



ESA ESDC heliophysics archives update

3rd IHDEA meeting, NASA/GSFC
16 October 2019

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Outline



1. Cluster Science Archive new features through science cases
2. Solar Orbiter Archive preview
3. SOHO archive at ESDC alignment with SOHO archive at Goddard
4. Proba-2 Jupyter Notebook
5. Ulysses archive ESDC/GSFC archives alignment and User group

ESA ESDC heliophysics archives

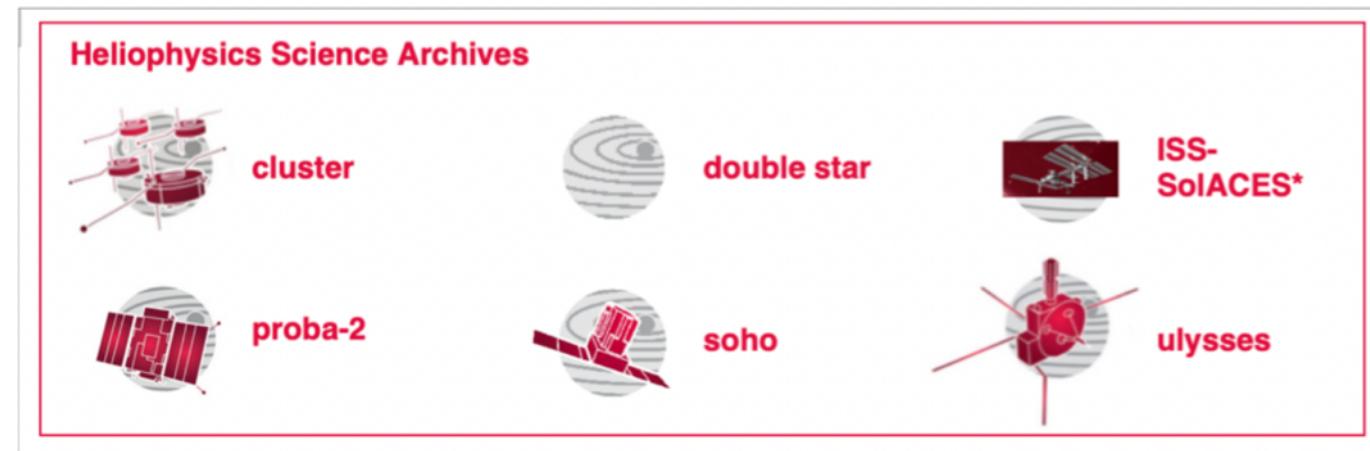


Heliophysics archives team at ESAC SDC supports the following missions

- Cluster (in operation)
- SOHO (in operation)
- Proba-2 (in operation)
- ISS-Solaces (legacy)
- Double Star (legacy)
- Ulysses (legacy)

In the (near) future

- Solar Orbiter
- SMILE
- PROBA-3



CSA Web GUI: <https://csa.esac.esa.int/>



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Cluster Science Archive

CSA 2.4.1

WELCOME TO THE CLUSTER SCIENCE ARCHIVE

The Cluster Science Archive provides access to all science and support data of the ongoing Cluster (2000-) and Double Star (2004-2008) missions. For each instrument on these missions, [detailed documentation](#) is available. Users are warmly invited to read the PI recommendations provided in the User Guide and Calibration Report of each instrument.

LATEST NEWS

Release csa-2.4.1
-Qtran has been rolled back instead of SPARTA in this patch release to convert CEF files to CDF. Differences in the way the data are stored in the CDF files have been indeed found when converting 2D and 3D datasets by Qtran vs. SPARTA. SPARTA will be deployed again in the near future, once fixed.
2019-09-04 12:40:00 CSA Team

SEARCH **GRAPHICS** **QUICKLOOKS** **INVENTORY** **DISTRIBUTION FUNCTIONS** **DOCUMENTATION** **COMMAND LINE** **CONTACT**

A vertical sidebar on the left contains icons for Home, Search, Lists, Plots, Waveforms, Folders, and Help, with a black arrow pointing to the Home icon.

Basic dataset search



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Cluster Science Archive

CSA 2.4.1

Mission Cluster DoubleStar

DATA SEARCH

Time (begin/end) -
Duration Days Hours Minutes

Clear Search

CLUSTER MISSION EXPERIMENTS

- All
- ASPOC active spacecraft potential control
- CIS ion spectrometer
- DWP wave-particle correlator
- EDI electron drift instrument
- EFW electric field double probe antenna
- FGM fluxgate magnetometer
- PEACE electron spectrometer
- RAPID energetic electron and ion spectrometer
- STAFF search coil magnetometer and spectrum analyzer
- WBD radio receiver - electric field waveforms
- WHISPER relaxation sounder
- Auxiliary, MAARBLE and ECLAT support data
- CAL Cross calibration products

DOUBLE STAR MISSION EXPERIMENTS

- All
- ASPOC spacecraft potential control experiment
- FGM fluxgate magnetometer
- HEED high energy electron detector
- HIA ion spectrometer
- HID high energy heavy ion detector
- PEACE electron spectrometer
- STAFF/DWP search coil magnetometer / wave-particle experiment
- Auxiliary and support data

NEW FEATURE

3x faster to make inventory queries

European Space Agency

The screenshot shows the Cluster Science Archive (CSA) search interface. At the top, there are links for the European Space Agency and Science & Technology, along with a Sign In button. The main title is "Cluster Science Archive" with a subtitle "CSA 2.4.1". Below the title, there's a "Mission" section with checkboxes for "Cluster" and "DoubleStar", both of which are checked. A red arrow points to the "DATA SEARCH" button, and a red box highlights the "Search" button. The search form includes fields for "Time (begin/end)" and "Duration" (Days, Hours, Minutes). Below the search form are two expandable sections: "CLUSTER MISSION EXPERIMENTS" and "DOUBLE STAR MISSION EXPERIMENTS", each listing various instruments and experiments. A callout box on the right contains the text "NEW FEATURE" and "3x faster to make inventory queries".

Results + new features



NEW FEATURES

- Experiments in tabs
- New ordering and grouping of datasets

The screenshot shows the Cluster Science Archive (CSA) version 2.4.1 interface. At the top, there are two tabs: "Data Request #1" and "Data Request #2". Below the tabs, there is a search bar and a sidebar with various icons. A red arrow points to the "Time (begin/end)" input field, which shows the range "2001-02-01T00:00:00Z - 2017-01-01T00:00:00Z". To the right of the time inputs are "Duration" fields for Days, Hours, and Minutes, all set to 0. Below the time inputs is a "Short List" checkbox followed by a dropdown menu set to "CEF". There are also buttons for "All", "Search", "Download", and "Delete".

The main panel is titled "CLUSTER" and contains a horizontal navigation bar with buttons for ASP, CIS, DWP, EDI, EFW, FGM, PEA, RAP, STA, WBD, WHI, AUX, and CAL. This navigation bar is highlighted with a red border. Below this, under the "CIS ION SPECTROMETER" heading, there are sections for SCIENCE, MOMENTS, PITCH ANGLE, and PARTICLE DISTRIBUTION. Under the ANCILLARY section, the "GRAPHICAL" option is highlighted with a green border.

Metadata: parameters display



EUROPEAN SPACE AGENCY SCIENCE & TECHNOLOGY SIGN IN

Cluster Science Archive

CSA 2.4.1

Data Request #1 x

Time (begin/end) - Duration Days Hours Minutes

Short List

CLUSTER

CIS **CAL**

CIS ION SPECTROMETER

SCIENCE

MOMENTS

C1 C2 C3 C4 CC/M Dataset Title

- Ion Moments (High and Low Sensitivity)
- H+ Moments (High sensitivity)
- He+ Moments (High sensitivity)
- Corrected He+ Density
- O+ Moments (High sensitivity)

Description: COSPAR ID: 2000-043A USSRACCUM Catalogue Number: 20403
CSDS Code: C1 ESOC FD code: S1 ESA Flight Model Number: FMS

Mission Name: Cluster

PARAMETERS

- TIME_TAGS
- DELTA_TIME
- SENSITIVITY
- CIS_MODE
- DENSITY
- VELOCITY_ISR2
- VELOCITY_GSE
- TEMPERATURE
- TEMP_PAR
- TEMP_PERP
- PRESSURE
- PRESSURE_TENSOR

C3_CP_CIS-HIA_ONBOARD_MOMENTS

Results + new features

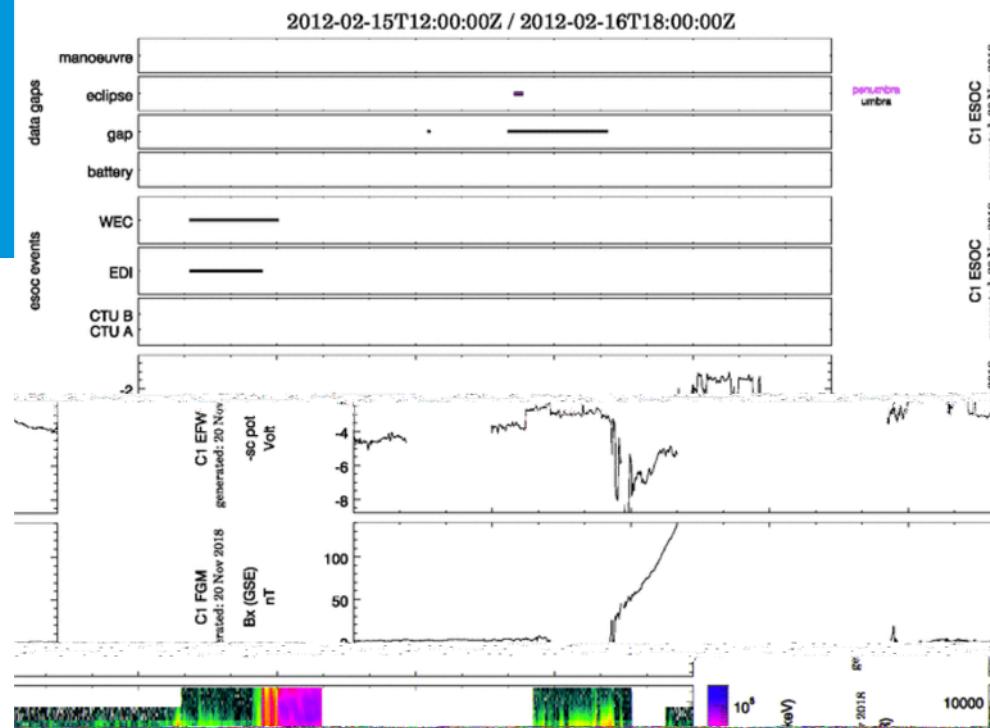


NEW FEATURES

- ESOC products (AUX)

A screenshot of the Cluster software interface, specifically the AUX tab. The interface has a header with tabs for CLUSTER, ASP, CIS, DWP, EDI, EFW, FGM, PEA, RAP, STA, WBD, WHI, AUX, and CAL. Below the header is a search bar containing the text "AUXILIARY, MAARBLE AND ECLAT SUPPORT DATA". The main area is divided into sections: ANCILLARY, GENERAL, and ESOC. The ESOC section is expanded, showing a table with columns C1, C2, C3, C4, CC/M, and Dataset Title. The dataset titles listed are: Battery Conditioning History, Data Gaps, Eclipse Intervals, Experiment Power Sharing, Ground Station Utilization Log, Manoeuvre Intervals, Spacecraft CTU/RTU switch-over, Spacecraft Event Log, SSR Bit Errors, TC History, Solar Array Performance, IPD/EPD Power and MEP Temperature, Spacecraft Orbital Elements, Monthly Report, and Weekly Report.

European Space Agency



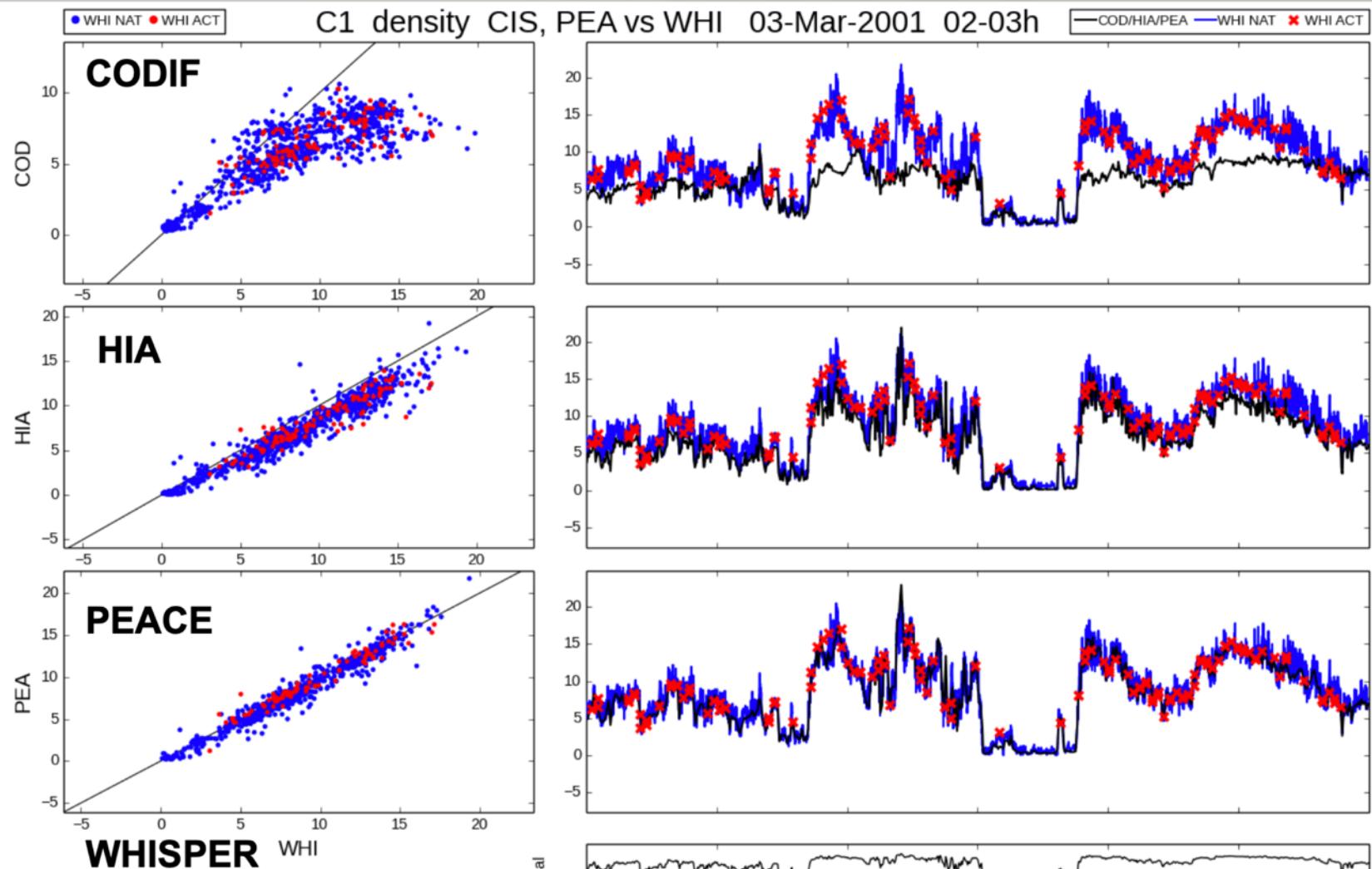
Search and Results – Cross calibration



NEW FEATURES

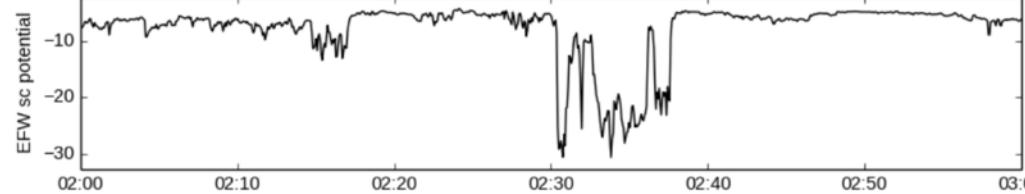
- Cross calibration plots
- Gathered in the CAL “experiment”

The screenshot shows the Data Search interface for Cluster and Double Star missions. At the top, there is a search bar with fields for 'Time (begin/end)' and 'Duration' (Days, Hours, Minutes). Below the search bar are two sections: 'CLUSTER MISSION EXPERIMENTS' and 'DOUBLE STAR MISSION EXPERIMENTS'. Both sections list various instruments and experiments. A red box highlights the 'CAL Cross calibration products' section under the Cluster experiments. At the bottom, there is a 'CAL CROSS CALIBRATION PRODUCTS' section with a 'GRAPHICAL' tab selected. This tab displays a grid of icons for datasets C1 through C4 and CC/M, along with a 'Dataset Title' column. A red box highlights the 'Dataset Title' column, showing entries such as 'Density Comparison: WHISPER vs CIS and PEACE', 'Electric Field Comparison: EDI vs HIA', etc.



GSE position (Earth radii):
 x = [6.7; 7.9], y = [3.4; 3.4], z = [9.0; 9.1]
 Distance = [11.7; 12.6]
 Invar lat = NAN, MLT = [11.3; 11.5], L-shell = NAN

V02; generated on 24-Oct-2016



European Space Agency



Science case on FTEs by Cluster and Double Star

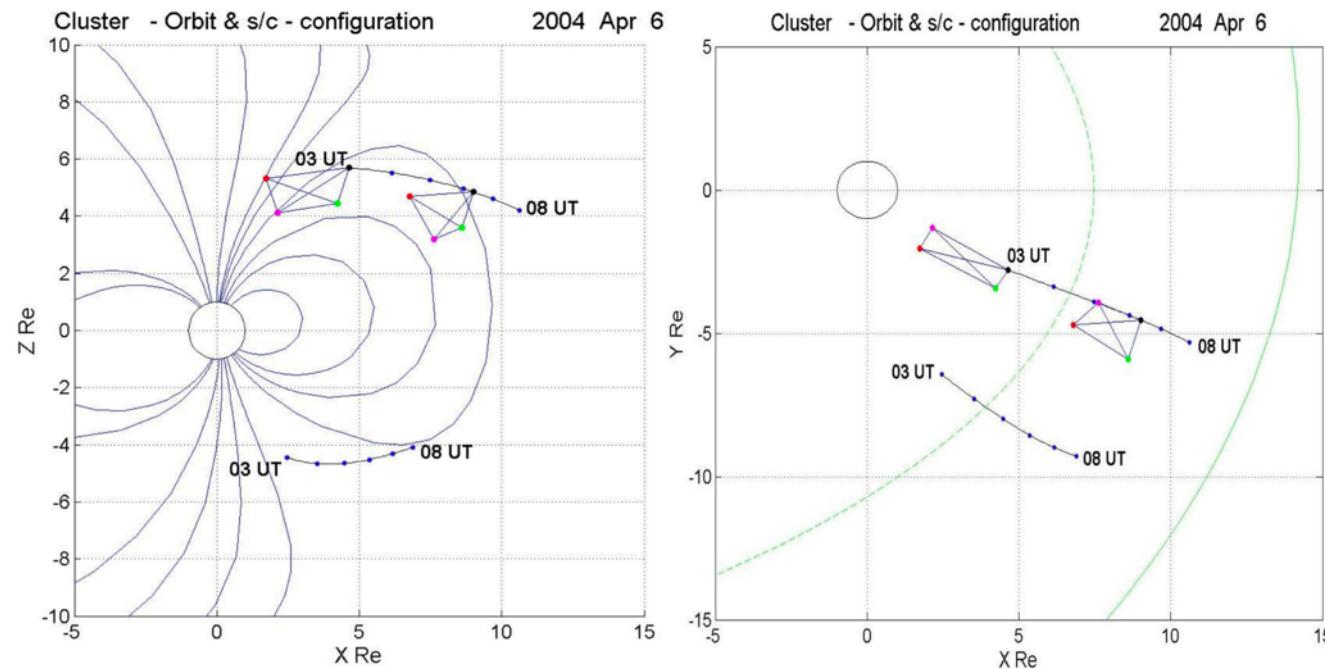


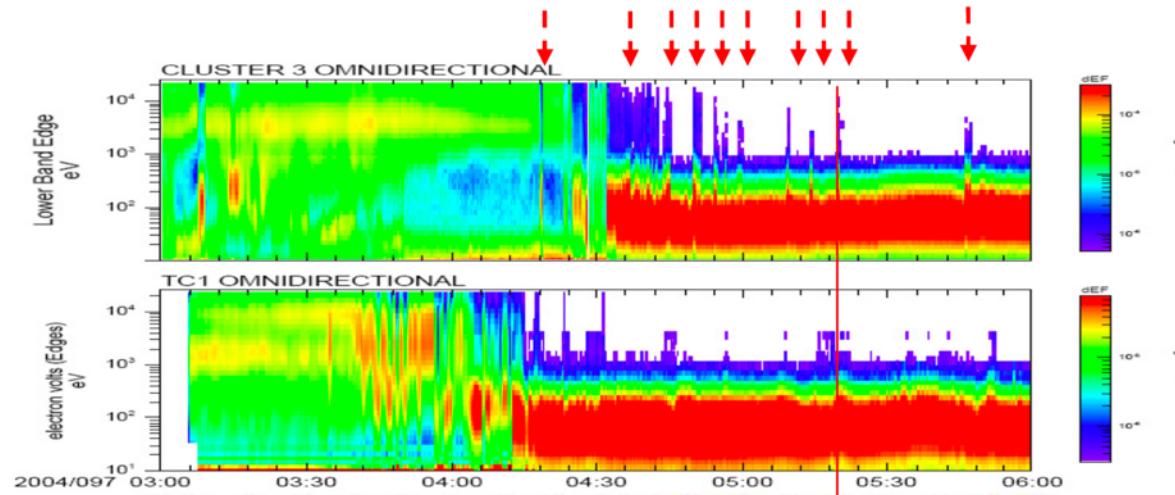
Fig. 1. Cluster s/c1 and Double Star TC-1 tracks in GSM coordinates for the interval 03:00 to 08:00 UT on 6 April 2004. The Cluster orbit also shows two spacecraft configurations (scaled up by a factor x50). Each orbit has hour markers. Model field lines are shown for the projection into the X,Z plane and cuts through the bow shock and magnetopause are shown for the X,Y plane. For the X,Z plane field lines are drawn from the Tsyganenko '89 model for guidance.

Science case on FTEs by Cluster and Double Star



2870

M. W. Dunlop et al.: Coordinated Cluster/Double Star observations of dayside reconnection signatures



Science case on FTEs by Cluster and Double Star

Cluster Science Archive

Cluster 2.1.1



KEY GRAPHICAL PRODUCTS

Time granularity 1 day 6 hours 1 hour On demand



Clear



Plot

PLOTS

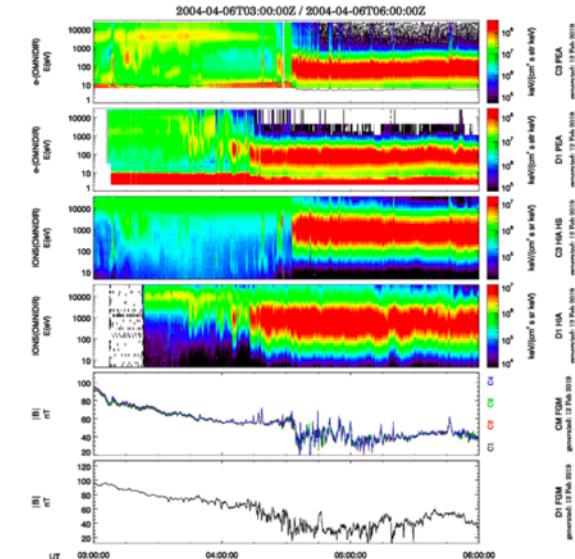


PS



CEF

CL_CG_ONDMD_20040406030000_20040406060000_V20190212232551_00.gif



Cluster DoubleStar

ASPOC AUX FGM HIA PEACE STAFF

- D1 D2 All Product Name
- DENSITY (ELECTRONS) -- On Demand only
 - ENERGY SPECTROGRAM (OMNI-DIRECTIONAL) - ELECTRONS -- On Demand only
 - ENERGY SPECTROGRAM (PARALLEL) - ELECTRONS -- On Demand only
 - ENERGY SPECTROGRAM (ANTI-PARALLEL) - ELECTRONS -- On Demand only
 - ENERGY SPECTROGRAM (PERPENDICULAR) - ELECTRONS -- On Demand only
 - PITCH-ANGLE DISTRIBUTION (5-200 EV) - ELECTRONS -- On Demand only
 - PITCH-ANGLE DISTRIBUTION (500-1500 EV) - ELECTRONS -- On Demand only
 - PITCH-ANGLE DISTRIBUTION (5-10 keV) - ELECTRONS --

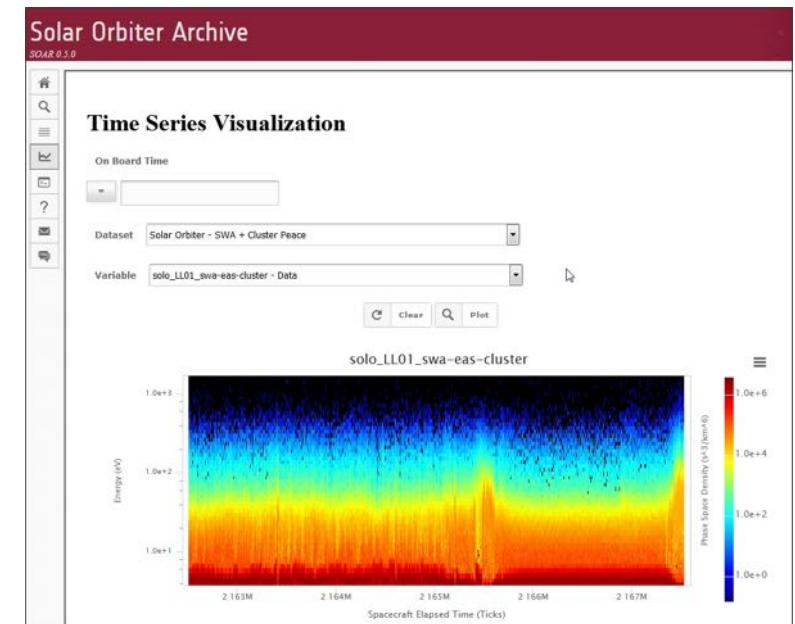
SELECTED PLOTS

- PEACE C3: ENERGY SPECTROGRAM (OMNI-DIRECTIONAL) - ELECTRONS
- PEACE D1: ENERGY SPECTROGRAM (OMNI-DIRECTIONAL) - ELECTRONS
- CIS C3: ENERGY SPECTROGRAM (OMNI-DIR) - IONS (HIGH SENSITIVITY)
- HIA D1: ENERGY SPECTROGRAM (OMNI-DIR)
- FGM CM: MAGNETIC FIELD - TOTAL FIELD
- FGM D1: MAGNETIC FIELD - TOTAL FIELD

Solar Orbiter ARchive (SOAR)



- SOAR is ready to ingest Solar Orbiter files and planning files (test with SOC: ok)
- Handles proprietary periods at file level
- On-going implementation on plotting with Highcharts Time Series data and spectrograms
- Ready for launch!



Solar Orbiter ARchive



Solar Orbiter Archive
SOAR 0.2.1

RESULTS #1 X

telemetry_items (19) low_latency (19833)

	Item ID	Version	Level
1	solo_LL01_swa-pas-mom_0722995200-0723081596 Q	V01	LL01
2	solo_LL01_swa-pas-mom_0723081600-0723167996 Q	V01	LL01
3	solo_LL01_swa-pas-mom_0723168000-0723254396 Q	V01	LL01
4	solo_LL01_swa-pas-mom_0723254400-0723340796 Q	V01	LL01
5	solo_LL01_swa-pas-mom_0723340800-0723427196 Q	V01	LL01
6	solo_LL01_swa-pas-mom_0723427200-0723513596 Q	V01	LL01
7	solo_LL01_swa-pas-mom_0723513600-0723599996 Q	V01	LL01
8	solo_LL01_swa-pas-mom_0723600000-0723686396 Q	V01	LL01
9	solo_LL01_swa-pas-mom_0723686400-0723772796 Q	V01	LL01
10	solo_LL01_swa-pas-mom_0723772800-0723859196 Q	V01	LL01
11	solo_LL01_swa-pas-mom_0723859200-0723945596 Q	V01	LL01
12	solo_LL01_swa-pas-mom_0723945600-0724031996 Q	V01	LL01
13	solo_LL01_swa-pas-mom_0724032000-0724118396 Q	V01	LL01
14	solo_LL01_swa-pas-mom_0724118400-0724204796 Q	V01	LL01
15	wa-pas-mom_0724204800-0724291196 Q	V01	LL01
16	wa-pas-mom_0724291200-0724377596 Q	V01	LL01
17	solo_LL01_swa-pas-mom_0724377600-0724463996 Q	V01	LL01
18	solo_LL01_swa-pas-mom_072446400-0724550396 Q	V01	LL01

199 of 199 Page size: 100 Displaying 19801-19833 of 19833

esa

SOLO_LL01_SWA-PAS-MOM_0723081600-0723167996 X

Science CDF Details Variable Details Repository Files

SWA_PAS_SCET (SCET)
SWA_PAS_DENSITY (Proton Density)
SWA_PAS_VELOCITY (Proton Velocity)
SWA_PAS_PRESSURE (Proton Pressure)
REP_PAS_VEL (Vector Representation for Velocity)
REP_PAS_PRES_1 (Vector Representation for Rows of Pressure Tensor)
REP_PAS_PRES_2 (Vector Representation for Columns of Pressure Tensor)
PAS_ROT_MATRIX (Rotation matrix to transform PAS_XYZ to SO_XYZ)

checking mandatory metadata at ingestion time

Figure 4: CDF variables displayed, and in the order they appear in CDF file

SOAR can already interact with external data analysis applications via IVOA SAMP protocol



Figure 5: If it is the first time, SOAR is registered in the SAMP hub in this session, user must to authorize the connection.

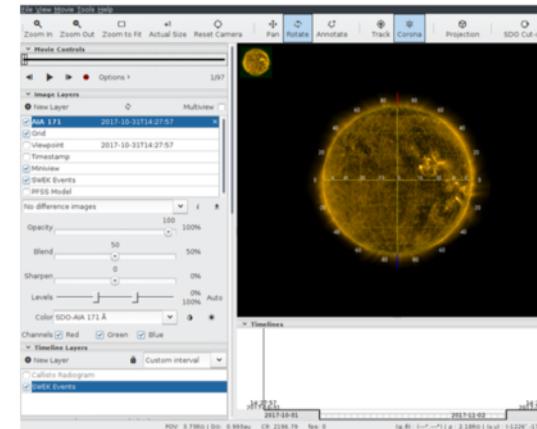


Figure 7: Example of FITS file (EUI) sent to JHelioviewer

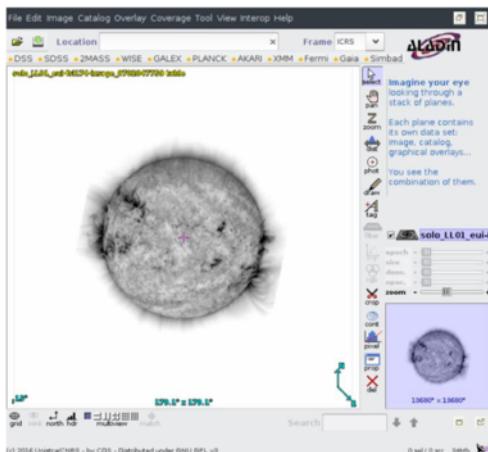


Figure 6: Example of FITS file (from EUI) sent to Aladin via SAMP

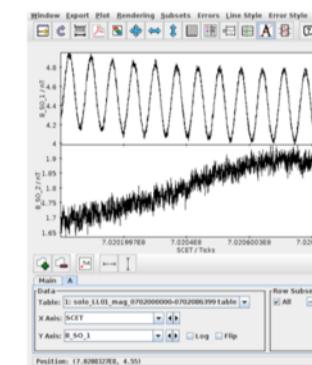


Figure 8: Example of CDF file (MAG) sent to Topcat

European Space Agency

Alignment of the GSFC/ESA SOHO archives



SOHO GUI at NASA definitely shut down end 2018 for security reasons (backend is up of course, i.e. data are Goddard are available through IDL, Python, VSO etc...)

The ESDC/GSFC alignment upgrade aims at

- Making sure all SOHO files stored at GSFC are at ESAC/SSA*
- Double check both archives are in sync
- Improving the metadata display and content to ease the life of scientists
- Re-ingest all data with the improved metadata

*Apart from MDI

IMPORT

- Making sure all SOHO files stored at GSFC are at ESAC/SSA: **9/12**
- Double check both archives are in sync with GSFC: **all in sync**

INGEST (opens each file, read CDF/FITS keywords, rejects if not compliant)

- Re-ingest all data with the improved metadata
 - 2/12 fully done (SUMER, CELIAS)
 - 1 on-going, 1.7 million files (LASCO)
 - 4 now providing mission long files (VIRGO, GOLF, COSTEP, CELIAS)
- This month the import/ingestion module speed increased by a factor 11 (multi-threads)

Integration of mission long files

Ingestion module updated to take into account these new type of files

- CELIAS [Proton Monitor 30sec data](#) [215M]
- CELIAS [Proton Monitor 5min data](#) [32M]
- CELIAS [Proton Monitor Carrington Rotation data](#) [8.4M]
- CELIAS [SEM 15sec Averaged data](#) [511M]
- CELIAS [SEM Daily Averaged data](#) [436K]
- COSTEP [EPHIN L3 I3i 10min \(By Year\)](#) [41M]
- COSTEP [EPHIN L3 I3i 1440min \(By Year\)](#) [4.5M]
- COSTEP [EPHIN L3 I3i 1min \(By Year\)](#) [185M]
- COSTEP [EPHIN L3 I3i 30min \(By Year\)](#) [21M]
- COSTEP [EPHIN L3 I3i 5min \(By Year\)](#) [62M]
- COSTEP [EPHIN L3 I3i 60min \(By Year\)](#) [25M]
- GOLF [22-year MEAN](#) [132M]
- GOLF [22-year PM1](#) [132M]
- GOLF [22-year PM2](#) [132M]
- VIRGO [SPM Blue](#) [93M]
- VIRGO [SPM Green](#) [93M]
- VIRGO [SPM Red](#) [93M]
- VIRGO [TSI Daily](#) [129K]
- VIRGO [TSI Hourly](#) [3.0M]

SOHO archive upgrade



SOHO Science Archive v2.10

File View Windows Actions Tools Help

Search Observations CELIAS #1

Results Display

Results Observations Studies Campaigns Sort Criteria Begin Date Ascending

Main Query Panel

Date Range

Begin End
dd/MM/yyyy HH:mm:ss dd/MM/yyyy HH:mm:ss

Instrument

Objective Campaign Name Obs Type
Object Study Name Wavelength
Calibrated

⚠ Proba2 products are now available from the Proba2 Science Archive

Instruments Panel

CDS CELIAS COSTEP EIT ERNE GOES LASCO MDI SUMER SWAN UVCS VIRGO

Detector Proc Level File Name

Log Console Not Logged In esa

A red circle highlights the 'Proc Level' dropdown menu.

SOHO Science Archive v2.10

File View Windows Actions Tools Help

Search Observations CELIAS #1 * - X

Observations

[5 Results] Page 1 of 1 Page Size: 20

Instrument	Detector	Observation Type	Begin Date
CELIAS	Proton Monitor	Solar wind parameters CR	00:00:00 01/12/1995
CELIAS	Proton Monitor	Solar wind parameters 30s	00:00:00 01/12/1995
CELIAS	Proton Monitor	Solar wind parameters 5mn	00:00:00 01/12/1995
CELIAS	Solar EUV Monitor	Solar EUV flux (daily avg)	00:00:00 01/12/1995
CELIAS	Solar EUV Monitor	Solar EUV flux (15s avg)	00:00:00 01/12/1995

[5 Results] Page 1 of 1 Page Size: 20

Mission long files!
+
Enhanced metadata
Proton Monitor instead of PM
Solar wind parameters instead of Proton etc...

Log Console Not Logged In esa

SOHO graphical user interface (GUI) at ESAC update (2019)



SOHO Science Archive v2.10

File View Windows Actions Tools Help

Search Observations CELIAS #1

Results Display

Results Observations Studies Campaigns Sort Criteria Begin Date Ascending

Main Query Panel

Date Range Begin dd/MM/yyyy HH:mm:ss End dd/MM/yyyy HH:mm:ss Instrument EIT ERNE GOLF LASCO MDI SUMER

Objective Objective Campaign Name Obs Type Study Name Wavelength

Object All Study Name All Wavelength All

Calibrated All

⚠ Proba2 products are now available from the [Proba2 Science Archive](#)

Instruments Panel

CDS | CELIAS | COSTEP | EIT | ERNE | GOLF | LASCO | MDI | SUMER | SWAN | UVCS | VIRGO

Detector All Proc Level All File Name ???

Obs Mode All Obs Name 1.5 1.8

Query Cancel Clear

Log Console Not Logged In esa

Results Display

Results Observations Studies Campaigns Sort Criteria Begin Date Ascending

Main Query Panel

Date Range Begin dd/MM/yyyy HH:mm:ss End dd/MM/yyyy HH:mm:ss Instrument LASCO MDI SUMER SWAN UVCS VIRGO

Objective Objective Campaign Name Obs Type Study Name Wavelength

Object All Study Name All Wavelength All

Calibrated All

⚠ Proba2 products are now available from the [Proba2 Science Archive](#)

Instruments Panel

CDS | CELIAS | COSTEP | EIT | ERNE | GOLF | LASCO | MDI | SUMER | SWAN | UVCS | VIRGO

Detector All Proc Level All File Name ???

Obs Mode All Obs Name All CalibratedL1 RawDataL0

Slit Id All

Query Cancel Clear

Log Console Not Logged In esa

Processing Level
Mission Long
Calibrated
Raw

SOHO Science Archive v2.10

File View Windows Actions Tools Help

Search

Results Display

Results Observations Studies Campaigns Sort Criteria Begin Date Ascending

Main Query Panel

Date Range Begin dd/MM/yyyy HH:mm:ss End dd/MM/yyyy HH:mm:ss Instrument LASCO MDI SUMER SWAN UVCS VIRGO

Objective Objective Campaign Name Obs Type Study Name Wavelength

Object All Study Name All Wavelength All

Calibrated All

⚠ Proba2 products are now available from the [Proba2 Science Archive](#)

Instruments Panel

CDS | CELIAS | COSTEP | EIT | ERNE | GOLF | LASCO | MDI | SUMER | SWAN | UVCS | VIRGO

Detector All Proc Level All File Name ???

Obs Mode All Obs Name All CalibratedL1 RawDataL0

Slit Id All

Query Cancel Clear

Log Console Not Logged In esa

Results Display

Results Observations Studies Campaigns Sort Criteria Begin Date Ascending

Main Query Panel

Date Range Begin dd/MM/yyyy HH:mm:ss End dd/MM/yyyy HH:mm:ss Instrument LASCO MDI SUMER SWAN UVCS VIRGO

Objective Objective Campaign Name Obs Type Study Name Wavelength

Object All Study Name All Wavelength All

Calibrated All

⚠ Proba2 products are now available from the [Proba2 Science Archive](#)

Instruments Panel

CDS | CELIAS | COSTEP | EIT | ERNE | GOLF | LASCO | MDI | SUMER | SWAN | UVCS | VIRGO

Detector All Proc Level All File Name ???

Obs Mode All Obs Name All CalibratedL1 RawDataL0

Slit Id All

Query Cancel Clear

Log Console Not Logged In esa

Working with B. Fleck and PI teams



The screenshot shows the SOHO Science Archive v2.10 software interface. The main window title is "SOHO Science Archive v2.10". The menu bar includes File, View, Windows, Actions, Tools, and Help. The toolbar contains various icons for search, file operations, and data visualization. The search bar at the top right says "Search Observations CELIAS #". The main panel is titled "Main Query Panel". It includes sections for "Results Display" (radio buttons for Observations, Studies, Campaigns, Sort Criteria: Begin Date, Ascending), "Main Query Panel" (Date Range, Instrument dropdown with options EIT, ERNE, GOLF, LASCO, MDI, SUMER), and "Instruments Panel" (Detector, Proc Level, File Name, Obs Name, Obs Mode dropdown with All, A, B, Slit Id dropdown with Rear Slit Camera, None). At the bottom are "Query", "Cancel", and "Clear" buttons. The status bar at the bottom left says "Log Console" and "Not Logged In". The status bar at the bottom right says "esa".

New science objects delivered clarified with PI team: FF, OS, NN

Instead of RSC, less acronyms



Goddard-SSA synchronisation

Created by Monica Fernandez, last modified on 08 Oct, 2019

On 2019 it has been decided to perform the whole re-ingestion of all SSA products to get a complete synchronisation between Goddard and SSA.

The table below contains the status of this alignment.

Instrument	Total number of files	Re-ingestion status	Software update	Download progress	Ingestion done																																								
16 mission long files (Celias, Costep, Golf, Virgo)	16	Done	4.5 days	N/A	03 Jun 2019																																								
SUMER	13.716	Done	2	2 hours	04 Jun 2019																																								
3 Virgo mission long files (SPM BLUE/GREEN/RED) + Celias re-ingestion	8				31 Jul 2019																																								
LASCO	1.773.296	Ingesting in SSA	3 (Coronal Images) + 2.5	<table border="1"> <thead> <tr> <th>Imported Date</th><th>Files</th><th>Status</th><th>Ingested</th></tr> </thead> <tbody> <tr> <td>2010-01-01 --> 2011-01-01</td><td>956114 (missing 48)</td><td>Done (except 48 files)</td><td>Ingesting...</td></tr> <tr> <td>2011-01-01 → 2013-0101</td><td>736</td><td>Done.</td><td>Done.</td></tr> <tr> <td>2013-01-01 → 2014-01-01</td><td>109582</td><td>Done.</td><td>Done.</td></tr> <tr> <td>2014-01-01 → 2015-01-01</td><td>32763</td><td>Done.</td><td>Done.</td></tr> <tr> <td>2015-01-01 → 2016-01-01</td><td>188895</td><td>Done.</td><td>Done.</td></tr> <tr> <td>2016->2017</td><td>98240</td><td>Done</td><td>Done.</td></tr> <tr> <td>2017->2019</td><td>93.074</td><td>Done.</td><td>Done.</td></tr> <tr> <td>2019_01_01->2019_05_01</td><td>192.298</td><td>Done.</td><td>Done.</td></tr> <tr> <td>2019_05_01 → 2019_07_01</td><td>101594</td><td>Done.</td><td>Done.</td></tr> </tbody> </table>	Imported Date	Files	Status	Ingested	2010-01-01 --> 2011-01-01	956114 (missing 48)	Done (except 48 files)	Ingesting...	2011-01-01 → 2013-0101	736	Done.	Done.	2013-01-01 → 2014-01-01	109582	Done.	Done.	2014-01-01 → 2015-01-01	32763	Done.	Done.	2015-01-01 → 2016-01-01	188895	Done.	Done.	2016->2017	98240	Done	Done.	2017->2019	93.074	Done.	Done.	2019_01_01->2019_05_01	192.298	Done.	Done.	2019_05_01 → 2019_07_01	101594	Done.	Done.	
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CELIAS	114.950			<table border="1"> <thead> <tr> <th>Imported date</th><th>Files</th><th>Download progress</th><th>ingested</th></tr> </thead> <tbody> <tr> <td>2010->2014</td><td>41.914</td><td>Done.</td><td>Done.</td></tr> </tbody> </table>	Imported date	Files	Download progress	ingested	2010->2014	41.914	Done.	Done.	14 Aug 2019																																
Imported date	Files	Download progress	ingested																																										
2010->2014	41.914	Done.	Done.																																										

New version
expected by the
end of 2019



CDS	552.143			
CELIAS	114.950			
		Imported date	Files	Download progress
		2010->2014	41.914	Done.
		2014->2017	47.713	Done.
		2017->2019_07_10	25.323	Done.
				14 Aug 2019
COSTEP	44.765			
		Imported date	Files	Download progress
		18 Jul 2019	44.765	Done. Missing 7 files.
EIT	534.093			
		Id range	Files	Download progress
		1 → 450.000	80.046	Done.
		450000->550000	100.001	Done (missing one).
		550000->650000	100.001	Done.
		650000->800000	149.917	Done.
		800.000->6.370.775	104.132	Done.
ERNE	36.743			
		Imported date	Files	Download progress
		All mission until 16 Jul 2019	37.049	Done.
GOLF	7.870			
		Imported date	Files	Download progress
		All mission until 15 Jul 2019	7.870	Done (missing 163)
MDI	96.401			
SWAN	12.184			
		Imported date	Files	Download progress
		18 Jul 2019	12.183	Done.
UVCS	156.609			
VIRGO	35.033			
		Imported date	Files	Download progress
		All mission until 16 Jul 2019	35.033	Done.

TBD



To be
redelivered





All from Provider All from

BBSO

(unavailable)

KANZ

OACT

OBSPM

YNAO

MLSO

HAO

JSOC

KIS
(unavailable)

KSO

LASP

LMSAL

LSSP

MSFC

MSU

Source

Instrument

Date Range

Start: 2019 Sep 19 / 01 : 00
End: 2019 Sep 19 / 04 : 59
 All Month All Day

Search Clear

<input type="checkbox"/> BBSO	2000.07.05 →
<input type="checkbox"/> KANZ	2001.02.07 →
<input type="checkbox"/> OACT	2002.02.26 →
<input type="checkbox"/> OBSPM	2004.10.22 →
<input type="checkbox"/> YNAO	2000.11.27 →
<input type="checkbox"/> MLSO	2013.09.30 →
<input type="checkbox"/> SMM	1996.04.20 – 2013.08.02
<input type="checkbox"/> SDO	1994.02.20 – 2010.02.23
<input type="checkbox"/> ChroTel	1998.10.01 – 2013.07.20
<input type="checkbox"/> SMM	1980.03.02 – 1989.11.18
<input type="checkbox"/> SDO	2010.05.12 →
<input type="checkbox"/> ChroTel	2010.03.29 →
<input type="checkbox"/> ChroTel	2012.04.01 →
<input type="checkbox"/> KSO	2008.06.07 →
<input type="checkbox"/> SDO	2010.04.30 →
<input type="checkbox"/> IRIS	2013.07.16 →
<input type="checkbox"/> TRACE	1996.01.19 – 2010.06.22
<input type="checkbox"/> RHESSI	2002.02.12 →
<input type="checkbox"/> CLASP2	2019.04.11 – 2019.04.11
<input type="checkbox"/> Hi-C	2019.04.11 – 2019.04.11
<input type="checkbox"/> Hi-C21	2019.04.11 – 2019.04.11
<input type="checkbox"/> YOHKOH	2012.07.11 – 2012.07.11
<input type="checkbox"/> Hi-C	2018.05.29 – 2018.05.29
<input type="checkbox"/> BCS	1991.09.01 – 2001.12.14
<input type="checkbox"/> HXT	1991.09.03 – 2001.12.14

Let's work
together to
bring ESDC
solar archives
within the
VSO!

Proba-2: new stand-alone archive released early 2019



Video Gallery containing SWAP up-to-date daily and Carrington rotation movies

The screenshot shows the Proba-2 Science Archive interface. At the top, there's a navigation bar with the European Space Agency logo and "SCIENCE & TECHNOLOGY". Below it, a banner says "Proba-2 Science Archive" and "P2SA 0.5-beta". On the right, the esa logo is visible.

The main area features two video galleries. The left one is for "SWAP" and shows a grayscale image of the Sun with a play button in the center. Below it is a smaller image of the Sun with a yellow/orange glow. To the left of these images is a sidebar with "Select Data Type" set to "All" and a "Select Date" calendar for January 2019, where the 23rd is highlighted. A date input field shows "2019-01-23".

The right video gallery is for "Carrington rotation" and shows a black-and-white image of the Sun with a play button. Below it is another black-and-white image of the Sun. To the right of these images is a sidebar with "Download ALL" and "Only DATA" buttons.

At the bottom right of the interface, the text "European Space Agency" is displayed.

P2SA Jupyter Notebook



jupyter pyP2SAExample Last Checkpoint: 09/10/2019 (autosaved)

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

2.3.2 Display Carrington movie

The get_p2sa_movie function allows to display SWAP daily movie files as well as SWAP Carrington movie files. This method needs a file_oid as input parameter to download and display the movie.

Here is an example:

```
In [2]: from esa_p2sa.p2sa_core import ESAP2SA
from IPython.display import Video
link = ESAP2SA.display_p2sa_movie_file("13785")

# Display the result Carrington movie.
Video(link)

Download url: http://p2sa.esac.esa.int/p2sa-sl-tap/video?file_oid=13785&data_retrieval_origin=UI
```

Out[2]:

A yellow Carrington movie visualization of the Sun's surface, showing solar flares and prominences against a dark background. The visualization is displayed in a video player window within the Jupyter Notebook interface.

Ulysses archives alignment



Main work achieved in 2019

- Critical upgrade of hardware
- Critical upgrade of software
- Update of Ulysses FTP server with 2018 3D data generated at UCLA
- Some 3D data at ESA were not yet on Goddard a few months ago
- All experiments have been reviewed by an external group of European experts: a number of upgrades needed have been found

To be implemented ASAP most likely next year

Heliophysics Archives user group



Topics	Names
Helioseismology	Markus Roth (KIS, Germany)
Solar Atmosphere	Louise Harra (ETH, Switzerland)
Solar and interplanetary transients	A. Veronig (Graz, Austria)
Heliophysics particles	Nina Dresing (Univ. of Kiel, Germany)
Heliophysics fields	Christopher Chen (Imperial College, UK)
Heliophysics Archive expert	Vincent Genot (IRAP, Toulouse)
PS Representative	Matt Taylor

Scope of this working group

- Review individual archives to identify shortcomings or missing functionality
 - to improve the content and usage of individual archives
- **Overarching heliophysics multi-missions archive**
Advise on the main functionalities (based on science cases)
- Link to PSA or even astro archives
Advise on the main functionalities (based on science cases)

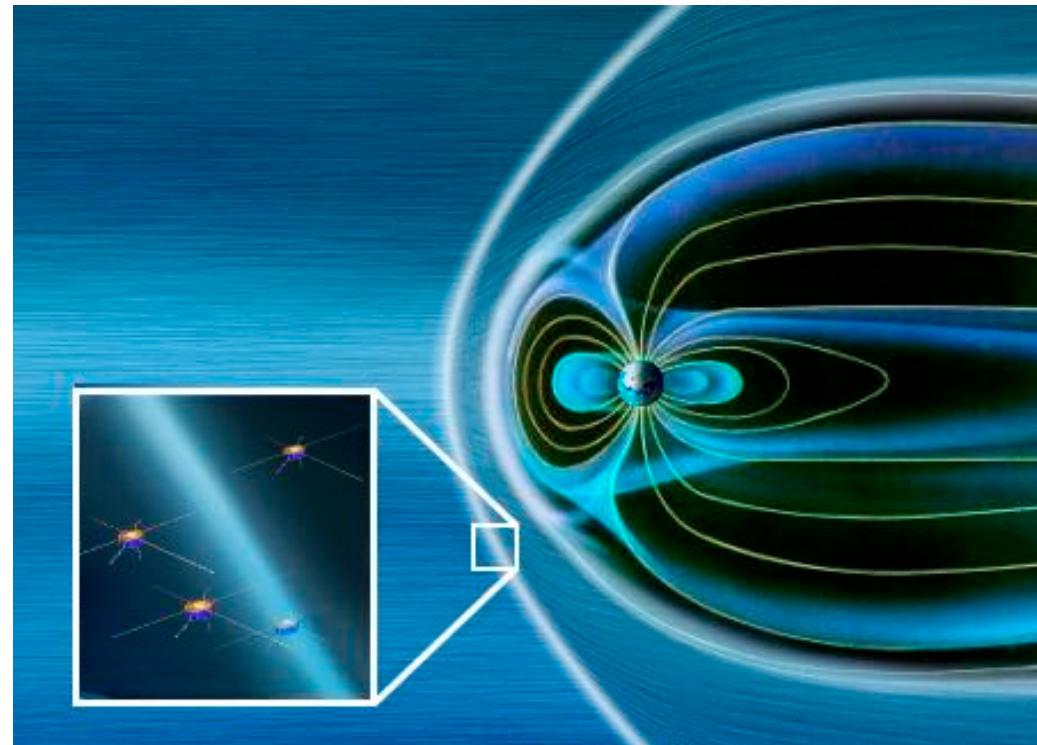
Conclusion



1. Cluster Science Archive new features through science cases
2. Solar Orbiter Archive preview
3. SOHO archive at ESDC alignment with SOHO archive at Goddard
4. Proba-2 Jupyter Notebook
5. Ulysses archive ESDC/GSFC archives alignment and User group

1. Cluster science archive

Science case on shock physics



83 quicklook plots (orbit long, 6h, PI plots)



EUROPEAN SPACE AGENCY ▾ SCIENCE & TECHNOLOGY ▾

AMASSON

Cluster Science Archive

CSA 2.4.1

DATA SEARCH

Transversal type: Plot Time
Plots: 1
Size: 1.0

2005-01-09T18:00:00Z

<< Find Plot >>

Cluster DoubleStar

AUX & ECLAT CIS Cross Calibration DWP EDI EFW RAPID STAFF WBD WHISPER

C1	C2	C3	C4	All	Interval	Product Name
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>		6 hour	6-hr CAA Summary Plot (Overview)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		6 hour	6-hr CAA Summary Plot (Fields)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		6 hour	6-hr CAA Summary Plot (Particles1)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		6 hour	6-hr CAA Summary Plot (Particles2)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		1 orbit	Orbit CAA Summary Plot (Overview)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		1 orbit	Orbit CAA Summary Plot (Fields)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		1 orbit	Orbit CAA Summary Plot (Particles1)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		1 orbit	Orbit CAA Summary Plot (Particles2)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		1 orbit	Orbit Summary Plot (Overview)
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		1 orbit	Orbit Summary Plot (Fields)

QUICKLOOK DATASET DETAILS

2005-01-09T18:00:00Z / 2005-01-09T00:00:00Z

CD FGM
CD EPW
CD CIS MOMENTS
CD HIA
CD PEIA
CD STASIA
CD WHI

Space Agency

The screenshot shows the Cluster Science Archive (CSA) interface. On the left, there's a 'DATA SEARCH' panel with date selection and plot parameters. Below it is a table of available products for the Cluster mission. On the right, a large window titled 'QUICKLOOK DATASET DETAILS' shows multiple panels of scientific data. One panel displays time-series plots for magnetic field components (Bx, By, Bz) and particle fluxes (VTE, VTF). Another panel is a spectrogram showing power density in dB. A red box highlights a specific region in the spectrogram panel, likely indicating a period of interest or a specific event.

Pre-generated plots (1h, 6h, 1day)



Cluster Science Archive

CSA 2.4.1

KEY GRAPHICAL PRODUCTS

Time granularity 1 day 6 hours 1 hour On demand

Time (begin/end) - Duration Days Hours Minutes

<< >>

Cluster **DoubleStar**

ASPOC **AUX** **CIS** **DWP** **EDI** **EFW** **FGM** **PEACE** **RAPID** **STAFF** **WBD** **WHISPER**

C1	C2	C3	C4	All	Product Name
<input type="radio"/>	MAGNETIC FIELD - X COMPONENT IN GSE				
<input type="radio"/>	MAGNETIC FIELD - Y COMPONENT IN GSE				
<input type="radio"/>	MAGNETIC FIELD - Z COMPONENT IN GSE				
<input checked="" type="radio"/>	MAGNETIC FIELD - TOTAL FIELD				
<input type="radio"/>	MAGNETIC FIELD - AZIMUTHAL COMPONENT IN GSE				
<input type="radio"/>	MAGNETIC FIELD - POLAR COMPONENT IN GSE				
CAVEATS -- On Demand only					

PLOTS

PS PNG

09 January 2005

CSA(CG_PREGEN_1HOUR_amasson_20191015_183147_20050109220000.png)

09 January 2005
CSA(CG_PREGEN_1HOUR_amasson_20191015_183147_20050109220000.png)
C1 FGM generated: 4 Dec 2015
C2 FGM generated: 18 Nov 2015
C3 FGM generated: 9 Oct 2015
C4 FGM generated: 17 Oct 2015
C1 HAM HS generated: 31 Dec 2015
C2 PEA generated: 3 Feb 2017

On-demand plotting



Cluster Science Archive

CSA 2.4.1

KEY GRAPHICAL PRODUCTS

Time granularity 1 day 6 hours 1 hour On demand

Time (begin/end) 2005-01-09T22:13:00Z - 2005-01-09T22:17:00Z Duration 0 0 4 Days Hours Minutes

<>

Cluster DoubleStar

ASPOC AUX CIS DWP EDI EFW FGM PEACE RAPID STAFF WBD WHISPER

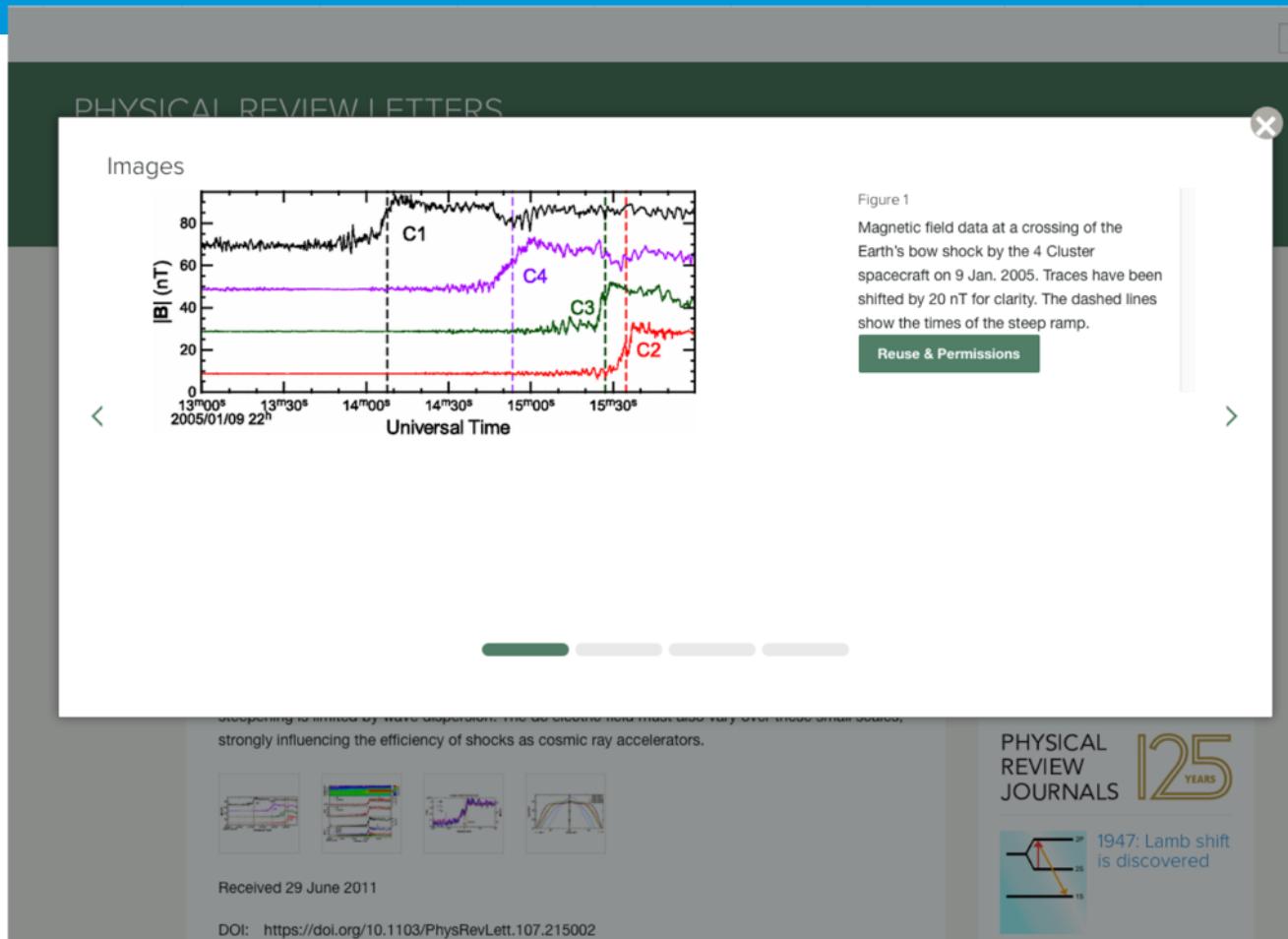
C1	C2	C3	C4	All	Product Name
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	MAGNETIC FIELD - X COMPONENT IN GSE
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	MAGNETIC FIELD - Y COMPONENT IN GSE
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	MAGNETIC FIELD - Z COMPONENT IN GSE
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	MAGNETIC FIELD - TOTAL FIELD
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	MAGNETIC FIELD - AZIMUTHAL COMPONENT IN GSE
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	MAGNETIC FIELD - POLAR COMPONENT IN GSE
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	CAVEATS -- On Demand only
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	DATA GAPS -- On Demand only
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VALIDATION GAPS -- On Demand only

PLOTS

CL_CG_ONNDMD_20050109221300_20050109221700_V20191016003015_00.gif

2005-01-09T22:13:00Z / 2005-01-09T22:17:00Z

1. Cluster science archive *Science case on shock physics*



1. Cluster science archive *Science case on shock physics*



PHYSICAL REVIEW LETTERS

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Access by European Space Agency/ESTEC Go Mobile »

Electron Temperature Gradient Scale at Collisionless Shocks

Steven J. Schwartz, Edmund Henley, Jeremy Mitchell, and Vladimir Krasnoselskikh
Phys. Rev. Lett. 107, 215002 – Published 14 November 2011

Article References Citing Articles (32) PDF HTML Export Citation

ABSTRACT

Shock waves are ubiquitous in space and astrophysics. They transform directed flow energy into thermal energy and accelerate energetic particles. The energy repartition is a multiscale process related to the spatial and temporal structure of the electromagnetic fields within the shock layer. While large scale features of ion heating are known, the electron heating and smaller scale fields remain poorly understood. We determine for the first time the scale of the electron temperature gradient via electron distributions measured *in situ* by the Cluster spacecraft. Half of the electron heating coincides with a narrow layer several electron inertial lengths (c/ω_{pe}) thick. Consequently, the nonlinear steepening is limited by wave dispersion. The dc electric field must also vary over these small scales, strongly influencing the efficiency of shocks as cosmic ray accelerators.

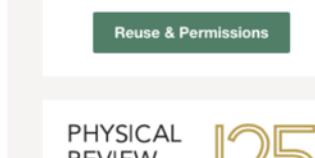
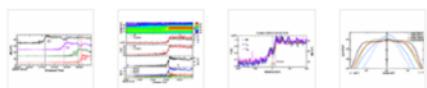
Received 29 June 2011

Issue Vol. 107, Iss. 21 — 18 November 2011

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PHYSICAL REVIEW JOURNALS 125 YEARS

1947: Lamb shift is discovered



European Space Agency

Distribution functions



Cluster Science Archive

CSA 2.4.1

DATA SEARCH

Time (begin/end) 2009-12-30T16:00:00Z - 2009-12-30T16:01:00Z Duration 0 Hours 1 Minutes

DISTRIBUTION PANELS

CIS PEACE RAPID

C1 C2 C3 C4 Product Name

- ANGLE-ANGLE DISTRIBUTION (HEEA)
- ANGLE-ANGLE DISTRIBUTION (LEEA)
- PITCH_ANGLE/ENERGY PLOT
- SAUVAUD PLOT
- WHEEL PLOT
- WHEEL PLOT (FULL)

PLOTS

C3_CG_PEA_PITCH_SPIN_DEFlux_CAA_WHEEL_20091230160000_20091230160100_20191009073756_00.png

C3 PEACE (PITCH_SPIN_DEFlux)

2009-12-30T16:00:03.646Z

Energy (eV) Diff. Flux pitch-angle (degrees) 7 22 37 52 67 82 97 112 127 143 159 172

2009-12-30T16:00:07.817Z

Energy (eV) Diff. Flux pitch-angle (degrees) 7 22 37 52 67 82 97 112 127 143 159 172

Legend: keV/(cm² s str keV)