

# DOI at ESAC science data centre & SPASE

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4<sup>th</sup> Plenary IHDEA meeting  
20 October 2020

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European Space Agency



## What do we want?

- Direct link from data in papers to our archives
- Improved findability of our datasets
- Better tracking of their usage
- Improved reproducibility of published results



## Introduction: DOI?

1. Why assigning DOIs to experiments on ESA heliophysics s/c?
2. How to get a DOI indexed by Google dataset search?
3. Direct link to the data and findability on Google dataset search
4. Who cares about heliophysics?
5. Next steps and open questions



Name	COSTEP, Comprehensive Suprathermal and Energetic Particle Analyzer
Mission	SOHO
URL	<a href="https://www.cosmos.esa.int/web/soho/mission-long-files">https://www.cosmos.esa.int/web/soho/mission-long-files</a>
DOI	<a href="https://doi.org/10.5270/esa-yrl3swm">10.5270/esa-yrl3swm</a>
Abstract	The COSTEP experiment on SOHO forms part of the CEPAC complex of instruments that perform studies of the suprathermal and energetic particle populations of solar, interplanetary, and galactic origin. Specifically, the LION and EPHIN instruments are designed to use particle emissions from the Sun for several species (electrons, protons, and helium nuclei) in the energy range 44 keV/particle to > 53 MeV/n as tools to study critical problems in solar physics as well as fundamental problems in space plasma and astrophysics. EPHIN is able to obtain energy spectra and achieve isotope separation for light nuclei.
Description	COSTEP key scientific data products are mission long files of calibrated proton and helium fluxes at either 1 minute, 5 minutes, 30 minutes, 1 hour or 1 day cadence, estimated by the EPHIN detector. The protons and Helium energy bands cover an energy range from 4.3 to 53 MeV/n. Daily files from EPHIN and LION are also available. While EPHIN is functioning nominally, LION is impaired since shortly after launch, with increased noise.
Publication	Müller-Mellin, R., et al., COSTEP - Comprehensive Suprathermal and Energetic Particle Analyser, <i>Sol. Phys.</i> , 162, 483–504 (1995); <a href="https://doi.org/10.1007/BF00733437">https://doi.org/10.1007/BF00733437</a>
Temporal Coverage	1996 - current
Mission Description	SOHO, the Solar & Heliospheric Observatory, is a project of international collaboration between ESA and NASA to study the Sun from its deep core to the outer corona and the solar wind. SOHO was launched on December 2, 1995. The SOHO spacecraft was built in Europe by an industry team led by prime contractor Matra Marconi Space (now Airbus) under overall management by ESA. The twelve instruments on board SOHO were provided by European and American scientists. Nine of the international instrument consortia are led by European Principal Investigators (PI's), three by PI's from the US. Large engineering teams and more than 200 co-investigators from many institutions supported the PI's in the development of the instruments and in the preparation of their operations and data analysis. NASA was responsible for the launch and is now responsible for mission operations. Large radio dishes around the world which form NASA's Deep Space Network are used for data downlink and commanding. Mission control is based at Goddard Space Flight Center in Maryland.  Domingo, V., Fleck, B. & Poland, A.I., The SOHO mission: An overview, <i>Sol. Phys.</i> , 162, 1–37, 1995; <a href="https://doi.org/10.1007/BF00733425">https://doi.org/10.1007/BF00733425</a>
Creator Contact	Heber, B., Principal Investigator, University of Kiel, Germany, <a href="mailto:heber@physik.uni-kiel.de">heber@physik.uni-kiel.de</a> The SOHO/COSTEP/EPHIN project is supported under various grants by the German Federal Ministry of Economics and Technology.
Publisher	



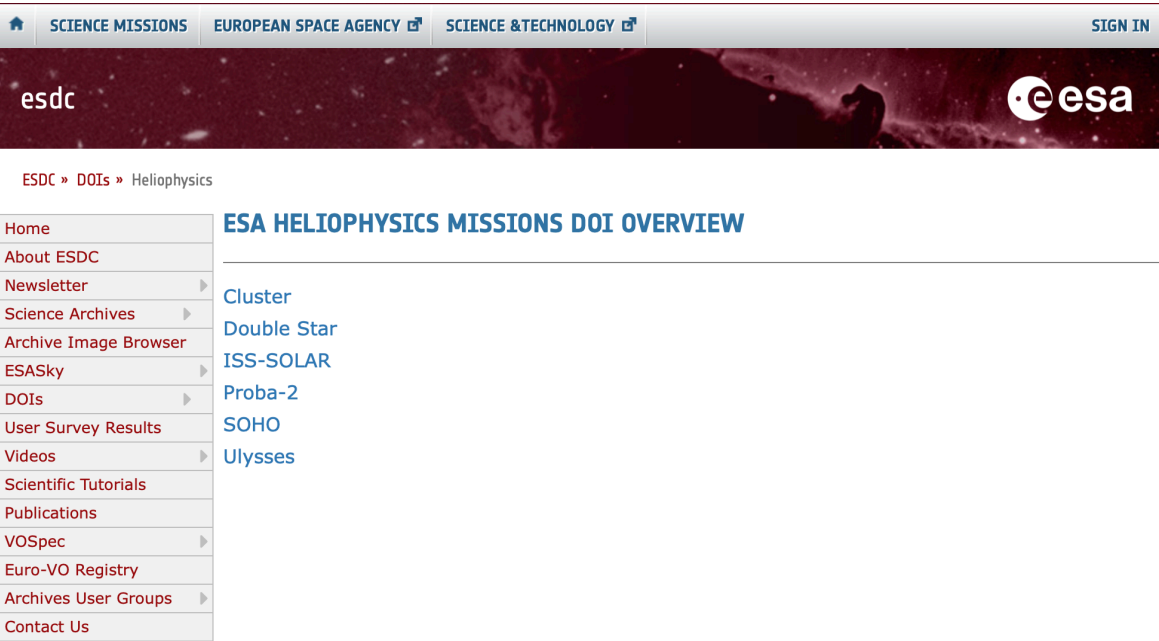
# 1. Why assigning DOIs to ESA Heliophysics missions experiments?



- Link publications to the data
- Improve traceability of data usage
- Acknowledging the work of PI teams
- Make all heliophysics experiments findable on Google Dataset Search
- Possibly increase the data usage



[cosmos.esa.int/web/esdc/doi/heliophysics](https://cosmos.esa.int/web/esdc/doi/heliophysics)



These missions overall carry  
47 experiments => 47 DOI

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DOI at E

## A dataset provided by the European Space Agency



Name	MAG, MAGnetometer
Mission	Solar Orbiter
URL	<a href="http://soar.esac.esa.int/">http://soar.esac.esa.int/</a>
DOI	<a href="https://doi.org/10.5270/esa-">10.5270/esa-</a>
Abstract	The Solar Orbiter magnetometer is a conventional dual fluxgate design. Two sensors are accommodated on the spacecraft boom: MAG-IBS and MAG-OBS. A dual sensor configuration provides redundancy and, since they are at different distances from the spacecraft body (approx. 1 m for IBS and 3 m for OBS), also allows gradiometer magnetometer characterisation of spacecraft signals in flight. The instrument noise floor has been successfully tested at 10 pT Hz <sup>-1/2</sup> at 1 Hz.
Description	Calibrated magnetic field data in RTN coordinates and in the spacecraft reference frame. Field vector components are given in units of nanoteslas and in RTN coordinates, where R is the Sun-spacecraft axis, T is the cross product of the solar rotation axis and R, and N is the cross product of R and T. During cruise phase, MAG is operating at 1 vector/s cadence. After the cruise phase, MAG is expected to operate continuously at 16 vectors/s cadence (normal mode) except during 1 hour per day at 128 Hz or during 2 hours at 64 Hz (Burst mode). Alternatively, burst modes will be triggered in coordination with other in-situ instruments' burst modes.
Publication	Horbury, A., et al., The Solar Orbiter magnetometer, Astron. Astrophys., 2020; DOI: <a href="https://doi.org/10.1051/0004-6361/201937257">doi.org/10.1051/0004-6361/201937257</a>
Temporal Coverage	2020-05-01 - present
Mission Description	Solar Orbiter is a mission of international collaboration between ESA and NASA. It explores the Sun and the heliosphere from close up and out of the ecliptic plane. Launched on 10 February 2020, it aims to address the overarching science question: how does the Sun create and control the Heliosphere – and why does solar activity change with time? To answer it, the Solar Orbiter spacecraft is cruising to a unique orbit around the Sun, eventually reaching a minimum perihelion of 0.28 AU, and performing measurements out of the ecliptic plane: reaching 18° heliographic latitude during its nominal mission phase, and above 30° during its extended mission phase. It carries six remote sensing instruments to observe the Sun and the solar corona, and four in-situ instruments to measure the solar wind, its thermal and energetic particles, and electromagnetic fields  Müller, D., O.C. St. Cyr, I. Zouganelis, et al., Astron. Astrophys., 2020; DOI: <a href="https://doi.org/10.1051/0004-6361/202038467">doi.org/10.1051/0004-6361/202038467</a> Müller, D., Marsden, R.G., St. Cyr, O.C. et al., Solar Orbiter, Sol. Phys., 285, 25–70 (2013); <a href="https://doi.org/10.1007/s11207-012-0089-4">doi.org/10.1007/s11207-012-0089-4</a>
Creator Contact	Prof. T. Horbury, Principal Investigator, Imperial College, United Kingdom, <a href="mailto:t.horbury@imperial.ac.uk">t.horbury@imperial.ac.uk</a>
Publisher And Registrant	<a href="https://www.esa.int/">European Space Agency</a>



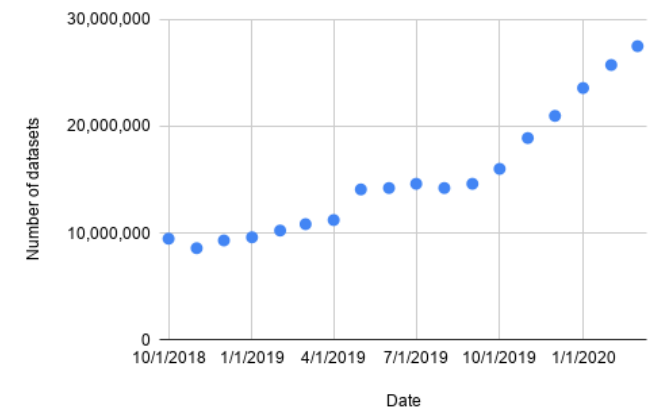
## 2. What is GDS? How to get indexed?



**Google Dataset Search (GDS) is a new search engine from Google**, launched in January 2020.  
<https://datasetsearch.research.google.com>

To get indexed, GDS requires to include a **JSON script** with at least **two compulsory properties**: name and description

```
<script type=application/ld+json>
{
  @context: http://schema.org/
  @type: Dataset
  name: GOLF
  description: Global Oscillations at Low Frequencies
}
</script>
```



**Google**  
Dataset Search





## 2. How to get indexed?



Adding more properties in the JSON script enables us to

- Point to the DOI landing page maintained by ESDC
- Make Google dataset search display a detailed description of the dataset
- Acknowledge the PI
- Acknowledge the data publisher (i.e. ESA)



## 2. How to get indexed?

Schema.org property used in Heliophysics DOI landing pages JSON script	Google Dataset Search compliance	Remark
@context	Compliant	
@type	Compliant	
name	Compliant	
alternate name	Compliant	This has been used to specify the mission, as sometimes the same type of experiment with the same name has been used on multiple missions like FGM, PEACE or ASPOC. It could also be used to specify the names of the different instruments of an experiment.
citation	Compliant	Key scientific paper listed, those agreed with PS/PI. At the moment, only one reference is linked (May 2020)
identifier	Compliant	this should be the DOI address
creator	Compliant	The creator or author of a dataset. To uniquely identify individuals, Google advises to use <a href="#">ORCID ID</a> as the value of the <code>sameAs</code> property of the <code>Person</code> type. To uniquely identify institutions and organizations, use <a href="#">ROR ID</a> . Implemented when available.
publisher	Compliant	Contains web address and new ESA logo
distribution	Compliant	Direct link to data download. Added when relevant, like for mission long files for SOHO.
temporalCoverage	Compliant	Correct format implemented
dateModified	Compliant	Added when dataset was updated recently, or last update is known
description	Compliant	Abstract content added before dataset description content, double quotes and HTML tags for hyperlinks removed. Link to the ESDC archive added.
keywords	Compliant	Keywords agreed with PS/PI
audience	Compliant	Manually edited per mission to fit scientific communities

**Table 1.** Schema.org properties used in the Heliophysics DOI landing pages





Please search 'SOHO GOLF' @ <https://datasetsearch.research.google.com>

The screenshot shows a Google search for "SOHO GOLF". The top navigation bar includes filters like "Last updated", "Download format", "Usage rights", "Topic", and "Free". Three data sets are listed:

- GOLF, Global Oscillations at Low Frequencies** by ESA. It includes a link to archives.esac.esa.int, a PDF icon labeled "fits", and an update date of Aug 30, 2019.
- SOHO/Global Oscillations at Low Frequencies (GOLF) Data Archive** by NASA. It includes a link to cmr.earthdata.nasa.gov and an update date of Jul 25, 2018.
- Global Oscillation at Low Frequencies (GOLF)** by hpde.io. It includes an update date of May 5, 2019.

Below these, there are two more results partially visible:

- VIRGO, Variability of solar IRradiance and Gravity...** by ESA, updated Jan 10, 2020.
- Solar acoustic modes in period 1996–2014** by DataCite, updated 2015.

On the right side, red arrows point from various labels to specific parts of the first result (ESA's GOLF dataset):

- "Experiment name" points to the title "GOLF, Global Oscillations at Low Frequencies".
- "Mission" points to "Experiment onboard the ESA/NASA SOHO mission".
- "Link to key reference article" points to the "Related Article" link.
- "Link to DOI at ESA (see next slide)" points to the blue button "Explore at archives.esac.esa.int".
- "Relation to Google Scholar" points to the text "64 scholarly articles cite this data set (View in Google Scholar)".
- "Data format" points to the PDF icon labeled "fits".
- "DOI (URL)" points to the URL "https://doi.org/10.5270/esa-ls55aku".
- "Last updated" points to "Data set updated Aug 30, 2019".
- "Data publisher" points to "Data set provided by European Space Agency".
- "PI+affiliation" points to "Authors Dr. Patrick Boumier, Institut d'Astrophysique Spatiale, France".
- "Time coverage" points to "Time period covered Jan 1, 1996 - Present".



### 3. Direct link to the data



A dataset provided by the European Space Agency



Name	GOLF, Global Oscillations at Low Frequencies
Mission	SOHO
URL	<a href="https://www.cosmos.esa.int/web/soho/mission-long-files">https://www.cosmos.esa.int/web/soho/mission-long-files</a>
DOI	<a href="https://doi.org/10.5270/esa-ls55aku">10.5270/esa-ls55aku</a>
Abstract	<p>The GOLF experiment on the SOHO mission aims to study the internal structure of the Sun by measuring the spectrum of global oscillations in the frequency range <math>10^{-7}</math> to <math>10^{-2}</math> Hz. Both p and g mode oscillations are investigated, with the emphasis on the low order long period waves which penetrate the solar core. The instrument employs an extension to space of the proven ground-based technique for measuring the mean line-of-sight velocity of the viewed solar surface. By avoiding the atmospheric disturbances experienced from the ground, and choosing a non-eclipsing orbit, GOLF improves the instrumental sensitivity limit by an order of magnitude to <math>1 \text{ mm s}^{-1}</math> over 20 days for frequencies higher than <math>2.10^{-4}</math> Hz. A sodium vapour resonance cell is used in a longitudinal magnetic field to sample the two wings of the solar absorption line. The addition of a small modulating field component enables the slope of the wings to be measured. This provides not only an internal calibration of the instrument sensitivity, but also offers a further possibility to recognise, and correct for, the solar background signal produced by the effects of solar magnetically active regions. The use of an additional rotating polariser enables measurement of the mean solar line-of-sight magnetic field, as a secondary objective.</p>
Description	<p>GOLF key scientific data products are mission long files related to calibrated line of sight velocities based on measurements collected either through the instrument PhotoMultiplier 1 (PM1), PhotoMultiplier 2 (PM2), or a mean of the two signals (PM1+PM2). The calibration of these data is based on method described in Appourchaux et al., 2018.</p>
Publication	<p>Gabriel, A.H., et al., Global Oscillations at Low Frequency from the SOHO mission (GOLF), Sol. Phys., 162, 61–99 (1995); <a href="https://doi.org/10.1007/BF00733427">https://doi.org/10.1007/BF00733427</a> Appourchaux, T., et al., Searching for g modes. I. A new calibration of the GOLF instrument, A&amp;A, 617, A108–A118; <a href="https://doi.org/10.1051/0004-6361/1001992595">https://doi.org/10.1051/0004-6361/1001992595</a></p>



SOHO » Mission Long files

Home
SOHO Science Archive
Mission Long files
Liveliink (SOHO)

#### SOHO MISSION LONG FILES

This page contains a list of the SOHO mission-long file bundles generated for certain instruments thus far. You can still use the [ESA SOHO Science Archive graphical user interface](#) (based on Java Web start technology) or the [ESA SOHO Science Archive Rest API](#) to search for individual observations from these instruments (e.g. images, daily files, spectra), but those might not have final calibrations applied. If no files loads below, try refreshing or switching to a different browser.

##### CELIAS

Mission long files	Direct download
Solar EUV flux at 15 s cadence (CELIAS Solar EUV Monitor)	<a href="#">Click here</a>
Solar EUV flux at 1 day cadence (CELIAS Solar EUV Monitor)	<a href="#">Click here</a>
Solar wind parameters at 5 minutes cadence (CELIAS Proton Monitor)	<a href="#">Click here</a>
Solar wind parameters at 30 s cadence (CELIAS Proton Monitor)	<a href="#">Click here</a>

##### COSTEP

Mission long files	Direct download
Proton and He fluxes at 1 mn cadence (COSTEP EPHIN)	<a href="#">Click here</a>
Proton and He fluxes at 5 mn cadence (COSTEP EPHIN)	<a href="#">Click here</a>
Proton and He fluxes at 10 mn cadence (COSTEP EPHIN)	<a href="#">Click here</a>
Proton and He fluxes at 30 mn cadence (COSTEP EPHIN)	<a href="#">Click here</a>
Proton and He fluxes at 1 h cadence (COSTEP EPHIN)	<a href="#">Click here</a>
Proton and He fluxes at 1 day cadence (COSTEP EPHIN)	<a href="#">Click here</a>

##### GOLF

Mission Long files	Direct download
Line of sight calibrated velocity through PhotoMultiplier 1 (PM1)	<a href="#">Click here</a>
Line of sight calibrated velocity through PhotoMultiplier 2 (PM2)	<a href="#">Click here</a>
Line of sight calibrated velocity Mean of PM1 and PM2	<a href="#">Click here</a>

##### VIRGO

Mission long files	Direct download
Total Solar Irradiance at 1h cadence (DIARAD+PMO6-V detectors)	<a href="#">Click here</a>
Total Solar Irradiance at 1d cadence (DIARAD+PMO6-V detectors)	<a href="#">Click here</a>
Spectral Irradiance blue channel 3995-4045 Angstrom (SPM detector)	<a href="#">Click here</a>
Spectral Irradiance green channel 4975-5025 Angstrom (SPM detector)	<a href="#">Click here</a>
Spectral Irradiance red channel 8600-8650 Angstrom (SPM detector)	<a href="#">Click here</a>

##### Ancillary mission long files

[GOLF\\_D4.2\\_SVEL\\_960411\\_121005](#)  
[GOLF\\_FrequencyShiftTables\\_960411\\_130407](#)  
[GOLF\\_FrequencyTables\\_960411\\_130407](#)

Direct download of the mission long files from the ESA SOHO Archive



<https://datasetsearch.research.google.com>



## Finding datasets by measurement technique

Google SOHO time of flight

9 data sets found

- esa** CELIAS, Charge, Element, and Isotope Analysis System  
archives.esac.esa.int  
ascii  
Updated Apr 16, 2020
- nasa** High-Performance Data Analysis Tools for Sun-Earth Connection...  
data.nasa.gov  
catalog.data.gov  
+1 more  
application/rss+xml +5  
Updated Jun 26, 2018
- nasa** High-Performance Data Analysis Tools for Sun-Earth Connection...  
data.nasa.gov  
catalog.data.gov  
tsv, xml +4  
Updated Jun 26, 2018
- esa** CDS, Coronal Diagnostic Spectrometer  
archives.esac.esa.int  
Updated Sep 5, 2014

**esa** CELIAS, Charge, Element, and Isotope Analysis System  
Experiment onboard the ESA/NASA SOHO mission  
GD Related Article

Explore at archives.esac.esa.int

85 scholarly articles cite this data set (View in Google Scholar)

ascii

**Unique identifier**  
<https://doi.org/10.5270/esa-ley8z2h>

**Data set updated** Apr 16, 2020

**Data set provided by**  
European Space Agency

**Authors**  
Dr. Robert Wimmer-Schweingruber

**Time period covered**  
Jan 1, 1996 - Present

**Description**  
The CELIAS experiment on SOHO is designed to measure the mass, ionic charge and energy of the low and high speed solar wind, of suprathermal ions, and of low energy flare particles. Through analysis of the elemental and isotopic abundances, the ionic charge state, and the velocity distributions of ions originating in the solar atmosphere, the investigation focuses on the plasma processes on various temporal and spatial scales in the solar chromosphere, transition zone, and corona. CELIAS includes 3 mass and charge discriminating sensors based on the time-of-flight technique: CTOF for the elemental, charge and velocity distribution of the solar wind, MTOF for the elemental and isotopic composition of the solar wind, and STOF for the mass, charge and energy distribution of suprathermal ions. The instrument provides detailed in-

Google Cluster solid state detector

17 data sets found

- esa** RAPID energetic electron and ion spectrometer  
archives.esac.esa.int  
Updated May 15, 2020
- esa** HID, hot ion detector  
archives.esac.esa.int
- esa** HEED, high energy electron detector  
archives.esac.esa.int
- openaire** Stand-alone cosmic muon reconstruction before installatio...  
explore.openaire.eu  
Updated Jan 1, 2009
- figshare** Data from: Cubane-Type Fe4S4 Clusters with Chiral Thiolate...  
figshare.com  
Updated Feb 22, 2016
- figshare** Fluorescence Enhancement in the Solid State by Isolating Perylene...  
acs.figshare.com  
Updated May 28, 2020
- materialscloud** Data from: Unsupervised landmark analysis for jump...  
archive.materialscloud.org

**esa** RAPID energetic electron and ion spectrometer  
Experiment onboard the ESA Cluster mission  
GD Related Article

Explore at archives.esac.esa.int

**Unique identifier**  
<https://doi.org/10.5270/esa-7bx3a0s>

**Data set updated** May 15, 2020

**Data set provided by**  
European Space Agency

**Authors**  
Dr. Patrick W. Daly

**Time period covered**  
Feb 1, 2001 - Present

**Description**  
The Research with Adaptive Particle Imaging Detectors (RAPID) spectrometer for the Cluster mission is an advanced particle detector for the analysis of suprathermal plasma distributions in the energy range from 39 to 400 keV for electrons, 28 to 1500 keV (up to 4000 keV) for hydrogen, and 10 keV/muc to 1500 keV (up to 4000 keV) for heavier ions.

All RAPID datasets are available on the ESA Cluster Science Archive at <https://csa.esac.esa.int/>

RAPID key scientific datasets for Cluster 1 (similar for all other Cluster spacecraft)

Dataset ID	Dataset content
CI_CP_RAP_ESPECT6	Electron, omni-directional, differential particle flux
CI_CP_RAP_ISPECT	Proton, omni-directional distribution, differential particle flux
CI_CP_RAP_ISPECT_He	Helium, omni-directional distribution, differential particle flux
CI_CP_RAP_ISPECT_CWO	CWO, omni-directional distribution, differential particle flux

3D distribution

Dataset ID	Dataset content
CI_CP_RAP_L3D0	Electron, 3D distribution, differential particle flux, standard resolution
CI_CP_RAP_E3D0	Electron, 3D distribution, differential particle flux, best resolution
CI_CP_RAP_I3D0_H	Proton, 3D distribution, differential particle flux
CI_CP_RAP_I3D0_He	Helium, 3D distribution, differential particle flux
CI_CP_RAP_I3D0_CWO	CWO, 3D distribution, differential particle flux

Pitch Angle Distribution (PAD)

Dataset ID	Dataset content
CI_CP_RAP_PAD_L3D0	Electron, PAD, differential particle flux, standard resolution
CI_CP_RAP_PAD_E3D0	Electron, PAD, differential particle flux, best resolution
CI_CP_RAP_PAD_H	Proton, PAD, differential particle flux
CI_CP_RAP_PAD_He	Helium, PAD, differential particle flux
CI_CP_RAP_PAD_CWO	CWO, PAD, differential particle flux

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European Space Agency



<https://datasetsearch.research.google.com>





## Finding datasets by type of measurements


Google


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**CIS ion spectrometer**  
archives.esac.esa.int  
Updated Jan 29, 2020

**Cluster Ion Spectrometry (CIS)**  
hpde.io  
Updated May 5, 2019

**RAPID energetic electron and ion spectrometer**  
archives.esac.esa.int  
Updated May 15, 2020

**Data from: High-Nuclearity 3d-4f Clusters as Enhanced Magnetic Coolers and...**  
acs.figshare.com  
txt  
Updated Feb 22, 2016

**CIS ion spectrometer**  
Experiment onboard the ESA Cluster mission  
[Related Article](#)  
[Explore at archives.esac.esa.int](#)  
14 scholarly articles cite this data set ([View in Google Scholar](#))  
**Unique identifier**  
<https://doi.org/10.5270/esa-ceffumg>  
**Data set updated** Jan 29, 2020  
**Data set provided by**  
[European Space Agency](#)  
**Authors**  
Dr. Iannis Dandouras, IRAP, CNRS, Université de Toulouse and CNES, France  
**Time period covered**  
Feb 1, 2001 - Present  
**Description**  
The CIS (Cluster Ion Spectrometry) experiment is a comprehensive ionic plasma spectrometry package



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<https://datasetsearch.research.google.com>



by scientific phenomena

ISS spectral solar irradiance

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**TSIS SIM Level 3 Solar Spectral Irradiance 24-Hour Means V04...**  
cmr.earthdata.nasa.gov  
catalog.data.gov  
pro  
Updated Jun 22, 2020

**SolACES, SOLAR Auto-Calibrating EUV/UV Spectrophotometers**  
Experiment onboard the International Space Station (ISS)  
Related Article  
Explore at [archives.esac.esa.int](https://archives.esac.esa.int)  
3 scholarly articles cite this data set ([View in Google Scholar](#))  
Unique identifier  
<https://doi.org/10.5270/esa-24m92t6>  
Data set provided by  
[European Space Agency](#)  
Authors  
Dr. Raimund Brunner  
Time period covered  
Apr 1, 2008 - Feb 15, 2017  
Description  
SolACES (SOLAR Auto-Calibrating EUV/UV Spectrophotometers) was designed to monitor (quasi)

**TSIS TIM Level 3 Total Solar Irradiance 24-Hour Means V03 (TSIS\_TSI\_L3\_24HR)...**  
cmr.earthdata.nasa.gov  
pro  
Updated Jun 22, 2020

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interstellar neutral helium



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Free

Saved data sets

6 data sets found



GAS, interstellar neutral GAS experiment

archives.esac.esa.int

Updated Apr 16, 2020



GAS, interstellar neutral GAS experiment  
Experiment onboard the ESA/NASA ULYSSES mission

Explore at archives.esac.esa.int



Spectrally resolved helium  
absorption from the extended  
atmosphere of a warm...

zenodo.org

search.datacite.org

zip

Updated Dec 6, 2018

Unique identifier

<https://doi.org/10.5270/esa-kdkd3ml>

Data set updated Apr 16, 2020

Data set provided by

[European Space Agency](#)

Authors

Dr. Manfred Witte

Time period covered

Oct 6, 1990 - Jun 30, 2009

Description



Data from: X-ray Line Formation  
by Charge Exchange

data.nasa.gov

catalog.data.gov

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Slide 15/21

n Space Agency



<https://datasetsearch.research.google.com>



Google

Cluster Auroral Kilometric Radiation



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Free

3 data sets found


 WBD radio receiver passive electric and magnetic field...  
archives.esac.esa.int  
Updated Mar 16, 2020




WBD radio receiver passive electric and magnetic field waveforms  
Experiment onboard the ESA Cluster mission

 Related Article

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 Auroral Emissions Radio Observer (AERO)  
data.nasa.gov  
catalog.data.gov  
 application/rss+xml +5  
Updated Sep 7, 2018

 Fast Auroral SnapshoT Explorer (FAST) Data Archive  
cmr.earthdata.nasa.gov  
Updated Aug 11, 2017

 Not seeing a result that you expected?  
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Unique identifier

<https://doi.org/10.5270/esa-h8ck8ox>

Data set updated Mar 16, 2020

Data set provided by

[European Space Agency](#)

Authors

Jolene Pickett

Time period covered

Feb 1, 2001 - Present

Description

The Wideband Data (WBD) Plasma Wave Investigation for Cluster provides wideband waveform measurements (up to 577 kHz) of plasma waves in the Earth's magnetosphere. The Wideband Receiver measures electric and magnetic fields over the frequency range 100 Hz to 577 kHz as part of the Wave Experiment Consortium (WEC) instrumentation. The Wideband Data Plasma Wave Receiver provides unique high time and frequency resolution measurement capabilities required for the detailed study of terrestrial plasma waves and radio emissions.

All WBD datasets are available on the ESA Cluster Science Archive at <https://csa.esac.esa.int/>

WBD scientific datasets for Cluster 1 (similar for all other Cluster spacecraft)

Dataset ID	Dataset content
C1_CF_WBD_WAVEFORM	Electric and magnetic waveform data (NM mode, CEF format)
C1_CE_WBD_WAVEFORM_CDF	Electric and magnetic waveform data (NM mode, CDF format)
C1_CF_WBD_WAVEFORM_BM2	Electric and magnetic waveform data (BM2 mode, CEF format)
C1_CE_WBD_WAVEFORM_BM2_CDF	Electric and magnetic waveform data (BM2 mode, CDF format)
C1_CF_WBD_ELECTRON_DENSITY	Electron density from WBD electron plasma frequency (CEF and CDF format)

ESA UNCLASSI

/10/2020 | Slide 16/21





European Space Agency



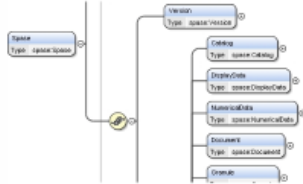
# SPASE HPDE DOI landing pages

<https://spase-group.org/>


Goddard Space Flight Center Space Physics Data Facility


Space Physics Archive Search and Extract

HOME DATA MODEL DOCUMENTS TOOLS SCHOOL SERVICES ABOUT




### Data Model

Get details of the SPASE [Data Model](#), which provides terms and syntax for uniform People, Repositories, and (most centrally) Numerical Data products. An extended s provided, along with the [XML schema](#) documents used to validate SPASE descripti

HPDE METADATA REGISTRY


HPDE LANDING PAGES

NAMING AUTHORITIES



### Documents

Specifications for [event lists](#) (and catalogues) and endorsed [conventions](#) for [text markup](#), [resource ID formation](#), and guidelines with dealing with [plain text data](#) within SPASE descriptions.



European Space Agency



# SPASE HPDE DOI landing page for WBD

<https://hpde.io/ESA/NumericalData/Cluster-Rumba/WBD/PT0.0000046S.html>

HPDE.io

**Data Access**

- [FTPS from SPDF \(not with most browsers\)](#)
- [HTTPS from SPDF](#)
- [CDAWeb](#)
- [Access to Cluster WBD CEFs](#)

**Cluster-Rumba Wideband Data (WBD) Plasma Wave Receiver/High Time Resolution Waveform Data**

**ResourceID**  
spase://ESA/NumericalData/Cluster-Rumba/WBD/PT0.0000046S

**Description**  
The following description applies to the Wideband Data (WBD) Plasma Wave Receivers on all four Cluster satellites, each satellite being uniquely identified by its number (1 through 4) or its given name (Rumba, Salsa, Samba, Tango, respectively). High time resolution calibrated waveform data sampled in one of 3 frequency bands in the range 0-577 kHz along one axis using either an electric field antenna or a magnetic search coil sensor. The dataset also includes instrument mode, data quality and the angles required to orient the measurement with respect to the magnetic field and to the GSE coordinate system. The AC electric field data are obtained by using one of the two 88m spin plane electric field antennas of the EFW (Electric Fields and Waves) instrument as a sensor. The AC magnetic field data are obtained by using one of the two search coil magnetometers (one in the spin plane, the other along the spin axis) of the STAFF (Spatio-Temporal Analysis of Field Fluctuations) instrument as a sensor. The WBD data are obtained in one of three filter bandwidth modes: (1) 9.5 kHz, (2) 19 kHz, or (3) 77 kHz. The minimum frequency of each of these three frequency bands can be shifted up (converted) from the default 0 kHz base frequency by 125.454, 250.908 or 501.816 kHz. The time resolution of the data shown in the plots is determined from the WBD instrument mode. The highest time resolution data (generally the 77 kHz bandwidth mode) are sampled at 4.6 microseconds in the time domain (~4.7 milliseconds in the frequency domain using a standard 1024 point FFT). The lowest time resolution data (generally the 9.5 kHz bandwidth mode) are sampled at 36.5 microseconds in the time domain (~37.3 milliseconds in the frequency domain using a standard 1024 point FFT). The availability of these files depends on times of DSN and Panska Ves ground station telemetry downlinks. A list of the status of the WBD instrument on each spacecraft, the telemetry time spans, operating modes and other details are available under Science Data Availability on the University of Iowa Cluster WBD web site at <http://www-pw.physics.uiowa.edu/cluster/> and through the documentation section of the Cluster Science Archive (CSA) (<https://www.cosmos.esa.int/web/csa/documentation>). Details on Cluster WBD Interpretation Issues and Caveats can be found at <http://www-pw.physics.uiowa.edu/cluster/> by clicking on the links next to the Caution symbol in the listing on the left side of the web site. These documents are also available from the Documentation section of the CSA website. For further details on the Cluster WBD data products see Pickett, J.S., et al., "Cluster Wideband Data Products in the Cluster Active Archive" in The Cluster Active Archive, 2010, Springer-Verlag, pp 169-183, and the Cluster WBD User Guide archived at the CSA website in the Documentation section. ... CALIBRATION: ... The procedure used in computing the calibrated Electric Field and Magnetic Field values found in this file can be obtained from the Cluster WBD Calibration Report archived at the CSA website in the Documentation section. Because the calibration was applied in the time domain using simple equations the raw counts actually measured by the WBD instrument can be obtained by using these equations and solving for 'Raw Counts', keeping in mind that this number is an Integer ranging from 0 to 255. Since DC offset is a real number, the resultant when solving for raw counts will need to be converted to the nearest whole number. A sample IDL routine for reverse calibrating to obtain 'Raw Counts' is provided in the WBD Calibration Report archived at the CSA. ... CONVERSION TO FREQUENCY DOMAIN: ... In order to convert the WBD data to the frequency domain

<b>ObservedRegion</b>	Earth.NearSurface.AuroralRegion
<b>ObservedRegion</b>	Earth.NearSurface.PolarCap
<b>ObservedRegion</b>	Earth.NearSurface.Ionosphere
<b>ObservedRegion</b>	Heliosphere.Inner
<b>Caveats</b>	See the Cluster WBD WBD data Interpretation Issues and Caveats documents at the web site <a href="#">http://www-pw.physics.uiowa.edu/cluster/</a> left hand side of the page. The documents can also be retrieved from the Documentation section
<b>Keywords</b>	Time Series Waveform AKR Auroral hiss Auroral Kilometric Radiation Chorus Continuum radiation Equatorial Noise Kilometric Continuum radiation Plasmaspheric Hiss Terrestrial Kilometric Radiation TKR Very Long Baseline Interferometry VLBI Langmuir Waves Type III Solar Bursts Electrostatic Solitary Waves ESW Whistlers Ion Acoustic Waves Bernstein Waves Upper Hybrid Waves Lower Hybrid Waves



## 4. Who cares about heliophysics?



### Planetary DOIs status

Guest Storage Facility is working and already contains 2 datasets with DOI directly linked to refereed papers (high value added products)

Thousands of landing pages already created, one per dataset, DOI assignement on-going

### Astronomy DOIs status


One per catalogue for survey missions (e.g. Planck, GAIA)

One per observing proposal for observatory type missions (e.g. XMM, Herschel)

A significant number of landing pages have already been generated

**JSON automatic generation (keyword extraction):**

**AI techniques may be envisaged (MAUI, RAKE, spaCy, Alchemy...) instead of TF-IDF**

psa	
PSA » UCL-MSSL_iMars_HRSC_v1.0	
PSA Introduction PSA Search Interfaces Missions Resources Contact Us	<b>DOI FOR UCL-MSSL_iMARS_HRSC_V1.0</b>
<b>Data Set / Bundle</b>	UCL-MSSL_iMars_HRSC_V1.0
<b>Description</b>	A high spatial resolution (50m) Digital Terrain Model (DTM) and orthorectified Image (ORI) have been produced for the Martian South Polar Residual Ice-Cap (SPRIC) for 33 HRSC strips and the associated ORIs at 12.5m. In addition, a 50m DTM mosaic has been created alongside a 12.5m ORI mosaic. For the ORI mosaic, individual HRSC image strips have been corrected for different surface scattering properties prior to mosaicing.
<b>Contact Point</b>	Alfiah Rizky Diana Putri (alfiah.putri.15@ucl.ac.uk) and Jan-Peter Muller (j.muller@ucl.ac.uk)
<b>Data Access</b>	<a href="http://npsa01.esac.esa.int/pub/mirror/Guest-Storage-Facility/UCL-MSSL_iMars_HRSC_V1.0/">http://npsa01.esac.esa.int/pub/mirror/Guest-Storage-Facility/UCL-MSSL_iMars_HRSC_V1.0/</a>
<b>Data browse</b>	<a href="http://www.i-mars.eu/web-gis">www.i-mars.eu/web-gis</a> and press "S" to show South polar view
<b>Product User Guide</b>	<a href="#">Link to the PUG</a>
<b>DOI</b>	10.5270/esa-0j79yk8
<b>Version History</b>	V1.0 First version of this data set
<b>Citation Guidelines</b>	European Space Agency, 2019, UCL-MSSL_iMars_HRSC_V1.0, <a href="https://doi.org/10.5270/esa-0j79yk8">https://doi.org/10.5270/esa-0j79yk8</a>
<b>Associated Publication(s)</b>	Putri, A. R. D., Sidiropoulos, P., Muller, J. P., Walter, S. H., & Michael, G. G. (2019). A New South Polar Digital Terrain Model of Mars from the High Resolution Stereo Camera (HRSC) onboard the ESA Mars Express. <i>Planetary and Space Science</i> . DOI: <a href="https://doi.org/10.1016/j.pss.2019.02.010">10.1016/j.pss.2019.02.010</a>
<b>Dataset credit</b>	When publishing any works relating to this dataset, please cite the aforementioned "Associated Publication". When reproducing any of the datasets on web-pages or publications you should include the following credit line ESA/DLR/FU-Berlin/UCL
<b>Mission(s)</b>	Mission : Mars Express Instrument : HRSC  mars express
<b>Primary Target(s)</b>	Mars
<b>Related Data Sets</b>	<a href="http://psa.esac.esa.int/pub/mirror/MARS-EXPRESS/HRSC/MEX-M-HRSC-5-REFDR-DTM-V1.0/DATA/">http://psa.esac.esa.int/pub/mirror/MARS-EXPRESS/HRSC/MEX-M-HRSC-5-REFDR-DTM-V1.0/DATA/</a>



## 5. Next steps and open questions



### **Closer to the data usage**

Short time periods from a few datasets are often used in refereed papers (case studies)

Short compared to decades long files

1. On-demand DOI could link papers directly to the data bundle used (via TAP, Rest API)
2. Such a service is available e.g. for Hubble data at the Canadian Astronomy Data Centre
3. Saving the version of the data used in papers could improve reproducibility
4. Include data quality? Which ones should be used? Need for international standard?

See Ruggeri, K., et al., (2020), Standards for evidence in policy decision-making, Nature Research Social and Behavioural Sciences, 399005; [go.nature.com/2zdTQIs](https://go.nature.com/2zdTQIs)



# Conclusion



1. DOIs related to 47 experiments onboard ESA heliophysics spacecraft are registered
2. This increases ESA commitment to the FAIR data principles and acknowledge PI work
3. All of them are findable on Google dataset search
4. A related peer reviewed manuscript is under revision (COSPAR Adv. Space Res.)
5. Discussion with editors to eventually enforce their usage has started
6. Long term goal: provide on-demand DOI and save the version of data used in papers

Questions? [Arnaud.Masson@esa.int](mailto:Arnaud.Masson@esa.int)