The SIDC - An introduction

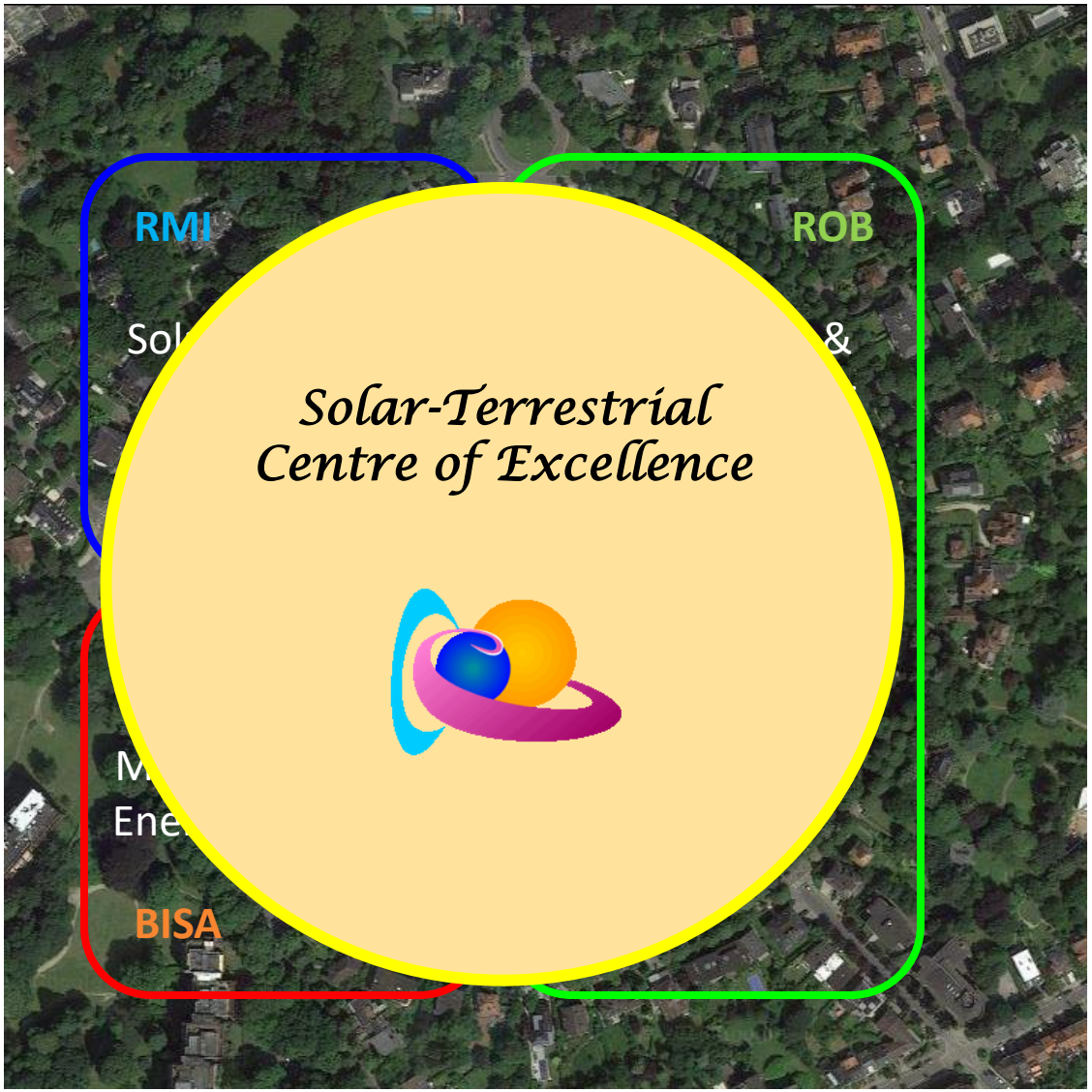
Jan Janssens

19 April 2018

Solar-Terrestrial Centre of Excellence

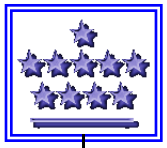
Royal Observatory of Belgium

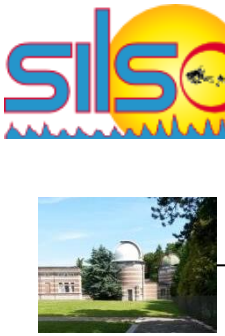
The « Space Pole » in Uccle



The SIDC - History

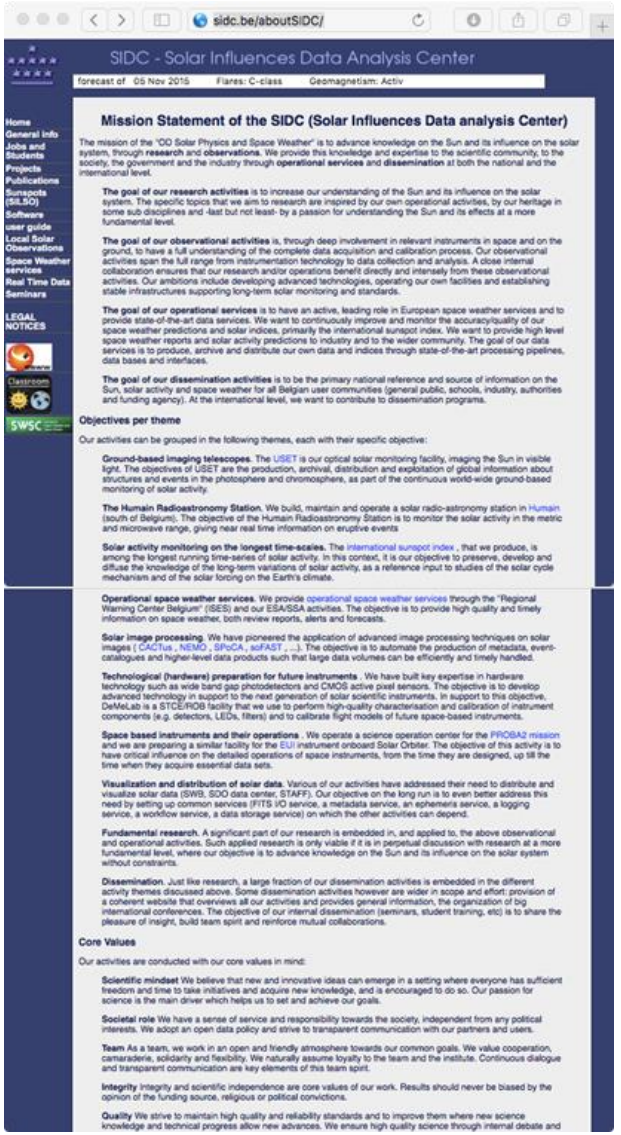
- 1981
  - Sunspot Index Data Centre
    - Sunspot number
- 2000
  - Solar Indices Data analysis Centre
    - = *OD «Solar Physics & Space weather»*
      - *Incl. Space weather services*
        - ***SIDC/RWC***
- 2013
  - SILSO
    - Sunspot Index and Long-term Solar Observations





The SIDC - Mission Statement

- **Research**: to increase our understanding of the Sun and its influence on the solar system.
- **Observations**: to have a full understanding of the complete data acquisition and calibration process.
- **Services**: to have an active, leading role in European space weather services



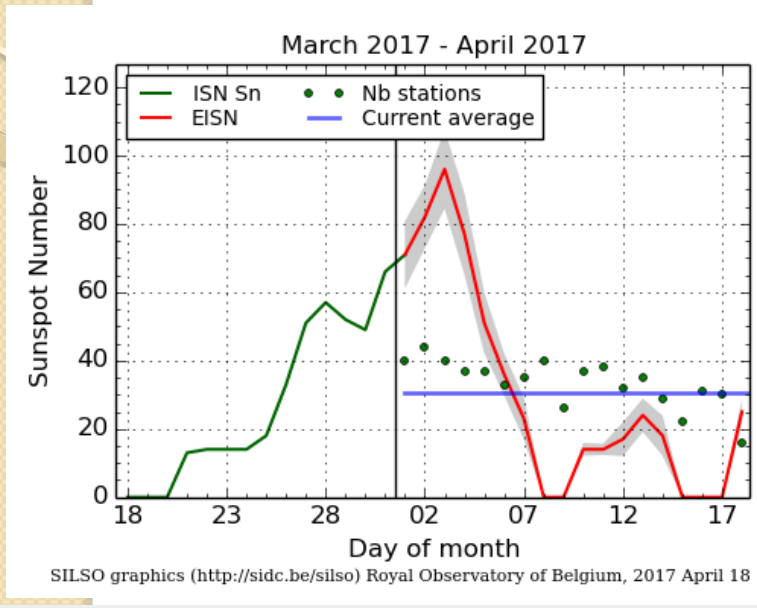
http://sidc.be/aboutSIDC

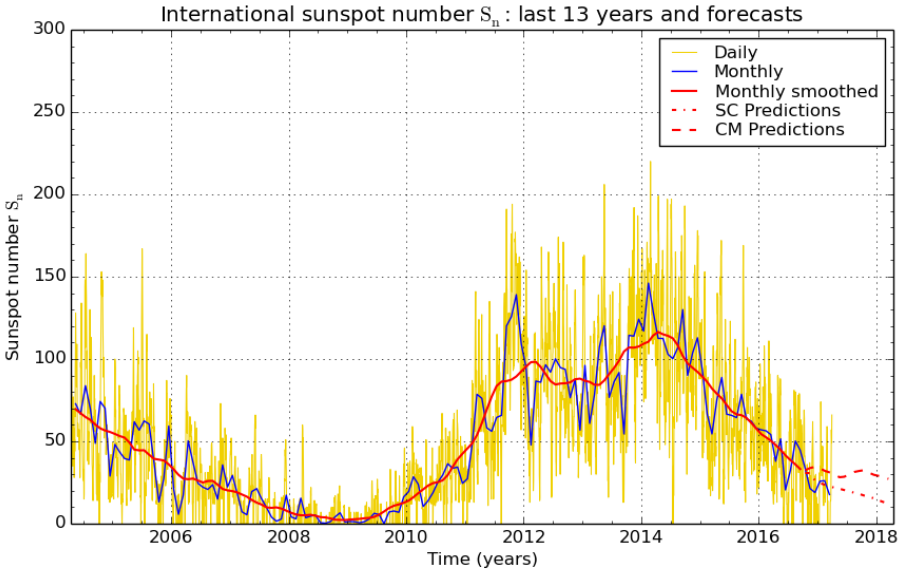
SILSO

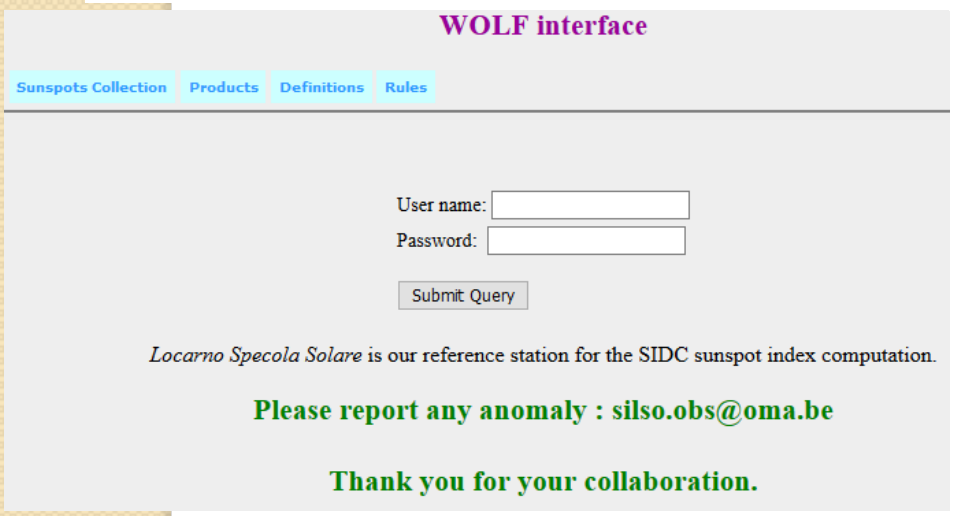
- 1981
  - Sunspot Index Data Centre
    - Sunspot number
- 2013
  - SILSO
    - Sunspot Index and Long-term Solar Observations

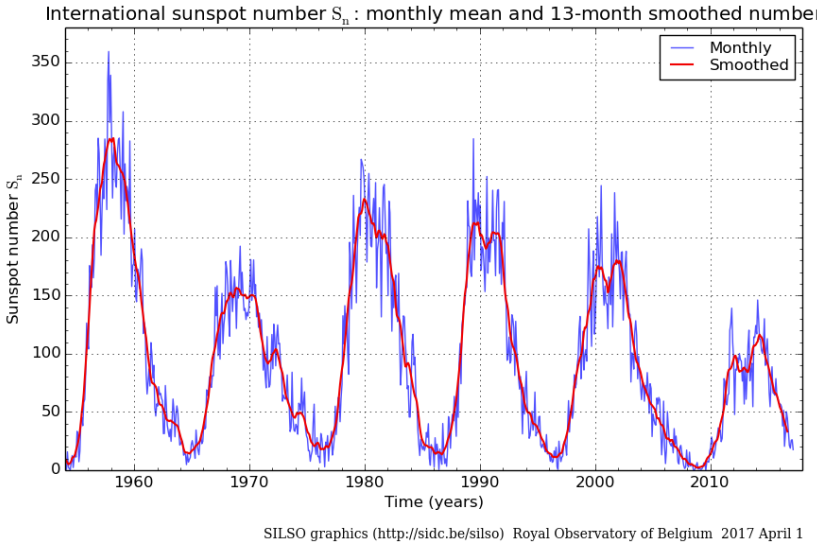
http://sidc.oma.be/silso/

SILSO


March 2017 - April 2017
ISN Sn
EISN
Nb stations
Current average
Sunspot Number
Day of month
SILSO graphics (http://sidc.be/silso) Royal Observatory of Belgium, 2017 April 18


International sunspot number S_n : last 13 years and forecasts
Daily
Monthly
Monthly smoothed
SC Predictions
CM Predictions
Sunspot number S_n
Time (years)


WOLF interface
Sunspots Collection
Products
Definitions
Rules
User name:
Password:
Submit Query
Locarno Specola Solare is our reference station for the SIDC sunspot index computation.
Please report any anomaly : silso.obs@oma.be
Thank you for your collaboration.

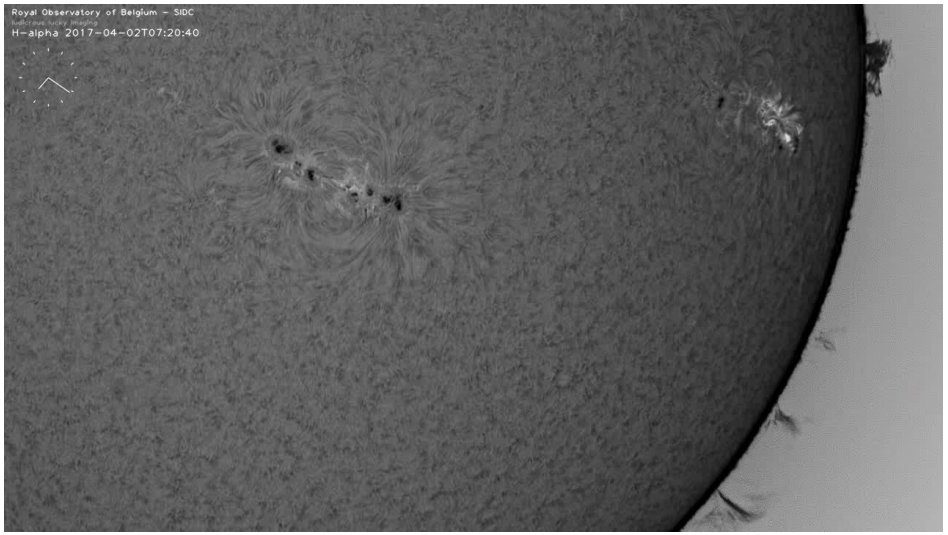

International sunspot number S_n : monthly mean and 13-month smoothed number
Monthly
Smoothed
Sunspot number S_n
Time (years)
SILSO graphics (http://sidc.be/silso) Royal Observatory of Belgium 2017 April 1

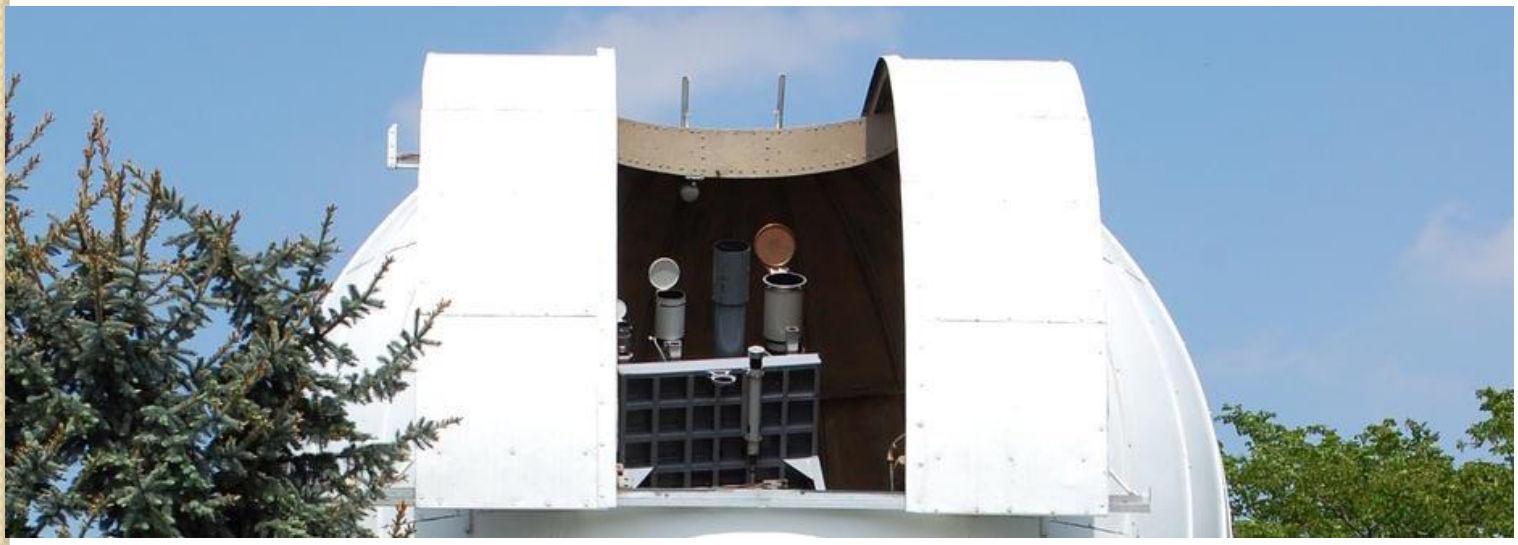
USET

- Uccle Solar Equatorial Table
- Four instruments
  - White Light
    - Drawings
      - Since the 1940's
    - CCD Imagery
  - H-alpha
    - Red end of the spectrum
    - CCD Imagery
  - CaII-K
    - Blue end of the spectrum
    - CCD Imagery
- Archives!

http://www.sidc.be/uset/

USET


Royal Observatory of Belgium – SIDC
H-alpha 2017-04-02T07:20:40



Humain

- Solar Radioastronomy
  - 45-1500 MHz
  - Near real-time
- 6m-dish
  - 2 antennas
  - 3 radio-spectrometers

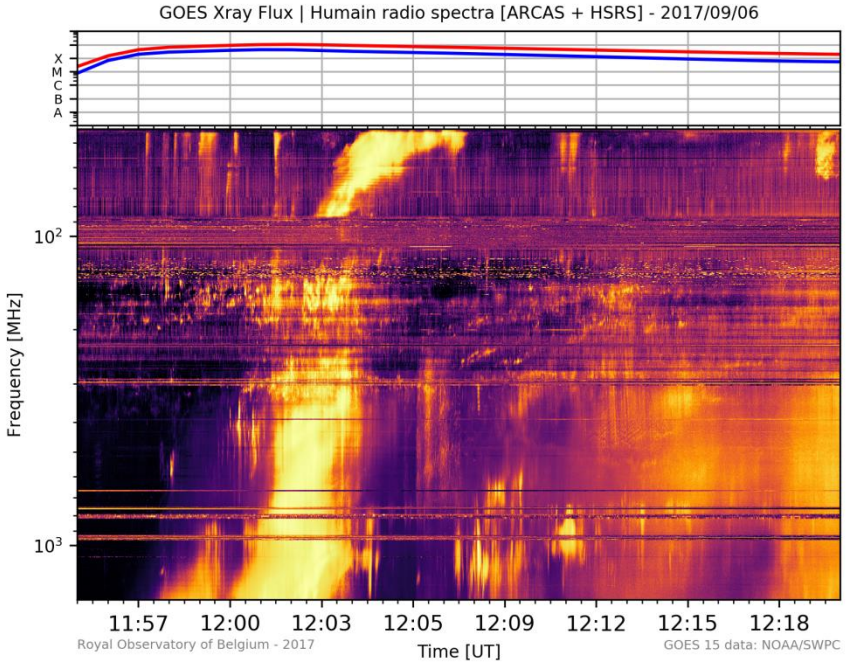
Technical comparison of the radio spectrometers in Humain

	Callisto	ARCAS	HSRS
Frequency band	45 - 447 MHz	45 - 450 MHz	275 - 1495 MHz
Frequency resolution	63 kHz	98 kHz	98 kHz
Time resolution	250 ms	~84 ms	~250 ms
Number of frequencies	200	~4.2 k	~12.5 k

http://www.sidc.be/humain/flux_realtime.php

Humain


08/09/2012 08:17:03

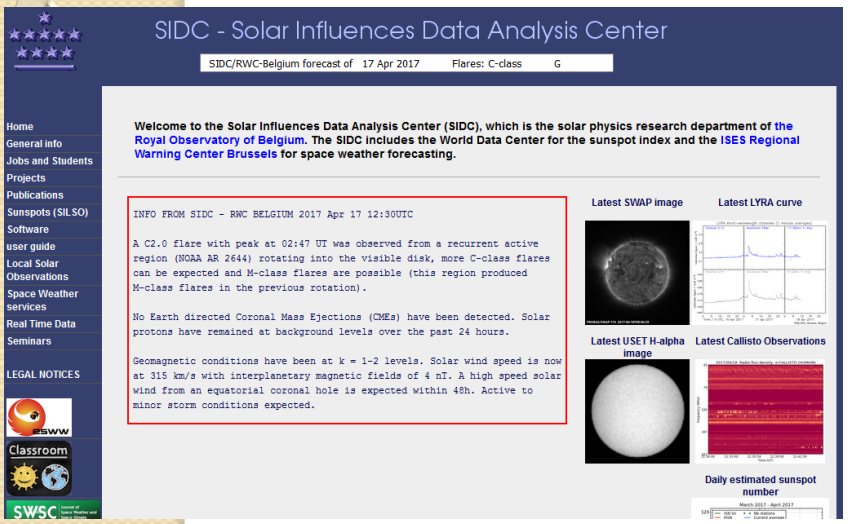

GOES Xray Flux | Humain radio spectra [ARCAS + HSRS] - 2017/09/06
X
M
C
B
A
10^2
10^3
Frequency [MHz]
11:57
12:00
12:03
12:05
12:09
12:12
12:15
12:18
Time [UT]
Royal Observatory of Belgium - 2017
GOES 15 data: NOAA/SWPC

The SIDC/RWC

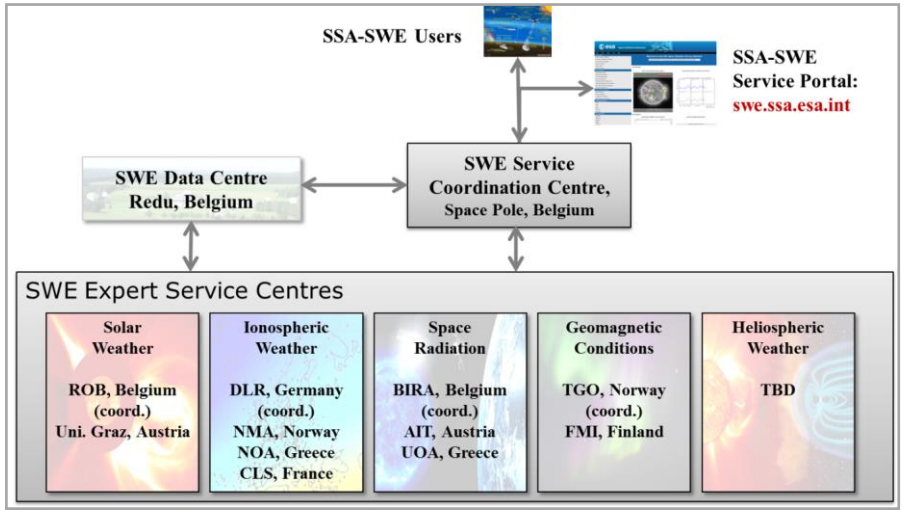
- Regional Warning Centre
  - Space weather
    - Monitoring & Prediction
    - Since 2000
- Team of 6-8 scientists
  - Weekly tour-of-duty
    - IT supported
    - Previweb
  - International
    - ISES, WMO, ESA,…
  - Services
    - Customers, Mission support,…
- ESA Space Situational Awareness
  - SSCC
- ESWW

http://www.sidc.be/

SIDC/RWC



From the TV5 documentary:
"La météo de l'espace: l'émergence d'une nouvelle science"

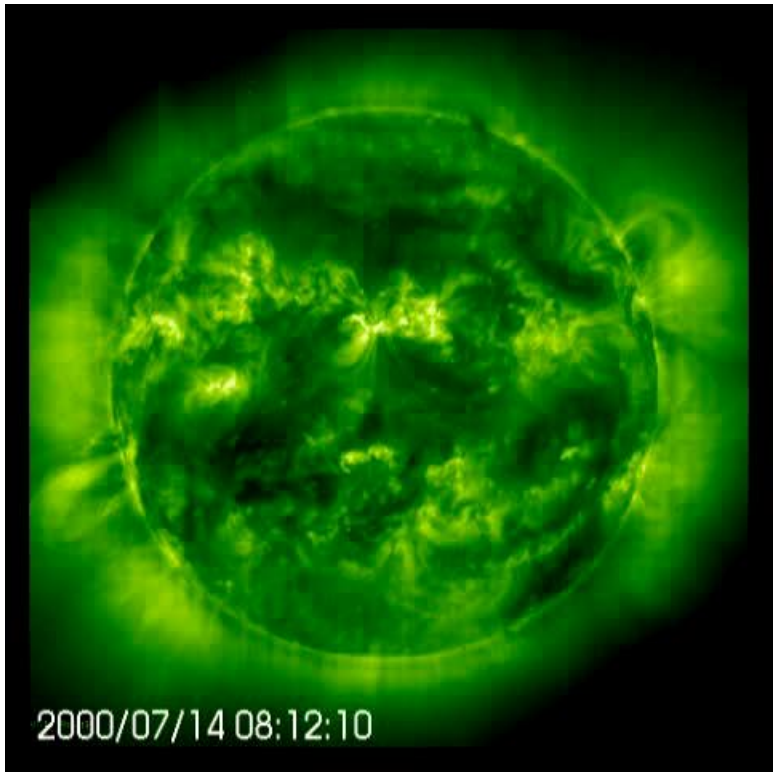


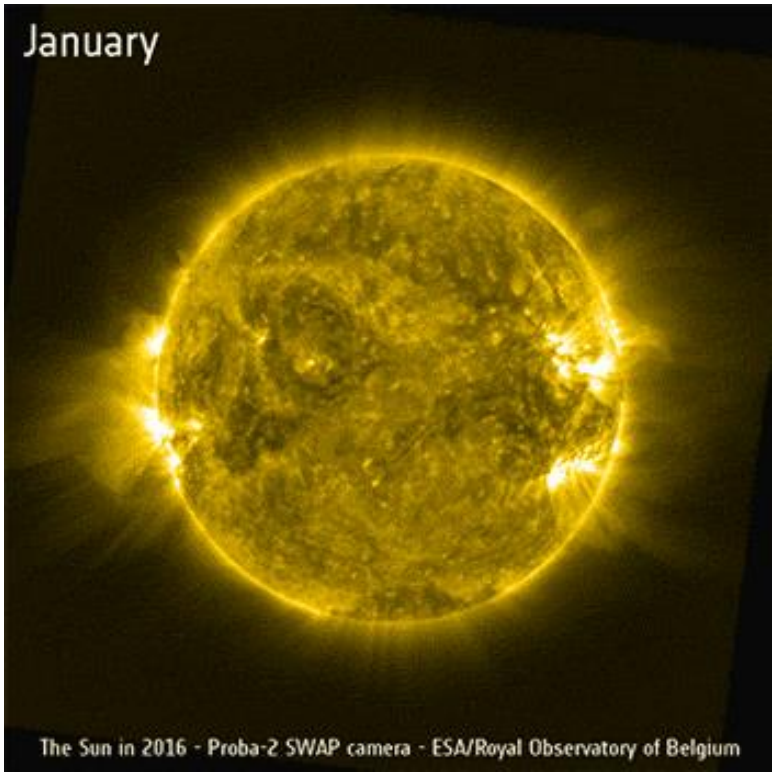
Solar Satellites

- SOHO
  - 1995 - EIT
- PROBA2
  - 2009 – SWAP & LYRA
  - PROBA2 Science Center
- Solar Orbiter
  - February 2019
    - EUI
- PROBA3
  - Late 2019
    - ASPIICS

http://proba2.oma.be/

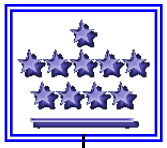
Solar Satellites

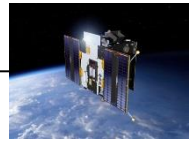




STCL: Instruments

- Space technology & Calibration Laboratories
  - Scientific instruments
    - Development
    - Calibration





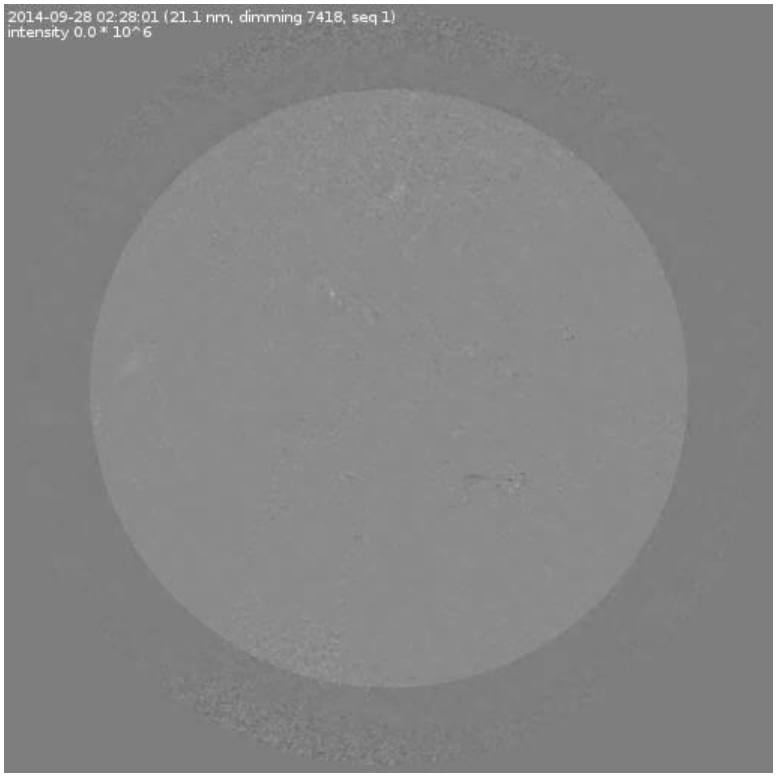
http://www.stce.be/press/05/welcome.html

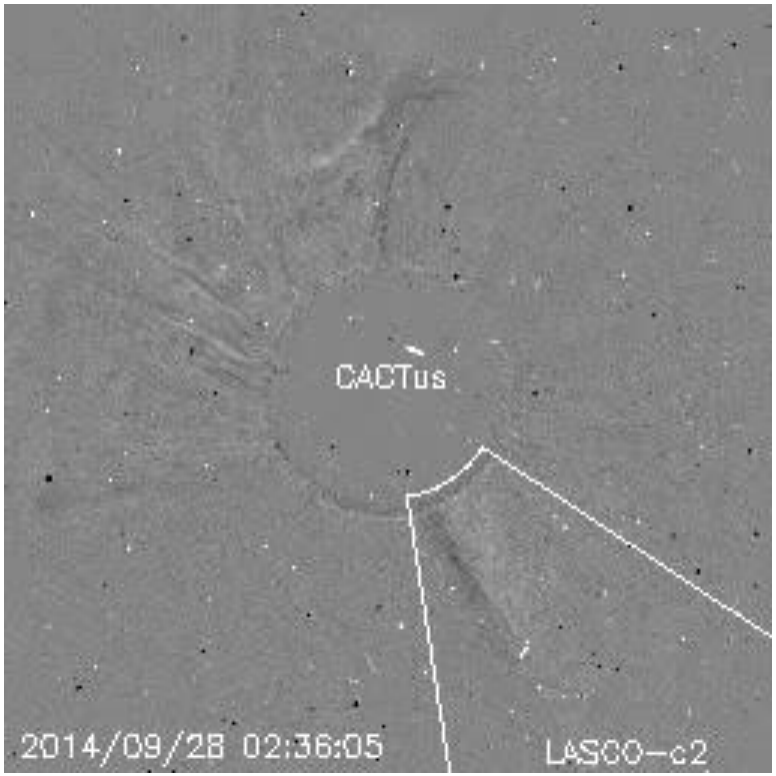
Tools

- Solar Image Processing
  - CACTus
  - Solar Demon
  - SoFAST
  - …
- Dissemination solar data
  - SWHV
  - STAFF
  - …

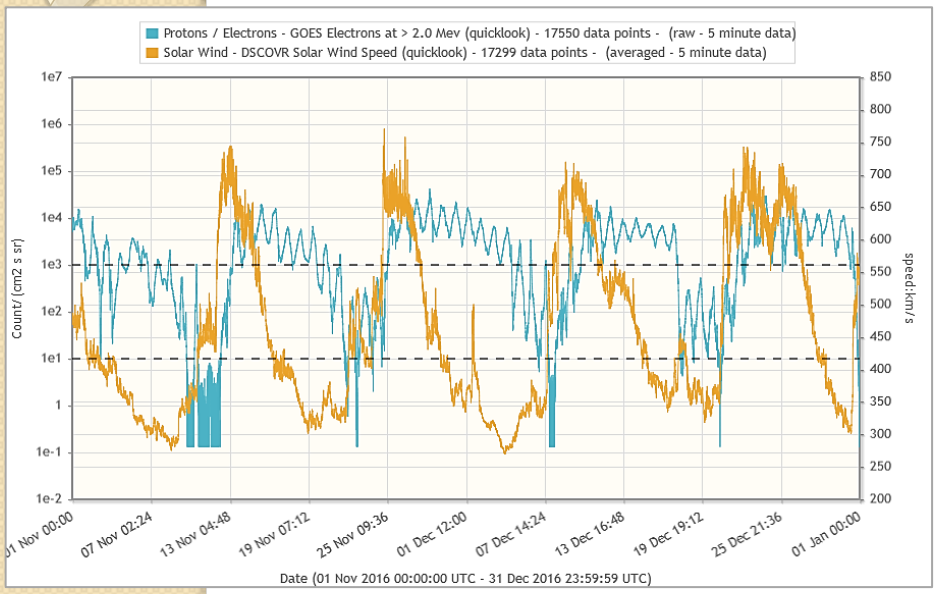
http://www.sidc.be/sofast/

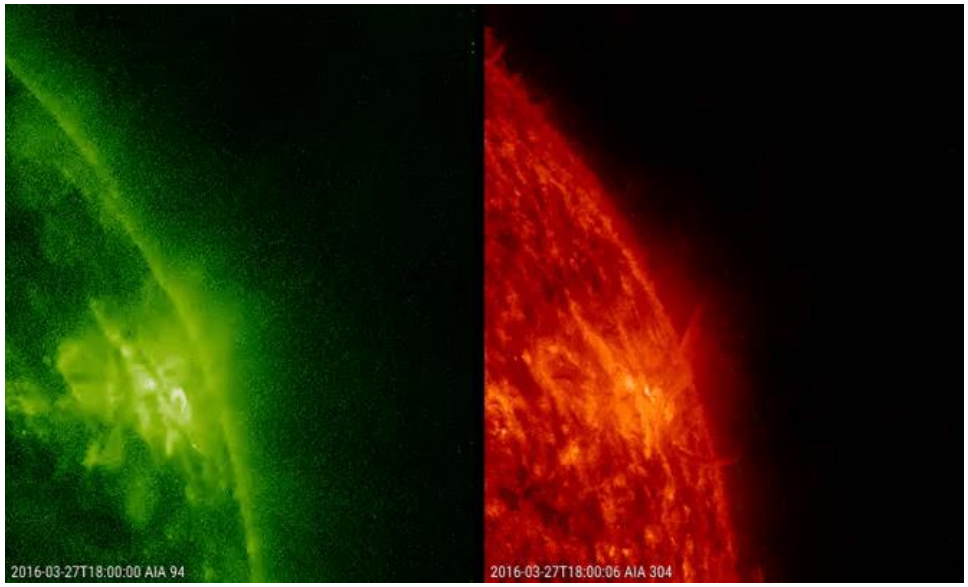
Tools / Solar Image Processing

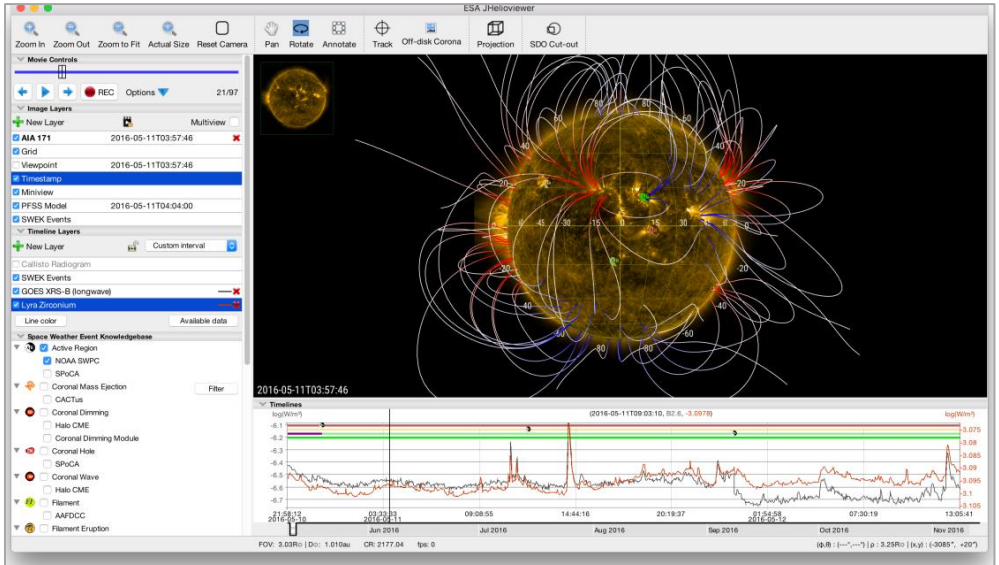




Tools / Solar data dissemination

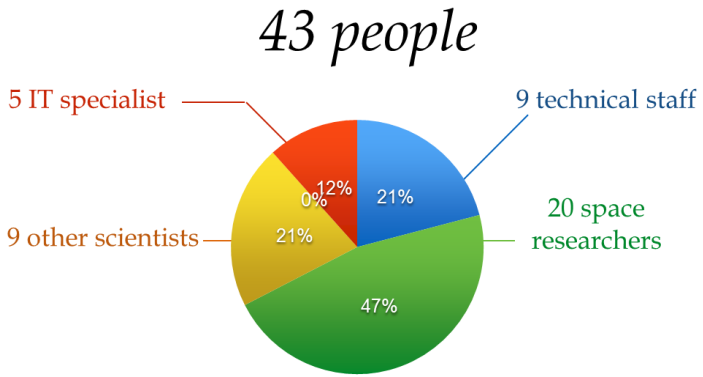






Science

- A wide variety of research topics
  - Solar activity
  - Space weather
- Projects for funding!



~25 FTE researchers of which 1 PhD student (KULeuven)
~ 12 nationalities, most < 45 years

Science

Go to private page - Formatted file for the annual report - Metrics

SIDC publications

Author: Year: 2016 Type: REFERD search reset

Open access disclaimer: If you have any problem accessing a paper, please contact one of the authors.

31 publication(s) found.

"Improved Determination of the Location of the Temperature Maximum in the Corona" Lemaire, Joseph; Stegen, Koen
Solar Physics vol. 291 pp. 3659-3683 (2016).10.1007/s11207-016-1001-3 REFERD

"Projection Effects in Coronal Dimmings and Associated EUV Wave Event" Dissauer, K; Temmer, M; Veronig, A. M; Vanninathan, K; Magdalenic, J
The Astrophysical Journal vol. 830 (2016). REFERD

"An Analysis of Interplanetary Solar Radio Emissions Associated with a Coronal Mass Ejection" Krupar, V; Eastwood, J; Kruparova, O; Santolik, O ; Soucek, J ; Magdalenic, J; Vourlidas, A; Maksimovic, M ; Bonnin, X ; Bothmer, V; and, 6 coauthors
The Astrophysical Journal Letters vol. 823 (2016). REFERD

"Extreme Geomagnetic Storms - 1868 - 2010" Vennerstrom, S.; Lefevre, L; Dumbović, M.; Crosby, N.; Malandraki, O.; Patsou, I.; Clette, F.; Veronig, A.; Vršnak, B.; Leer, K.; Moretto, T.
Solar Physics vol. 291 pp. 1447-1481 (2016).10.1007/s11207-016-0897-y REFERD

"Detailed Analysis of Solar Data Related to Historical Extreme Geomagnetic Storms: 1868 - 2010" Lefèvre, Laure; Vennerstrøm, Susanne; Dumbović, Mateja; Vršnak, Bojan; Sudar, Davor; Arlt, Rainer; Clette, Frédéric; Crosby, Norma
Solar Physics vol. 291 pp. 1483-1531 (2016).10.1007/s11207-016-0892-3 REFERD

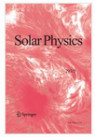
"Preface to Topical Issue: Recalibration of the Sunspot Number" Clette, F.; Cliver, E. W.; Lefèvre, L.; Svalgaard, L.; Vaquero, J. M.; Leibacher, J. W.
Solar Physics vol. 291 pp. 2479-2486 (2016).10.1007/s11207-016-1017-8 REFERD

"An Early Sunspot Catalog by Miguel Aguilar for the Period 1914 - 1920" Lefèvre, L.; Aparicio, A. J. P.; Gallego, M. C.; Vaquero, J. M.
Solar Physics vol. 291 pp. 2609-2628 (2016).10.1007/s11207-016-0905-2 REFERD

"The New Sunspot Number: Assembling All Corrections" Clette, Frédéric; Lefevre, Laure
Solar Physics vol. 291 pp. 2629-2651 (2016).10.1007/s11207-016-1014-y REFERD

"Uncertainties in the Sunspot Numbers: Estimation and Implications" Dudok de Wit, Thierry; Lefèvre, Laure; Clette, Frédéric
Solar Physics vol. 291 pp. 2709-2731 (2016).10.1007/s11207-016-0970-6 REFERD

"The Revised Brussels-Locarno Sunspot Number (1981 - 2015)" Clette, Frédéric; Lefèvre, Laure; Cagnotti, Marco; Cortesi, Sergio; Bulling, Andreas
Solar Physics vol. 291 pp. 2733-2761 (2016).10.1007/s11207-016-0875-4 REFERD



Solar Physics
May 2016, Volume 291, Issue 5, pp 1447–1481

Extreme Geomagnetic Storms – 1868 – 2010

Authors | Authors and affiliations

S. Vennerstrom, L. Lefevre, M. Dumbović, N. Crosby, O. Malandraki, I. Patsou, F. Clette, A. Veronig, B. Vršnak, K. Leer, T. Moretto

Article

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DOI: 10.1007/s11207-016-0897-y

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1 Citations 348 Downloads

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Article
Abstract
1 Introduction
2 Data and Method
3 Results and Discussion
4 Summary and Conclusio...
Acknowledgements
References
Copyright information
About this article

Abstract

We present the first large statistical study of extreme geomagnetic storms based on historical data from the time period 1868 – 2010. This article is the first of two companion papers. Here we describe how the storms were selected and focus on their near-Earth characteristics. The second article presents our investigation of the corresponding solar events and their characteristics. The storms were selected based on their intensity in the aa index, which

Dissemination

- Via STCE
- Scientific
  - Conferences & workshops
    - ESWW
    - …
  - Seminars
- Public Outreach
  - STCE Newsletter
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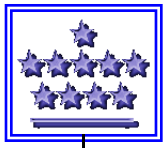
  - Lecturing
  - Annual meeting & report
  - …
- Media and press items/events



http://www.stce.be/

Dissemination

Extra-muros contacts

- ROB
  - GNSS (Ionosphere)
- RMI
  - Dourbes
    - Geomagnetism
  - Solar Irradiance
    - Climate
- BISA
  - Magnetopshere
  - Particles, Planeterrella
- Universities, industries,…