



SEPServer advances overview on Solar Energetic Particle events

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SEPServer: Data Services and Analysis Tools for SEP Events and Related EM Emissions



- ✓ The project is funded through the 7th Framework Programme of the EU (Contract No 262773) and coordinated by the University of Helsinki.
- ✓ It will combine data and knowledge from **11 European partners** and several collaborating parties from Europe and US.

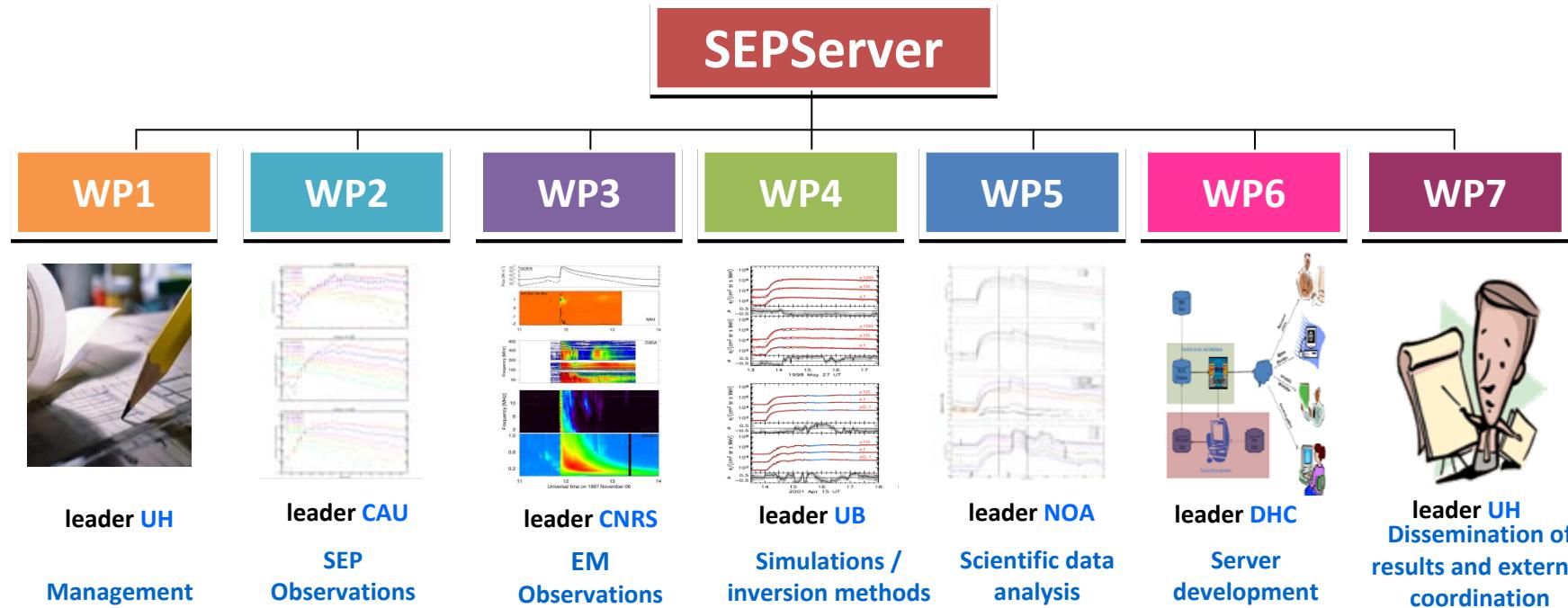


D_HC



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✓ The SEPServer project will **produce a new tool**, which greatly facilitates the investigation of solar energetic particles (SEPs) and their origin. This will be **an Internet server** providing:

- **high-quality SEP data**
- **related electromagnetic (EM) observations and state-of-the-art analysis methods**
- **a comprehensive catalogue of the observed SEP events**

will **provide educational and outreach material** on solar eruptions and space environment on its website.



Facts & Figures:

- ✓ The project started in **December 2010** and will last **36 months**. The most significant milestones are planned as follows:
 - **The prototype server populated with the first data sets has been running since October 2011**
 - **The 1st catalogue of SEP events has been published on the project website in February 2012**
 - **The server will be released in November 2013 during a dedicated Splinter at ESWW10**
- ✓ The consortium will also **analyse the data** using the ***data-driven methods*** and ***numerical-simulation based inversion methods*** to be developed during the project.
- ✓ A **scientific Workshop**, access by invitation, **on SEP event analysis** has been organised in Paris from 19-22 March 2013
(http://www.sepserver.eu/sepserver/news/Dissemination/SEPServer_workshop_2013.html)
- ✓ In addition the consortium will provide **educational** and **outreach material** on solar eruptions and space environment on its website



Datasets:

✓ SEPServer will provide **public access** to a number of **SEP datasets** that **have been previously either unavailable or available only through the PI team**. SEP experiments to be included in the database come from a number of European and American missions:

- **SOHO: COSTEP, ERNE** (electrons 44 keV – 9 MeV, ions 1 – 100 MeV/n)
- **ACE: SIS, EPAM** (electrons 40 – 310 keV, ions 0.05 – 100 MeV/n)
- **Wind: 3DP** (electrons 30 – 500 keV, protons 0.07 – 7 MeV)
- **STEREO: SEPT and LET** (electrons 30 – 400 keV, ions 0.07 – 30 MeV/n)
- **Helios: E6** (electrons 0.3 – 2 MeV, ions 2 – 50 MeV/n)
- **Ulysses: COSPIN/KET and LET, HI-SCALE** (electrons 30 keV – GeV, ions 50 keV – 2 GeV/n)

SEPServer will **also provide streamlined access to the data from ground-based Neutron monitors**.

✓ In addition to energetic particle data, SEPServer will provide access to a comprehensive set of electromagnetic emissions related to the SEP events. These include:

- **Spectrographic radio observations from AIP/Tremsdorf, ARTEMIS, Nancay Decameter Array and Wind/WAVES.**
- **Radio imaging observations from Nancay Radioheliograph**
- **Microwave observations from the University of Bern**
- **X-ray and gamma-ray observations from INTEGRAL, RHESSI, GRANAT/Phebus, Compton/BATSE**

All datasets will be accompanied with **reports** on the **assessment of their quality**



Home
Datasets
Metadata
Event lists
Plot event data
Upload
Event catalogues
Simulation datasets
Green's functions
Inversion methods
Forward modelling
My environment
My entities
My account
Login
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Plot event data

Time range definition

Select how to define the time range: Plot margin: [hrs]

Event list:

Event:

Data selection

Add a new panel of type:

Plot panel 1

Optional axis label:

Plot scale:

Current content: Empty

Select channels from dataset:

Context help
 On this page, data can be plotted for events.
Contact and feedback
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Functionality
of the
database





Home
Datasets
Metadata
Event lists
Plot event data
Upload
Event catalogues
Simulation datasets
Green's functions
Analysis methods
Inversion
Forward modelling
My environment
My entities
My account
Login
atpapaio logged in
Log out

Plot event data

Time range definition

Select how to define the time range: Plot margin: [hrs]

Event list:

Event:

Data selection

Existing panels

Panel 1

Add a new panel of type: (highlighted with a red circle)

Plot panel 2

Optional axis label:

Plot scale: logarithmic linear

Current content: Empty

Select channels from dataset:

Plotting options

Optional plot title:

Optional time axis label:

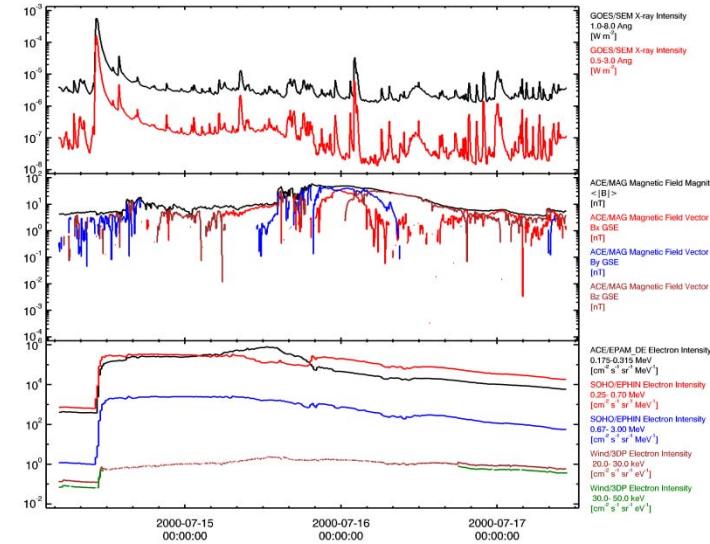
Show legends: yes no

Time axis range: exact approximate

Plot template

Name:

Description:



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- [Home](#)
- [Datasets](#)
- [Metadata](#)
- [Event lists](#)
- [Plot event data](#)
- [Upload](#)
- [Event catalogues](#)
- [Simulation datasets](#)
- [Green's functions](#)
- [Analysis methods](#)
- [Inversion](#)
- [Forward modelling](#)
- [My environment](#)
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Event Catalogues

Event catalogues

Event catalogue selection

Event catalogue: SEPServer SOHO/ERNE Catalogue

Event #	Date	SEP Observations						Solar observations		Comments
		p ⁺ onset (55-80 MeV)	I _{p,max}	0.3-0.7 MeV	0.7-3.0 MeV	e ⁻ onset	e ⁻ PAD	start time	end time	
0	24.09.1997	3:59	1.50E-03	3:12	3:14	3:43	irregular	0:00	3:59	
1	07.10.1997	14:43	8.00E-04	13:15	13:23	13:45	moderate	12:00	15:00	
2	04.11.1997	6:41	1.50E-01	6:16	6:16	6:19	beam	4:50	7:59	
3	06.11.1997	12:37	1.50E-01	12:23	12:23	12:37	moderate	11:30	16:00	
4	13.11.1997	22:26	2.00E-03	21:39	21:47	21:42	beam	20:00	23:59	
5	14.11.1997	14:29	1.00E-03	13:45	13:46	13:59	moderate	11:30	14:30	
6	20.04.1998	11:13	1.00E-01	10:30	10:33	10:43	moderate	9:00	13:00	
7	02.05.1998	14:10	1.00E-01	13:47	13:47	13:46	beam	13:20	16:00	
8	06.05.1998	8:29	4.00E-01	8:05	8:05	8:09	bad μ-coverage	7:30	13:00	
9	09.05.1998	4:32	6.00E-03	4:18	4:20	4:18	isotropic	2:00	5:59	
10	16.06.1998	20:35	1.00E-03	18:59	19:03	19:40	bad μ-coverage	17:00	20:59	
11	18.10.1998	22:22	4.00E-03	21:30	21:32	22:06	moderate	20:00	23:59	
12	14.11.1998	6:16	1.50E-01	5:36	5:47	5:28	moderate	4:00	7:59	
13	22.11.1998	7:17	8.00E-03	7:03	7:00	7:12	moderate	6:00	8:59	
14	24.11.1998	2:53	6.00E-03	2:42	3:07	2:55	isotropic	1:00	4:59	

Context help

On this page, the event catalogue can be consulted.

The event information is presented by means

Catalogue #0

1 AU

**~70MeV
SOHO/ERNE
protons**

115 events

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National Observatory of Athens (NOA)

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- [Home](#)
- [Datasets](#)
- [Metadata](#)
- [Event lists](#)
- [Plot event data](#)
- [Upload](#)
- [Event catalogues](#)
- [Simulation datasets](#)
- [Green's functions](#)
- [Analysis methods](#)
- [Inversion](#)
- [Convolution](#)
- [My environment](#)
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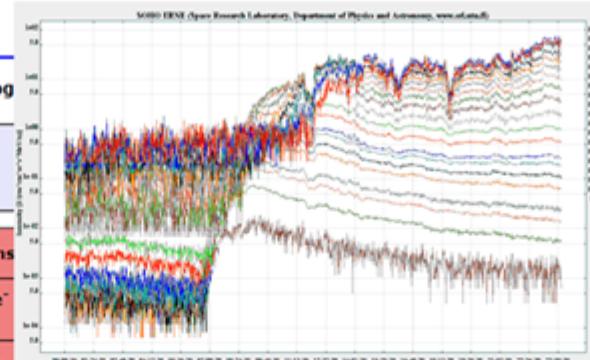
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Event catalogue selection

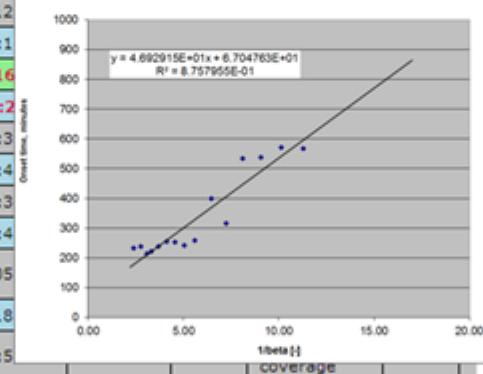
Event catalogue: SEPServer SOHO/ERNE Catalogue

SEPServer SOHO/ERNE Catalogue		SEP Observations			
		SOHO/ERNE		SOHO/EPHIN e-onset	
Event #	Date	p ⁺ onset (55-80 MeV)	I _{p,max}	0.3-0.7 MeV	0.7-3.1 MeV
0	24.09.1997	3:59	1.50E-03	3:12	
1	07.10.1997	14:43	8.00E-04	13:1	
2	04.11.1997	6:41	1.50E-01	6:16	
3	06.11.1997	12:37	1.50E-01	12:2	
4	13.11.1997	22:26	2.00E-03	21:3	
5	14.11.1997	14:29	1.00E-03	13:4	
6	20.04.1998	11:13	1.00E-01	10:3	
7	02.05.1998	14:10	1.00E-01	13:4	
8	06.05.1998	8:29	4.00E-01	8:05	
9	09.05.1998	4:32	6.00E-03	4:18	
10	16.06.1998	20:35	1.00E-03	18:5	
11	18.10.1998	22:22	4.00E-03	21:3	
12	14.11.1998	6:16	1.50E-01	5:36	
13	22.11.1998	7:17	8.00E-03	7:03	
14	24.11.1998	2:53	6.00E-03	2:42	
15	24.04.1999	14:30	3.00E-03	13:3	
16	09.05.1999	18:40	2.00E-03	18:1	
17	27.05.1999	11:16	1.00E-02	10:5	
18	01.06.1999	19:49	1.80E-02	19:2	
19	11.06.1999	1:09	5.00E-03	0:53	
20	09.01.2000	21:30	8.00E-04	complex	complex

• Protons (SOHO/ERNE)



Information about the event can be obtained by means of windows opened on the menu items ent. on the tents is e when a mouse



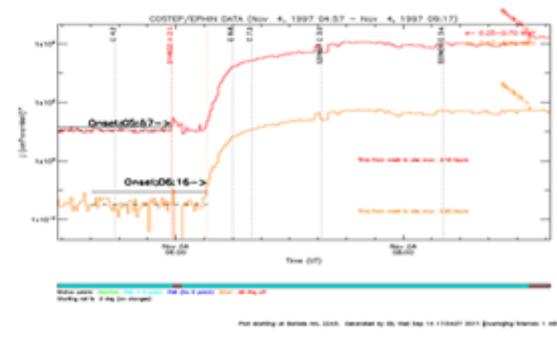
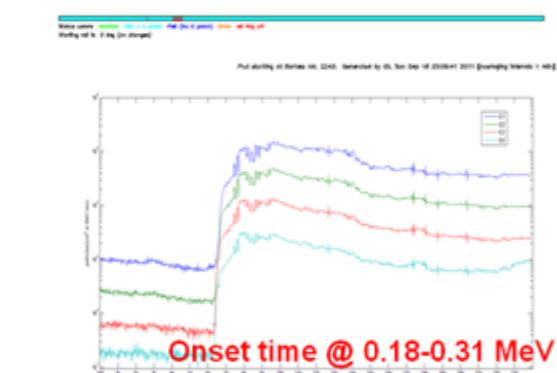
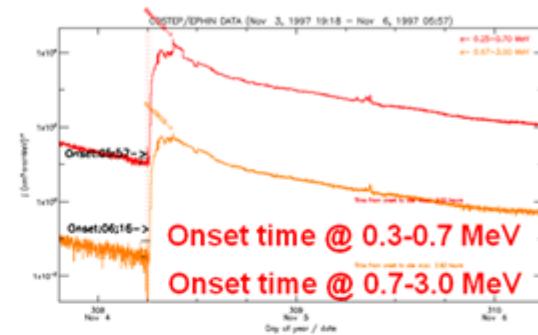
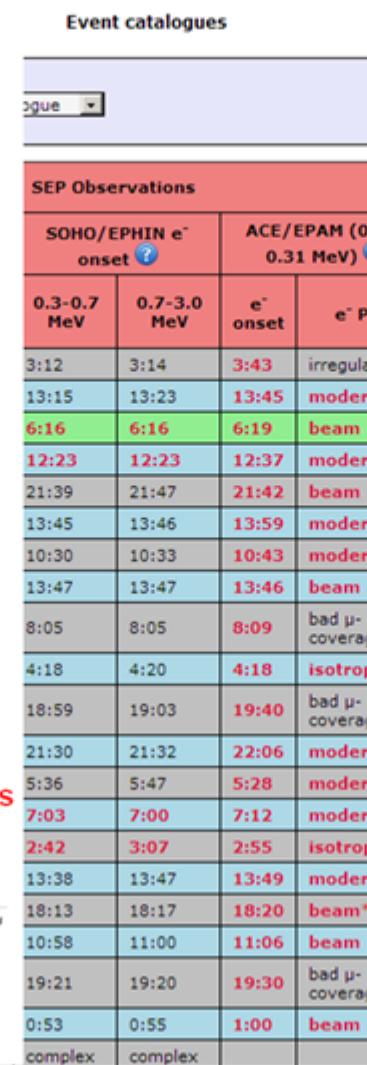
Channel	Nom	beta	tbeta	Observed onset	
				Hour	Min
1	1.63	0.05887	16.98719	RNA	RNA
2	1.97	0.06470	15.45606	22	33
3	2.41	0.07154	15.97999	2	43
4	2.98	0.07951	12.57689	2	32
5	3.7	0.08655	11.29053	9	28
6	4.61	0.09877	10.12498	9	32
7	5.77	0.11039	9.05851	8	57
8	7.24	0.12351	8.06621	8	54
9	9.09	0.13820	7.23611	5	16
10	11.4	0.15448	6.47331	6	40
11	15.4	0.17998	5.58707	4	19
12	18.9	0.19774	5.05712	4	2
13	23.3	0.21880	4.57030	4	13
14	29	0.24303	4.11571	4	15
15	36.3	0.27038	3.69646	3	58
16	45.6	0.30091	3.32325	3	42
17	54	0.32539	3.07322	3	35
18	67.5	0.36017	2.77648	3	39
19	94	0.41693	2.39848	3	53
20	116	0.45602	2.19290	RNA	RNA



0	Velocity Dispersion Analysis
0	Onset time @ 67.5 MeV
3	Ipmax @ 67.5 MeV



- Electrons (SOHO/EPHIN & ACE/EPAM)



Multiple levels of information



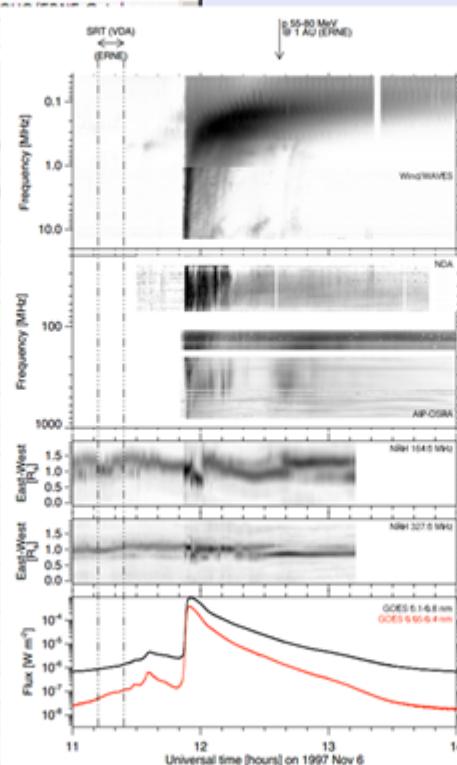
Home
Datasets
Metadata
Event lists
Plot event data
Upload
Event catalogues
Simulation datasets
Green's functions
Analysis methods
Inversion
Convolution
My environment
My entities
My account
Login
atpapaio logged in
Log out

Event catalogue selection

Event catalogue: [SEPServer SOHO/ERNE Catalogue](#)

SEPServer SOHO/ERNE Catalogue		SOHO
Event #	Date	p ⁺ onset (55-80 MeV)
0	24.09.1997	3:59
1	07.10.1997	14:43
2	04.11.1997	6:41
3	06.11.1997	12:37
4	13.11.1997	22:26
5	14.11.1997	14:29
6	20.04.1998	11:13
7	02.05.1998	14:10
8	06.05.1998	8:29
9	09.05.1998	4:32
10	16.06.1998	20:35
11	18.10.1998	22:22
12	14.11.1998	6:16
13	22.11.1998	7:17
14	24.11.1998	2:53
15	24.04.1999	14:30
16	09.05.1999	18:40
17	27.05.1999	11:16
18	01.06.1999	19:49
19	11.06.1999	1:09
20	09.01.2000	21:30

Event catalogues



Solar observations	Comments
start time	end time
0:00	3:59
12:00	15:00
4:50	7:59
11:30	16:00
20:00	23:59
11:30	14:30
9:00	13:00
13:20	16:00
7:30	13:00
2:00	5:59
17:00	20:59
20:00	23:59
4:00	7:59
6:00	8:59
1:00	4:59
12:30	17:00
17:00	21:59
10:00	13:00
17:00	21:59
18:00	23:58
0:00	2:59
0:00	23:59

Context help

On this page, the event catalogue can be consulted.

The event information is presented by means of pop-up windows which can be opened by clicking on the various column items for each event.

Information on the column contents is made visible when hovering the mouse pointer over the column headers in the last row of the table header (e.g. 'Date'). Clicking on the icons will open a pop-up window with more detailed information.

Some entries provide a double or triple action: Click, Ctrl+Click and/or Shift+Click, which will present different information.

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The first SEP Server
event catalogue
+
statistical comparative
analysis

J. Space Weather and Space
Climate, 3, A12, 2013

SWSC

Journal of
Space Weather and
Space Climate

SWSC

OPEN ACCESS

J. Space Weather Space Clim. 3 (2013) A12
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RESEARCH ARTICLE

The first SEP Server event catalogue ~68-MeV solar proton events observed at 1 AU in 1996–2010

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ABSTRACT

SEP Server is a three-year collaborative project funded by the seventh framework programme (FP7-SPACE) of the European Union. The objective of the project is to provide access to state-of-the-art observations and analysis tools for the scientific community on solar energetic particle (SEP) events and related electromagnetic (EM) emissions. The project will eventually lead to better understanding of the particle acceleration and transport processes at the Sun and in the inner heliosphere. These processes lead to SEP events that form one of the key elements of space weather. In this paper we present the first results from the systematic analysis work performed on the following datasets: *SOHO/ERNE*, *SOHO/EPHIN*, *ACE/EPAM*, *Wind/WAVES* and *GOES* X-rays. A catalogue of SEP events at 1 AU, with complete coverage over solar cycle 23, based on high-energy (~68-MeV) protons from *SOHO/ERNE* and electron recordings of the events by *SOHO/EPHIN* and *ACE/EPAM* are presented. A total of 115 energetic particle events have been identified and analysed using velocity dispersion analysis (VDA) for protons and time-shifting analysis (TSA) for electrons and protons in order to infer the SEP release times at the Sun. EM observations during the times of the SEP event onset have been gathered and compared to the release time estimates of particles. Data from those events that occurred during the European day-time, i.e., those that also have observations from ground-based observatories included in *SEP Server*, are listed and a preliminary analysis of their associations is presented. We find that VDA results for protons can be a useful tool for the analysis of proton release times, but if the derived proton path length is out of a range of $1 \text{ AU} < s \lesssim 3 \text{ AU}$, the result of the analysis may be compromised, as indicated by the anti-correlation of the derived path length and release time delay from the associated X-ray flare. The average path length derived from VDA is about 1.9 times the nominal length of the spiral magnetic field line. This implies that the path length of first-arriving MeV to deka-MeV protons is affected by interplanetary scattering. TSA of near-relativistic electrons results in a release time that shows significant scatter with respect to the EM emissions but with a trend of being delayed more with increasing distance between the flare and the nominal footpoint of the Earth-connected field line.

Key words. SEP – radiation – flares – radio emissions (dynamic) – projects



✓ Available @ <http://server.sepserver.eu>

Home
Event catalogues
Login
Username:
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Event catalogues

Event catalogue selection –

Event catalogue: SEPServer ULYSSES/KET Catalogue

Context help

On this page, the event catalogue can be consulted.

The event information is presented by means

Event #	Date	SEP Observations					e ⁻ Onset	Solar Observations		Spacecraft Location		Co
		p ⁺ Onset (116 MeV/Poisson CUSUM)	p ⁺ Onset (116 MeV/Fit)	p ⁺ Onset (32 MeV/Poisson CUSUM)	p ⁺ Onset (32 MeV/Fit)	I _{p,max} (32 MeV)		Start Time	End Time	R (AU)	Helio latitude (deg)	
0	20.04.1998			6:15	2:28	5.32E-03	14:06			5.405	-6.2	216.8
1	21.01.1999			8:25	6:30	5.62E-03	8:56			5.167	-19.99	277.5
2	02.06.1999			17:55	10:44	1.11E-03	11:36			4.879	-27.41	201.4
3	14.07.2000	15:15		15:55	14:11	3.54E-02	13:09			3.165	-62.22	189.2
4	12.09.2000	17:15		16:25	14:49	4.19E-02	15:46			2.789	-71.02	68.57
5	29.10.2000			8:35	5:18	1.02E-04	4:02			2.475	-78.22	152.3
6	09.11.2000	12:04		5:55	4:34	1.75E-02	2:16			2.4	-79.45	10.19
7	25.11.2000			14:55	10:48	4.81E-03	9:36			2.285	-80.21	162.1
8	21.01.2001			1:25	21:42	7.62E-04	23:23			1.888	-68.49	143.2
9	01.04.2001			15:35	13:39	2.24E-04	11:48			1.464	-32.72	241.7
10	03.04.2001	22:15		7:04	17:50	2.68E-02	20:48			1.456	-31.62	218.3
11	15.04.2001	22:55		2:15	22:08	3.41E-03	21:15			1.406	-22.76	38.79
12	18.04.2001	8:15		8:25	7:06	5.66E-02	8:37			1.398	-21.14	7.21
13	07.05.2001			16:25	15:21	4.88E-03	10:12			1.351	-6.54	95.64
14	20.05.2001			10:45	11:13	3.22E-04	10:37			1.339	3.5	276.5

Catalogue #1

>1 AU

~120 MeV &

~ 30 MeV

**Ulysses/KET
protons**

40 events

Information.

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- Home
- Datasets
- Metadata
- Event lists
- Plot event data
- Upload
- Event catalogues
- Simulation datasets
- Green's functions
- Analysis methods
- Inversion Convolution
- My environment
- My entities
- My account
- Login
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Event catalogues

Event catalogue selection

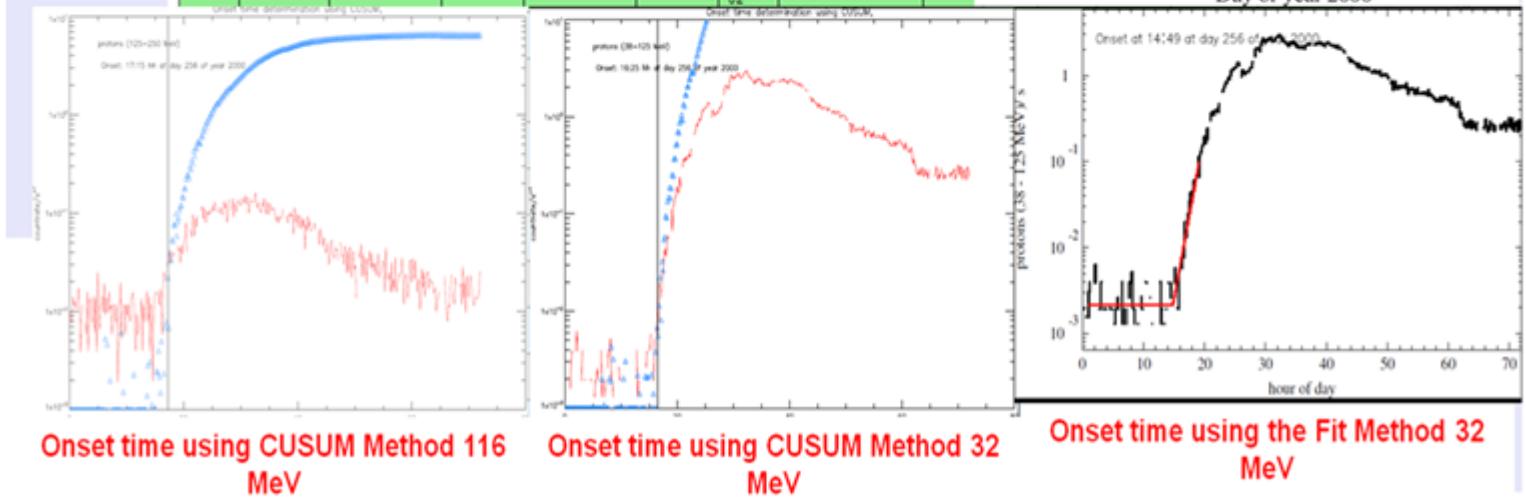
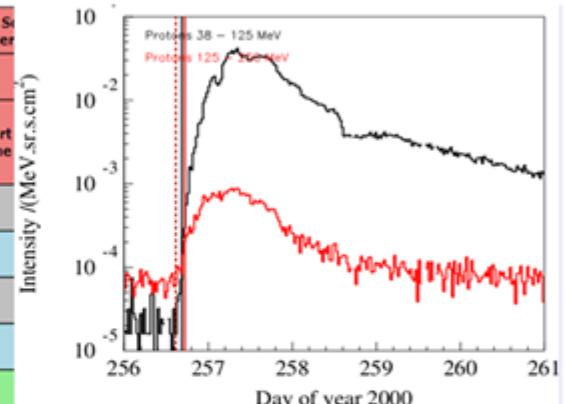
Event catalogue: **SEPServer ULYSSES/KET Catalogue**

Event #	Date	SEP Observations						Start Time
		p ⁺ Onset (116 MeV/Poisson CUSUM)	p ⁺ Onset (116 MeV/Fit)	p ⁺ Onset (32 MeV/Poisson CUSUM)	p ⁺ Onset (32 MeV/Fit)	J _{p,max} (32 MeV)	e ⁻ Onset	
0	20.04.1998			6:15	2:28	5.32E-03	14:06	
1	21.01.1999			8:25	6:30	5.62E-03	8:56	
2	02.06.1999			17:55	10:44	1.11E-03	11:36	
3	14.07.2000	15:15		15:55	14:11	3.54E-02	13:09	
4	12.09.2000	17:15		16:25	14:49	4.19E-02	15:46	

Context help

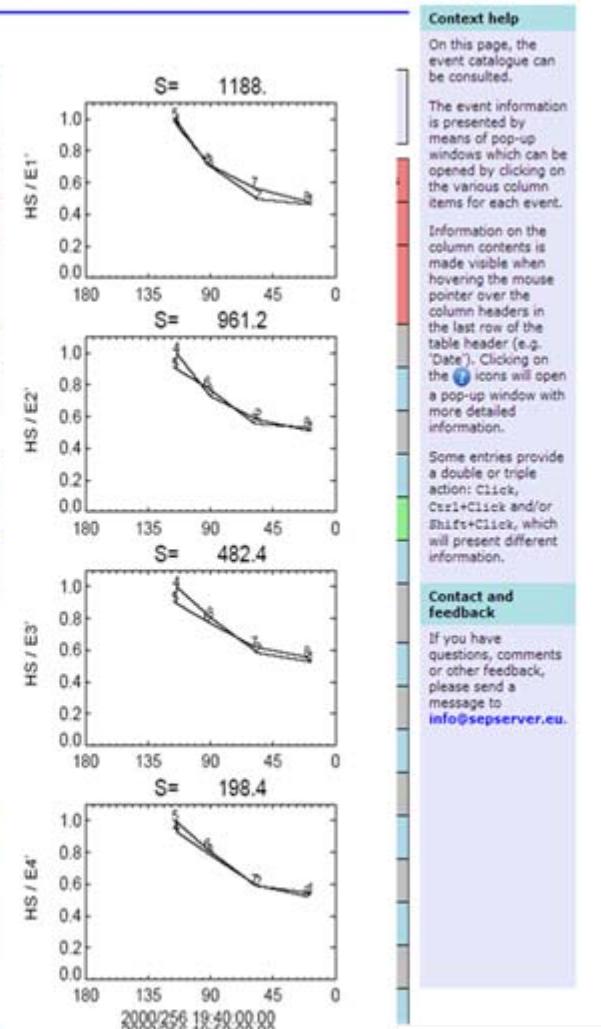
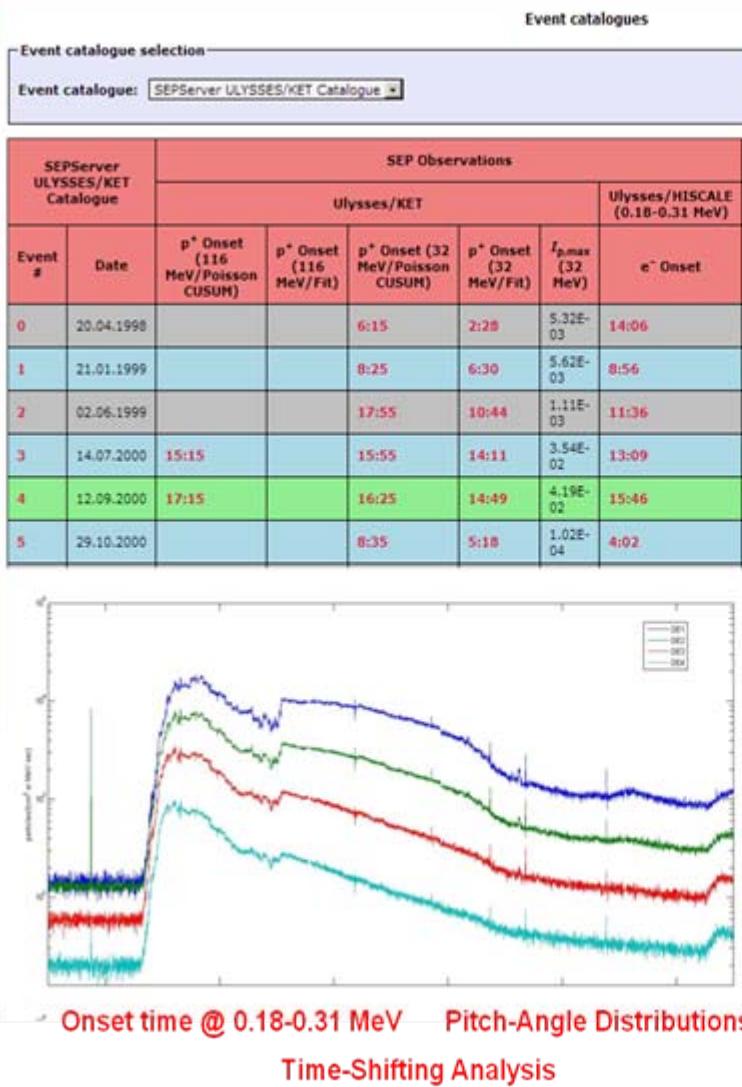
On this page, the event catalogue can be consulted.

Comparative plots of 32 and 116 MeV





Home
Datasets
Metadata
Event lists
Plot event data
Upload
Event catalogues
Simulation datasets
Green's functions
Analysis methods
Inversion
Convolution
My environment
My entities
My account
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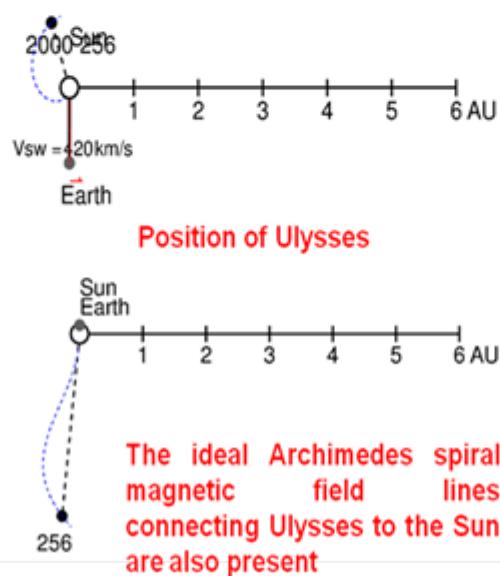




• Complementary data

Multiple levels of information

Home	Event catalogues													
Datasets	Event catalogue selection													
Metadata	Event catalogue: SEPServer ULYSSES/KET Catalogue													
Event lists														
Plot event data														
Upload														
Event catalogues														
Simulation datasets														
Green's functions														
Analysis methods														
Inversion														
Convolution														
My environment														
My entities														
My account														
Login														
atpapa1o logged in														
Log out														
0	20.04.1998			6:15	2:28	5.32E-03	14:06			5.405	-6.2	216.8		
1	21.01.1999			8:25	6:30	5.62E-03	8:56			5.167	-19.99	277.5		
2	02.06.1999			---	---	1.11E-03	---			4.879	-27.41	201.4		
3	14.07.2000	15:15								3.165	-62.22	189.2		
4	12.09.2000	17:15								2.789	-71.02	68.57		
5	29.10.2000									2.475	-78.22	152.3		
6	09.11.2000	12:04								2.4	-79.45	10.19	Ambiguous onset due to data gap	
7	25.11.2000													
8	21.01.2001													
9	01.04.2001													
10	03.04.2001	22:15												
11	15.04.2001	22:55												
12	18.04.2001	8:15												
13	07.05.2001													
14	20.05.2001													
15	30.05.2001													



Vsw, L (AU), Coordinates
in textural form

Context help

On this page, the event catalogue can be consulted.

The event information is presented by means of pop-up windows which can be opened by clicking on the various column items for each event.

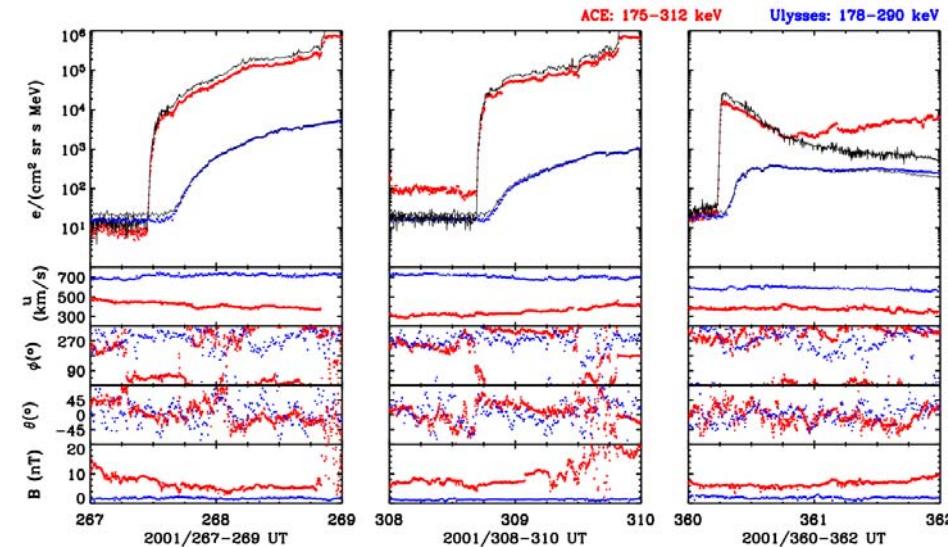
Information on the column contents is made visible when hovering the mouse pointer over the column headers in the last row of the table header (e.g. 'Date'). Clicking on the icons will open a pop-up window with more detailed information.

Some entries provide a double or triple action: Click, Ctrl+Click and/or Shift+Click, which will present different information.

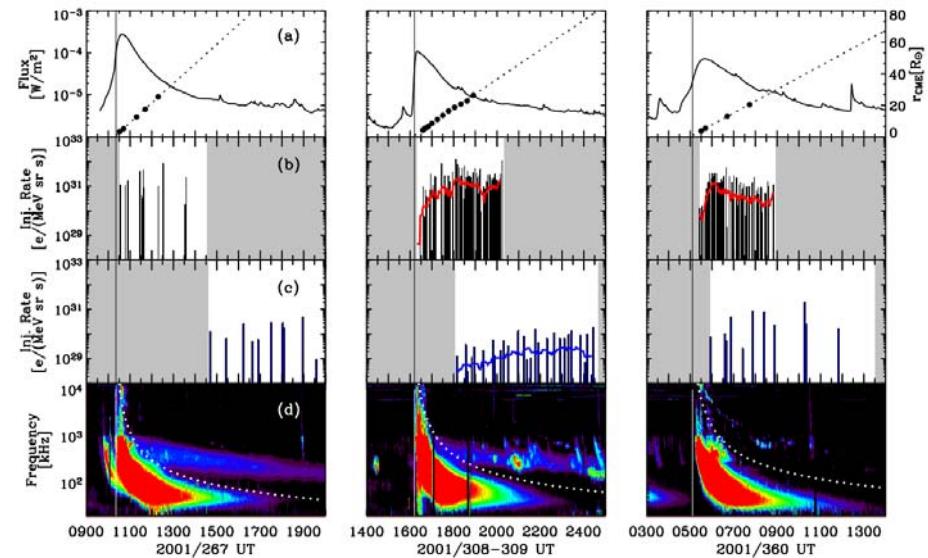
Contact and feedback

If you have

Comparative results between ACE and Ulysses



Ulysses Catalogue



Inversion fits

Identification of the Solar Source



The secondSEPServer
event catalogue
+
detailed analysis on a
case study

33rd ICRC Proc., 2013

ICRC
2013

33ND INTERNATIONAL COSMIC RAY CONFERENCE, RIO DE JANEIRO 2013
THE ASTROPARTICLE PHYSICS CONFERENCE

SEPServer solar energetic particle event catalogue in and out of the ecliptic; a Ulysses COSPIN/KET, COSPIN/LET and HISCALE particle data driven study

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Abstract: SEPServer is a three-year collaborative project funded by the seventh framework programme (FP7-SPACE) of the European Union. The objective of the project is to provide, among other things, access to state-of-the-art observations and analysis tools for the scientific community on solar energetic particle (SEP) events. The study of SEPs at different latitudes and under different conditions provides useful information about energetic particle propagation and acceleration, and is one of the focus areas of the project. The Ulysses mission, launched in 1990, explored the three dimensional heliosphere during different solar activity conditions until the spacecraft was finally switched off on June 30, 2009. The mission has been the only one that allowed us to study the characteristics of SEPs at low and high latitudes. In this work, the Cosmic Ray and Solar Particle Investigation (COSPIN) Kiel Electron Telescope (KET) data of 38 to 125 MeV has been used to identify a number of 40 events SEPs observed in and out of the ecliptic plane over solar cycle 23. Using electron observations from the Heliosphere Instrument for Spectra, Composition and Anisotropy at Low Energies (HISCALE) and proton intensities from the COSPIN Low-Energy Telescope (LET), different characteristics of these events have been determined and compared with simulation based analysis and remote sensing data from radio and optical observation. The event catalogue presented in this paper will be available to the community for further analysis through <http://server.sepserver.eu>.

Keywords: Solar energetic particles, Analysis tool, Latitudinal distribution



1 Introduction

SEPServer (www.sepserver.eu) is a collaborative project of eleven European partners funded by the European Union's Seventh Framework Programme. The project was launched in December 2010 and will run for three years. The main objective of the project is to develop an Internet server facilitating access to solar energetic particle (SEP)

community in form of event catalogs. The results are available online (server.sepserver.eu) in a reusable form and the community is encouraged to make use of the results in further studies.

The first SEPServer event catalogue [22] is based on *SOHO/ERNE* observations of ~ 68 MeV proton intensities and contains 115 SEP events from 1996–2010 observed at L1. The focus of the



A sample of the 3rd & 4th SEPServer SEP event lists



✓ Available @ <http://server.sepserver.eu>

Home
Event catalogues
Login
Username: rami
Password: *****
Log in

Event catalogues													
Event catalogue selection		SEP Observations								Solar observations		R (AU)	Comments
SEPServer HELIOS-A Catalogue		Integral Protons (P51) ?			Protons (P37) ?		Electrons (E2) ?						
Event #	Date	p ⁻ onset 2σ	p ⁻ onset 4σ	p ⁻ onset 2σ	p ⁻ onset 4σ	e ⁻ onset 2σ	e ⁻ onset 4σ	Start time	Peak time	R (AU)			
0*	28.07.1975	2:05	2:06	2:06	2:06	2:05	2:05						
1	05.09.1977	20:50	20:51	20:50	20:55	19:49	20:51			0.784			
2	08.09.1977									0.761	onset in data gap		
3	19.09.1977	11:28	11:29	11:29	11:29	11:27	11:28	9:03	13:20	0.646			
4	24.09.1977	6:15	6:15	6:15	6:15	6:15	6:15			0.59			
5	22.11.1977	10:25	10:25	10:25	10:25	10:25	10:25	9:46	10:43	0.631			
6	01.01.1978	21:54	21:54	21:54	21:55	21:53	21:55			0.966			
7	13.02.1978	2:06	2:06	19:48	2:06	2:05	2:06			0.953	double peak structure		
8	08.04.1978	1:04	2:06	2:06	2:06	20:50	2:06			0.519	E2 2σ onset on DOY 97		
9	11.04.1978	14:37	14:37	14:37	14:37	14:36	14:36	13:42	14:21	0.474	double peak structure		
10	28.04.1978	13:33	13:33	13:34	13:34	13:33	13:34	13:12	13:55	0.647	multiple peak structure		

Context help

On this page, the event catalogue can be consulted.

The event information is presented by means of pop-up windows which can be clicked to ev

Catalogues #2 & 3

0.3 to < 1 AU

> 51 MeV &

~ 37 MeV

Helios/E6
protons

63 events

Con

If you have questions, comments or other feedback, please send a message to info@sepserver.eu.



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Protons (Helios A & B)

Home

Event catalogues

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Username:

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Event catalogues selection

Event catalogue: **SEPServer HELIOS-A Catalogue**

SEPServer HELIOS-A Catalogue		SEP Observations						Solar observations		R (AU)	Comments
		Integral Protons (P1)		Protons (P37)		Electrons (E2)		Start time	Peak time	R (AU)	
Event #	Date	p ⁻ onset 2σ	p ⁻ onset 4σ	p ⁻ onset 2σ	p ⁻ onset 4σ	e ⁻ onset 2σ	e ⁻ onset 4σ				
0*	28.07.1975	2:05	2:06	2:06	2:06	2:05	2:05				
1	05.09.1977	20:50	20:51	20:50	20:55	19:49	20:51			0.784	
2	08.09.1977									0.761	onset in data gap
3	19.09.1977	11:28	11:29	11:29	11:29	11:27	11:28	9:03	13:20	0.646	
4	24.09.1977	6:15	6:15	6:15	6:15	6:15	6:15			0.59	
5	22.11.1977	10:25	10:25	10:25	10:25	10:25	10:25	9:46	10:43	0.631	
										0.966	
										0.953	double peak structure
										0.519	E2 2σ onset on DOY 97
										0.474	double peak structure
										0.647	multiple peak structure
										0.488	multiple structure in P37 and E2
										0.98	multiple peak structure
										0.95	
										0.968	onset in data gap / double peak structure
										0.985	double peak structure
										0.595	onset in data gap / double peak structure
										0.31	multiple peak structure
										0.545	double peak structure
										0.714	

Onset time using 2 σ

Onset time using 4 σ

Context help

On this page, the event catalogue can be consulted.

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Electrons (Helios A & B)

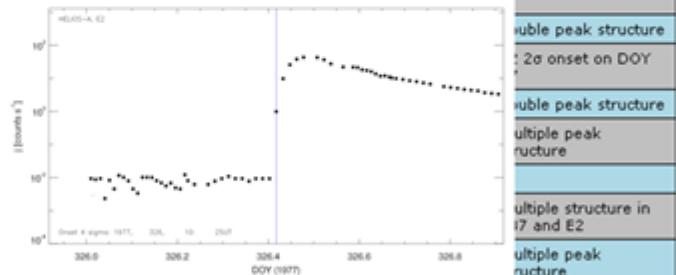
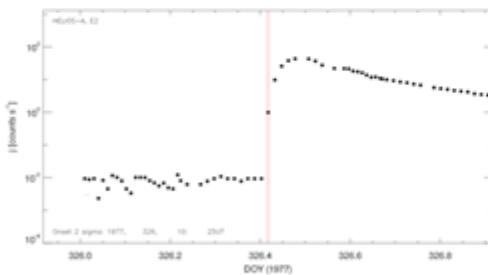
Home
Event catalogues
Login
Username: <input type="text"/>
Password: <input type="password"/>
<input type="button" value="Log in"/>

Event catalogues

Event catalogue selection

Event catalogue: **SEPServer HELIOS-A Catalogue**

SEPServer HELIOS-A Catalogue	SEP Observations						Solar observations		R (AU)	Comments	
	Integral Protons (PS1)		Protons (P37)		Electrons (E2)		Start time	Peak time	R (AU)		
Event #	Date	p ⁻ onset 2σ	p ⁻ onset 4σ	p ⁻ onset 2σ	p ⁻ onset 4σ	e ⁻ onset 2σ	e ⁻ onset 4σ	Start time	Peak time	R (AU)	
0*	28.07.1975	2:05	2:06	2:06	2:06	2:05	2:05				
1	05.09.1977	20:50	20:51	20:50	20:55	19:49	20:51			0.784	
2	08.09.1977									0.761	onset in data gap
3	19.09.1977	11:28	11:29	11:29	11:29	11:27	11:28	9:03	13:20	0.646	
4	24.09.1977	6:15	6:15	6:15	6:15	6:15	6:15			0.59	
5	22.11.1977	10:25	10:25	10:25	10:25	10:25	10:25	9:46	10:43	0.631	



Onset time using 2σ

Onset time using 4σ

16	18.08.1979	15:38	15:38	15:39	15:39	15:38	15:38	10:48	14:06	0.985	double peak structure
17	08.09.1979										onset in data gap / double peak structure
18	01.05.1980	19:48	19:48	19:48	19:49	19:48	19:48			0.595	double peak structure
19	28.05.1980	17:42	17:42	15:37	15:39	15:38	15:38	13:14	14:19	0.31	multiple peak structure
20	21.06.1980	1:04	1:04	1:04	1:04	1:04	1:04			0.545	double peak structure
21	06.07.1980	0:02	0:02	1:02	1:02	0:02	0:02			0.714	

Context help

On this page, the event catalogue can be consulted.

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Event catalogues

Solar Associations (OSRA data)

Event catalogue selection

Event catalogue: **SEPServer HELIOS-A Catalogue**

SEPServer HELIOS-A Catalogue		SEP Observations				Solar observations		<i>R</i> (AU)	Comments		
		Integral Protons (P51)		Protons (P37)						Electrons (E2)	
Event #	Date	p ⁻ onset 2σ	p ⁻ onset 4σ	p ⁻ onset 2σ	p ⁻ onset 4σ	e ⁻ onset 2σ	e ⁻ onset 4σ	Start time	Peak time	<i>R</i> (AU)	Comments
0*	28.07.1975	2:05	2:06	2:06	2:06	2:05	2:05				
1	05.09.1977	20:50	20:51	20:50	20:55	19:49	20:51			0.784	
2	08.09.1977									0.761	onset in data gap
3	19.09.1977	11:28	11:29	11:29	11:29	11:27	11:28	9:03	13:20	0.646	
4	24.09.1977	6:15	6:15	6:15	6:15	6:15	6:15			0.59	
5	22.11.1977	10:25	10:25	10:25	10:25	10:25	10:25	9:46	10:43	0.631	
		21:55	21:53	21:55						0.966	
		2:06	2:05	2:06						0.953	double peak structure
		20:50	2:06							0.519	E2 2σ onset on DOY 97
		14:37	14:36	14:36	13:42	14:21	0.474				multiple peak structure
		13:34	13:33	13:34	13:12	13:55	0.647				multiple peak structure
		4:10	3:09	3:09							
		10:25	10:25	10:25	12:01	7:11	0.488				multiple structure in P37 and E2
		2:05	1:02	1:04						0.98	multiple peak structure

1977-09-19

Context help

On this page, the event catalogue can be consulted.

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Contact and feedback

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Solar associations

Complementary info on the event

#	date	P51_2sig	P51_4sig	P37_2sig	P37_4sig	E2_2sig	E2_4sig	OSRA_onset	OSRA_peak	<i>R</i> _AU	v_sw	magnetic footprint
5	22.11.1977	10:25	10:25	10:25	10:25	10:25	10:25	09:46	10:43	0.631	265	S06 W 18

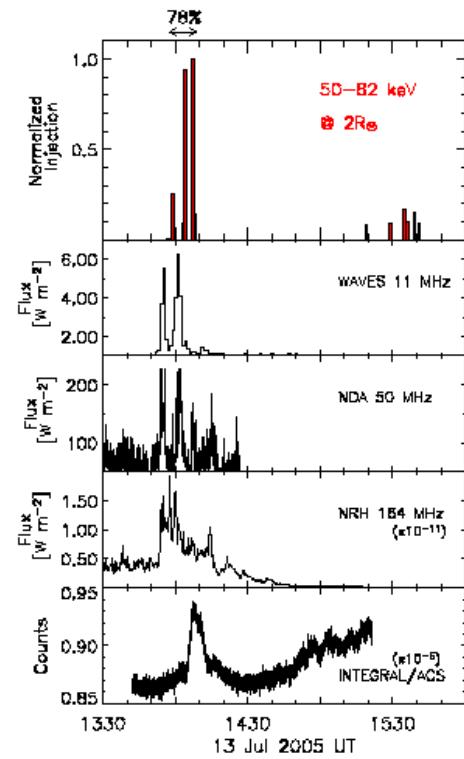
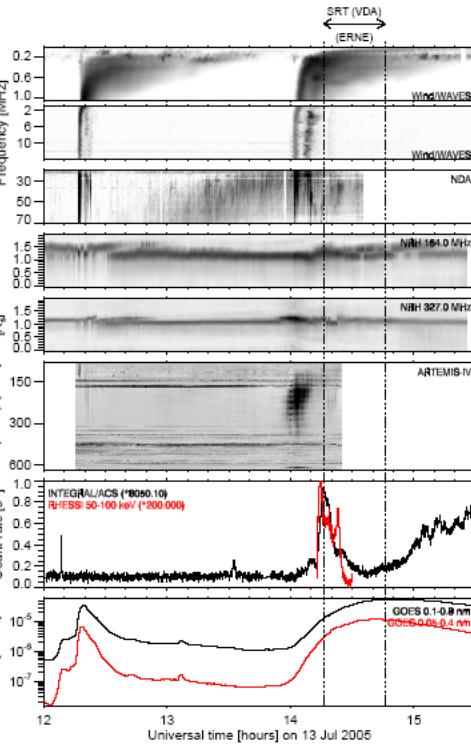
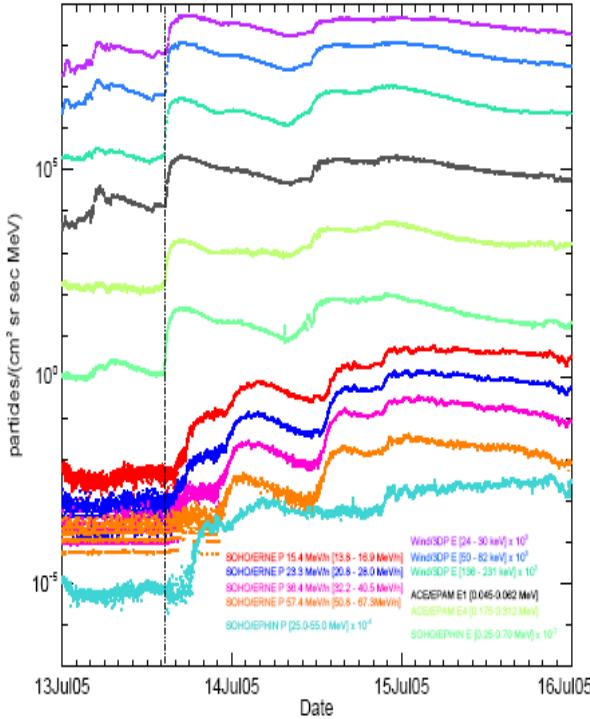
(!) First comparative results of SEPServer

Case Study: The SEP event of 13 July 2005

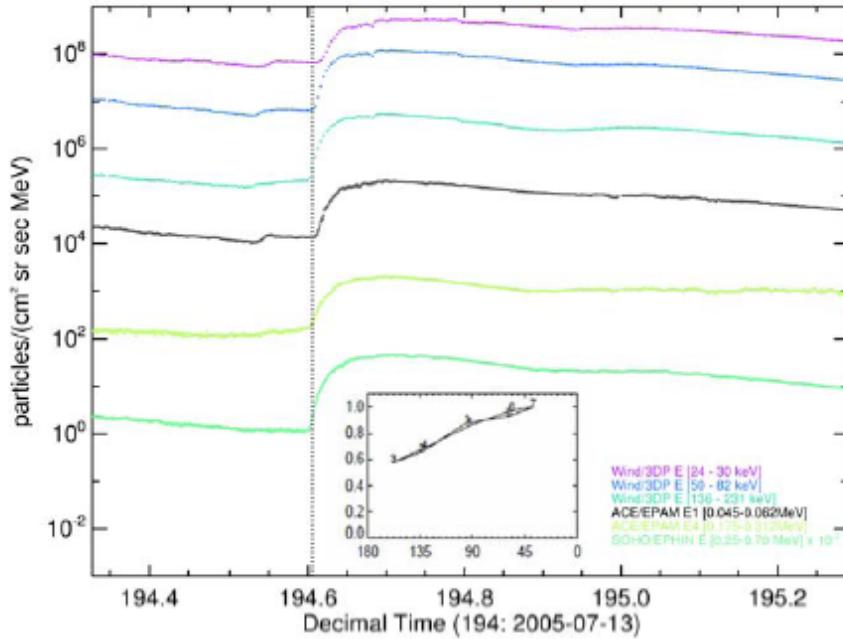
Particle
Observations

EM Observations

Simulations



Pitch-Angle Distributions (PADs)



- ✓ PADs were calculated for all E's channels of ACE/EPAM. Moderate anisotropic characteristics was revealed and sector 7 of E'4 was directed along the magnetic field.

Onset Time Determination

$$\langle I \rangle + n \cdot \sigma$$

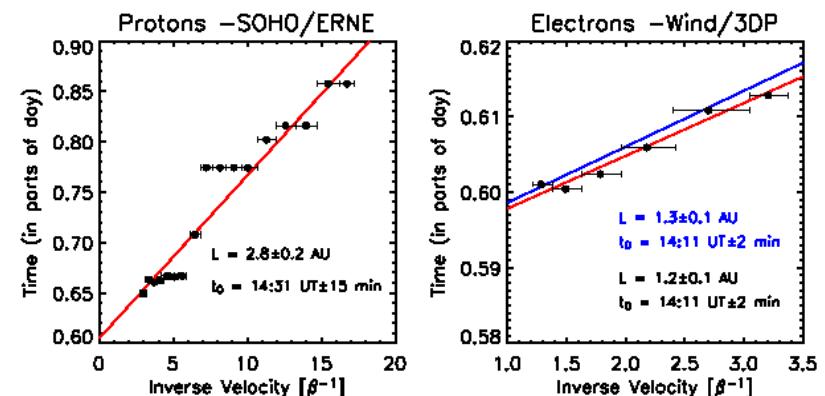
Instrument	Channel	Onset time	Sector
ACE/EPAM	E'4 (0.175-0.312 MeV)	14:33	7
Instrument	Channel	Onset time	
SOHO/EPHIN	Electrons (0.25-0.70 MeV)	14:27	

- ✓ Onset times for **ACE/EPAM** and **SOHO/EPHIN** have been determined based on the criterion of $> I+3\sigma$ or $> I+4\sigma$

Velocity Dispersion Analysis (VDA)

$$t_{onset}(E) = t_0 + 8.33 \frac{[\text{min}]}{[\text{AU}]} \cdot s \cdot \beta^{-1}(E)$$

- ✓ **Wind/3DP** and **SOHO/ERNE** onset times have been determined by the *Poisson-CUSUM* method. VDA has been applied to these results.





Anticipated Release Time Determination

- ✓ The SOHO/ERNE VDA presents, based on onset times determined by the Poisson-CUSSUM method, a path length of **2.84 AU** and an Anticipated release time of **$14:31 \pm 15 \text{ min}$** based on onset times determined by eye, a path length of **2.32 AU** and an Anticipated release time of **$14:40 \pm 17 \text{ min}$**
- ✓ The Wind/3DP VDA presents an anticipated release time **$14:11 \pm 2 \text{ min}$** when the path length is considered to be **1.2 AU**

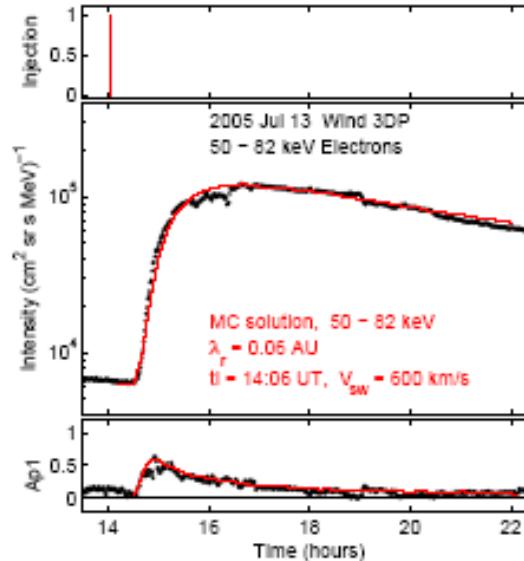
Instrument	Path length (AU)	Release time (UT)
Wind/3DP Electrons (0.025-0.65 MeV)	1.2	$14:11 \pm 2 \text{ min}$
SOHO/ERNE Protons (1.58-67.30 MeV)	2.84 2.32	$14:31 \pm 15 \text{ min}$ $14:40 \pm 17 \text{ min}$

Modeling results

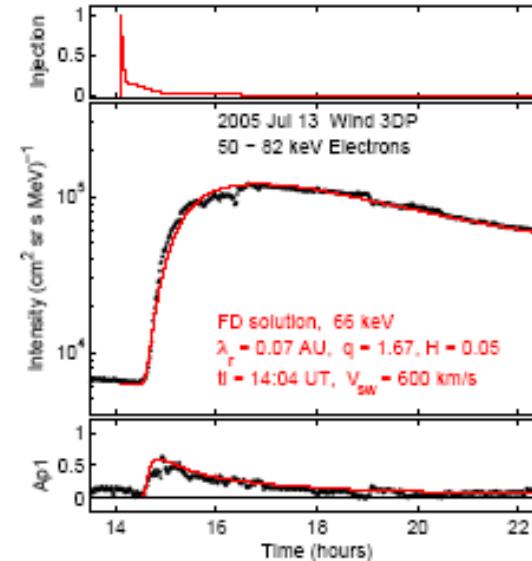
$$\frac{\partial f}{\partial t} + v\mu \frac{\partial f}{\partial z} + \frac{1-\mu^2}{2L} v \frac{\partial f}{\partial \mu} - \frac{\partial}{\partial \mu} \left(D_{\mu\mu} \frac{\partial f}{\partial \mu} \right) = q(z, \mu, t)$$

Numerical Methods Applied

Monte Carlo (MC)



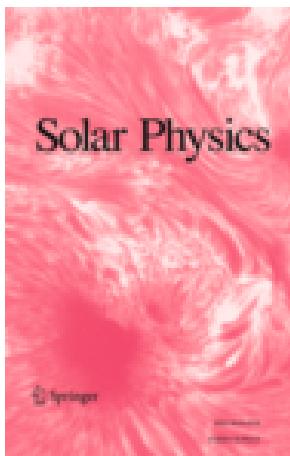
Finite Differences (FD)





**Comparative analysis
and DDA of various
datasets available via
SEPServer**

**Solar Phys., 281, 333-352, 2012
*Malandraki et al., 2012***



Solar Phys
DOI 10.1007/s11207-012-0164-9

THE SUN 360

Scientific Analysis within SEPServer – New Perspectives in Solar Energetic Particle Research: The Case Study of the 13 July 2005 Event

O.E. Malandraki · N. Agueda · A. Papaioannou · K.-L. Klein · E. Valtonen ·
B. Heber · W. Dröge · H. Aurass · A. Nindos · N. Vilmer · B. Sanahuja ·
A. Kouloumvakos · S. Braune · P. Preka-Papadema · K. Tziotziou · C. Hamadache ·
J. Kiener · V. Tatischeff · E. Riihonen · Y. Kartavykh · R. Rodríguez-Gasén · R. Vainio

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Abstract Solar energetic particle (SEP) events are a key ingredient of solar–terrestrial physics both for fundamental research and space weather applications. Multi-satellite observations are an important and incompletely exploited tool for studying the acceleration and the coronal and interplanetary propagation of the particles. While STEREO uses for this diagnostic two identical sets of instrumentation, there are many earlier observations carried out with different spacecraft. It is the aim of the SEPServer project to make these data and analysis tools available to a broad user community. The consortium will carry out

The Sun 360

Guest Editors: Bernhard Fleck, Bernd Heber, and Angelos Vourlidas

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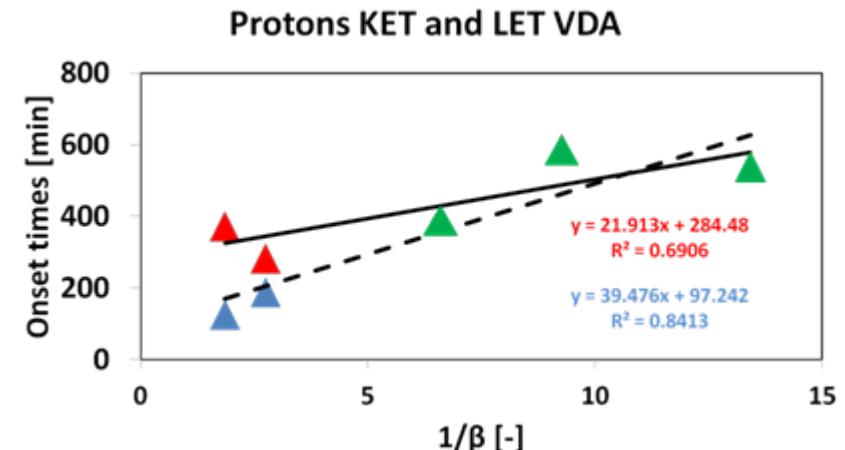
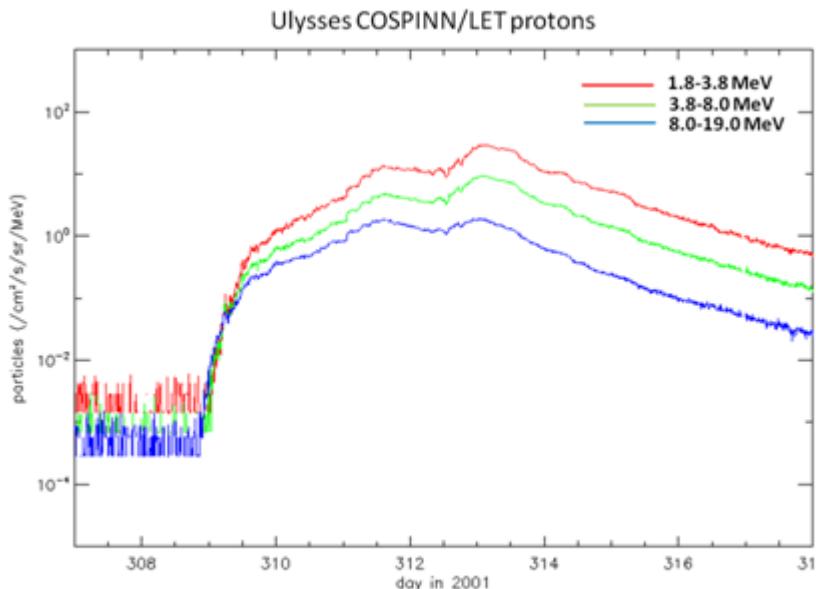
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Future Improvements/Additions on the Catalogues :

Ulysses/KET Catalogue

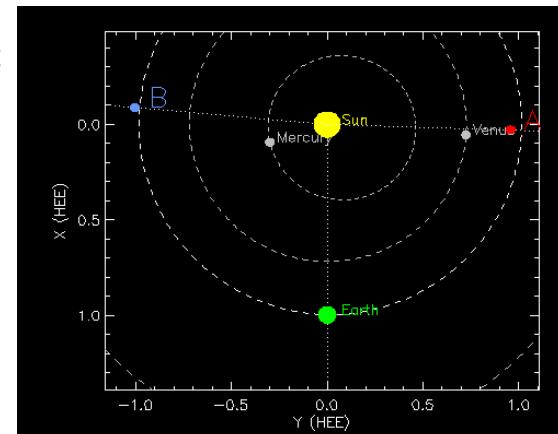
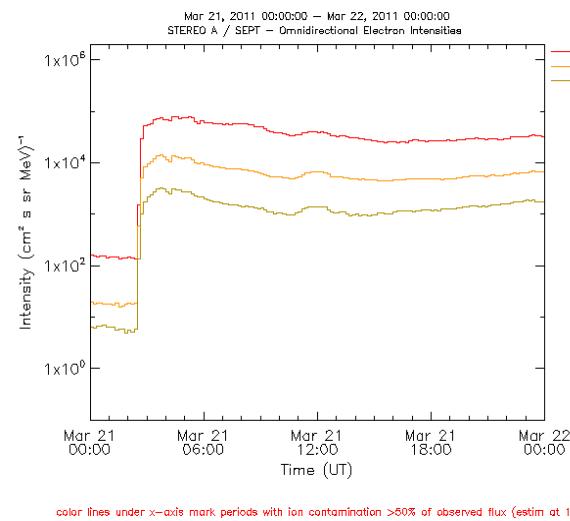
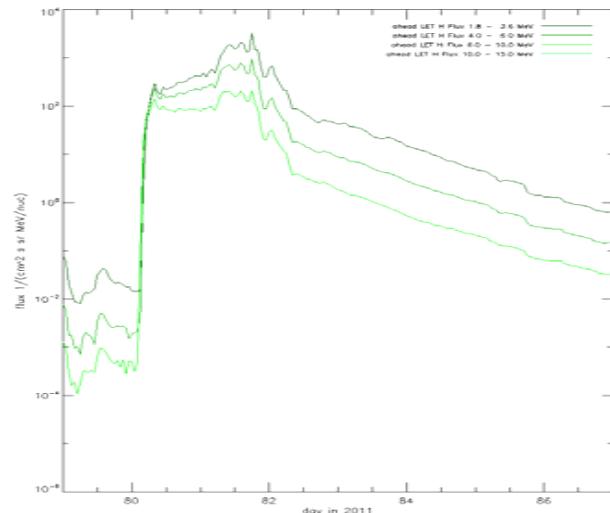


Heber et al., 2013



Future Improvements/Additions on the Catalogues :

STEREO/LET Catalogues

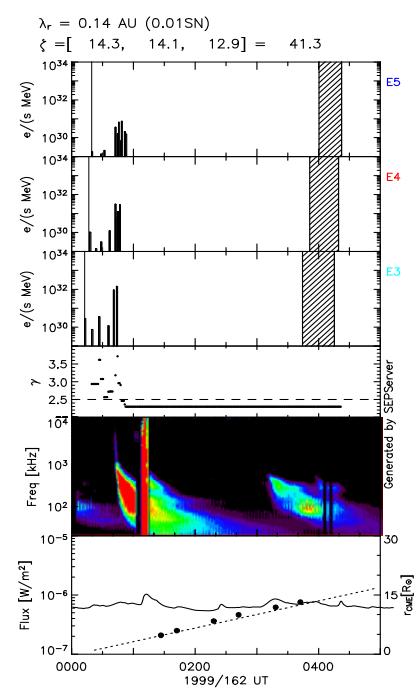
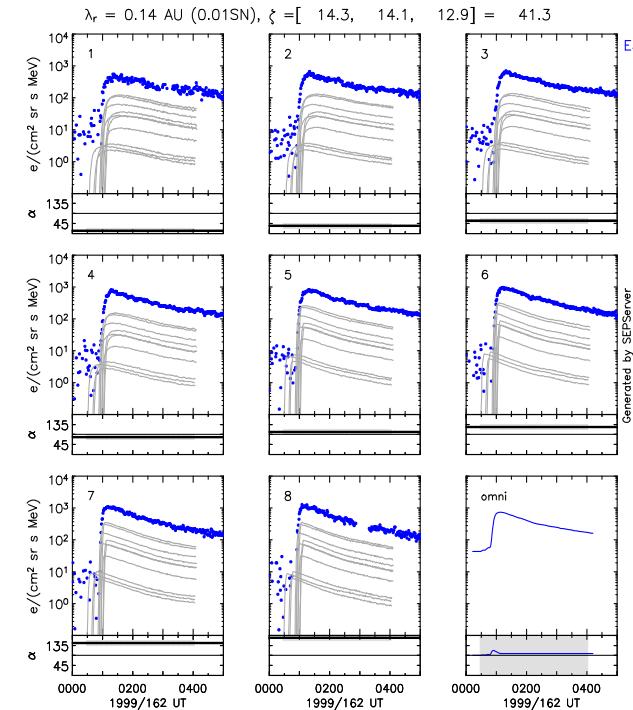
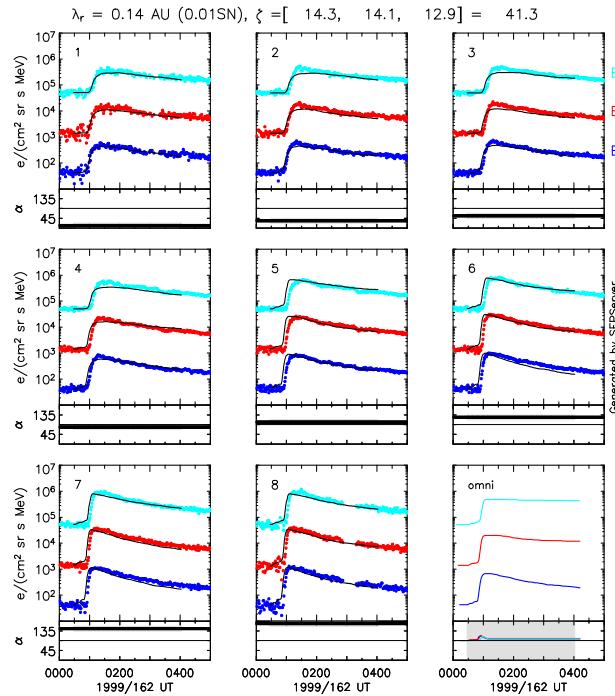


Papaioannou et al., 2013 this conference



Future Improvements/Additions on the Catalogues :

SOHO/ERNE Catalogue:





National Observatory of Athens (NOA)

**INSTITUTE FOR ASTRONOMY, ASTROPHYSICS,
SPACE APPLICATIONS & REMOTE SENSING**
(formerly INSTITUTE OF ASTRONOMY & ASTROPHYSICS)
National Observatory of Athens

SEPServer Progress Meeting

Home Program Participants Venue Contact

News

• MARCH 11, 2013

The website of the SEPServer Progress Meeting has been launched.

• AUGUST 29, 2013

The list of the [confirmed Participants](#) as well the [Preliminary Agenda](#) of the SEPServer Progress Meeting have been uploaded.

Relevant info

• MARCH 11, 2013

Information on the Venue of the Meeting have been uploaded.

• MARCH 11, 2013

Information on transport and accommodation have been uploaded today.



SEPServer Progress Meeting

ATHENS, MARCH 11, 2013

Posted by A. Papaioannou

SEPServer Progress Meeting will be hosted by the [National Observatory of Athens](#) and it will take place in Athens from **18-20 September, 2013**. The organization of the meeting is undertaken by O.E. Malandraki and the [Heliophysics Research Group](#).

SEPServer project aims to facilitate the coordinated exploitation of the various datasets by developing a server providing:

1. Access to directional fluxes and compositional data of SEPs and EM solar emissions
2. Assessment reports
3. Numerical Modeling Results
4. Scientific analysis results on all the catalogued SEP events

SEPServer is a collaborative project that brings together experts from eleven European Universities and institutes. Further info can be found [here](#).

This project has been receiving funding from the [European Commission FP7 Project SEPServer \(262773\)](#).

SEPServer Meeting in Athens

18-20 September 2013

✓ Overview of the Project from the WP leaders

✓ 20+ representatives from 14 Institutes

✓ 14 Scientific Presentations from Young Scientists

✓ 1 Public Talk

✓ 3 Talks from the Advisory Board



**Thank you for your
attention**



**SEPServer Release
Splinter Meeting @ ESWW10**