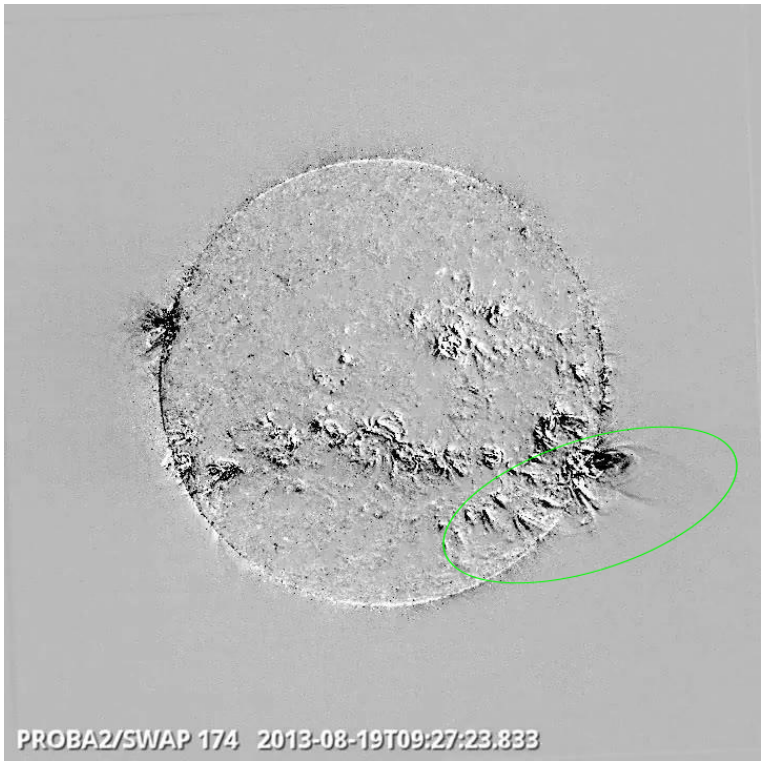
Solar (flaring) activity evolved from low to very low during the week.

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/WR178_Aug19toAug25_2013/2013_08_19_00_01_53_2013_08_25_20_16_03_SWAP_174-hq.mp4 (SWAP174; HelioViewer.org).

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

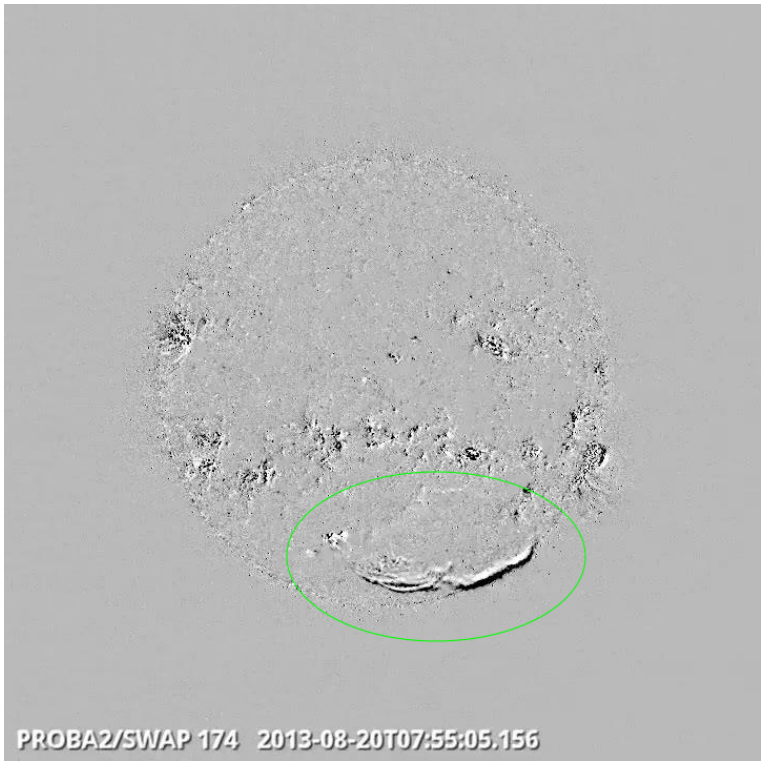
Monday August 19th



C2.2 Flare eruption in South West Quadrant @ 09:27 - SWAP difference image

Find a movie of the event here: http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR178_Aug19toAug25_2013/Events/20130819_Eruption_SouthWestQuad_0927_swap_diff.mp4 (SWAP difference movie)

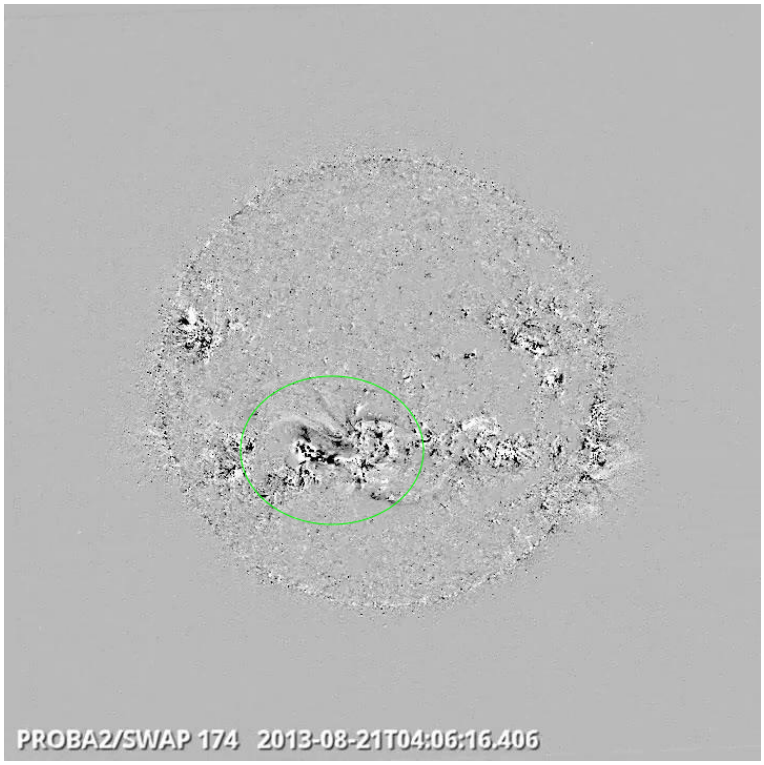
Tuesday August 20th



Prominence Eruption in South West Quadrant @ 07:55 - SWAP difference image

Find a movie of the event here: http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR178_Aug19toAug25_2013/Events/20130820_BigPromEruption_SouthWestQuad_0755_swap_diff.mp4 (SWAP difference movie)

Wednesday August 21st:



C1.3 Flare Eruption in South East Quadrant @ 04:06 - SWAP difference image

Find a movie of the event here: http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR178_Aug19toAug25_2013/Events/20130821_Eruption_SouthEastQuad_0406_swap_diff.mp4 (SWAP difference movie)

Thursday August 22nd:

C1.9 Flare Eruption in North East Quadrant @ 22:10 - SWAP difference image

Find a movie of the event here: http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR178_Aug19toAug25_2013/Events/20130822_C19FlareEruption_NorthEastQuad_2210_swap_diff.mp4 (SWAP difference movie)

Eruption on the West Limb @ 14:13 - SWAP difference image

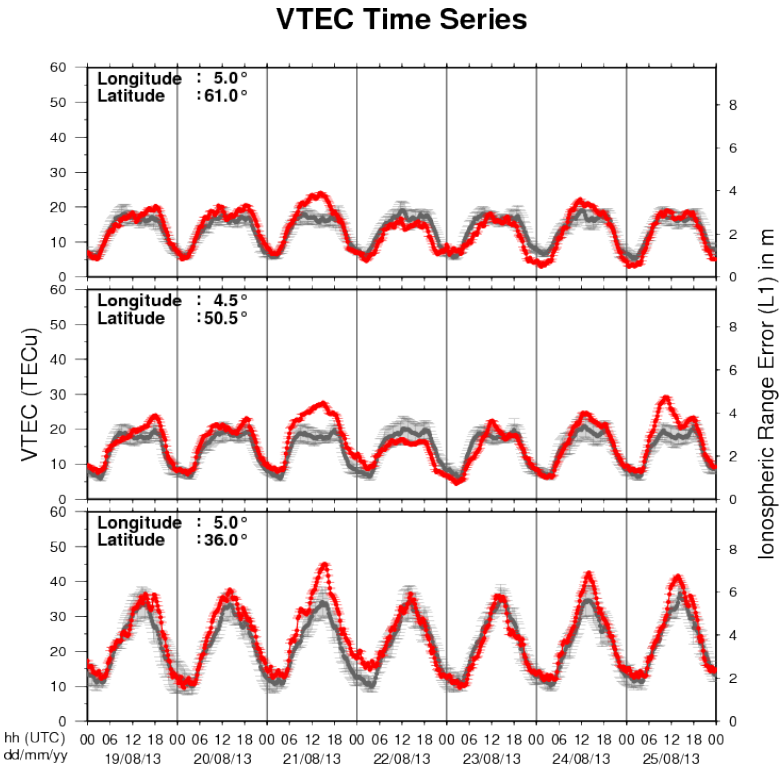
Find a movie of the event here: http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR178_Aug19toAug25_2013/Events/20130822_Eruption_WestLimb_1413_swap_diff.mp4 (SWAP difference movie)

Saturday August 24th:

Eruption on the South West Limb @ 09:44 - SWAP difference image

Find a movie of the event here: http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR178_Aug19toAug25_2013/Events/20130824_Eruption_SouthWestLimb_0944_swap_diff.mp4 (SWAP difference movie)

5. Review of ionospheric activity (19 Aug 2013 - 25 Aug 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

6. Future Events

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

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

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

The purpose of the meeting is to provide a forum for the italian scientists in the field (some of which are abroad) to consolidate on-going collaborations and establish new ones, for example in future projects such as Solar Orbiter and EST, where several of us are involved.
The meeting is obviously open to scientists from all the countries!
Website:
http://www.oact.inaf.it/weboac/SoHe2013/

7th International Workshop on Solar Polarization in Kunming, China

Start : 2013-09-09 - End : 2013-09-14
We gain information about the universe through analysis of the spectra from celestial objects. However, while the intensity spectrum represents a scalar quantity but electromagnetic radiation occurs in the form of transverse waves, the polarized spectrum provides us with a 4-vector, the Stokes vector. The increased amount of information space opens new windows to the universe, in particular for the exploration of magnetic fields. It is well recognized that the magnetic field is a primary agent responsible for structuring and the source of all variability on intermediate time scales, which manifests itself in all forms of solar and stellar activity.
It is therefore not surprising that every year there are many scientific meetings organized with the objective of studying the role of magnetic fields in cosmic objects. What is largely missing in these meetings is however an in-depth investigation of the fundamental aspects of how magnetic fields can be determined by the means of spectro-polarimetry, our main gateway to cosmic magnetism. The primary aim of our series of Workshops is to address these fundamental aspects, with less emphasis on the morphological and physical properties of cosmic magnetic fields.
Website: http://spw7.ynao.ac.cn/

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

Start : 2013-09-16 - End : 2013-09-20
The meeting will cover a broad range of aspects of solar physics, space science and solar-terrestrial relations. We aim to include every side of solar and space research, including observations, theory, and numerical modelling. The main idea behind the meeting is to treat the entire solar-terrestrial domain as one system, rather than each region independently.
The topics to be covered are:
* advanced solar observations
* waves and flows in the Solar atmosphere
* structure and dynamics of solar magnetic fields
* connecting analytical theory and modern numerical simulations to observations
* new physics in numerical modelling
* linking solar interior with heliosphere
* particle acceleration in the Sun and heliosphere
* non-linear phenomena in space plasmas
* physics of magnetosphere and ionosphere
Website:
http://swat.group.shef.ac.uk/Conferences/Ukraine_UK_2013/index.html

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/

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/

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/

7. New documents in the European Space Weather Portal Repository

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

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

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

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

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

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