

# IACHEC Source Database Tutorial

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## Intent of the IACHEC Source Database:

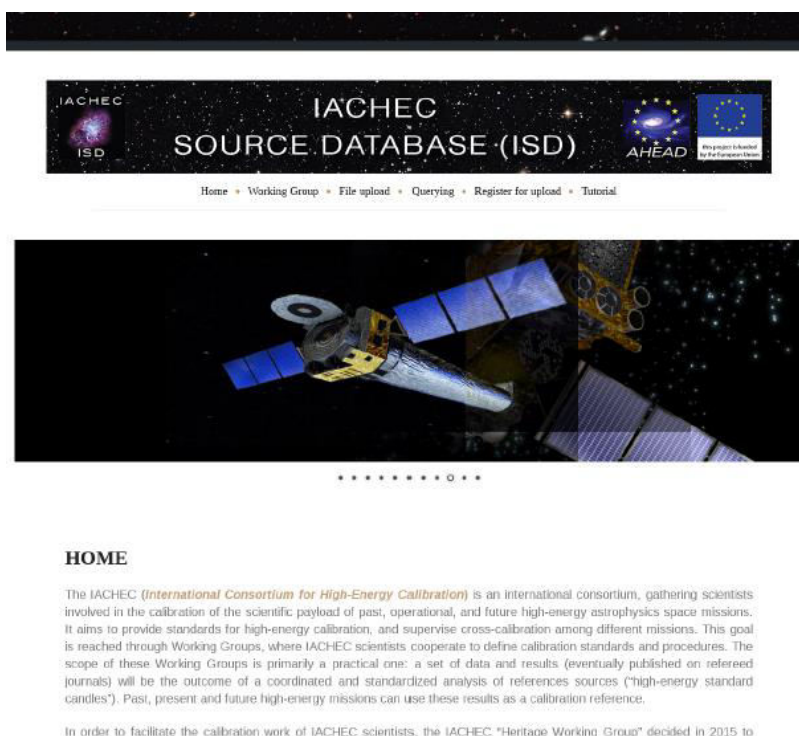
The IACHEC (International Consortium for High-Energy Calibration) Source Database (ISD) is the result of a 2015 decision by the IACHEC “Heritage Working Group.” The intention of the ISD is to function as the single repository of high-level scientific data and data analysis procedures used in IACHEC published papers. The ISD has been funded and is being maintained by the AHEAD project under the EU Research Infrastructure Programme, in the framework of a direct collaboration with IACHEC. It is a public resource created for the benefit of the astrophysical observers community. The ISD should be updated by the chair of an IACHEC Working Group when:

- An IACHEC paper is published on a refereed journal
- Updated calibrations with respect to that used in the aforementioned paper are published, and they have a “significant impact” on the results of the cross-calibration analysis, as verified by the Working Group and documented in a Technical Note, or in a new paper
- Paper and Technical Notes are supposed to be also ingested in the ISD, besides being available from the IACHEC web portal

## The IACHEC Source Database:

Currently, the ISD is hosted in Rome by IAPS-INAF at the web address <http://iachecdb.iaps.inaf.it/> and is linked by the IACHEC website (<http://web.mit.edu/iachec/sdb/index.html>) . It provides functionalities as file uploading, querying the database, and registering an account for uploading data to the ISD. The ISD is composed of several sections: a “Querying” section, an “Uploading” section, and a “Register for upload” section.

Below is a screenshot of the homepage.



### **ISD File Naming Convention:**

The data stored in the ISD should be uploaded as a single tarfile per source, including all the files relevant to the analysis of that source. The tarfile should be named:

**iachec\_isd\_\${source}\_\${working\_group}\_YYYYMMDD.tar, where:**

- `${source}` is the name of the source
- `YYYYMMDD` is the start date of the observation (in format year/month/day)
- `${working_group}` is a two-letter code indicating the IACHEC Working Group responsible for the upload, according to the following legend:

<b>IACHEC Working Group name</b>	<b>Code</b>
Calibration Uncertainties	cu
Clusters of Galaxies	cg
Contamination	cn
Coordinated Observations	co
Detector and Background	db
Heritage	he
High-resolution	hr
Non-Thermal SNR	nt
Thermal-SNR	ts
White Dwarfs and Isolated Neutron Stars	wd

In the following table the files to be included in the tarfile are listed, together with the recommended naming convention. In some instances, observations within a tarfile cannot be uniquely identified by only a source name, an instrument name, and a working group. In such cases, an observation id string `${obsid}` is available. `${obsid}` should be limited to the dates of the individual observations in `YYYYMMDD` is the start date of the observation (in format year/month/day) or to instrument Good Time Intervals (GTI's) between the instruments included in the analyses. For using GTI's, the `${obsid}` should be 'gti'+`${instrument_number}`. The `${instrument_number}` is a 2-digit number from a list of current and past IACHEC instruments. The instrument number list can be found below the naming convention table. This list will be upgraded when new instruments become available.

<b>Product</b>	<b>Mandatory</b>	<b>Naming convention</b>
Source+background spectrum	Y	<code>\${source}_\${instrument}_\${wg}_\${obsid}_src.pi</code>
Background spectrum	Y	<code>\${source}_\${instrument}_\${wg}_\${obsid}_bkg.pi</code>
Source+background light curve	N	<code>\${source}_\${instrument}_\${wg}_\${obsid}_src.lcu</code>
Background light curve	N	<code>\${source}_\${instrument}_\${wg}_\${obsid}_bkg.lcu</code>
Background-subtracted, exposure corrected image	N	<code>\${source}_\${instrument}_\${wg}_\${obsid}_sbs.img</code>

Redistribution matrix <sup>1</sup>	Y	<code>\${source}_\${instrument}_\${wg}_\${obsid}_src.rmf</code>
Effective area	Y	<code>\${source}_\${instrument}_\${wg}_\${obsid}_src.arf</code>
Exposure map	N	<code>\${source}_\${instrument}_\${obsid}.exm</code>
Spectral analysis script per instrument	Y	<code>\${source}_\${instrument}_\${wg}_\${obsid}_src.cmd</code>

Spectral analysis script per source	N	<code>\${source}_\${wg}_\${obsid}_src.cmd</code>
IACHEC paper <sup>2</sup>	Y	<code>\${source}_\${wg}_iachecPaper.pdf</code>
Technical Notes	N	<code>\${source}_\${wg}_tni.pdf<sup>3</sup></code>
README (list of the full content of the tar file)	Y	<code>\${source}_\${wg}_readme.txt</code>

AstroSat 00:CZTI 01:LAXPC 02:SSM 03:SXT	Chandra 04:ACIS 05:HETG 06:HRC 07:LETG	Hitmoi 08:HXT 09:SGD 10:SXI 11:SXS
Insight-HMXT 12:HE 13:LE 14:ME	INTEGRAL 15:ISGRI 16:JEM-X 17:SPI	MAXI 18:GSC 19:SSC
NICER 20:NICER	NuSTAR 21:FPMA 22:FPMB	Suzaku 23:GSO 24:PIN 25:XIS0 26:XIS1 27:XIS2 28:XIS3
Swift 29:BAT 30:XRT	XMM-Newton 31:EPIC-pn 32:MOS1 33:MOS2 34:RGS	

All strings in the file naming convention shall be *lower case*. A free naming convention may be used

<sup>1</sup> This can be replaced by a response file (RSP) given by the combination of the redistribution matrix and the effective area. The file naming convention in this case is:

`${source}_${instrument}_${wg}_src.rsp`

<sup>2</sup> The paper can include also data of other sources, it goes without saying.

<sup>3</sup> With  $i=1, 2, \dots$

for graphical products, provided that their name is specified in the README. However, it is warmly encouraged to follow a self-explaining naming convention, as close as possible to the general rules described above.

### Querying:

The “querying” page contains multiple ways to search for files. This page is open to the general public. There is a search bar that allows for a general search of files uploaded. One can also search by source name under “Categories,” which lists all of the sources currently in the database. Additionally, it is possible to search by “Tags,” which includes satellite and instrument names.

#### **Download search**

The screenshot shows a search interface with a search bar at the top. Below it is a 'Filter' section with four columns: 'Categories' (with a dropdown menu showing 'Abell 3571'), 'Tags' (with an empty input field), 'Creation date' (with 'From' and 'To' date pickers), and 'Update date' (with 'From' and 'To' date pickers). There are 'RESET' and 'SEARCH' buttons. Below the filter is a table with the following data:

FILE TYPE / FILE NAME	OPEN	CREATION DATE	CATEGORY
A3571.tar		06 - 04 - 2018	Abell 3571

At the bottom right, there is a 'Display #' dropdown menu set to '30'.

Finally, one can search by either a range of creation date or update dates. Here is an example search for the source Abell 3571.

### Registering an Account for Uploading Files:

Uploading a file to the ISD requires a user account and should be limited to the chair of the Working Group to limit who can upload files. The required information for an account is: name, email address, affiliation, IACHEC working group, and a user name. This information is sent to IAPS-INAF for verification. After approval, the person will receive an email with a password and can then proceed to the “File upload” page to log in and proceed with adding data to the ISD. Below is a screenshot of the “Registration Page.”

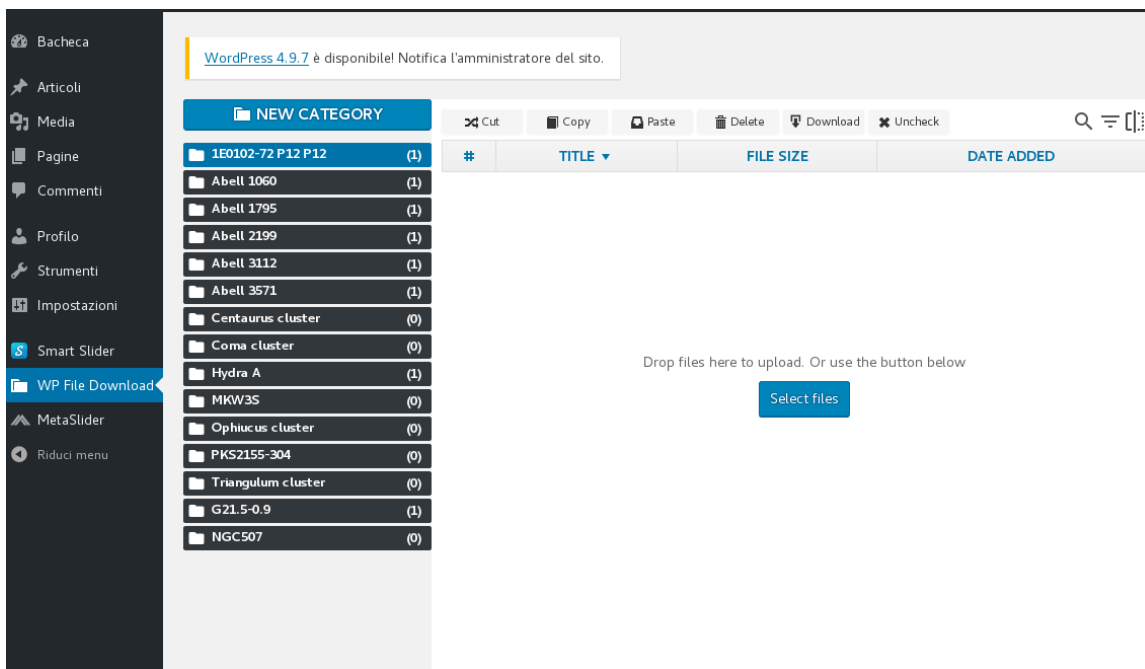
#### **Register for upload**

The registration form includes the following fields:

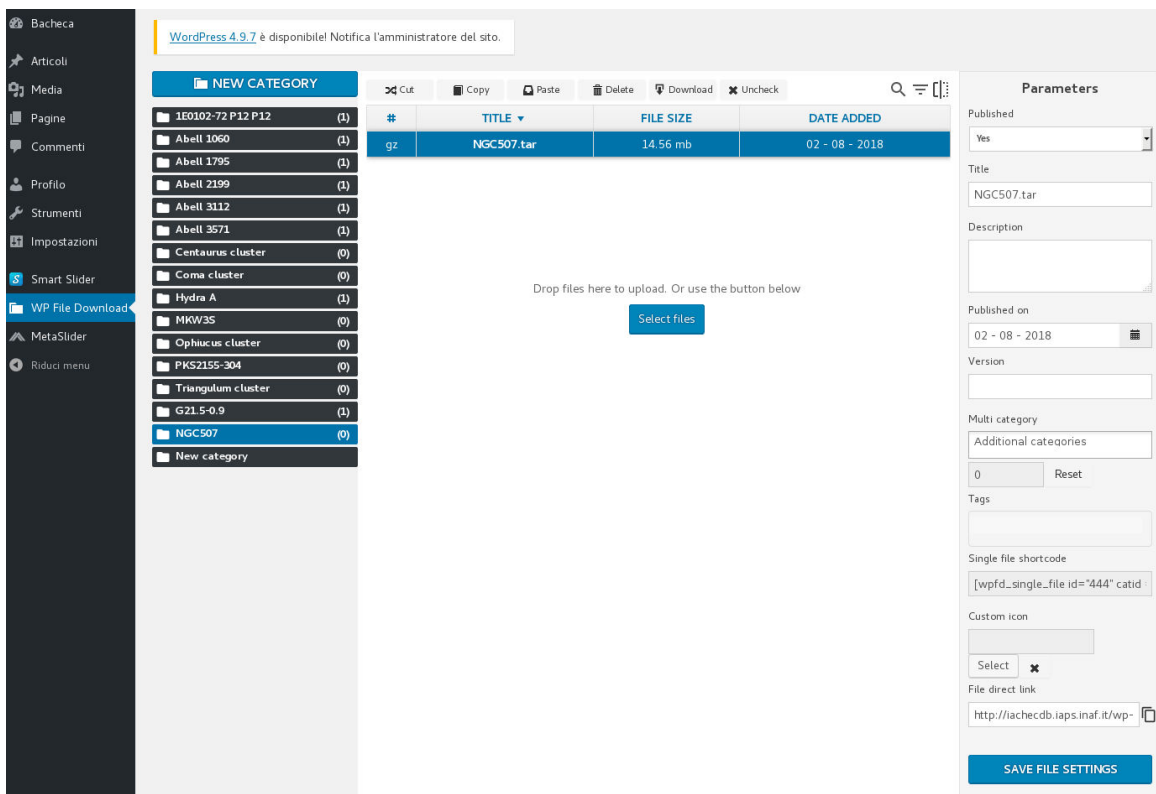
- Name \* (split into First and Last)
- Email \*
- Phone
- Affiliation \*
- Iachec working group \*
- Username \*
- Details (text area)
- captcha (akgwr)
- SUBMIT button

## Uploading Files to the Database:

After receiving an account, one can login via the “File upload” page using the user name and password provided by email. To access the uploading page, click on the “WP File Download” link along the left-hand sidebar. This will go to a page listing all the sources already included in the ISD.



If the source is not in the list, click “NEW CATEGORY” on the left-hand side and change the title from “New category” by clicking on the right side of the newly created tab. When the source tab is selected (colored blue), the file can be uploaded by dragging and dropping the file to the center area of by using the “Select files” button in the middle of the screen. After uploading the desired file, click on the “SAVE FILE SETTINGS” on the bottom right side of the screen.



Next, click on the newly added file to add “Tags” related to the instrument data included in the tarfile. The “Tags” section in the right-side panel. The list of defined instrument tags can be found below:

chandra_hrc	nustar_fpma	suzaku_xis4	swift_xrt
chandra_acis-s	nustar_fpmb	suzaku_hxdpin	swift_bat
chandra_acis-i	integral_isgri	suzaku_hxdgso	fermi_gbm
chandra_hetgs	integral_picsit	hitomi_sxi	fermi_lat
chandra_letgs	integral_jemx1	hitomi_sxs	nicer_xti
xmm_mos1	integral_jemx2	hitomi_sgd1	rxte_pca
xmm_mos2	integral_spi	hitomi_sgd2	rxte_hexte
xmm_pn	suzaku_xis1	hitomi_hxi1	maxi_ssc
xmm_rgs1	suzaku_xis2	hitomi_hxi2	maxi_gsc
xmm_rgs2	suzaku_xis3		

In the “Tags” section, the tag can auto-fill if it has already been defined. During the early period of the ISD, some instrument tags may not have been used yet. All of the instrument data included in the tarfile should have a tag. In the case of uploaded IACHEC papers, a tag for the first author should be added as well.