



10TH EUROPEAN SPACE WEATHER WEEK

2004 2005 2006 2007 2008 2009 2010 2011 2012 **2013**

NOVEMBER 18-22 2013, ANTWERP, BELGIUM

SWWT Topical Group "Drivers of Space Weather" Subgroup "Solar Storms"

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**INSTITUTE FOR ASTRONOMY, ASTROPHYSICS,
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SWWT Topical Group "Drivers of Space Weather" Subgroup "Solar Storms"

Submitted by Stijn Calders on Wed, 05/23/2012 - 15:32.

Solar flares & CMEs and geomagnetic activity

Solar flares are the most powerful explosions in the solar system. Radiation and particles emitted during flares may strongly interact with the Earth's ionosphere. The monitoring of the extreme and far ultraviolet irradiance variations is essential to characterize the Earth's upper atmosphere. The impact of flares on the Earth's atmosphere is still a field under development.

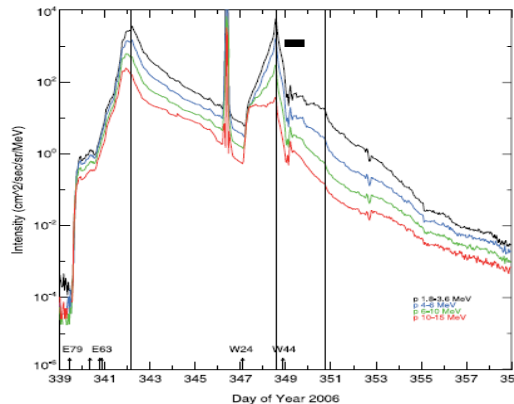
The main drivers of geomagnetic storms at Earth are Coronal mass ejections associated with solar flares or solar filament eruptions and co-rotating regions formed by the interaction between two solar wind streams which produce recurrent storms.

The coronal mass ejections (CMEs) and their interplanetary counterparts (ICMEs) are the main sources of the interplanetary transient events and shocks that produce the strongest geomagnetic storms. To be able to forecast the arrival of these magnetic structures at the Earth, it is necessary to develop tools to investigate their origin and onset at the solar atmosphere as well as their further propagation in the interplanetary medium and subsequent interaction with the Earth's magnetosphere. Space-borne observations as well as numerical simulations are needed to significantly enhance our knowledge about the onset of flares/CMEs, their 3D structure and impact on the Earth's magnetosphere. Understanding the solar wind-magnetosphere-ionosphere coupling through modeling, simulations and data analysis is also crucial to understand the development of the geomagnetic activity.

The Solar Storms Topical sub-group is a forum of discussion and exchange of ideas to enhance the understanding of the triggering of flares and CMEs at the Sun, the further propagation of CMEs in the interplanetary medium and their impact on the Earth's magnetosphere. The sub-group also deals with critical aspects of modeling and forecasting of geomagnetic activity.

Solar Energetic Particle (SEP) events

SEP events form one of the key elements of Space Weather. SEPs are accelerated either by the magnetic energy released in solar flares or by shock waves driven by Coronal Mass Ejections (CMEs). A long-standing debate within the solar and heliospheric community concerns the relative roles that flares and CMEs play in the acceleration and release of SEPs. SEP events are much more frequent during the active phase of a solar cycle. The maximum energy reached in SEP events is typically 10-100 MeV, although CME-driven shocks can accelerate particles up to 20 GeV. Large Solar Proton events (SPEs), which constitute a sub-group of SEPs, are extremely hazardous to astronauts outside the Earth's atmosphere and magnetosphere. To mitigate the hazard SPEs pose, it is necessary to develop the capability to predict when and where they will occur on the Sun, and to provide adequate shielding from them.



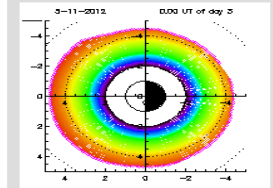
The SEP events in December 2006 as observed by the IMPACT/LET instrument onboard the STEREO-B spacecraft. Upward vertical arrows indicate the intense flares that occurred during this period. Vertical solid lines denote the passage of shocks. (Adapted from Malandraki et al. 2009, Astrophys. J., 704, 469, 2009).

The Solar Storms Topical sub-group is a forum of discussion and exchange of ideas to enhance the understanding of the particle acceleration and transport processes at the Sun and in the inner heliosphere that lead to SEP events. The sub-group also deals with critical aspects of modeling and forecasting of SEP events.

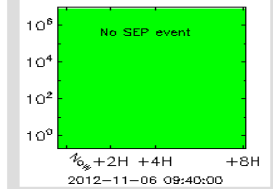
Composition

Spokesperson:
 Nicole Vilmer (Solar Flares/ CMEs)
 Olga Malandraki (SEP events)

Plasmasphere density



SEP event forecast



[Add your forecast]

Maintenance and hosting:



<http://spaceweather.eu/swwt/solarstorms>

Subgroup 2: Solar Storms (Solar Flares, CMEs, SEP events)

ESSW10

Solar Storms: Flares, CMEs and Solar Energetic Particle (SEP) events

- *Splinter on Thursday 21 November 15:15- 16:45*

- *SCALA 4*

This splinter meeting will cover topics from the SWWT Topical Working Group Drivers of Space Weather, Subgroup 2 SolarStorms.

(N. Vilmer (LESIA, Paris Observatory), O. Malandraki (NOA), N. Crosby (BIRA-IASB))

During the splinter, recent advances in the understanding of

1- particle acceleration and transport processes at the Sun and in the inner heliosphere that lead to SEP events will be presented and discussed. The presentation from results from relevant FP7 projects will be highlighted during the splinter.

2- the onset of CMES, propagation in the interplanetary medium and subsequent interactions with the Earth's magnetosphere. The splinter will address both results from observations and from numerical simulations. Presentation from relevant FP7 projects will also be highlighted.

3- the impact of flares (UV radiation, particles) on the Earth's atmosphere which is still a field under development.

ESSW10

Solar Storms: Flares, CMEs and Solar Energetic Particle (SEP) events

- *Splinter on Thursday 21 November 15:15- 16:45*

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Thanassis Papaioannou (National Observatory of Athens)

'Solar Energetic particles within the STEREO era : 2007-2012'

Bernd Heber (Christian-Albrechts-Universität zu Kiel)

'A statistical survey of wide-spread solar electron events observed with STEREO and ACE'

Neus Agueda (Universitat de Barcelona)

'Numerical simulations of the propagation of SEPs'

Francesco Zucarello (KU Leuven)

'Numerical simulations of CME's in the interplanetary medium'

Jan Maik Wissing (University of Osnabrück)

'Modelling particle precipitation in the Earth's atmosphere'

ESSW10

Solar Storms: Flares, CMEs and Solar Energetic Particle (SEP) events

- *Splinter on Thursday 21 November 15:15- 16:45*

- *SCALA 4*

- *You are all welcome!!*