

Trilateral meeting KNMI, MeteoLux and RMI

An introduction to Space Weather

Jan Janssens

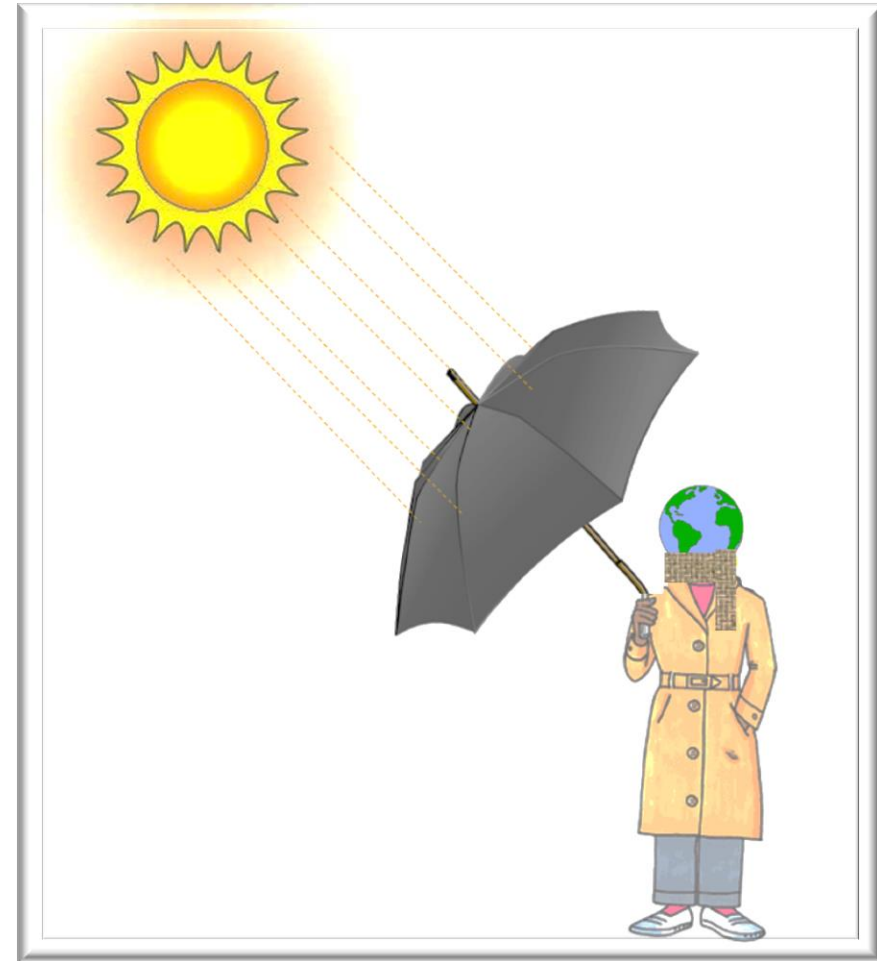
Solar-Terrestrial Centre of Excellence

19 October 2016



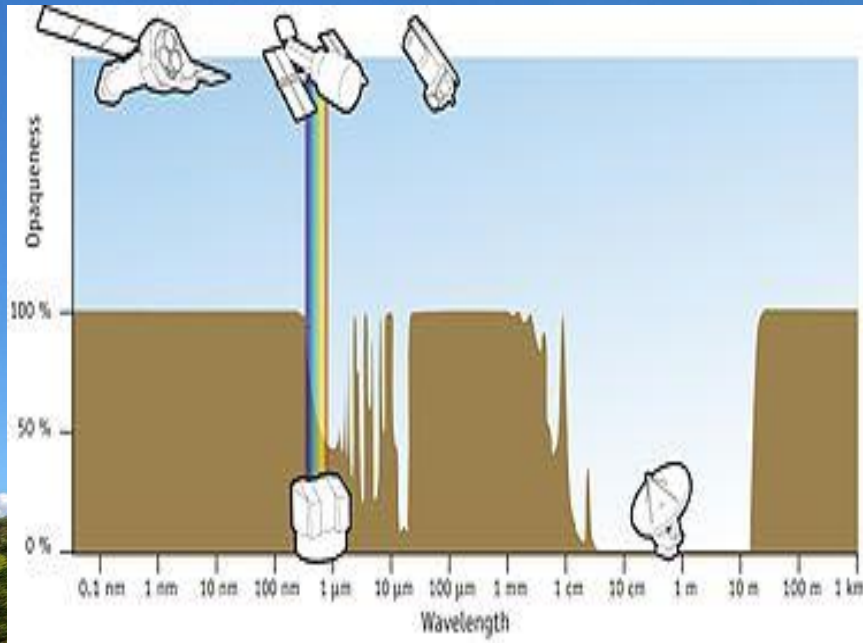
Space Weather (SWx)

- Space weather refers to the environmental conditions in Earth's magnetosphere, ionosphere and thermosphere due to the Sun and the solar wind that can influence the functioning and reliability of spaceborne and ground-based systems and services or endanger property or human health.

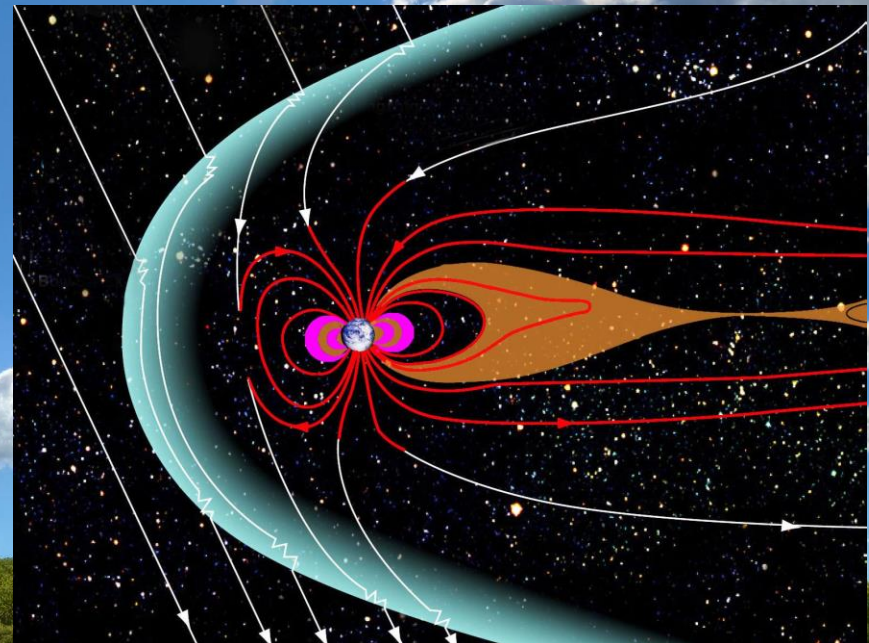


NSWP, ESA

The quiet Sun



Electromagnetic radiation

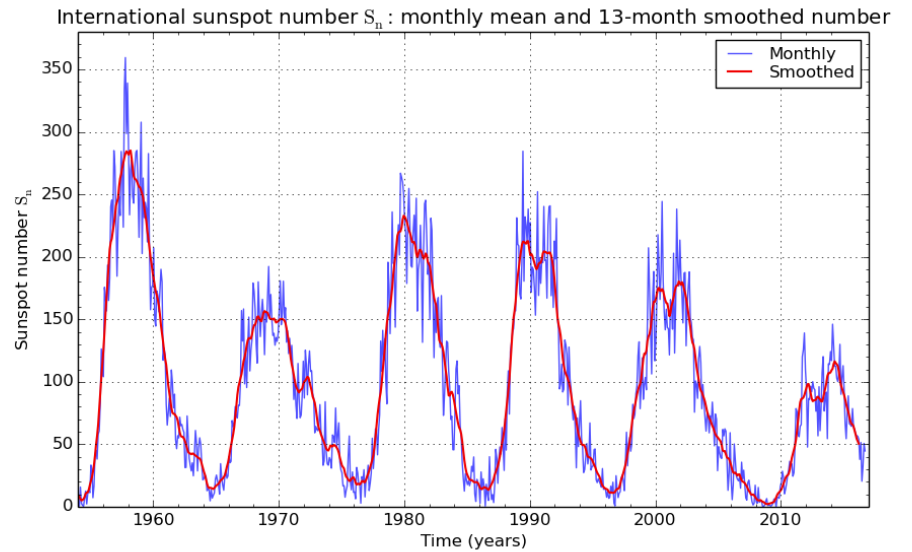
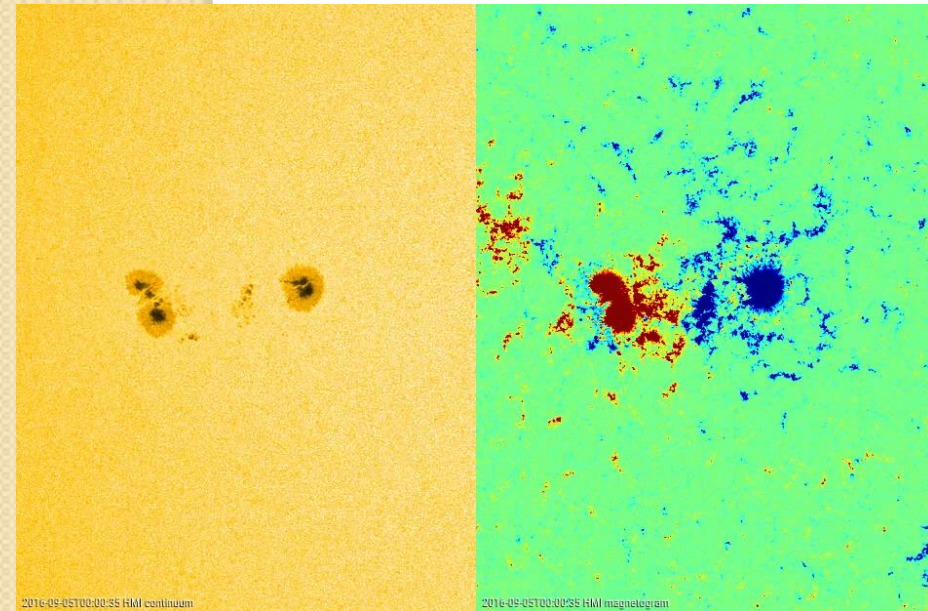


Particles – Solar wind

Solar activity: Sunspots

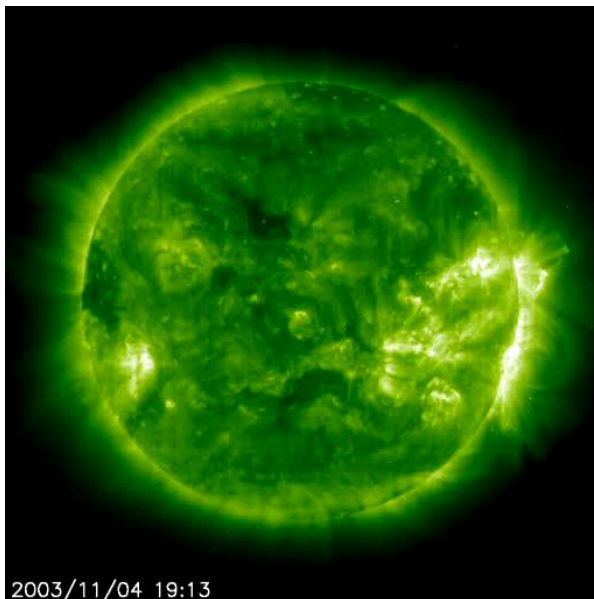
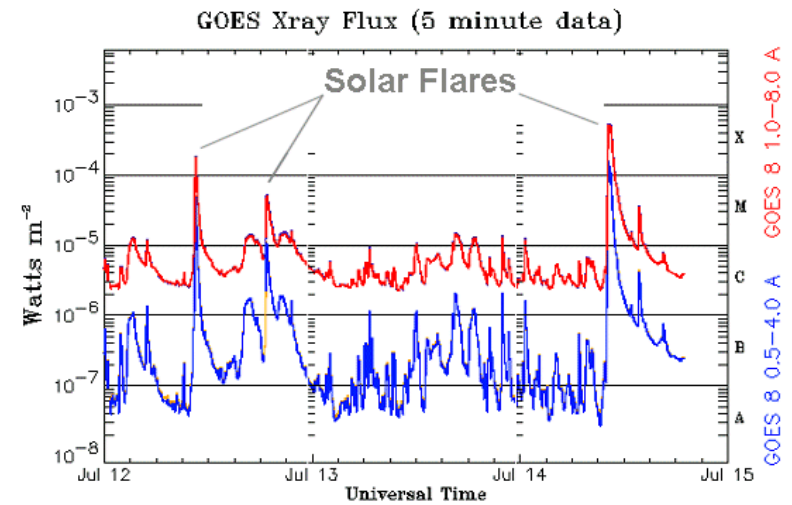


Solar activity: Solar cycle

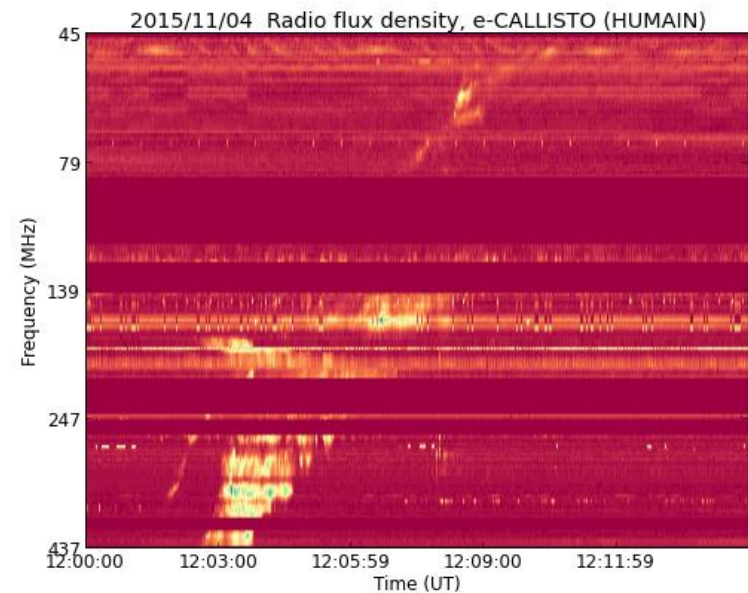


SILSO graphics (<http://sidc.be/silso>) Royal Observatory of Belgium 2016 October 7

Solar flares (radiation)



2003/11/04 19:13

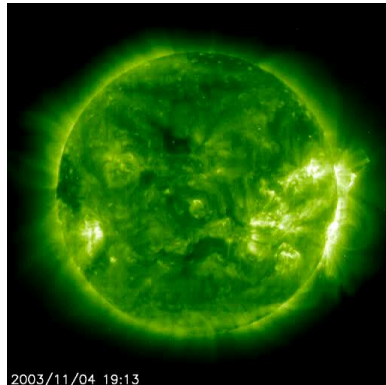


Solar eruptions

Reconnection

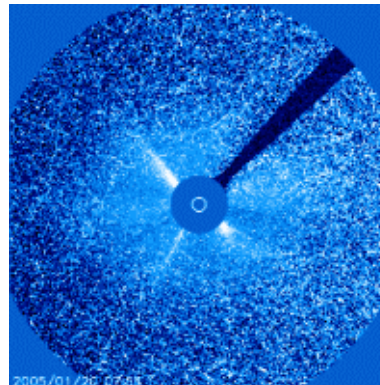
Radiation

Solar flares

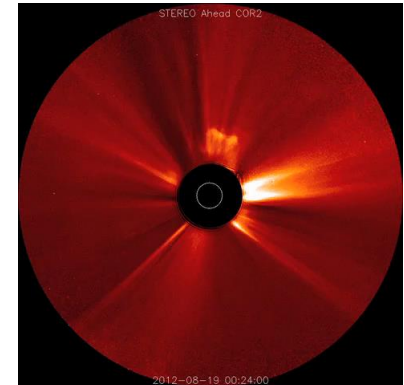


Particles

Proton storms



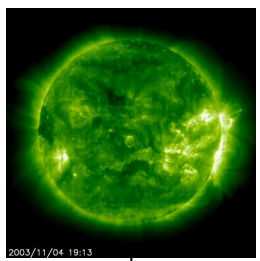
Coronal Mass Ejections



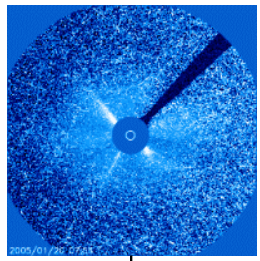
Effects from disturbed space weather

Source

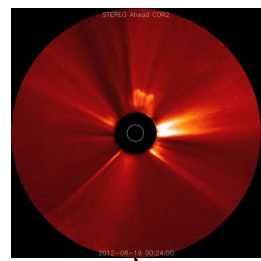
Solar flares



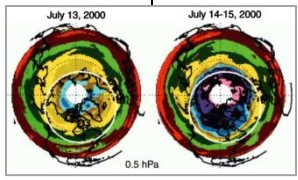
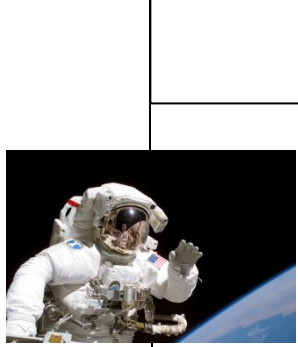
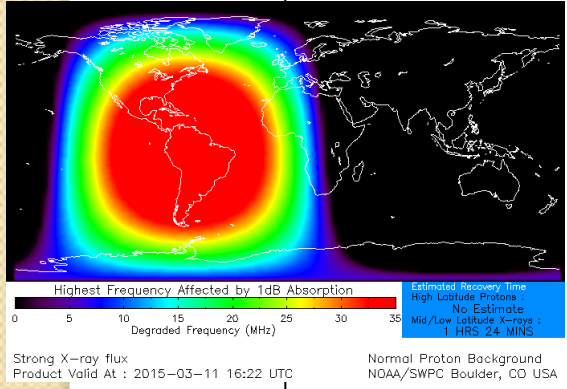
Proton storms



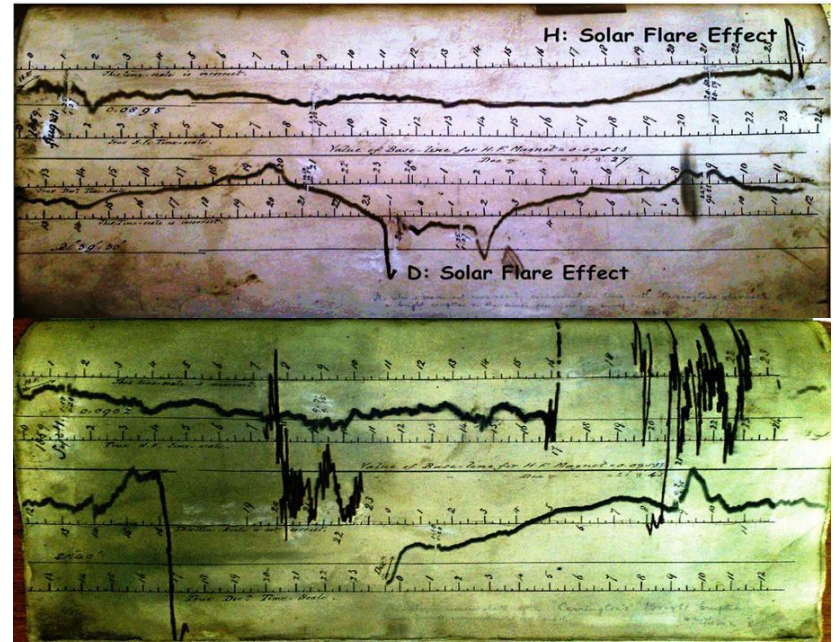
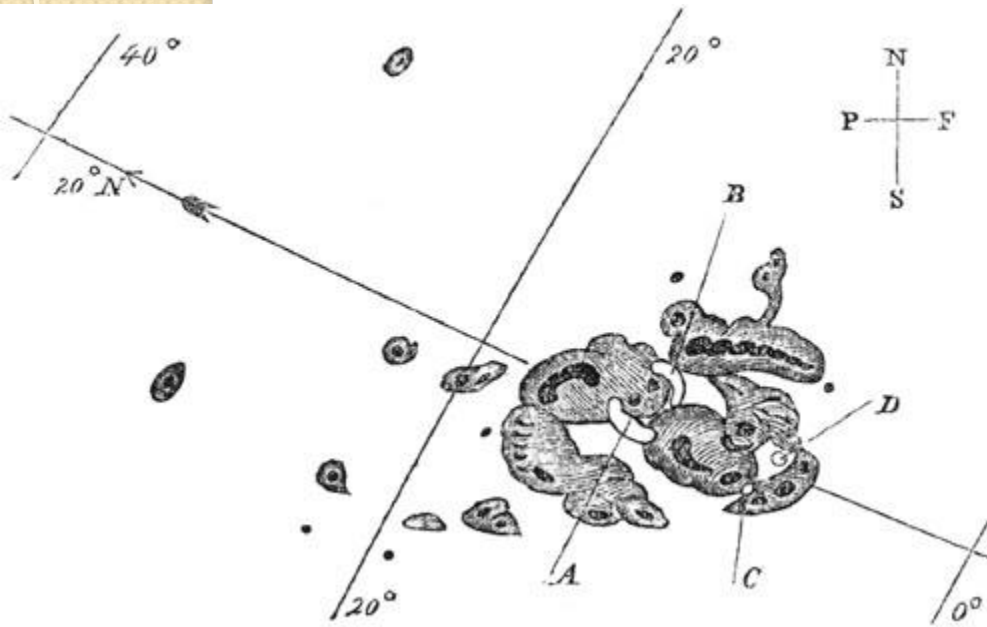
Coronal Mass Ejections



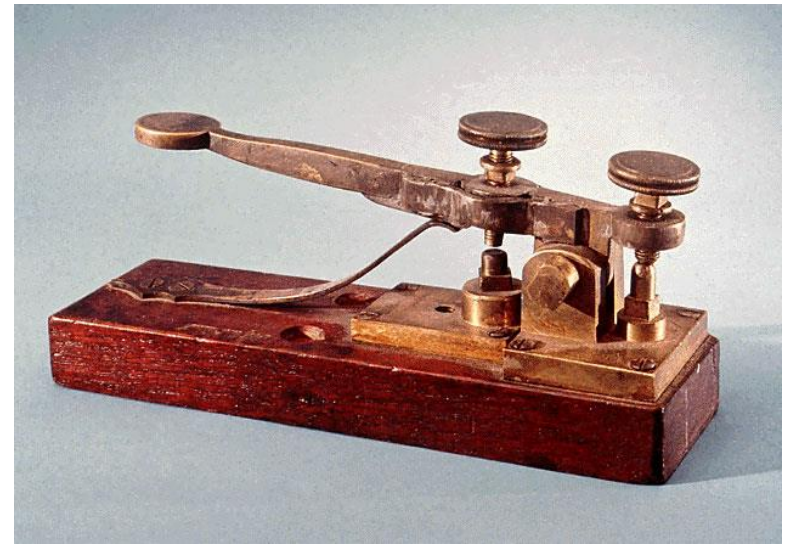
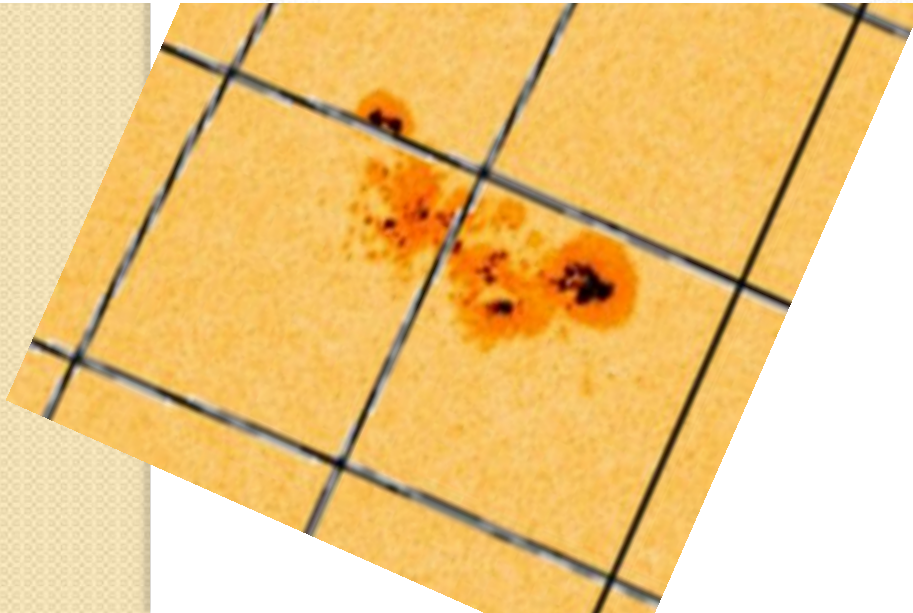
Effects



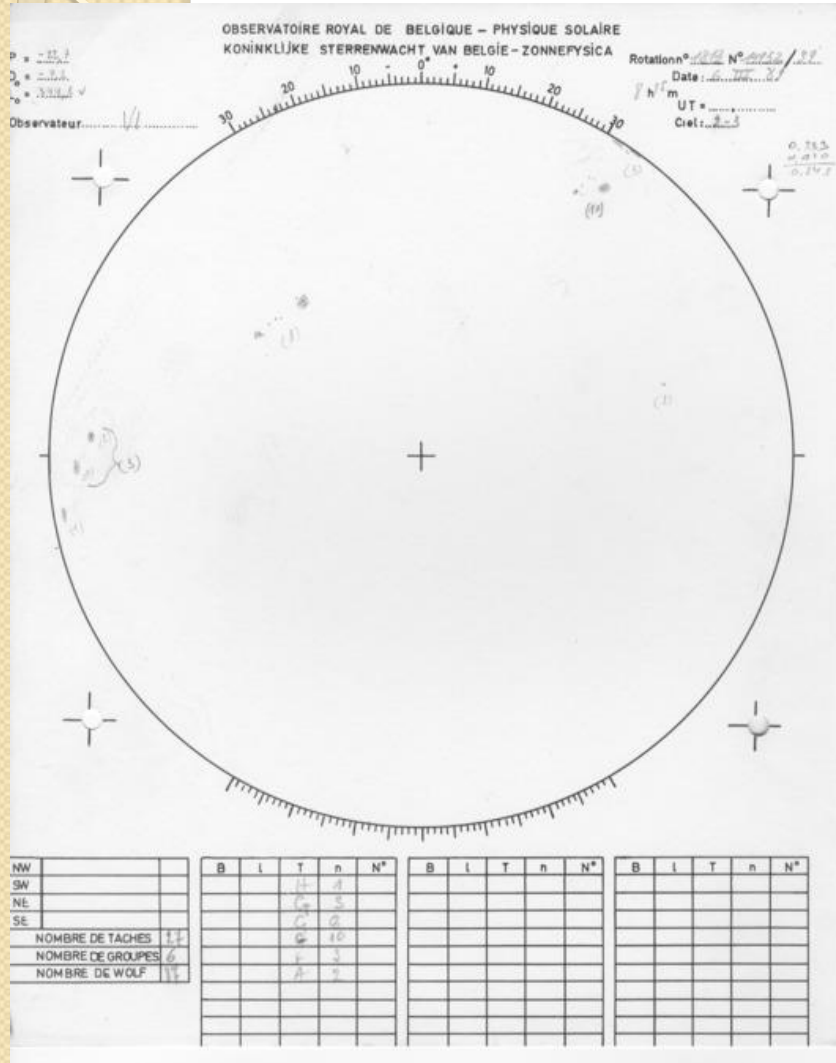
1 September 1859: Carrington event



<http://www.geomag.bgs.ac.uk/education/carrington.html>



13-14 March 1989: Québec event



28 October 2003: Halloween event



SWx effects during SC24

- 24-25 Octobre 2011
 - WAAS/EGNOS services interrupted; blood-red aurora
- 24 January 2012
 - Polar flight detours
- 7 March 2012
 - Polar flight detours
- 7 January 2014
 - Delay launch supply rocket ISS
- 1 September 2014
 - ST-B lost sun-lock
- 4 November 2015
 - Swedish Air Traffic down



Questions?

- **SIDC:**
 - <http://www.sidc.be/>
- **SSCC:**
 - <http://swe.ssa.esa.int/web/guest/contact>
 - helpdesk.swe@ssa.esa.int
- **STCE:**
 - <http://www.stce.be/>
 - jan.janssens@oma.be
- **Adres:**
 - Space Pole
 - Avenue Circulaire - Ringlaan, 3
1180 Uccle - Ukkel
 - BELGIUM



Solar-Terrestrial Centre of Excellence Search...

HOME PROJECTS PEOPLE NEWSLETTER NEWS PRESS LINKS GOOD TO KNOW

SC24 highlights page NEW
Every year, the STCE publishes a news item with an overview of the most memorable solar and space weather highlights.

Backside eruptions VIDEO
2016-06-30 18:00:15

STCE Annual meeting GOOD
Once again, solar observers were

European Space Weather Week GOOD
13TH EUROPEAN SPACE WEATHER WEEK
November 14-18, 2016
Oostende, BELGIUM
At ESWW13 we try to make the