# Education, Outreach and Emerging Markets: Worldwide Efforts

Norma B. Crosby

Belgian Institute for Space Aeronomy, Belgium

Thursday, 21 Nov. 2013, 13:30-15:00
Room: Scala 2

SWWT EOEM Splinter, ESWW10, Antwerp, Belgium

# SWWT Topical Working Groups (TWGs)

http://spaceweather.eu/swwt/

- Drivers of Space Weather (e.g. solar, S-T, including future missions and instrumentation) [Subgroup 1: Solar Magnetic Energy, spokesperson: H. Lundstedt (IRF) ; Subgroup 2: Solar Storms (Solar Flares, CMEs, SEP events), spokepersons: N. Vilmer (Paris Observatory) and O. Malandraki (NOA)]
- Ground Effects (GIC, prospecting, tourism), spokesperson: M. Wik (NeuroSpace)
- Atmospheric Effects (incl. drag), spokesperson: S. Bruinsma (CNES)
- Ionospheric Effects, spokesperson: M. Angling (University of Birmingham and QinetiQ)
- Spacecraft, Launcher and Aircraft Environments, spokesperson S. McKenna-Lawlor (STIL), co-spokespersons F. di Marco (VEGA) and G. Reitz (DLR)
- Education, Outreach and Emerging Markets, spokesperson: N. Crosby (BIRA-IASB)
- Space Weather Forecast, spokesperson L. Trichtchenko (NRCan), co-spokesperson S. Bloomfield (Trinity College Dublin)

# Education, Outreach and Emerging Markets (EOEM) TWG

## OVERALL OBJECTIVE

Raise and maintain awareness of space weather effects on the systems affected by space weather and how space weather impacts modern society.

- Education and Outreach Activities
- Identifying Emerging Markets.

# EOEM ESWW10 Splinter Abstract

The SWWT Topical Working Group (TWG) "Education, Outreach and Emerging Markets (EOEM)" concerns education (formal and informal) and public outreach activities. Efforts on both national level as well as international are included.

The EOEM TWG is also an umbrella for potential future space weather markets.

This year's EOEM splinter meeting will look back on some of the highlights from the last ten years and discuss the future too in regard to this TWG.

# EOEM TWG: The next years

Looking for the next EOEM TWG spokesperson(s) as a function of future EOEM organization.

Should the EOEM TWG be restructured into two sub-groups or two separate TWGs?

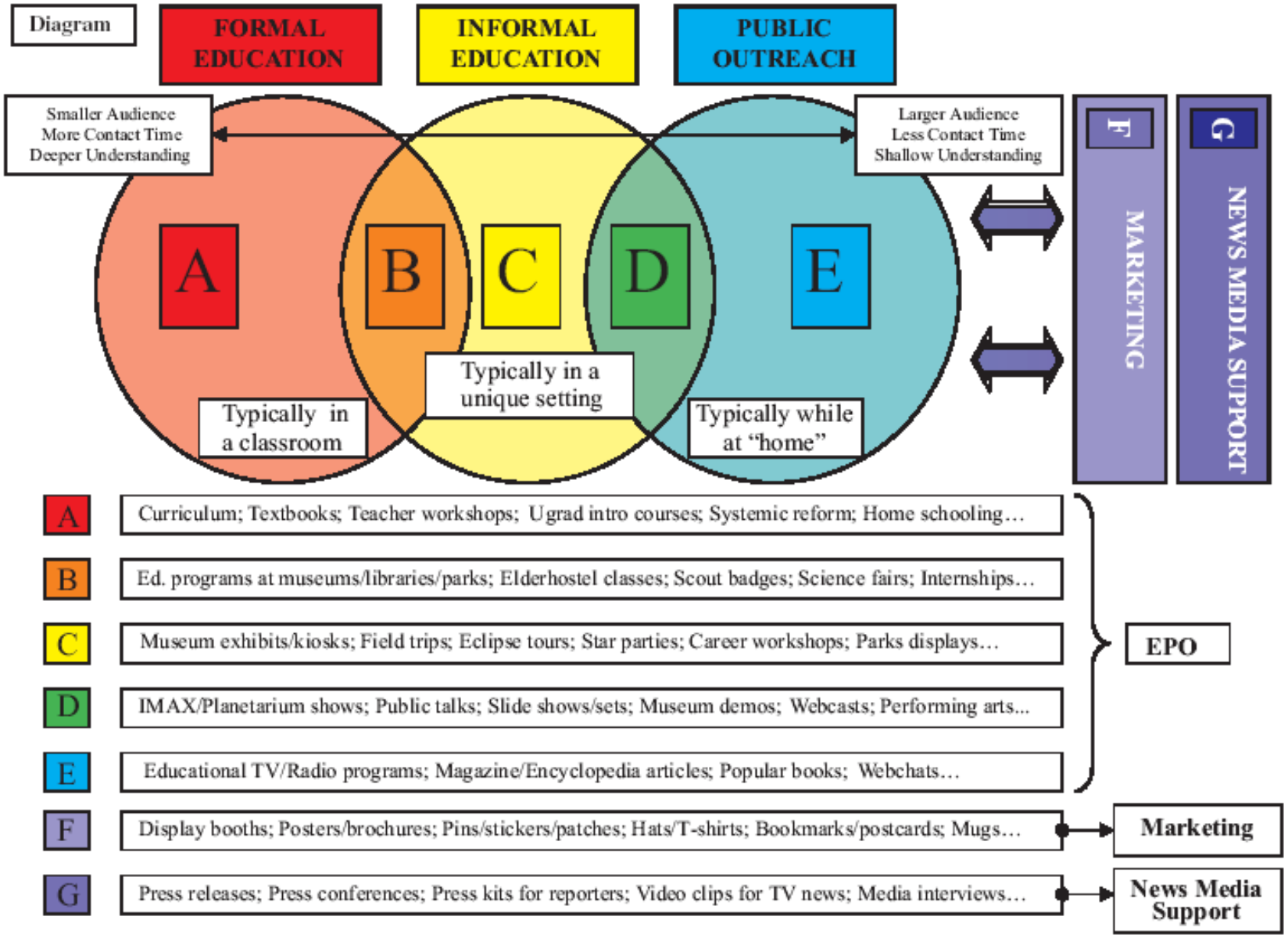
- Subgroup 1: Education and Outreach
- Subgroup 2: Emerging Markets.

EOEM

# EOEM OBJECTIVES

- To cover Education (primary to university), both formally (schooling, textbooks, etc.) and informally (museums, webcasts, etc.)

- To cover Public Outreach activities (TV/radio programmes, popular books, etc.).




This 3-circle Venn diagram offers a conceptual framework for planning education and public outreach programs associated with scientific research programs.

Cherilynn Morrow, Space Science Institute, May, 2000. Email camorrow@colorado.edu.

http://www.spacescience.org

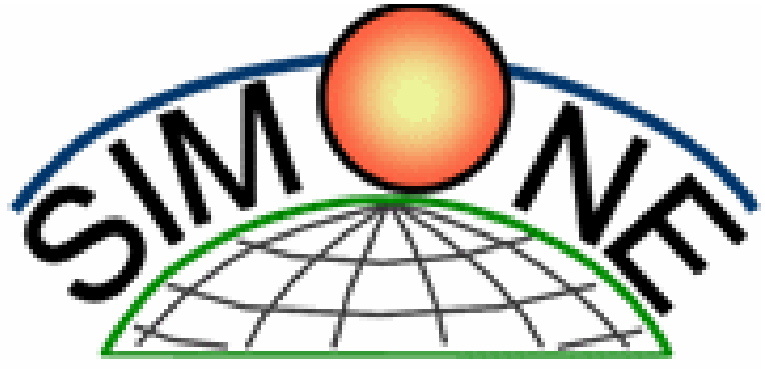
# International Heliophysical Year


http://ihy2007.org/

# Space Weather and Europe - an Educational Tool with the Sun

The goal of SWEETS was to raise public awareness of space weather, the sun, solar activities, cosmic rays and their effect on our society.


SWEETS "Space Weather Bus"




# Sun & Ionosphere MOnitoring NEtwork

SIMONE was a German student project for space weather research and was involved in German national activities related to the IHY.

The objective was to detect solar flares by measuring the intensity of long-wavelength radio signals.

# I Love My Sun


My Drawings

Opendeurdagen / Portes Ouvertes 2013


http://www.ilovemysun.org/

# EO Articles in the SWSC Journal

J. Space Weather Space Clim. 3 (2013) A07
DOI: 10.1051/swsc/2013029


SWSC

RESEARCH ARTICLE OPEN ACCESS

## The Planeterrella experiment: from individual initiative to networking

Jean Lilensten[1,*], Gabrielle Provan[2], Sandrine Grimald[3], Asgeir Brekke[4], Erwin Flückiger[5], Petra Vanlommel[6] Cyril Simon Wedlund[7,8], Mathieu Barthélémy[1], and Pierre Garnier[3]

[1] Institut de Planétologie et d'Astrophysique de Grenoble, 38041 Grenoble, France
[*]Corresponding author: jean.lilensten@obs.ujf-grenoble.fr
[2] Institution University of Leicester, LE1 7RH Leicester, UK
[3] Onera – The French Aerospace Lab, 31055 Toulouse, France
[4] History of Geoph. and Space Sciences Journal, University of Tromso, Department of Science and Technology, Faculty of Science and Technology, N-9037 Tromso, Norway
[5] Physikalisches Institut, University of Bern, Sidlerstrasse 5, 3012 Berne, Switzerland
[6] Royal Observatory of Belgium, Rue Groeselenberg 57, 1180 Uccle, Belgium
[7] Belgian Institute for Space Aeronomy, Brussels, Belgium
[8] Now at Finnish Meteorological Institute, Helsinki, Finland

Received 4 June 2012 / Accepted 1 February 2013

J. Space Weather Space Clim. 3 (2013) A04
DOI: 10.1051/swsc/2013026


SWSC

RESEARCH ARTICLE OPEN ACCESS

## The COST example for outreach to the general public: I love my Sun

Yurdanur Tulunay[1,*], Norma Bock Crosby[2], Ersin Tulunay[3], Stijn Calders[2], Aleksei Parnowski[4], and Desanka Sulic[5]

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[*]corresponding author: e-mail: ytulunay@ae.metu.edu.tr
[2] Belgian Institute for Space Aeronomy, Ringlaan-3-Avenue Circulaire, 1180 Brussels, Belgium
[3] Department of Electrical and Electronics Engineering, METU, Ankara, Turkey
[4] Space Research Institute NASU & NSAU, Kyiv, Ukraine
[5] Faculty of Ecology and Environmental Protection, University Union – NIKOLA TESLA, Belgrade, Serbia

Received 7 June 2012 / Accepted 9 January 2013

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**18 - 29 October 2010**

***Miramare, Trieste, Italy***

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Organized by: *SWIFF* Co-organizer: *CINECA, COST Action ES0803*
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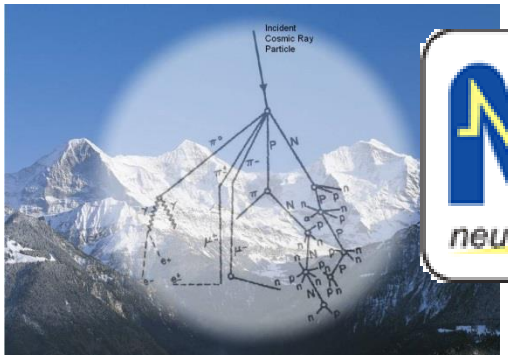
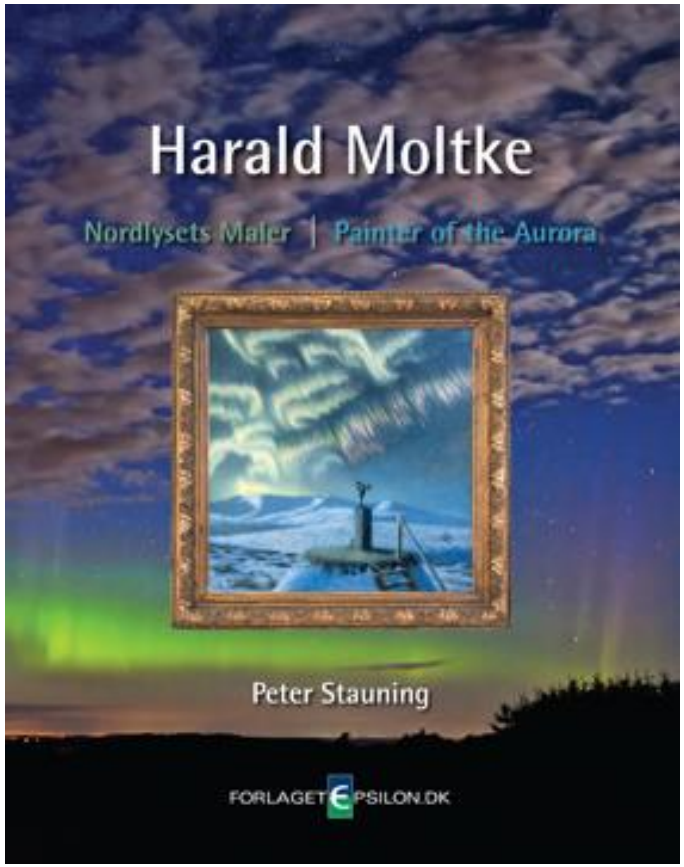
cost ES0803


NMDB neutron monitor database

HAMLET


Harald Moltke
Nordlysets Maler | Painter of the Aurora
Peter Stauning
FORLAGET EPSILON.DK


Pål Brekke
OUR EXPLOSIVE SUN
A Visual Feast of
Our Source of Light and Life
EXTRA MATERIALS
extras.springer.com
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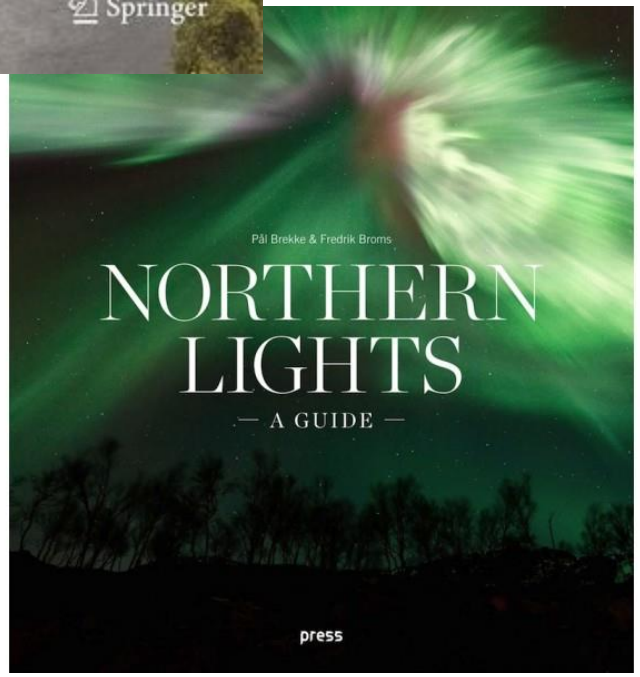
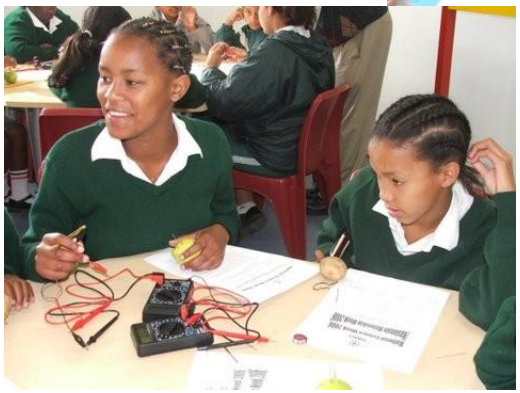

Pål Brekke & Fredrik Broms
NORTHERN LIGHTS
— A GUIDE —
press

sansa
SOUTH AFRICAN NATIONAL
SPACE AGENCY

SANSA Space Science in South Africa



Space Weather in the Space Physics class in UPV/EHU Space Science and Technology Master, Spain

Ingeniaritza Goi Eskola Teknikoa
Escuela Técnica Superior de Ingeniería
Bilbao

BFA DFB
Bizkaiko Foru Aldundia
Diputación Foral de Bizkaia

eman ta zabal zazu
Universidad del País Vasco
Euskal Herriko Unibertsitatea

# Ebro Observatory, Spain

## 18 Nov. 2012 event

Visit of the facilities including the solar section where old and current solar telescopes are kept.

Workshop on electromagnetism related to the generation of induced currents and of the electrojet. GOAL: help the public understand the large-scale weather phenomena that occur daily in the upper atmosphere in the auroral regions.


Ebro Blog

# Open Doors in Uccle, Belgium


CLASSROOM COLLECTS AND PROVIDES SPACE WEATHER EDUCATIONAL MATERIAL. YOU CAN UPLOAD AND DOWNLOAD FOR FREE.

Language Audience Max number of results 20 Keywords (search in abstract, title and authors)

| TITLE | AUTHORS | LANGUAGE | AUDIENCE |
|---|---|---|---|
| Solar activity indices | Ioannis ZOIS | English | Master and phd students |
| Understanding the Space Environment | Whitney Lohmeyer | English | Press + |
| Διαστημικός καιρός και Ηλεκτρικά δίκτυα | Ioannis ZOIS | Greek | General public |
| Soarele. steaua de langa noi | Cristiana Dumitrache + | Romanian | General public |
| Space Education web page | Mari | Armenian | Press + |
| Proba2@School | Elke D'Huys + | Dutch | Press + |
| Satellites as a working tool | Dan Seaton + | English | Children 5-7years |
| La météo spatiale et les éjections de masse coronales | Luciano Rodriguez | French | General public |
| Space Weather: interpreting the wind | Petra Vanlommel + | English | Master and phd students |
| Ruimteweer | Petra Vanlommel + | Dutch | Commercial company |

*CLASSROOM is developed within the European Commission's Seventh Framework Programme eHEROES.*

http://stce.be/classroom/

# Education and Outreach:

## Who to target?

- General public (e.g., educational institutions at all levels)
- Engineers and managers
- Policy makers
- Etc.

## How to target?

EOEM

# EOEM OBJECTIVES

- To cover Emerging space weather Markets by acting as an umbrella for markets until they are “mature enough” to have a Topical Working Group of their own in the context of an European space weather programme.

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# Welcome and Introduction

http://swh2012.cosmos.ru/


English
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News | Registration | Participant Login

- About the Conference
- Important Dates
- Organizing Committee
- Program Committee
- Registration
- Abstract preparation guidelines
- Travel Information
- Visa
- Accomodation

## About the Conference

### Space Weather Effects on Humans: in Space and on Earth

**International Conference**

**Space Research Institute**
**Moscow, Russia**
**June 4-8, 2012**

During the last thirty years there has been steady progress in our understanding of the influence that space weather has on the state of human health both in Space and at Earth. This development is mainly based on research conducted on humans onboard space stations and

# Emerging Markets:

Potential future space weather markets:

- Possible effects (direct and indirect) of space weather on human health on Earth
- Aurora tourism
- Space tourism
- Astrobiology
- Etc.

How to target?

# The Future

# EOEM TWG: The next years

Should the EOEM TWG be restructured into two sub-groups or two separate TWGs?

- Subgroup 1: Education and Outreach
- Subgroup 2: Emerging Markets.

# ESWW10

22 Nov. 2013, 15:15-16:45

Splinter on “Promoting Citizen Science for Space Weather Research and Applications”

# EGU2014

ST6.1/EOS16/NH9.14/PS5.6 “Raising and maintaining awareness of our local space weather: education and public outreach (co-organized)”

Convener: Athanasios Papaioannou | Co-Convener: Jean Lilensten

29 Nov. 2013: Deadline for Support Applications