

The COMESEP Alert System

Crosby, Norma B.¹; Veronig, Astrid²; Robbrecht, Eva³; Rodriguez, Luciano³; Vrsnak, Bojan⁴; Vennerstrom, Susanne⁵; Malandraki, Olga⁶; Dalla, Silvia⁷; Srivastava, Nandita⁸; Hesse, Michael⁹; Odstrcil, Dusan¹⁰ and the COMESEP Team

¹Belgian Institute for Space Aeronomy, BELGIUM; ²University of Graz, AUSTRIA; ³Royal Observatory of Belgium, BELGIUM; ⁴Hvar Observatory, CROATIA; ⁵Technical University of Denmark, DENMARK; ⁶National Observatory of Athens, GREECE; ⁷University of Central Lancashire, UNITED KINGDOM; ⁸Udaipur Solar Observatory, INDIA; ⁹NASA Goddard Space Flight Center, UNITED STATES; ¹⁰George Mason University, Fairfax and NASA Goddard Space Flight Center, UNITED STATES

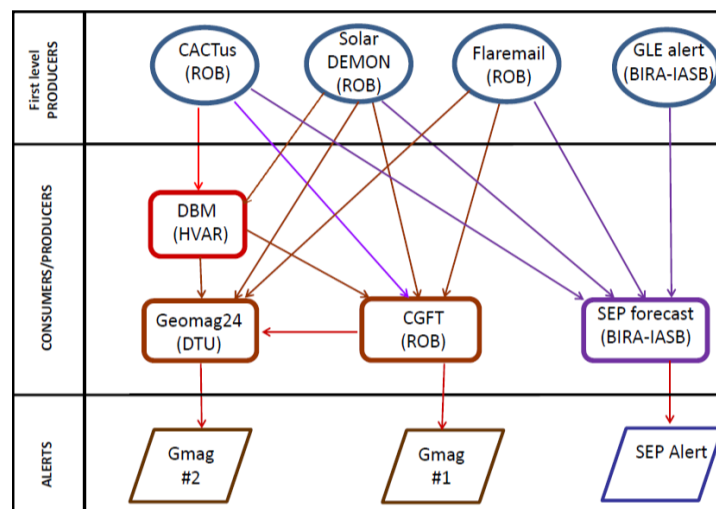
Introduction

- The three-year EU FP7 COMESEP (COronal Mass Ejections and Solar Energetic Particles) collaborative Project has combined basic research on space weather events with the development of an European space weather alert system.
- Scientific results obtained in the COMESEP Project have been used for optimising detection and forecasting methods.
- The derived solar energetic particle (SEP) and interplanetary coronal mass ejection (CME) forecast tools are linked with real-time automated detection of CMEs as they appear when observed at the Sun.
- Individual detection tools and models have been integrated into an automated “start-to-end-service” system.
- SEP radiation storm and magnetic storm alerts are being disseminated to the European space weather community.

Alert System

The COMESEP alert system provides notifications for the space weather community. To achieve this, the system relies on both models and data, the latter including near real-time data as well as historical data.

The system consists of several tools that work together to automatically issue alerts of detected solar eruptive events as well as expected geomagnetic and SEP radiation storms.



Flow diagram of the tools used in the COMESEP alert system.

Risk Analysis

The forecasting tools estimate the storm probability and impact, both of which are combined to obtain an estimated risk.

Geomagnetic and SEP radiation storm alerts are based on the COMESEP definition of risk. Below is shown the risk matrix used to estimate geomagnetic storm and SEP storm risk levels in the COMESEP alert system [L stands for low, M for medium, H for high and E for extreme risk].

Arrival of CME / Likelihood of occurrence	L	M	H	H	E	E
Ongoing (100%)	L	M	H	H	E	E
Very likely (90-100%)	L	M	H	H	E	E
Likely (70-90%)	L	M	M	H	H	E
Possible (40-70%)	L	L	M	M	H	E
Unlikely (10-40%)	L	L	M	M	H	H
Very Unlikely (0-10%)	L	L	L	M	M	H
Storm Level	None	Minor	Moderate	Strong	Severe	Extreme
Geomagnetic Dst in nT	<50	50-100	100-200	200-300	300-400	>400
SEP peak flux > 10 MeV in s ⁻¹ sr ⁻² cm ⁻²	<10 ⁵	10 ⁵ -10 ⁶	10 ⁶ -10 ⁷	10 ⁷ -10 ⁸	10 ⁸ -10 ⁹	>10 ⁹
SEP peak flux > 60 MeV in s ⁻¹ sr ⁻² cm ⁻²	<7.9x10 ²	7.9x10 ² - 1.4	1.4 - 2.5x10 ³	2.5x10 ³ - 4.5x10 ³	4.5x10 ³ - 7.9x10 ³	>7.9x10 ³
Kp	<5	5	6	7	8	9

Tools

To enhance our understanding of the 3D kinematics and interplanetary propagation of CMEs, the structure, propagation and evolution of CMEs have been investigated. In parallel, the sources and propagation of SEPs have been examined and modeled.

Tools for forecasting geomagnetic storms and SEP radiation storms have been developed under the COMESEP project. During the third year of the project the produced tools have been validated and implemented into an operational space weather alert system.

System Overview

The system is triggered by different solar phenomena such as CMEs and solar flares. After the automatic detection in solar data of any of these transients, the different modules of the system communicate in order to exchange information. Overall the system produces a series of coherent alerts that are then displayed online.

The summary frame on the COMESEP Alert System webpage is a table that contains information about each impact type: Geomagnetic storm alert, SEP proton storm alert >10 MeV, SEP proton storm alert >60 MeV.

Launch of COMESEP Alert System

<http://www.comesep.eu/alert/>

The COMESEP alert system is being launched at the ESWW10 meeting during the Fair on Wed. (see “COMESEP alert system” stand). See also Rodriguez et al., “The COMESEP Space Weather Alert System” (Session 9 - Oral) on Thu.

Receiving COMESEP alerts will be free of charge, but registration will be required. This service is currently under development and will be available by Jan. 2014. For further information please contact the Project Coordinator N. Crosby (Norma.Crosby@aeronomie.be).

Alert Viewer Current time: 14-11-2013 09:37

	Latest issued alert	Impact risk
Geomagnetic Storm Alert	08/11/13 13:19	The risk level for a CME geomagnetic storm is MODERATE following the observation of a CME that erupted at 03:24 on 2013-11-08 UTC. The risk level results from the following forecasted parameters: 1) occurrence probability: POSSIBLE 2) storm level: STRONG
SEP Proton Storm Alert > 10 MeV	13/11/13 16:55	Forecast for a SEP radiation storm following a M1.4 flare with peak at 2013-11-13 15:20UT (protons > 10 MeV: MINOR, VERY UNLIKELY).
SEP Proton Storm Alert > 60 MeV	No alert since 4 days	Nothing to report

Legend: ★ ... an alert has been issued
 ○ ... risk impact (timing and level, ● low, ● medium, ● high, ● extreme)

Click on the icons to see alert details

Thu 14 Nov 2013

	11 NOV 12:00	12 NOV 12:00	13 NOV 12:00	14 NOV 12:00	15 NOV 12:00	16 NOV 12:00	17 NOV 12:00	18 NOV 12:00
Flare	★		★	★				
CME			★	★				
SEP	★							
Geomagnetic activity								

Register for COMESEP alerts [Register for COMESEP alerts](#)

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This work has received funding from the European Commission FP7 Project COMESEP (263252).

Acknowledgements

The authors acknowledge all members of the COMESEP Project Consortium. This work has received funding from the European Commission FP7 Project COMESEP (263252).