STCE Newsletter

4 Aug 2014 - 10 Aug 2014

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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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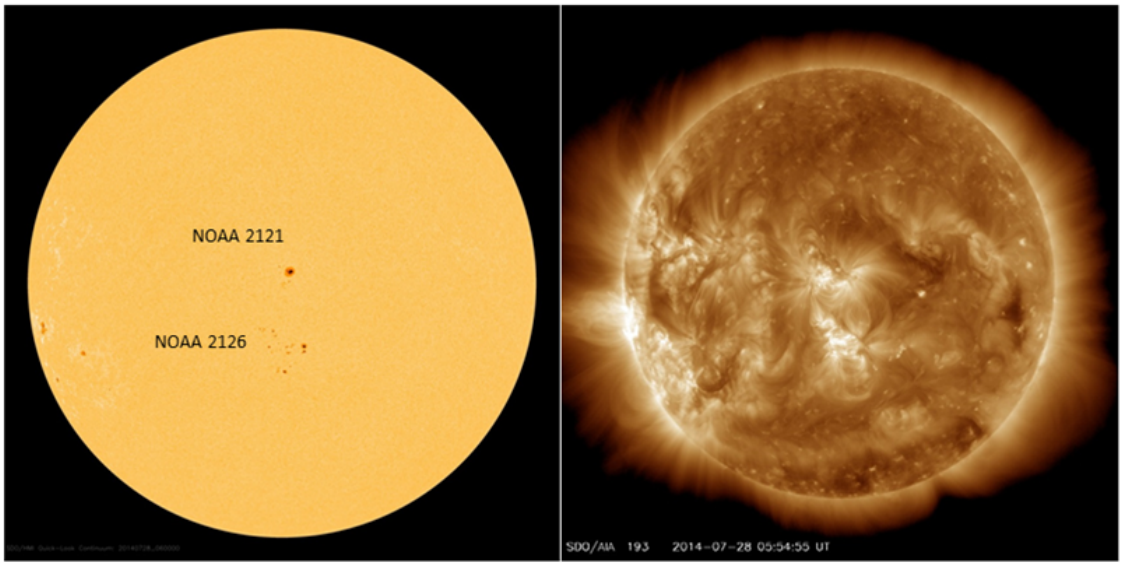
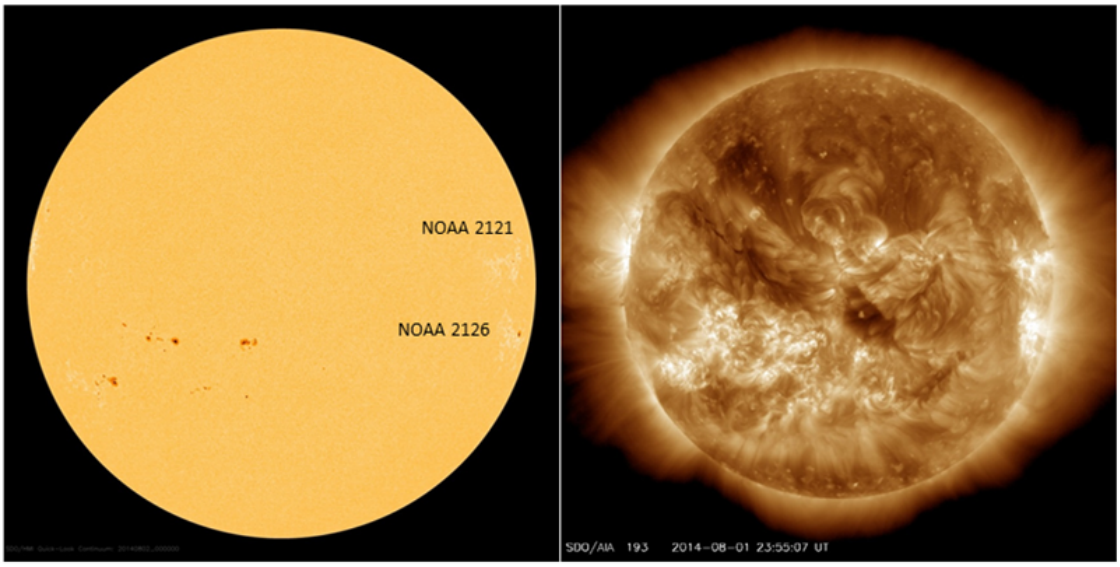
1. Far-side blast targets STEREO-A

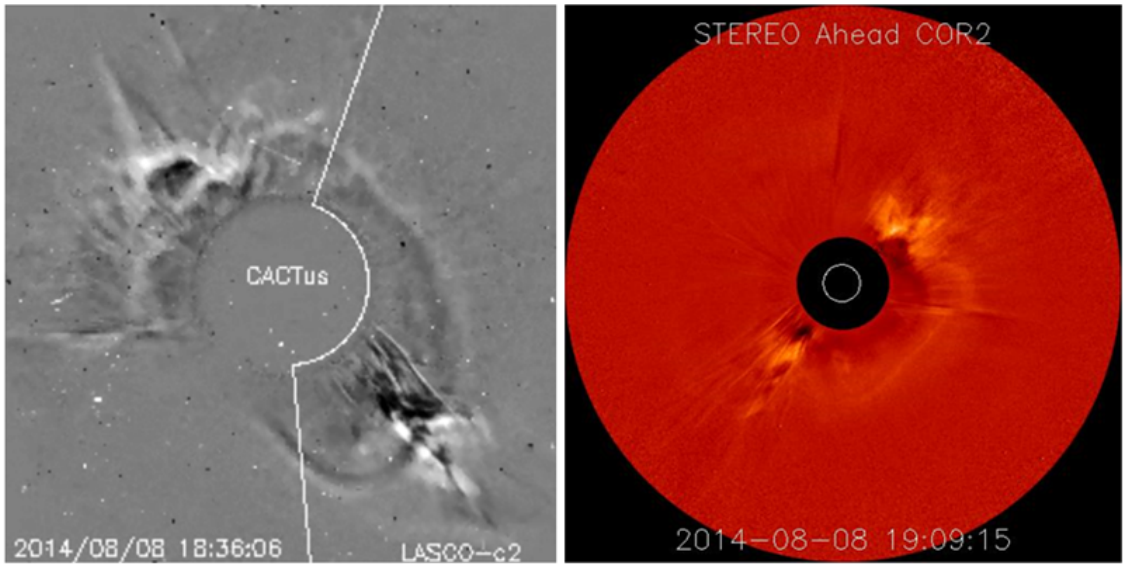
Remember NOAA 2126? This relatively small sunspot group was visible from about 23 July till 3 August. It was flanked to the north and south by resp. NOAA 2129 and NOAA 2123, which were smaller and simpler sunspot groups. During its transit, NOAA 2126 produced only a few small C-class flares.



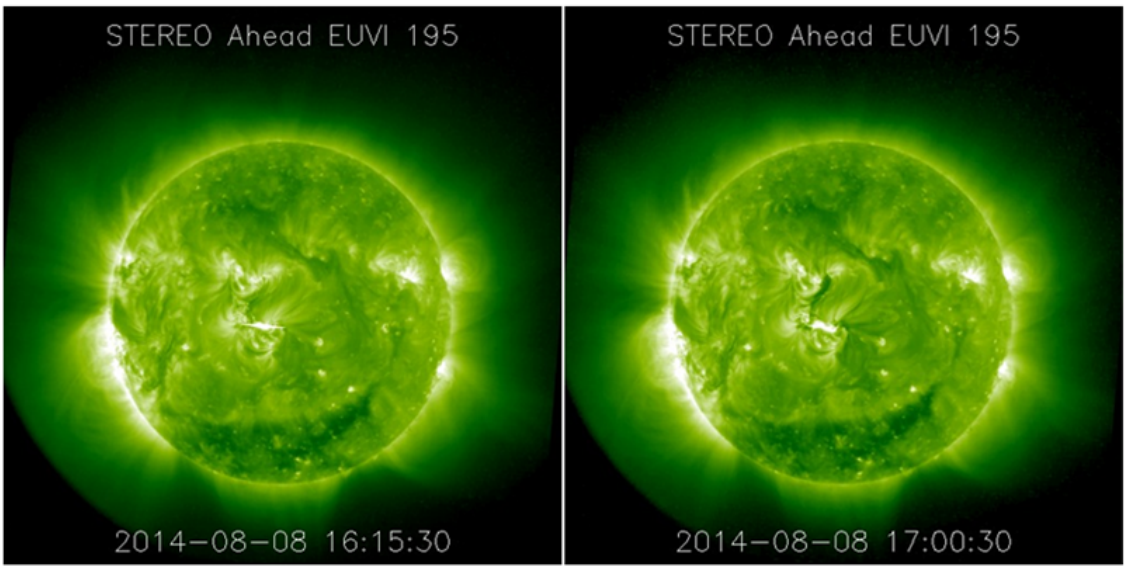
At the time of its rounding of the west limb on 3 August, the group seemed stable and even declining. It showed also some magnetic connection with NOAA 2121 in the northern hemisphere, as can be deduced from the faint trans-equatorial loops over the west limb as seen in extreme ultraviolet (EUV) images from SDO (1-2 August).



During the afternoon hours of 8 August, CACTUS detected an asymmetric halo coronal mass ejection (CME) first seen in images at 16:36UT. The bulk of the CME seemed to be directed to the southwest, having a plane-of-the-sky speed of about 700 km/s.

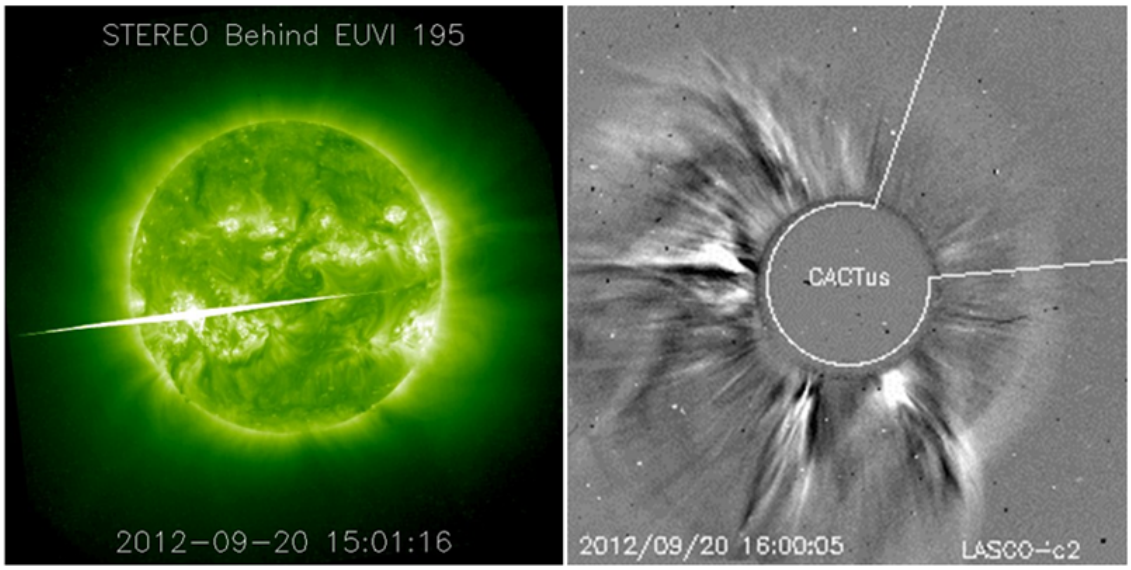


As there was nothing particularly happening on the Earth-facing side of the Sun, a quick examination of STEREO-images revealed that the source region was indeed on the backside of the Sun. Peaking at 16:15UT, a strong burst in EUV could be seen nearly on the centre of the solar disk as seen from STEREO-A. This location corresponded with that of old sunspot group NOAA 2126. EUV imagery also showed an EIT-wave (see http://www.stce.be/news/241/welcome.html for more info on these features) and a transient coronal hole (coronal dimming), indicative of the launch of a coronal mass ejection. Coronagraphic images revealed this was a full halo CME as seen from the STEREO-A vantage point. The transient coronal hole and post-flare coronal loops also clearly indicated an intimate connection with NOAA 2121 on the northern hemisphere.



From the EUV images, it has been estimated that the strength of the flare was comparable to a good-sized M-class or even a low-level X-class flare, so roughly between M4 and X1.2. The STEREO spacecraft have seen much worse. Based on correlation studies between the EUV (SDO, STEREO) and X-ray (GOES) fluxes, it has been estimated that one of the strongest flares so far this solar cycle

occurred on 20 September 2012. Based on STEREO's EUV data, the strength of that eruption was estimated to be between X6 and X18, with X12 the most likely value. That would make it by far the strongest flare of ongoing SC24.



A movie of the 8 August 2014 event, showing EUV images from STEREO-A and coronagraphic images from SOHO and STEREO-A, can be found at http://youtu.be/6tfDrDHYudw Further reading on estimating the strength of flares from STEREO EUV images is at the Solar Physics website (http://adsabs.harvard.edu/abs/2013SoPh..288..241N).

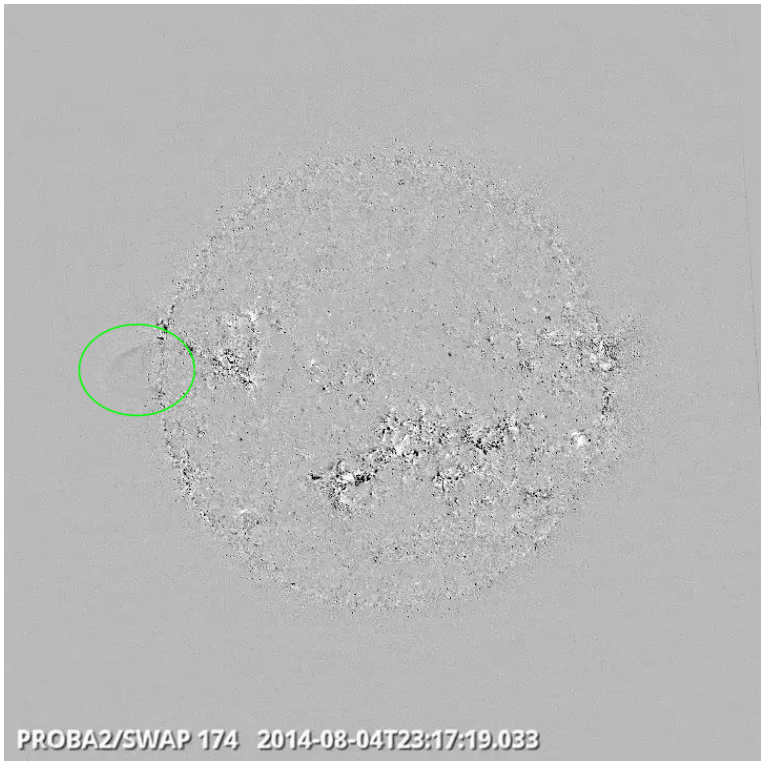
Credits - Data and imagery were taken from SDO (http://sdo.gsfc.nasa.gov/data/aiahmi/browse/), CACTUS (http://www.sidc.oma.be/cactus/out/latestCMEs.html), STEREO (http://stereo-ssc.nascom.nasa.gov/cgi-bin/images) and SOHO (http://sohowww.nascom.nasa.gov/home.html).

2. PROBA2 Observations (4 Aug 2014 - 10 Aug 2014)

Solar Activity

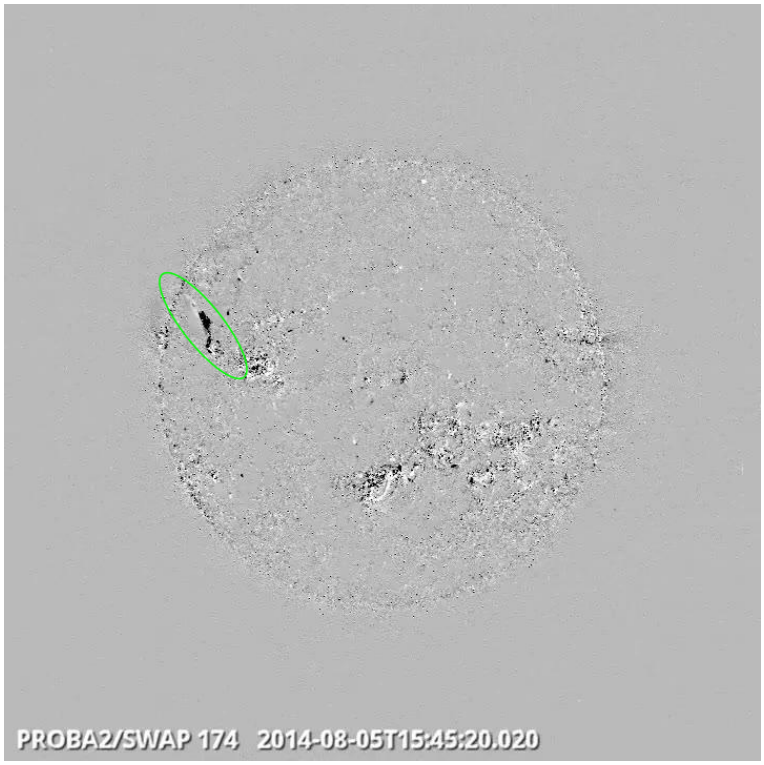
Solar flare activity remained low during the week.
In order to view the activity of this week in more detail, we suggest to go to the following website from which all the daily (normal and difference) movies can be accessed: http://proba2.oma.be/ssa
This page also lists the recorded flaring events.
A weekly overview movie can be found here (SWAP week 228).
http://proba2.oma.be/swap/data/mpg/movies/WeeklyReportMovies/WR228_Aug04_Aug10/weekly_movie_2014_08_04.mp4
Details about some of this week's events, can be found further below.

Monday Aug 04:



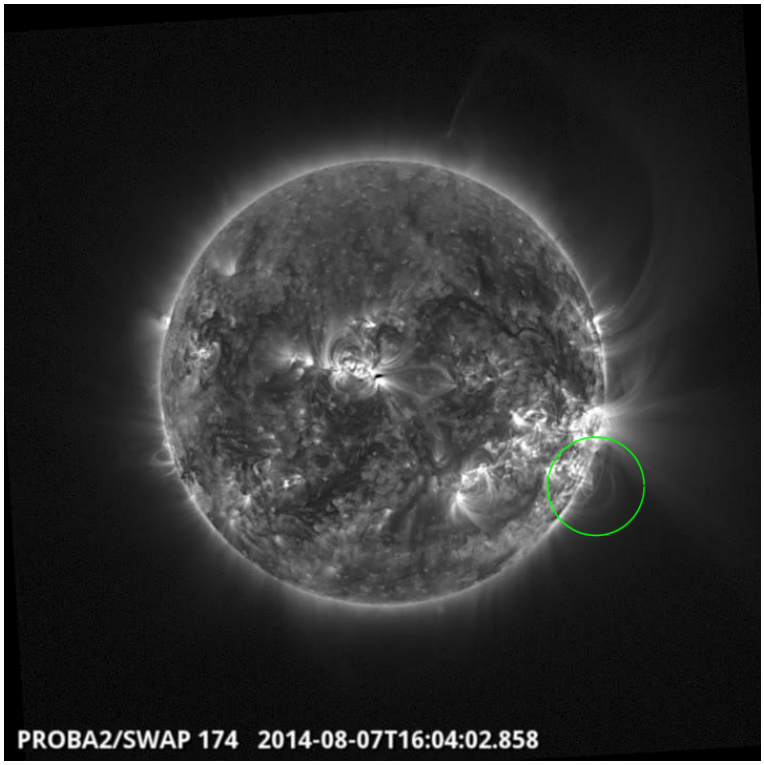
Loop expansion on the east limb @ 23:17 SWAP difference image
Find a movie of the events here (SWAP difference movie)
http://proba2.oma.be/swap/data/mpg/movies/20140804_swap_diff.mp4

Tuesday Aug 05:



Jet in the north east quadrant @ 15:45 SWAP difference image
Find a movie of the events here (SWAP difference movie)
http://proba2.oma.be/swap/data/mpg/movies/20140805_swap_diff.mp4

Thursday Aug 07:



Loop expansion on the west limb @ 16:04 SWAP image
Find a movie of the event here (SWAP movie)
http://proba2.oma.be/swap/data/mpg/movies/20140807_swap_movie.mp4

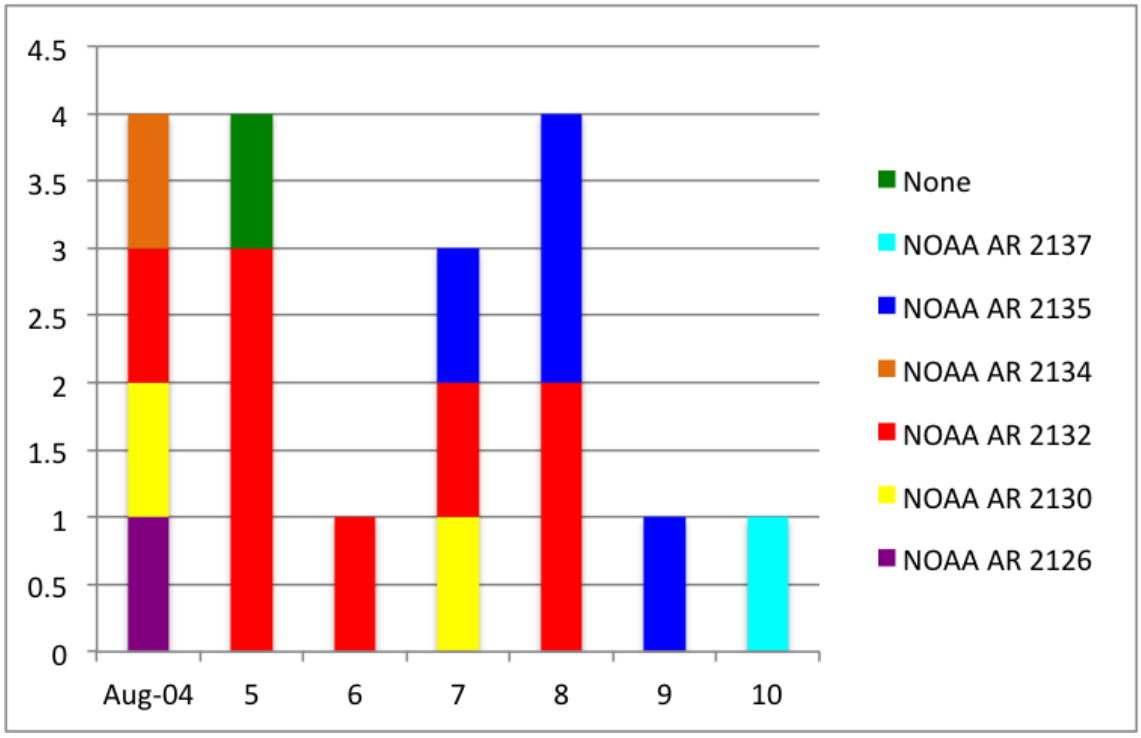
Sunday 10:

Jet on the south half @ 02:44 SWAP difference image
Find a movie of the events here (SWAP difference movie)
http://proba2.oma.be/swap/data/mpg/movies/20140810_swap_diff.mp4

3. Review of solar activity (4 Aug 2014 - 10 Aug 2014)

Flares

Solar flaring activity was low during the past week. While the background X-ray radiation was at B-level, 18 C-class flares were observed. The strongest eruption during the period was a C4.5 flare that occurred in NOAA AR 2135 on August 8 at 17:01 UT. The most active region was NOAA AR 2132, which produced almost half of the reported C-flares. From August 7 onwards also NOAA AR 2135 showed C-flaring activity.



Coronal mass Ejections

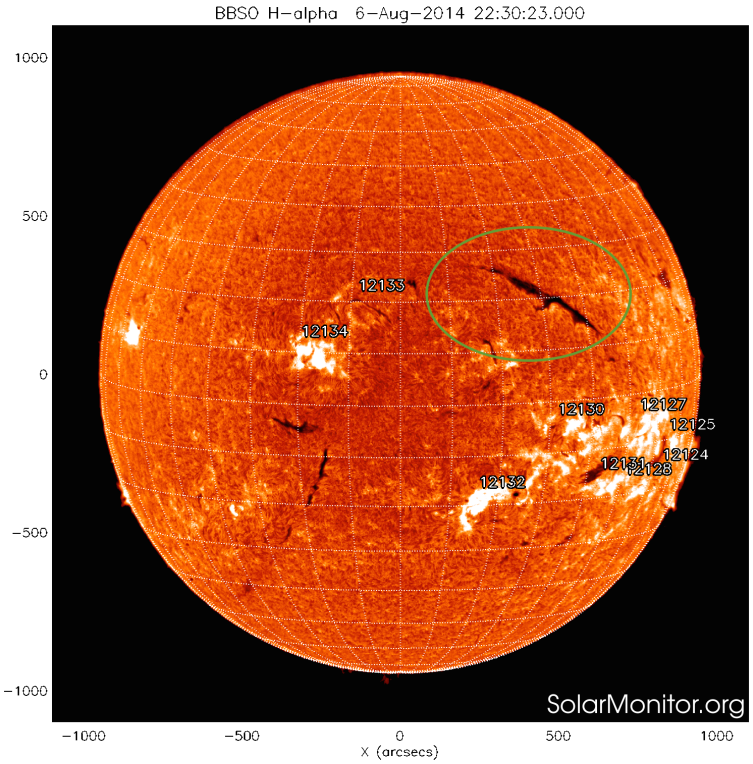
No earth-directed CMEs were observed in the past week. A type II radio burst was observed in Humain on August 5 at 15:50. It was related to a C1.1 flare at location N11E51 (close to NOAA AR 2134 - green in the above chart, the source region is labeled as None because it could not be linked to an active region) and to a narrow CME observed by LASCO at 16:24 UT towards the north-east.

A wide CME was observed in LASCO at 04:36 UT on August 6, probably associated to an eruption in NOAA AR 2121, which at that time had already turned over the west limb. The eruption was visible in STEREO images on August 5 around 20:00 UT.

A filament eruption was observed near NOAA AR 2127 at 10:40 UT without an associated CME.

CACTus reported on a halo CME observed in LASCO images on August 8 around 16:36 UT. This full halo CME was associated to a strong back-sided eruption observed in the center of the solar disk in STEREO-a/EUVI 195 images starting at 15:55 UT.

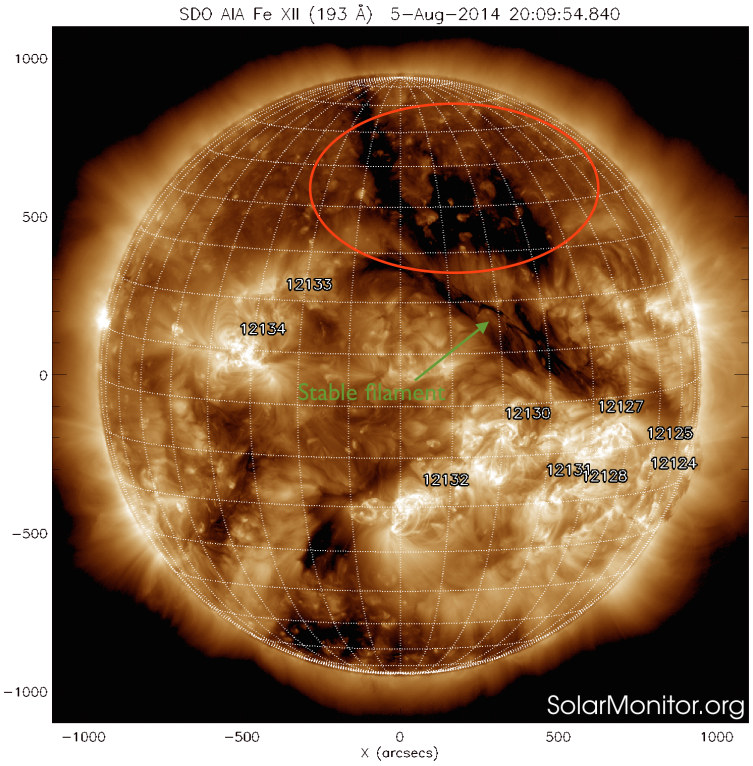
Stable coronal structures



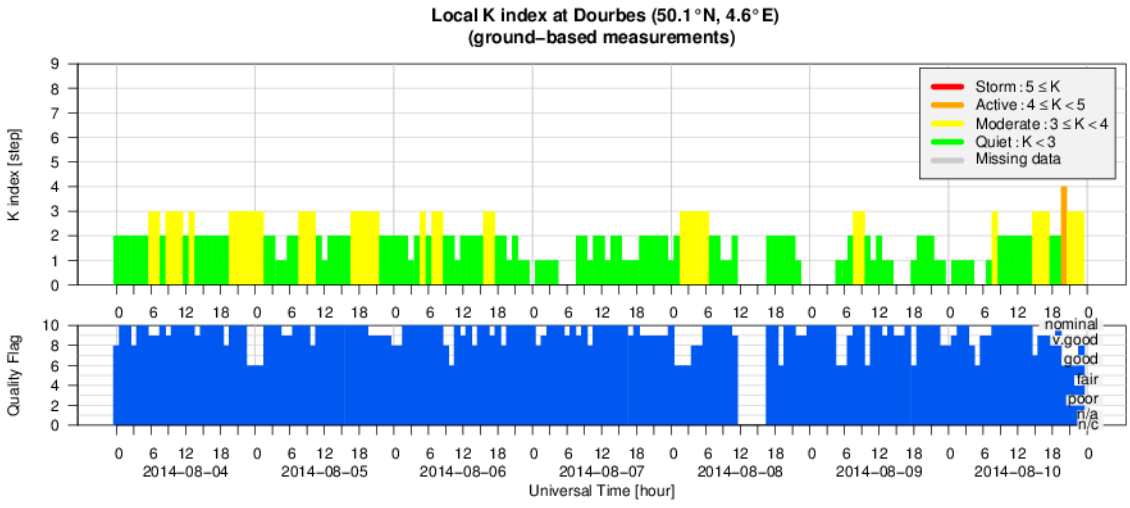
The very extended filament that was on the earth-facing side of the Sun remained stable throughout the week. It is circled in green on the H-alpha picture from the earth based Big Bear Solar Observatory (BBSO) http://www.bbso.njit.edu .
Two small coronal holes passed the central meridian during this period: the first one on August 6, the other on August 9.

4. Review of geomagnetic activity (4 Aug 2014 - 10 Aug 2014)

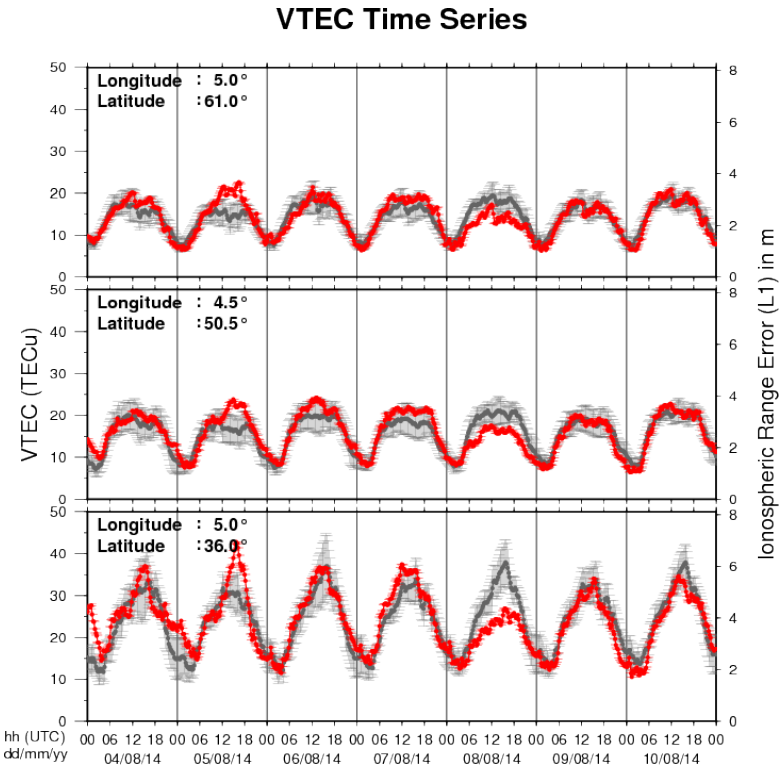
Geomagnetic conditions were at quiet to unsettled levels throughout the week and dominated by coronal hole high speed wind streams. A small disturbance in the solar wind was observed on August 4, around 06:00 UT and was likely related to a high speed wind stream originating from the coronal hole that passed the central meridian on August 1. The K index for Dourbes reached a maximum of K=4 on August 10, with unsettled conditions (K=3) before and after this peak. This disturbance was probably related to the coronal hole that passed the central meridian on August 6 (indicated with the red circle in the SDO/AIA image below).



5. Geomagnetic Observations at Dourbes (4 Aug 2014 - 10 Aug 2014)



6. Review of ionospheric activity (4 Aug 2014 - 10 Aug 2014)



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. Future Events

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

European Planetary Science Congress 2014 in Cascais, Portugal

Start : 2014-09-07 - End : 2014-09-12
Planetary space weather can be characterised by changes in the ambient planetary magnetic field and plasma populations around the planetary environment while space climate refers to the long-term

changes in space weather conditions. Space weather and space climate are driven by the changes in the Sun. The effects of Space Weather on the Earth's environment are well documented, particularly in terms of risk to satellites, communications and ground-based systems such as electrical power grids and pipelines. However, planetary space weather and space climate studies as well as better prediction models for space weather are needed. Typically differences in the magnetic field and plasma environment at different planets, as well as the distance of the planet from the sun drives different space weather effects as we move through the solar system. The use of solar wind propagation models combined with solar observations allows us to obtain and predict the interplanetary conditions around each planet.
We solicit papers on planetary as well as terrestrial space weather and space climate, where data from past and on-going space missions such as ACE, SOHO, SDO, MEX, VEX, MESSENGER and CASSINI is used. We welcome papers on observations as well as modeling of space weather and space climate in our solar system.
Website:
http://meetingorganizer.copernicus.org/EPSC2014/session/16809

Workshop on Radiation Monitoring for the International Space Station in Krakow, Poland

Start : 2014-09-09 - End : 2014-09-11
The Workshop on Radiation Monitoring for the International Space Station (WRMISS) has been held annually since 1996. The major purpose of WRMISS is to provide a forum for discussion of technical issues concerning radiation dosimetry aboard the International Space Station and other spacecraft. This includes discussion of new results, improved instrumentation, detector calibration, and radiation environment and transport models. The goal of WRMISS is to enhance international efforts to provide the best information on the space radiation environment in low-Earth orbit and on the exposure of astronauts and cosmonauts in order to optimize the radiation safety of space crew.
Website:
http://www.ifj.edu.pl/conf/wrmiss/

Geospace revisited: a Cluster/MAARBLE/Van Allen Probes Conference in Rhodos, Greece

Start : 2014-09-15 - End : 2014-09-20
The 'Geospace Revisited' conference aims at revisiting long-standing issues of geospace dynamic phenomena. New data from space missions like Cluster, THEMIS and the more recent Van Allen Probes, along with measurements from ground-based magnetometer arrays around the globe, processed with new methods and combined with theory and simulations are expected to shed light on the complex interplay of particles, fields and waves in geospace, and in particular the inner magnetosphere (radiation belts and ring current).
Website:
http://geospacerev.space.noa.gr/index.php

2014 Conference on Big Data from Space (BiDS '14) in Frascati, Italie

Start : 2014-11-12
This conference aims to bring together researchers, engineers, users in the area of Big Data in the Space sector.
The focus is on the whole data lifecycle, ranging from data acquisition by spaceborne and ground-based sensors to data management, analysis and exploitation in the domains of Earth Observation, Space Science, Space Engineering, Space Weather, etc.
Special emphasis will be put on highlighting synergies and cross-fertilization opportunities from domains like Climate Change, Solid Earth Science, Planetary Sciences, Life Science, Astrophysics, High Energy Physics, Social Sciences, etc.
We expect this conference to:
* contribute towards a common "Big Data from Space" scientific and programmatic framework

* widen competences and expertise of universities, labs and industrial actors
* foster networking of experts and users towards better access and sharing of data, tools and resources
* leverage innovation, spin-in, spin off of technologies, and business development arising from research and industry progress
Website:
http://congrexprojects.com/2014-events/BigDatafromSpace/objectives

European Space Weather Week in LiÃ¨ge, Belgium

Start : 2014-11-17 - End : 2014-11-21
The 11th Edition of the European Space Weather Week will take place on 17-21nd November 2014 in Liège, Belgium.
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 is coordinated by the Belgian Solar-Terrestrial Centre of Excellence (STCE), ESA and the Space Weather Working Team. The local organisation is done by the STCE.
Website:
http://www.stce.be/esww11/

2014 AGU Fall Meeting in San Fransisco, USA

Start : 2014-12-15 - End : 2014-12-19
The AGU Fall Meeting is the largest worldwide conference in the geophysical sciences, attracting more than 22,000 Earth and space scientists, educators, students, and other leaders. For 46 years, energized and passionate Earth and space scientists from around the world gather at the AGU Fall Meeting to connect with colleagues, broaden their knowledge base, and embrace the joy of science. The 2014 meeting takes place Monday 15 - Friday 19 December 2014.
Several sessions about space weather are foreseen:
*
When and Why Does Space weather Forecasting Fail?
*
Addressing Operational Space Weather Needs
*
Near Real Time Data for Earth Science and Space Weather Applications
*
Understanding Hemispheric Asymmetry and Space Weather
*
Connection of Solar Events With the Variability of Space Environments
*
Bz from the Sun to the Earth: Observations and Modeling
*
Solar Sources and Heliospheric Consequences of Coronal Mass Ejections in Solar Cycle 24
*
Advances in Ionospheric Forecasting - Modeling, Observations, and Validation
Abstract Submission Deadline: August 6, 2014
Website:
http://fallmeeting.agu.org/2014/

Measurement Techniques for Solar and Space Physics, in Boulder, CO, USA

Start : 2015-04-20 - End : 2015-04-24
This gathering was born out of the desire to collect in one place the latest technologies required for advancement of science in the discipline of Solar and Space Physics. In doing so, it was recognized that the two 1998 volumes of 'Measurement Techniques in Space Plasmas' (Particles and Fields) have

been a valuable reference and resource for advanced students and scientists who wish to know the fundamentals of measurement techniques and technology.
Website:
https://mtssp.msfc.nasa.gov/

26th General Assembly of the International Union of Geodesy and Geophysics (IUGG) in Prague, Czech Republic

Start : 2015-06-22 - End : 2015-07-02
We invite contributions on novel inversion methods with application across the geosciences. Of particular interest are 3D imaging, joint inversion of geodetic, geophysical and geochemical datasets, and multi-disciplinary interpretation approaches such as integration of gravity, EM and seismic data or thermo-mechanical modelling studies constrained by physical parameters.
Modelling of Space Weather Effects: Solar, Magnetospheric and Earth Resistivity Constraints (IAGA, IAMAS)
In this symposium we welcome contributions on all aspects of the modelling of space weather and its effects, from the Sun to Earth. This includes the modelling of the various interactions between travelling solar storms and the solar wind, magnetosphere, ionosphere and solid Earth and the validation of models through measurements. Contributions on models developed to aid end-users, such as satellite and power grid operators, survive the impact of space weather are also encouraged.
Website:
http://www.iugg2015prague.com/joint-inter-association-symposia.htm#JA