# STCE Newsletter

## 7 Jan 2013 - 13 Jan 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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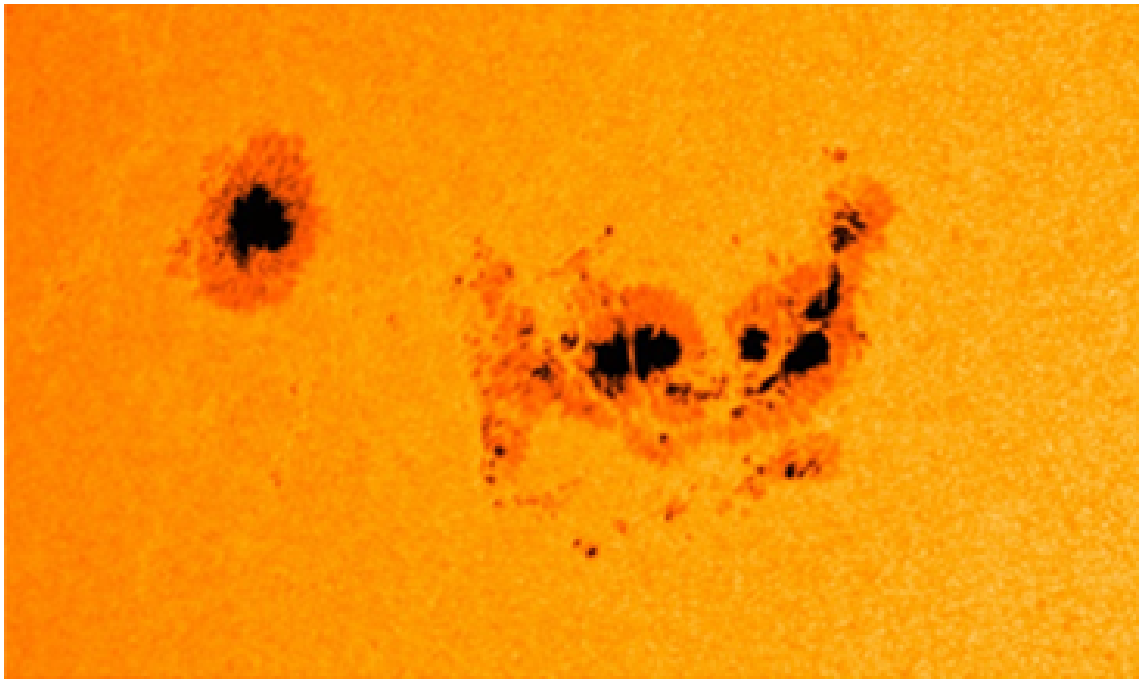
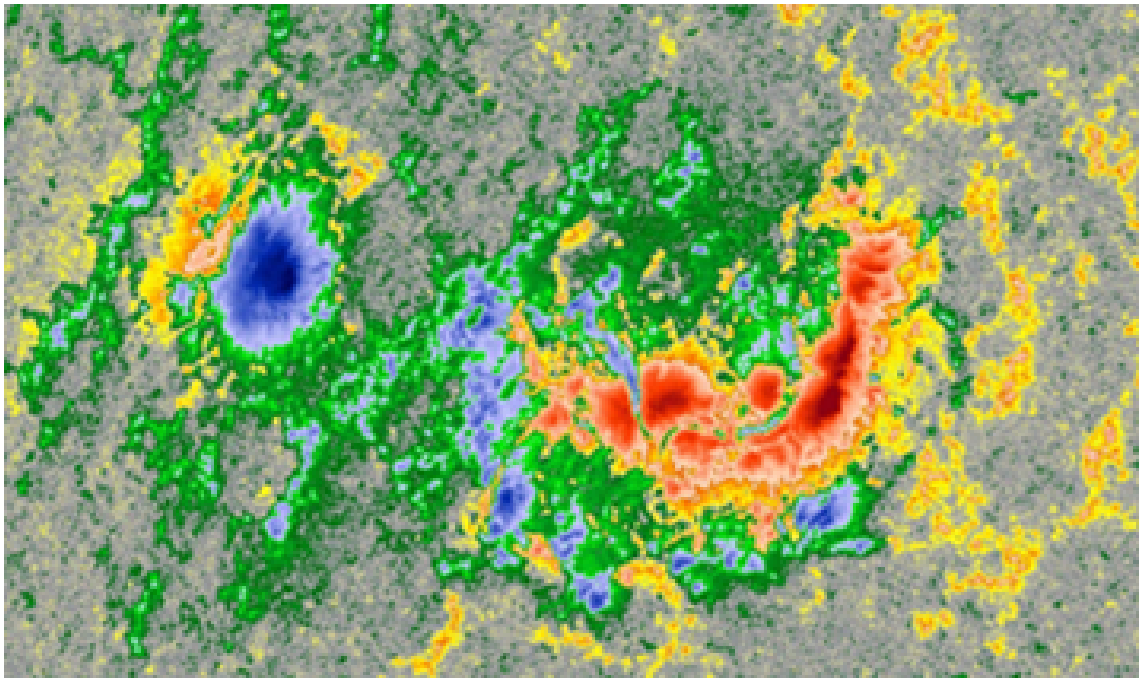
# 1. NOAA 1654 show-off (7 Jan 2013 - 13 Jan 2013)

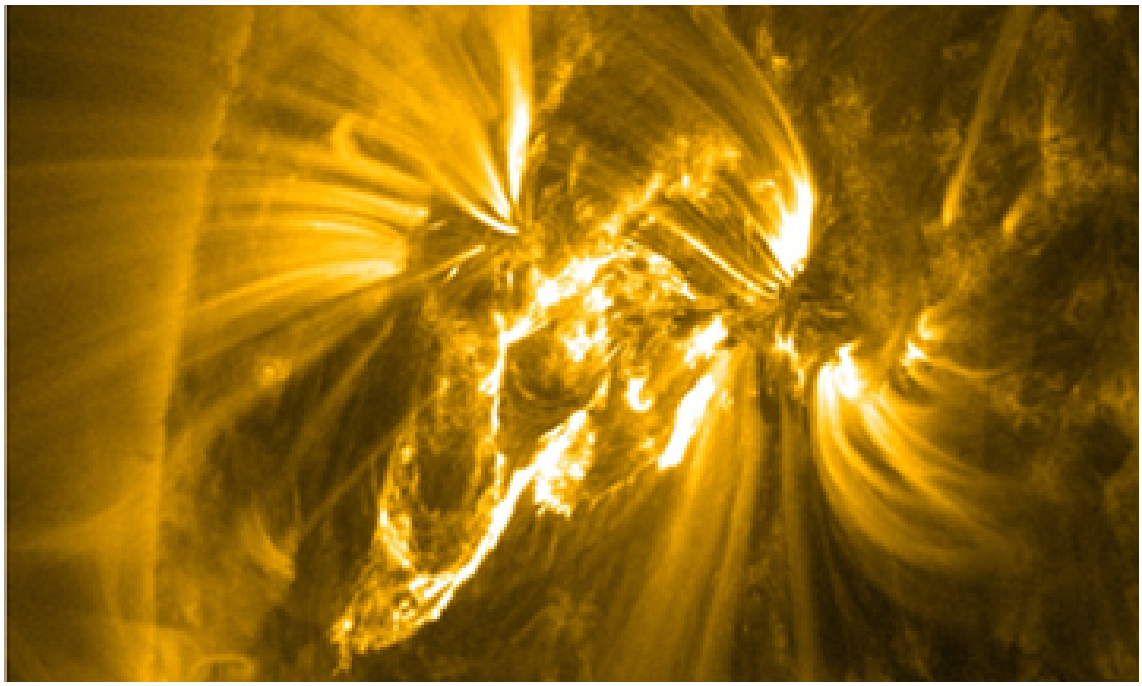
Active region NOAA 1654 appeared on 8 January at the northeast solar limb and quickly became the dominant sunspot group on the visible solar surface. On 11 January, its sunspot area equaled about 7 times the area of the Earth, and by 13 January its length was almost 19 Earth diameters. The leading spot was complex and changed its shape impressively, as can be seen in this movie at http://www.youtube.com/watch?v=qDOnNhD4WYI covering the period from 10 January (noon) till 12 January (noon).



One would expect quite some strong flaring activity from such a dynamic an ominously looking sunspot group, but this was not the case. NOAA 1654 produced mainly small C-flares (more than 20 on 10 and 11 January), and only 2 M-class (medium) flares. The reason for this is that the big sunspots in the main part of the group are actually all of the same magnetic polarity, as can be seen in this colored SDO-magnetogram (http://sdo.gsfc.nasa.gov/). Red is negative (returning, "black") polarity, while the blue colors indicate positive (outcoming, "white") polarity. This situation prevents important magnetic reconnection.

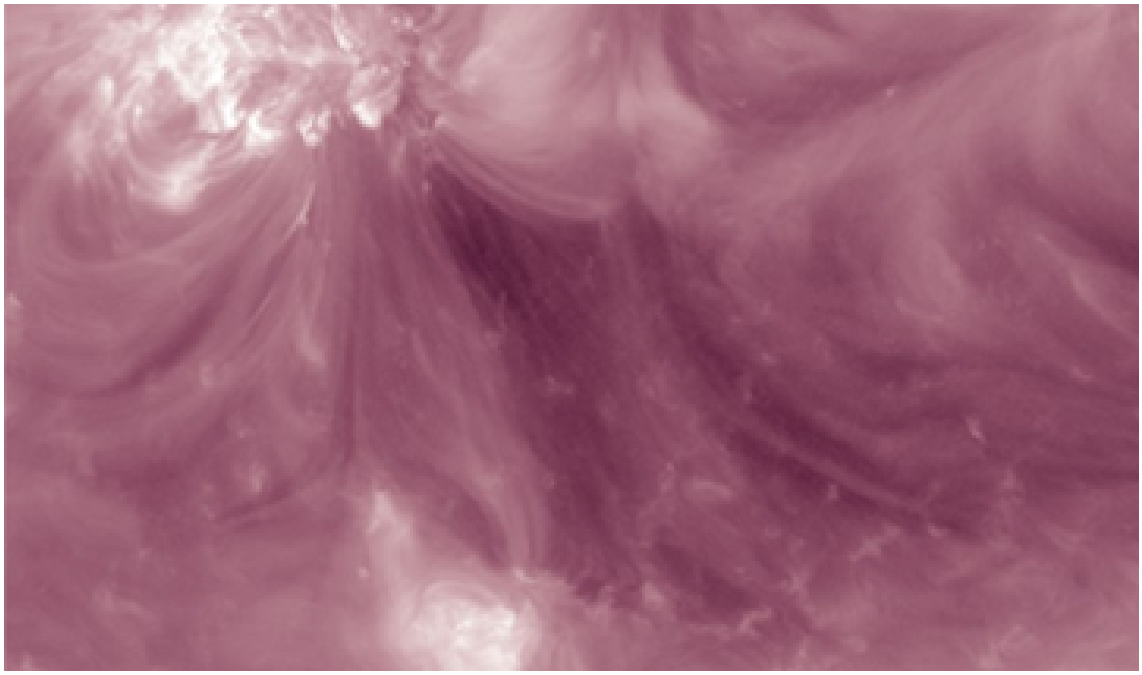


Hence, the strongest flaring took place on the south side of the sunspot group, near the rather tiny blue spots to the lower left "southeast" and lower right ("southwest") of the big main spot - which was of opposite polarity. This guaranteed magnetic reconnections, but thus only small to medium flares. The picture underneath shows some mass ejection to the southeast of the main spot, following the C8-flare on 10 January (around 17:45UT).

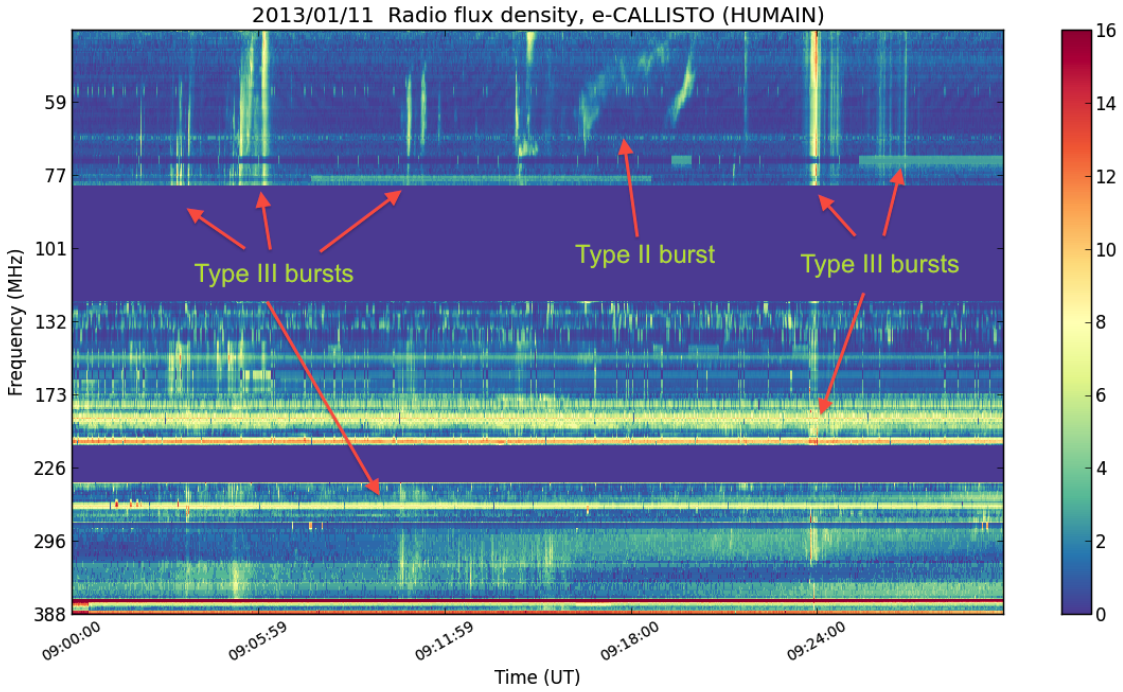


The C9-flare during the early morning hours of 11 January, as well as the second M-flare in the afternoon, both took place in the same area. However, the first M-flare occurred to the southwest of the main spot,

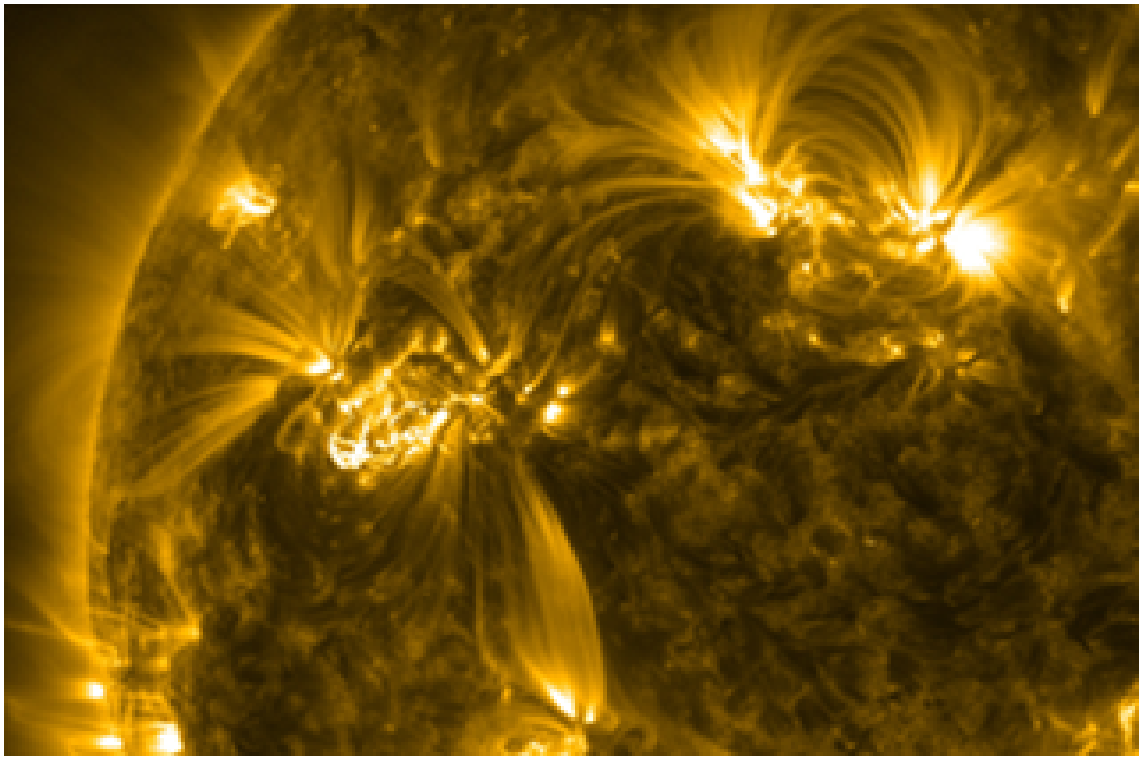
reaching its maximum x-ray intensity (M1.2) at 09:11UT. It ejected also plasma to the southwest, and created a small temporary coronal hole. This can be seen as an EUV-dimming (slightly darkish area) to the west of the imaginary line between NOAA 1654 and NOAA 1657. See the SDO/AIA 211 image underneath.



The eruption also created a radio burst which was nicely captured by the Radio Observatory in Humain (http://sidc.oma.be/humain/realtime.php). Radio-disturbances can be seen between 09:00 and 09:30UT, with signatures of electron beams (type III bursts) and a signature of a shock wave (type II burst). Despite the occasional mass ejections, none of the 10-11 January flares from this active region produced an obvious coronal mass ejection in the coronagraphs of SOHO or STEREO.



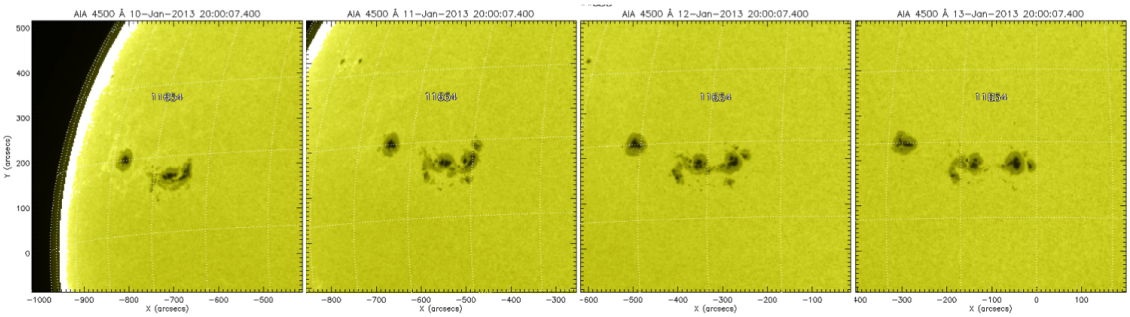

NOAA 1654 also interacted with other active regions such as NOAA 1652, a sunspot group to the northwest, and with NOAA 1657 on the southern solar hemisphere. This can be seen in the image underneath (SDO/AIA 171 on 11 January at 14:59UT), showing the ongoing M1-eruption (southeast of the main spot) as well as the coronal loops connecting NOAA 1654's main spot with the opposite polarity regions in the trailing part of NOAA 1652 and the leading part of NOAA 1657.



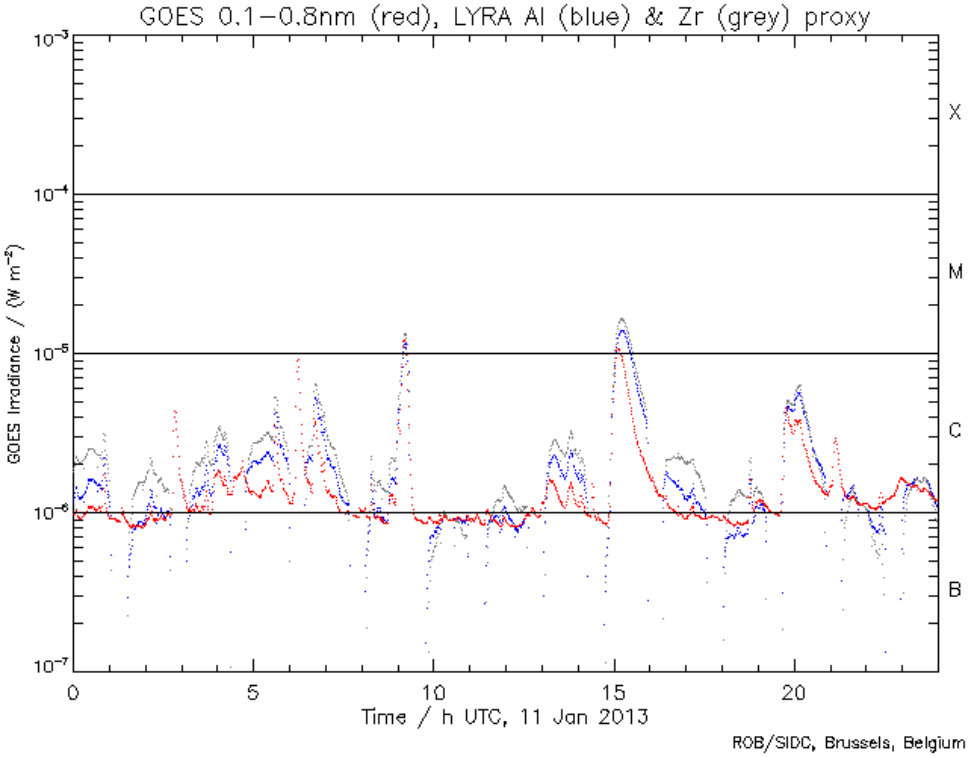
# 2. Review of solar and geomagnetic activity (7 Jan 2013 - 13 Jan 2013)

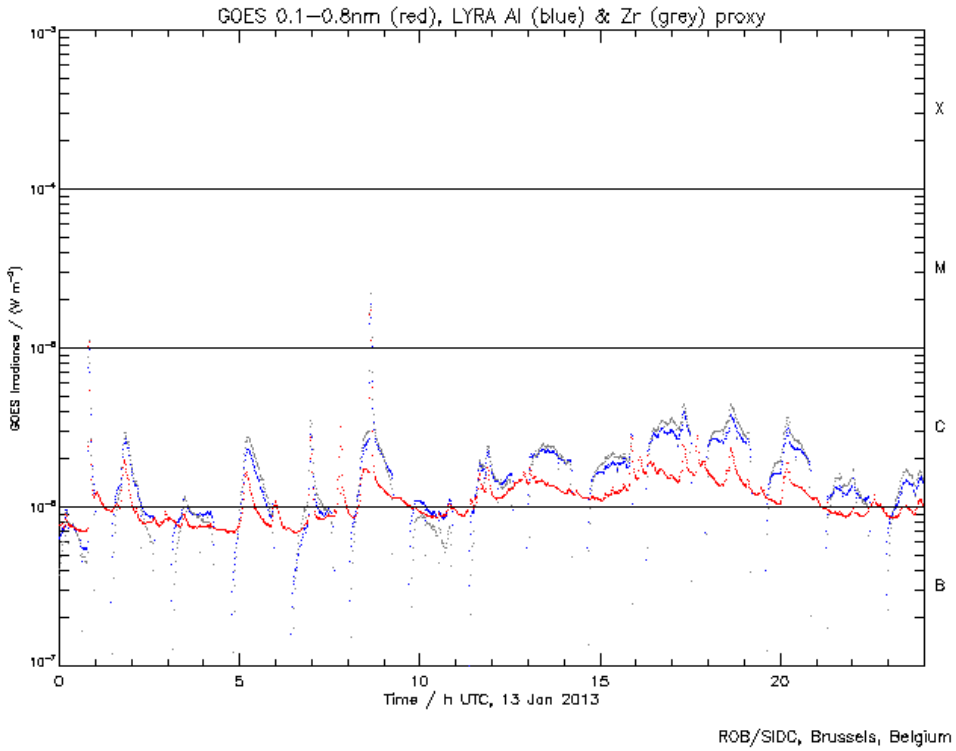
## Solar Activity

Solar activity was low during the first three days of the week, with moderate C flares. From Jan 10 onwards, activity increased from eruptive to active levels with the beginning of the transit of NOAA AR 1654, which showed quick evolution.




Two M flares occurred in this region on Jan. 11, the strongest one peaking at M1.2 level at 0911 UT. No obvious CME signatures could be observed in association with these events. Two additional M flares took place in NOAA AR 1652, on Jan. 13; the strongest one at 0838 UT (peak time) reached the M1.7 level. Again, it is not clear if CMEs were associated with these two events: for the M1.7 flare, only a narrow jet-like ejection was observed with LASCO C2 shortly after the flare.






The two graphs show the solar x-ray radiation as a function of time measured by GOES and the solar radiation in the wavelengths between 17 and 80 nm, this is the Aluminium channel and the solar radiation in the wavelengths between 6 and 20 nm, this is the Zirconium channel. The M-flares are measured by GOES and LYRA.

### Geomagnetic Activity

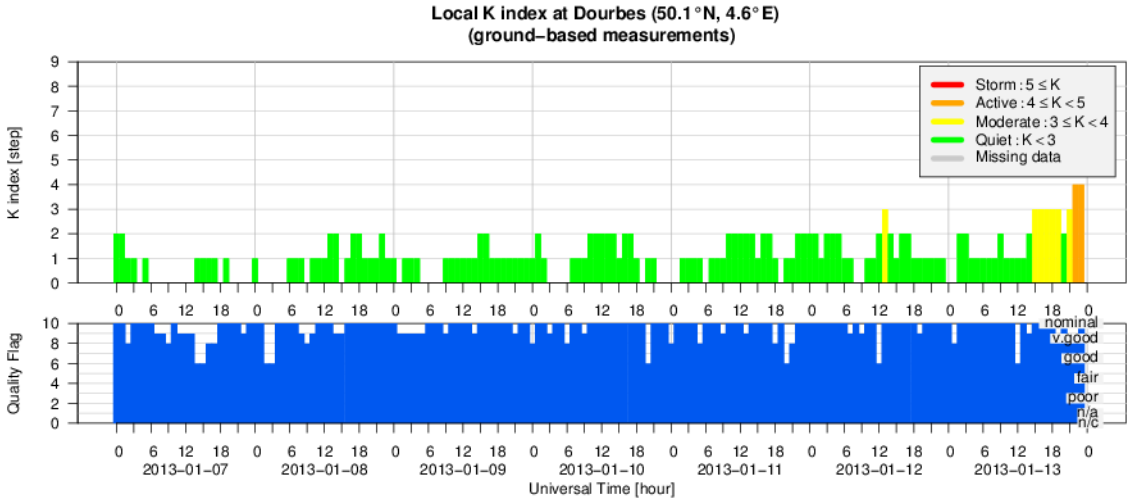
Geomagnetic activity was low during the whole week.

## 3. Noticeable Solar Events (7 Jan 2013 - 13 Jan 2013)

| DAY | BEGIN | MAX | END | LOC | XRAY | OP | 10CM | TYPE | Cat | NOAA | NOTE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | 0843 | 0911 | 0917 | N05E36 | M1.2 | | 0 | VI/2<br>II/1<br>IV/1 | 64 | 1654 | |
| 11 | 1451 | 1507 | 1524 | N06E39 | M1.0 | 1F | 0 | | 64 | 1654 | |
| 13 | 0045 | 0050 | 0052 | N18W18 | M1.0 | | 0 | III/3<br>V/2 | 62 | 1652 | |
| 13 | 0835 | 0838 | 0840 | | M1.7 | | 140 | III/2<br>II/2<br>IV/2 | 62 | 1652 | |

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

# 4. Geomagnetic Observations at Dourbes (7 Jan 2013 - 13 Jan 2013)




# 5. Future Events

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

## Understanding the Dynamics of the Sun using Helioseismology and MHD Simulations in NASA Ames Research Center, CA (USA)

Start : 2013-02-04 - End : 2013-02-08
Helioseismology provides tools for imaging structures and mass flows below the solar surface, and is becoming an essential technique for understanding the dynamics of solar activities and developing physics-based forecasts of the solar cycle, emerging active regions and energy release events. A better understanding is needed to unravel the effects of the complex interactions of solar oscillations with the turbulent magnetized plasma on global and local helioseismology diagnostics. These effects are particularly challenging in regions of strong magnetic fields. Numerical simulations of solar MHD waves and turbulent dynamics give important insights into the complicated wave and turbulence physics, and provide synthetic data for verification and validation of helioseismology methods and results.
The goals of this workshop are to discuss and stimulate further development of helioseismology methods, solar interior models, and realistic numerical simulations. These goals are particularly important for analysis of the continuous data flow from the Solar Dynamics Observatory, development and verification of helioseismology methods, and for theoretical interpretation of observations and inversion results.
Website:
http://sun.stanford.edu/LWS2013/

## AFFECTS User Workshop in Brussels, Belgium

Start : 2013-02-28 - End : 2013-02-28
On February 28th, 2013 the AFFECTS team organises an international user workshop at the Royal Observatory of Belgium in Brussels.
At the workshop there will be a demonstration of all AFFECTS space weather products:
* Near real time dimming and EIT wave detection
* 3D CME analysis tool
* Coronal analysis tool
* CME & solar wind arrival and impact forecast tool
* Flare, CME , geomagnetic, auroral, ionospheric forecasts & alerts
* Forecast of perturbed TEC

* Solar activity and space weather timelines viewer
To register, please send an e-mail incl. your full name, institution, e-mail and (institutional) address to . DÃ¶rte Dannemann
Website:
http://www.affects-fp7.eu/news-events/user-ws/

## 9th GEANT4 space users' workshop in Barcelona, Spain

Start : 2013-03-04 - End : 2013-03-06
Geant4 Space Users' Workshop -G4SUW- is focused on new results on space radiation interaction with components, sensors and shielding analysis, as well as on Geant4-based tools and developments applicable to space missions.
The Geant4 particle transport toolkit is jointly developed by a world-wide collaboration and is intended for a wide range of applications in HEP, medical field, and space physics and engineering. In recent years, space and astrophysics has become a significant user category, with applications ranging from instrument and detector response verification to space radiation shielding optimization, component effects, support of scientific studies, and analysis of biological effects.
Main topics for next G4SUW will include:
* Single Event Effects (SEE) simulation.Geant4-TCAD coupling.
* Microdosimetry.
* Planetary exploration applications.
* Space electronics and science detectors.
* Simulation of astronaut radiation hazards.
* Interfaces and tools to space environment analysis tools such as SPENVIS.
* Cosmic ray magnetospheric propagation analysis.
* Large-scale simulations requiring event biasing and/or GRID capabilities.
* General shielding optimization applications.
Website:
http://www.inta.es/g4suw2013/index.html

## 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/

## 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

## 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

## 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/

## 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

## 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 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-Alfvenic flows whereas the solar wind interacts with supersonic and super-Alfvenic 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/

## 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/

## 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: not yet available

### 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/

## 6. New documents in the European Space Weather Portal Repository

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

### Effects of the ionosphere on RF systems topical working group

http://www.spaceweather.eu/en/repository/show?id=408

### eHEROES - De Zon en PROBA2

A presentation given during the open doors of the public observatory Urania, Hove. 60 people participated and were instructed about our Sun, Space Weather and how PROBA2 operates as a satellite monitoring space weather. The latest scientific outcome of SWAP and LYRA, two scientific space weather instruments onboard of PROBA2 was presented.
http://www.spaceweather.eu/en/repository/show?id=409

### ESWW9-splinter: Space Weather Working Team/SWWT

ESWW9 Splinter wrap up of the Space Weather Working Team.
http://www.spaceweather.eu/en/repository/show?id=410

### ESWW9-splinter: Education, Outreach and Emerging Markets

Splinter wrap up of the SWWT Topical Working Group 'Education, Outreach and Emerging Markets Topical Working Group.
http://www.spaceweather.eu/en/repository/show?id=412

### ESWW9-splinter: PROBA2/SWAP and LYRA Science Meeting

Splinter wrap up of the PROBA2/SWAP and LYRA Science Meeting
http://www.spaceweather.eu/en/repository/show?id=413

### Panel on Space Weather: report 2004

http://www.spaceweather.eu/en/repository/show?id=414

### Panel on Space Weather: report 2006

http://www.spaceweather.eu/en/repository/show?id=415

### Panel on Space Weather: report 2008

http://www.spaceweather.eu/en/repository/show?id=416

### Panel on Space Weather: report 2010

http://www.spaceweather.eu/en/repository/show?id=417

### Panel on Space Weather: report 2012

http://www.spaceweather.eu/en/repository/show?id=418

### ESWW9-splinter: Ionospheric Effects Working Group Splinter Meeting

http://www.spaceweather.eu/en/repository/show?id=407

### ESWW9-splinter: Atmospheric Effects

ESWW9 Splinter wrap up of the SWWT topical group 'Atmospheric Effects'.
http://www.spaceweather.eu/en/repository/show?id=411