STCE Newsletter

8 Jul 2013 - 14 Jul 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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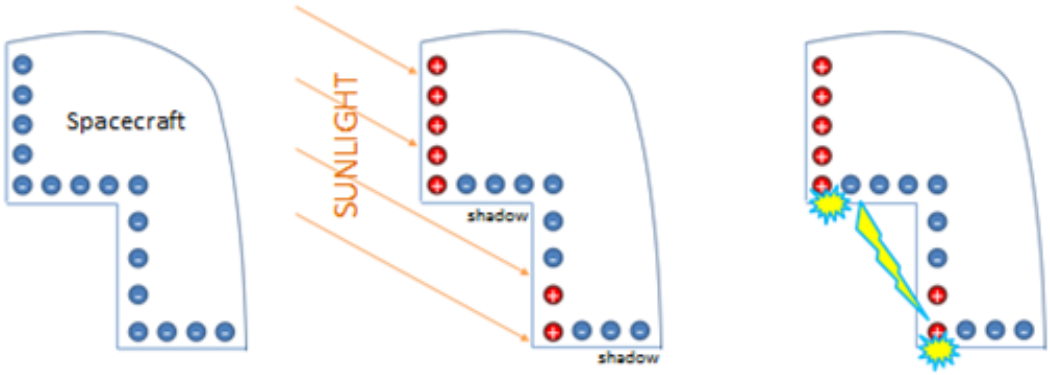
1. Itchy satellites (8 Jul 2013 - 14 Jul 2013)

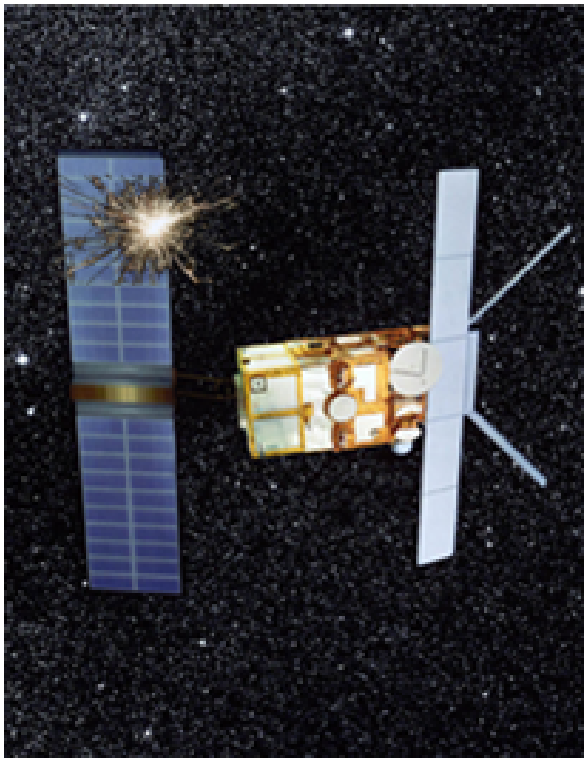
Most often, people think about high energetic protons, space debris and altitude loss from an expanding atmosphere as the most important threats to the survival of earth-orbiting satellites. However, also the abundantly present electrons can constitute a lethal danger to the satellite's life. Many satellites such as Telstar 401 and Galaxy IV did not recover from electron induced effects, so two of them will be sketched here.

The first effect is called "surface charging". During night time, electrons have the tendency to charge the satellite's surface negatively. In sunlight, the satellite's surface becomes positively charged. Of course, satellites have an irregular shape, so parts of the spacecraft will still be in the shadow, leading locally to different charges. This may result in an electrical discharge on the surface. These are comparable to tiny "lightning strikes" like when you touch a door knob after having walked for some time on tapestry.

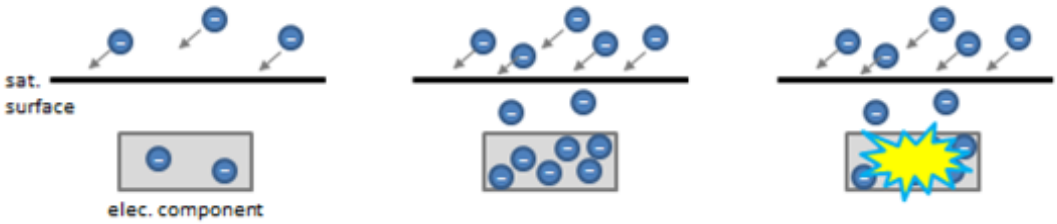


The discharges tend to occur around local midnight, due in part to the immersion or exit from shadow to light acting as a triggering mechanism for the discharge, but also and very significantly due to the increased plasmasheet electron fluxes in the midnight sector.

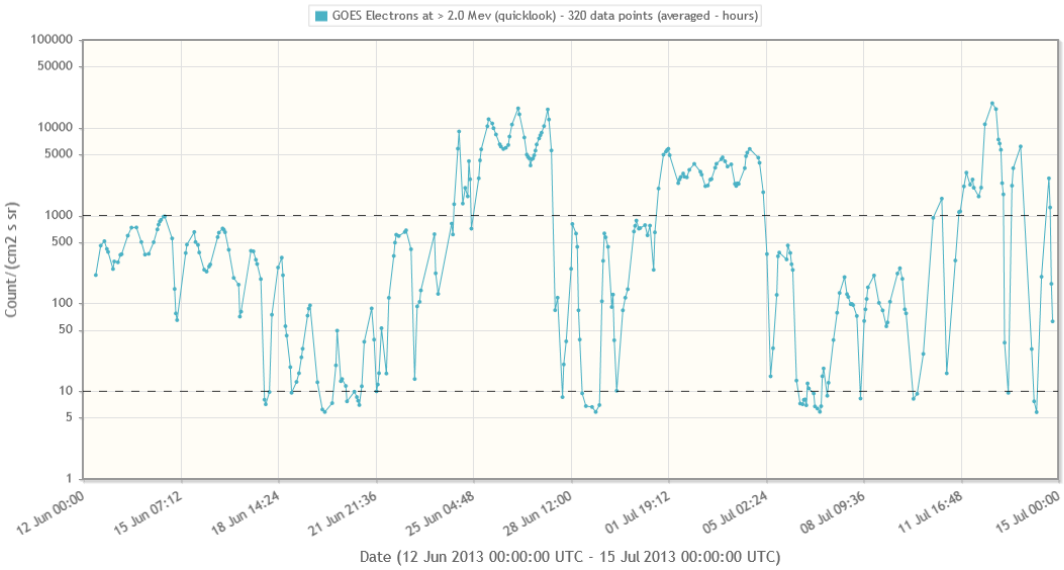
Though these discharges are generally not life threatening to the satellite, they may result in phantom commands and glitches in e.g. data telemetry, which are of course a nuisance. Surface charging related discharges can also occur on spacecraft solar arrays. These can have a significant effect on the performance of the solar arrays and the overall power capability of the spacecraft.



Electrons that have a somewhat higher energy, i.e. more than 0.1 MeV (mega electron volt; a unit of energy) can have a different effect. These particles can travel through several mm of aluminium shielding, and thus deposit themselves in critical electronic components in circuit boards and coax cables underneath the satellite's surface. As these particles accumulate, charge can build up until a threshold is reached. The result may be an electrical discharge, which may destroy the electronic components. This "deep-dielectric charging" manifests itself especially in high altitude spacecraft which pass through the Earth's radiation belts.

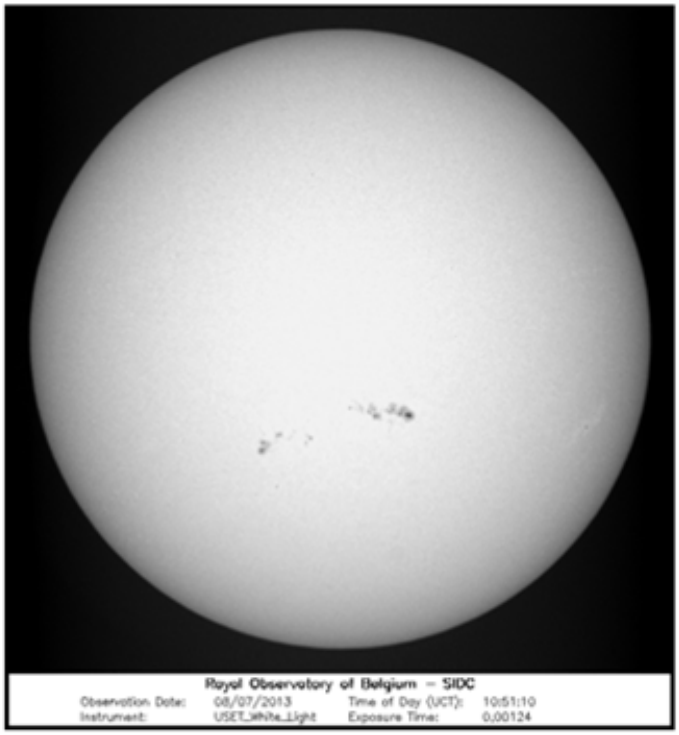


The effects of these discharges are more pronounced as the number of particles and their energies increase. These particle streams from coronal holes, plasma clouds and substorms (accelerated particles from the Earth's magnetotail) can contribute significantly to the charging of the satellite and its components. Alerts are usually given when the flux of electrons having energies of more than 2 MeV exceeds 1000 pfu (particle flux units), with hazardous conditions if this level is sustained for several days. Over the last month, several active periods were noted, such as 24-28 June, 1-5 July and 10-14 July. These were mainly due to the passing streams of coronal mass ejections and coronal holes. Satellite operators noted a significant increase in anomalies during these periods, thought to be due to repeated electrostatic discharges. Fortunately, all spacecraft survived and are in good health.

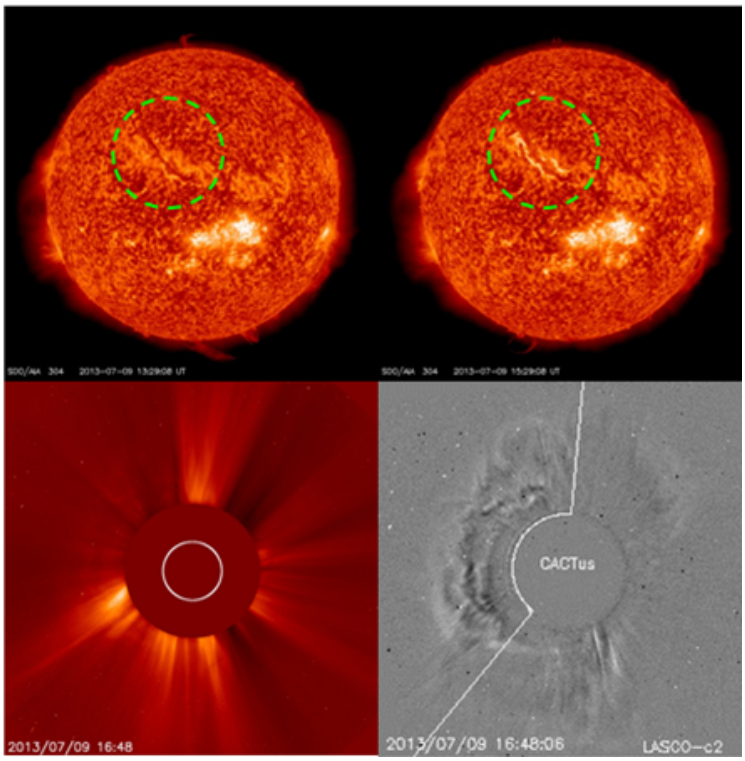


2. Review of solar activity (8 Jul 2013 - 14 Jul 2013)

Solar activity was dominated by active regions NOAA 1785 and 1787 (See image by the Uccle Solar Equatorial Table (USET) underneath). Together, they produced 15 of this week's 17 C-class solar flares. Despite NOAA 1785's complex appearance, no medium class flares were produced. The strongest event was a C9.7 flare on 8 July peaking at 01:22UT.



Another event of interest this week was a filament eruption during the afternoon of 9 July. It was accompanied by a weak partial halo coronal mass ejection (CME) cruising at a leisurely speed of about 400 km/s. SDO/AIA 304 images underneath show the outlook of the eruption prior and during the event (top). The two bottom images show the CME as viewed by the SOHO/Lasco C2 coronagraph in white light and as a difference image (Cactus - http://www.sidc.oma.be/cactus/), both at 16:48UT.



3. PROBA2 Observations (8 Jul 2013 - 14 Jul 2013)

Solar (flaring) activity was low throughout the week. Several high-level C flares occurred, but the M-level was not achieved.

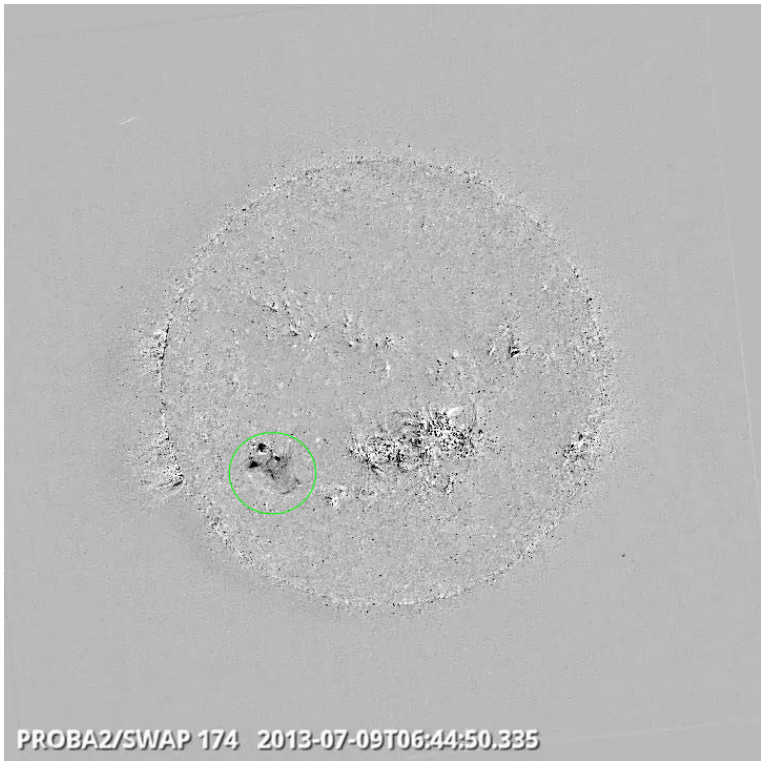
In order to view the activity of this week in more detail, we suggest to go to the following website from which all the daily (normal and difference) movies can be accessed: http://proba2.oma.be/ssa.

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/WR172%20-%20Jul08toJul14_2013/2013_07_08_00_00_07_2013_07_14_22_52_55_SWAP_174__AIA_304-hq.mp4 (SWAP174/AIA304 combination; HelioViewer.org).

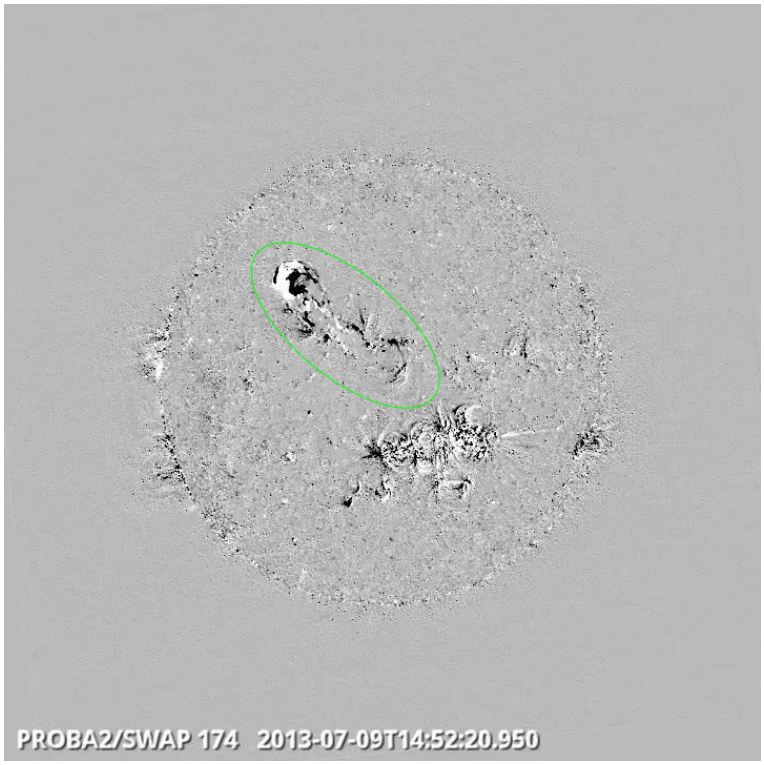
Details about some of this week's events, can be found further below.

Tuesday 9 July:



Eruption in south-east quadrant @ 06:44 - SWAP difference image

Find a movie of the event here: http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR172%20-%20Jul08toJul14_2013/Events/20130709_eruptionSE_0644_swap_diff.mp4 (SWAP difference movie)



Filament eruption in north-east quadrant @ 14:52 - SWAP difference image

Find a movie of the event here: http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR172%20-%20Jul08toJul14_2013/Events/20130709_eruptionNECenter_1452_swap_diff.mp4 (SWAP difference movie)

Friday 12 July:

Eruption on north-east limb @ 15:51 - SWAP difference image

Find a movie of the event here: http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR172%20-%20Jul08toJul14_2013/Events/20130712_eruptionNELimb_1551_swap_diff.mp4 (SWAP difference movie)

C3.5 flare on south-west limb - Active region NOAA 1785 @ 17:33 - SWAP difference image

Find a movie of the event here: http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR172%20-%20Jul08toJul14_2013/Events/20130712_eruptionSWLimb_1733_swap_diff.mp4 (SWAP difference movie)

Saturday 13 July:

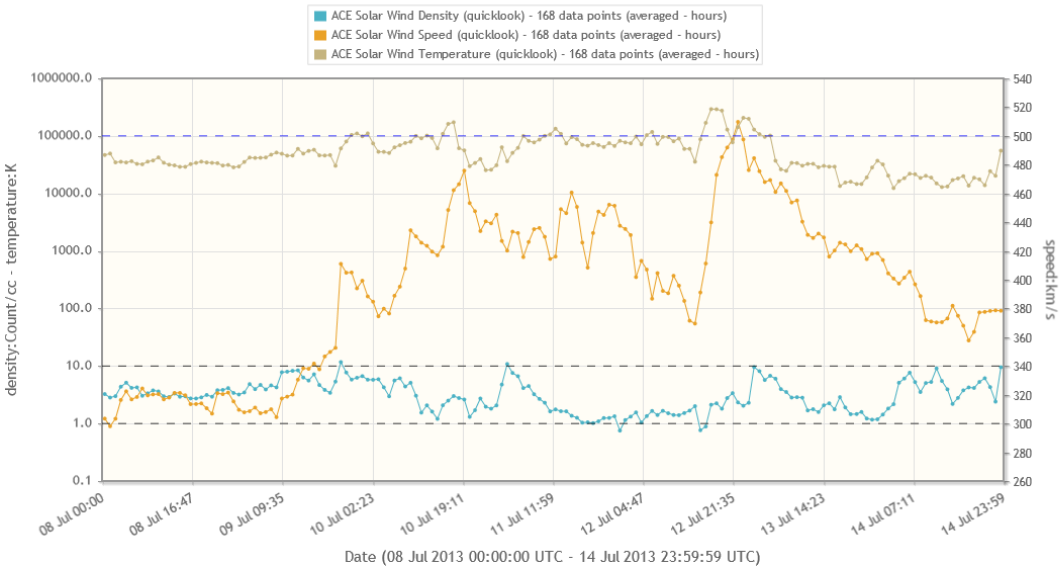
C1.4 flare in south-east quadrant - Active region NOAA 1791 @ 06:13 - SWAP difference image

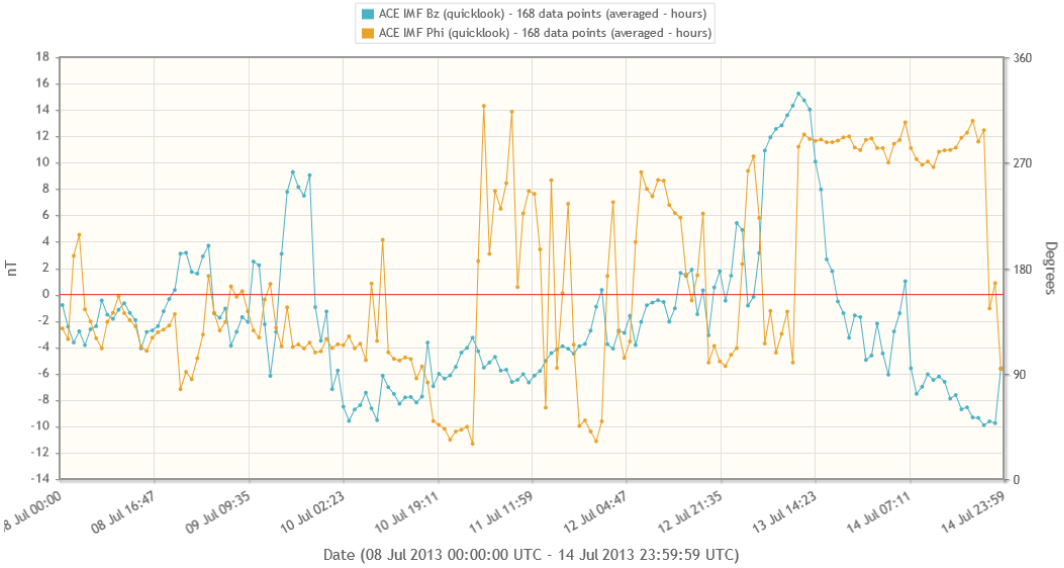
Find a movie of the event here: http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR172%20-%20Jul08toJul14_2013/Events/20130713_eruptionSEquad_0610_swap_diff.mp4 (SWAP difference movie)

4. Review of geomagnetic activity (8 Jul 2013 - 14 Jul 2013)

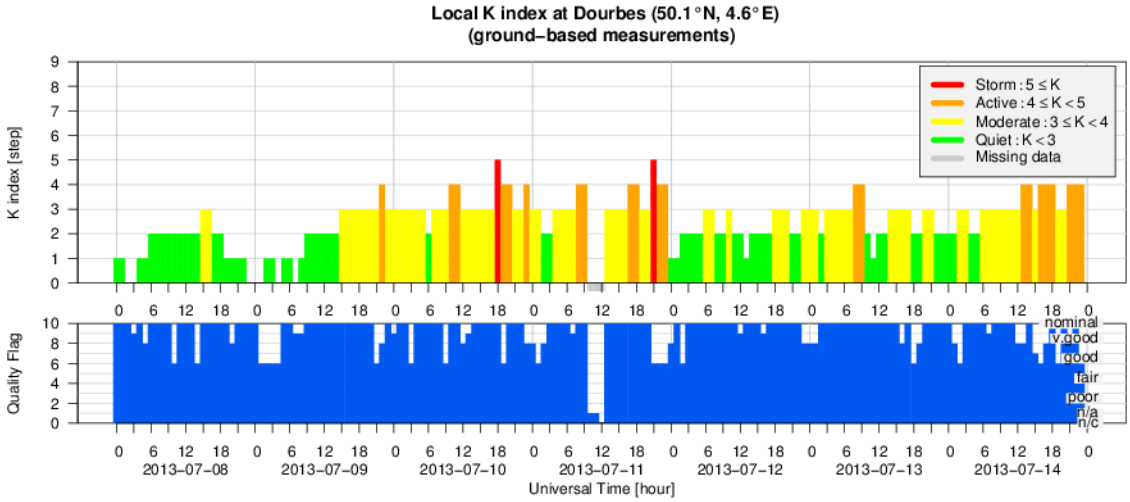
The geomagnetic field was at quiet to unsettled levels for most of the week. From the end of 9 July till 11 July, active to minor storm levels were registered due to the arrival of a coronal mass ejection (CME) from a solar eruption that probably took place on 6 July.

On 13 and 14 July, active levels were reached due to the arrival of the CME from the 9 July filament eruption. During both periods, the magnitude of the interplanetary magnetic field reached 16 nT with the north/south component as low as -10 nT.

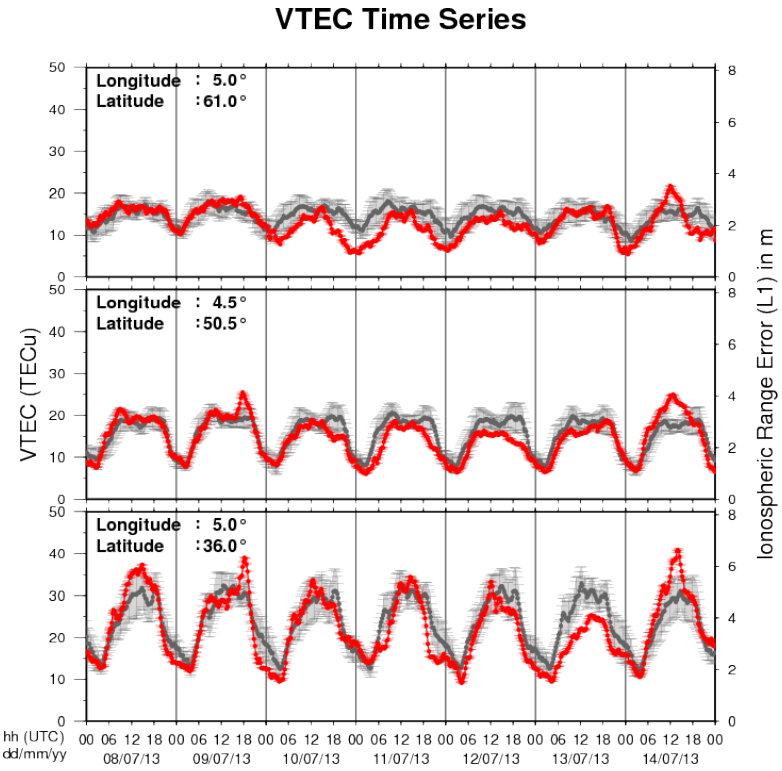

ACE Solar Wind Density (quicklook) - 168 data points (averaged - hours)
ACE Solar Wind Speed (quicklook) - 168 data points (averaged - hours)
ACE Solar Wind Temperature (quicklook) - 168 data points (averaged - hours)
density:Count/cc - temperature:K
speed:km/s
Date (08 Jul 2013 00:00:00 UTC - 14 Jul 2013 23:59:59 UTC)


ACE IMF Bz (quicklook) - 168 data points (averaged - hours)
ACE IMF Phi (quicklook) - 168 data points (averaged - hours)
nT
Degrees
Date (08 Jul 2013 00:00:00 UTC - 14 Jul 2013 23:59:59 UTC)

5. Geomagnetic Observations at Dourbes (8 Jul 2013 - 14 Jul 2013)



6. Review of ionospheric activity (8 Jul 2013 - 14 Jul 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

7. New documents in the European Space Weather Portal Repository

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

8. Future Events

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

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 - 3rd EAST/ATST meeting 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
* to provide a forum to discuss the use of current and future observational solar facilities, and how to optimise their scientific returns;
* 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;
* 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.
Website:
http://folk.uio.no/matsc/oslo-13/info.html

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.

XIIth 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 MÃ©rida YucatÃ¡n, 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

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/

14th European Solar Physics Meeting in Dublin, Ireland.

Start : 2013-09-08 - End : 2013-09-12
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/

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/

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/

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/