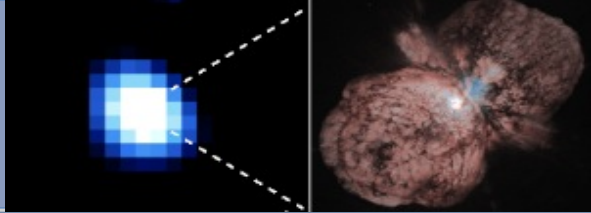


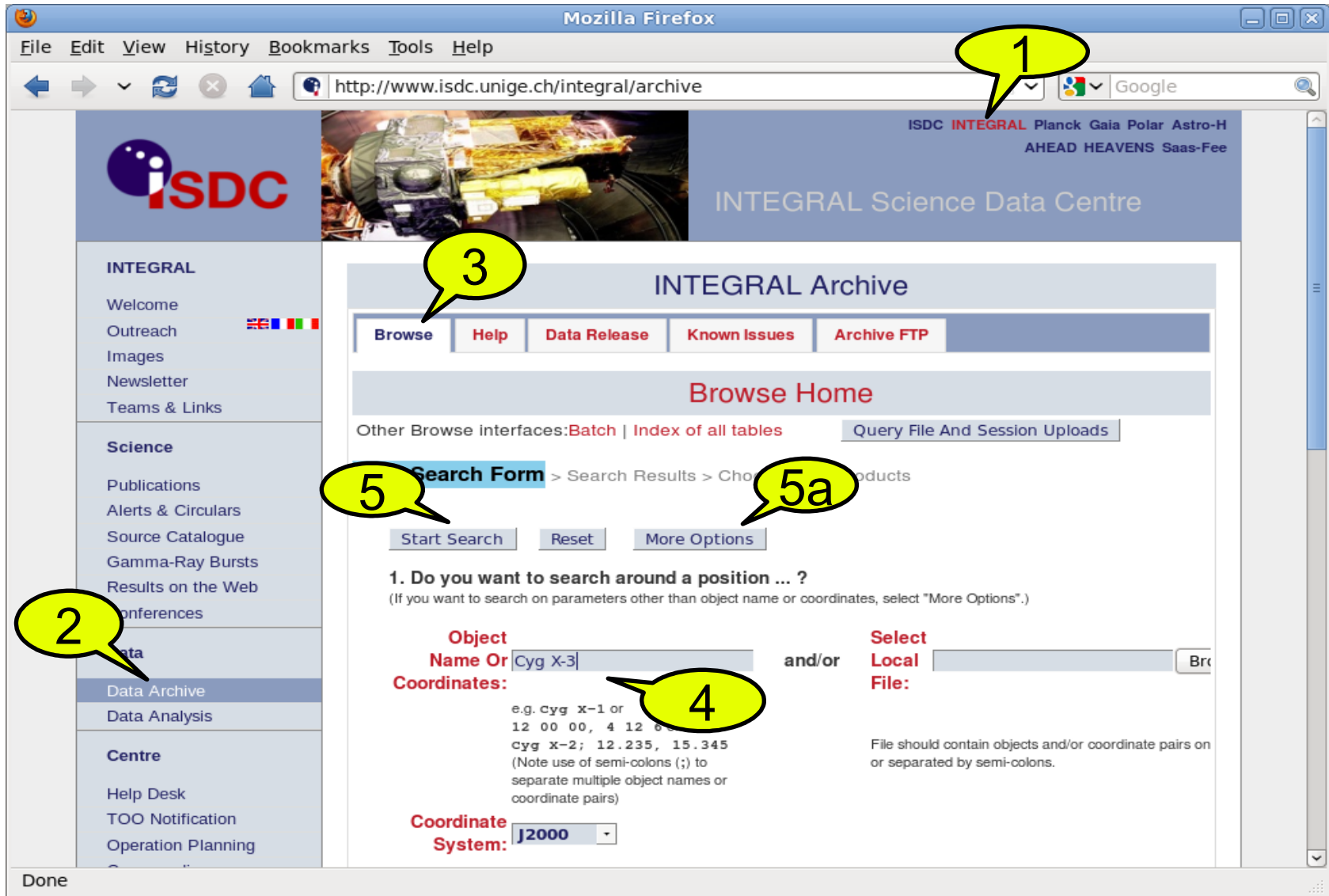
# **INTEGRAL Data Access and Analysis**

Reiner Rohlfs

on behalf of many people ...



- **Data Access**
  - Download Public INTEGRAL Data
- **INTEGRAL Software**
  - Offline Scientific Analysis (OSA)
- **Access to High Level Data Products**
  - Images
  - Spectra
  - Light Curves



Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.isdc.unige.ch/integral/archive

ISDC INTEGRAL Planck Gaia Polar Astro-H  
AHEAD HEAVENS Saas-Fee

INTEGRAL Science Data Centre

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- Source Catalogue
- Gamma-Ray Bursts
- Results on the Web
- Conferences

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- Data Archive
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**Centre**

- Help Desk
- TOO Notification
- Operation Planning

**INTEGRAL Archive**

[Browse](#) [Help](#) [Data Release](#) [Known Issues](#) [Archive FTP](#)

**Browse Home**

Other Browse interfaces: [Batch](#) | [Index of all tables](#) [Query File And Session Uploads](#)

**Search Form** > Search Results > Choose products

[Start Search](#) [Reset](#) [More Options](#)

**1. Do you want to search around a position ... ?**  
(If you want to search on parameters other than object name or coordinates, select "More Options".)

**Object Name Or Coordinates:**  **and/or** **Select Local File:**

e.g. cyg x-1 or 12 00 00, 4 12 00  
cyg x-2; 12.235, 15.345  
(Note use of semi-colons (;) to separate multiple object names or coordinate pairs)

**Coordinate System:**



( 1 scw is typically 1 stable pointing )

## SCW - Science Window Data (integral\_rev2\_scw)

Search radius used: 300.00 '

Select	Services	scw id	scw ver	scw type	ra x	dec x	start date	end date	obs id
<input checked="" type="checkbox"/> All		↕↕	↕↕	↕↕	↕↕	↕↕	↕↕ [ISO]	↕↕ [ISO]	↕↕
<input checked="" type="checkbox"/>	ORNSD	043700180010	001	pointing	20 33 02.69	+41 01 37.7	2006-05-12T22:44:08	2006-05-12T23:17:44	032001400
<input checked="" type="checkbox"/>	ORNSD	046200160010	001	pointing	20 32 20.22	+41 05 31.7	2006-07-26T13:05:32	2006-07-26T13:38:53	032001400
<input checked="" type="checkbox"/>	ORNSD	043800480010	001	pointing	20 33 01.22	+41 02 06.4	2006-05-17T07:27:06	2006-05-17T08:00:27	032001400
<input checked="" type="checkbox"/>	ORNSD	043270010001	001	pointing	20 32 55.44	+41 04 13.9	2004-07-03T13:31:12	2004-07-03T14:28:59	022000400
<input checked="" type="checkbox"/>	ORNSD	043380010001	001	pointing	20 32 58.10	+41 04 04.0	2004-07-07T03:04:05	2004-07-07T04:01:53	022000400
<input checked="" type="checkbox"/>	ORNSD	021100620010	001	pointing	20 32 57.69	+41 04 09.8	2004-07-08T04:14:40	2004-07-08T05:12:27	022000400
<input checked="" type="checkbox"/>	ORNSD	021100140010	001	pointing	20 32 56.62	+41 04 20.9	2004-07-06T02:37:51	2004-07-06T03:35:38	022000400
<input checked="" type="checkbox"/>	ORNSD	021200470010	001	pointing	20 32 58.76	+41 04 05.0	2004-07-10T15:51:52	2004-07-10T16:49:39	022000400
<input checked="" type="checkbox"/>	ORNSD	043040010001	001	pointing	20 32 58.76	+41 04 05.0	2004-07-09T14:22:58	2004-07-09T15:20:45	022000400

1

### Are you interested in data products?

1. Select the checkboxes for the rows of interest above,
2. un-check any data products you are not interested in:

### Data Products available for integral\_rev2\_scw

- All
- Science Window Data (SCW)

3. then click a button below.

data products for selected rows  
 data products for selected rows  
 for creation of Observation Groups

**Submit Request**

You have selected the following data products:

Data product(s)	Number of items	Size (kB)
Science Window Data	885	~46984802

A summary of the data you selected can be found at the bottom of this page.

To download your selected data:

Please provide your e-mail address:

3

then click the button below:

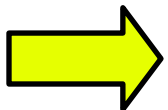
4



**After a few minutes an e-mail will be send.**

Follow the instructions:

- Save the attached download script
- Choose a directory with enough disk space
- Execute the download script



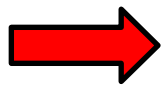
The requested data will be downloaded as FITS files.



## Offline Scientific Analysis (OSA)

A tailored software package is required to analyse INTEGRAL data:

- ◆ Coded mask instruments → convolved imaging
- ◆ Analysis requires many steps  
OSA consist of more than 150 programs



Graphical user interfaces and scripts are provided to launch the analysis.

The OSA system follows the ftools – approach, similar to the software concept used for RXTE, Swift, XMM, Chandra, Fermi, ...



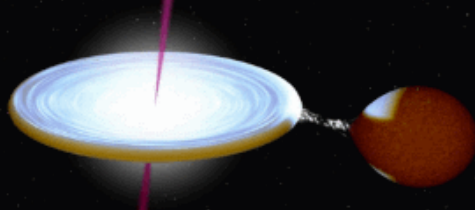
## Offline Scientific Analysis (OSA)

What OSA software does:

- ◆ Energy reconstruction
- ◆ Dead-time calculations, good-time interval selections
- ◆ Image reconstruction (including mosaics)
- ◆ Source identification and extraction
- ◆ spectra, light curves

Tasks after the OSA processing is finished:

- ◆ Spectral fitting (use xspec)
- ◆ Timing analysis (period search, FFT, ..)



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- Internal**
- + Documents
- + Meetings
- + Software
- + Config. Mgt.
- + Testing
- + Change Ctrl.

## INTEGRAL Data Analysis

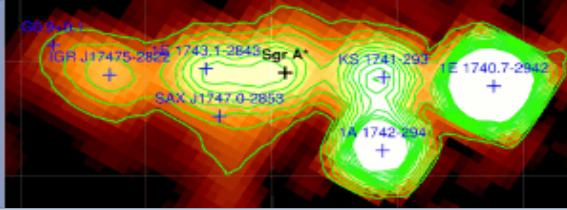
Documentation
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Errors

Package	Rel. Note.	Download	Documentation	Testdata	Comments
OSA Software	8.0	Linux: 32-bit 64-bit  OS X: Intel PPC  Solaris: 32-bit  Developers	Inst. Guide: <a href="#">PDF</a> <a href="#">Known Issues</a>	Testdata (optional)	The three binary distributions are recommended. Source code compilation is possible with the "Developers" package.
Instrument Characteristics	8.0.1	Use rsync to download	Inst. Guide: <a href="#">PDF</a>	--	Use <code>'rsync -Lzrtv isdcarc.unige.ch: :arc/FTP/arc_distr/ic_tree/prod/ \$REP_BASE_PROD' to download the data</code>
Reference Catalogue	30.0	20 MB	Inst. Guide: <a href="#">PDF</a>	--	Contains general reference and OMC catalogue.
Updated TCOR data	2009-08-07	431 MB	--	--	use the following commands : <code>cd \$REP_BASE_PROD chmod -R +w aux tar xzvf ... chmod -R -w aux</code>

Access the previous OSA release

recommended





## INTEGRAL Data Analysis

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Package	Rel. Note.	Download	Documentation	Testdata	Comments
OSA Software	8.0	Linux: <a href="#">32-bit</a> <a href="#">64-bit</a>  OS X: <a href="#">Intel</a> <a href="#">PPC</a>  Solaris: <a href="#">32-bit</a>  <a href="#">Developers</a>	Inst. Guide: <a href="#">PDF</a>  <a href="#">Known Issues</a>	<a href="#">Testdata</a> (optional)	The three binary distributions are recommended. Source code compilation is possible with the "Developers" package.
<a href="#">Instrument Characteristics</a>	8.0.1	Use rsync to download	Inst. Guide: <a href="#">PDF</a> <hr style="border: 2px solid red;"/>	--	Use <pre>rsync -Lzrtv isdcarc.unige.ch: :arc/FTP/arc_distr/ic_tree/prod/ \$REP_BASE_PROD' to download the data</pre>
<a href="#">Reference Catalogue</a>	30.0	<a href="#">20 MB</a>	Inst. Guide: <a href="#">PDF</a> <hr style="border: 2px solid red;"/>	--	Contains general reference and OMC catalogue.
Updated TCOR data	2009-08-07	<a href="#">431 MB</a>	--	--	use the following commands : <pre>cd \$REP_BASE_PROD chmod -R +w aux tar xzvf ... chmod -R -w aux</pre>

[Access the previous OSA release](#)

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### Data

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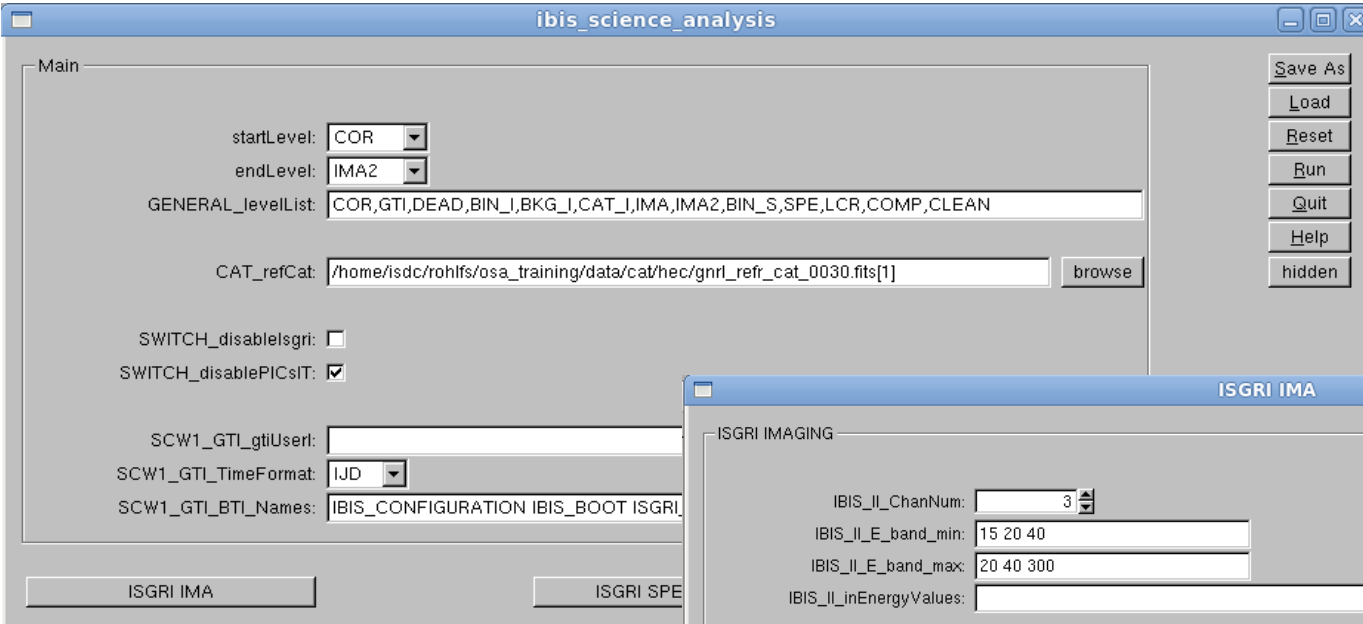
### Centre

[Help Desk](#)  
[TOO Notification](#)  
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### Internal

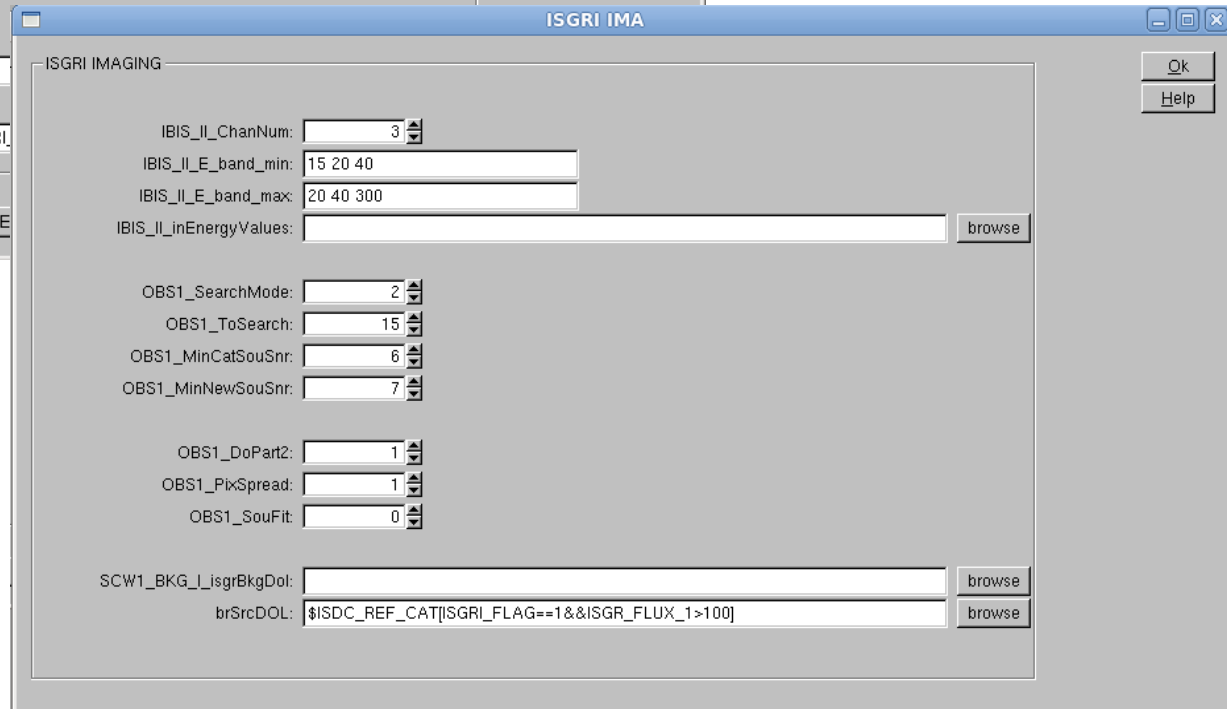
[Documents](#)  
[Meetings](#)  
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## > `ibis_science_analysis`



The 'ibis\_science\_analysis' window contains the following fields and controls:

- startLevel: COR
- endLevel: IMA2
- GENERAL\_levelList: COR,GTI,DEAD,BIN\_I,BKG\_I,CAT\_I,IMA,IMA2,BIN\_S,SPE,LCR,COMP,CLEAN
- CAT\_refCat: /home/isdc/rohlf/osa\_training/data/cat/hec/gnrl\_refr\_cat\_0030.fits [browse]
- SWITCH\_disableIsgr:
- SWITCH\_disablePICsIT:
- SCW1\_GTI\_gtiUser: [empty]
- SCW1\_GTI\_TimeFormat: IJD
- SCW1\_GTI\_BTI\_Names: IBIS\_CONFIGURATION IBIS\_BOOT ISGRI
- Buttons: Save As, Load, Reset, Run, Quit, Help, hidden
- Buttons at bottom: ISGRI IMA, ISGRI SPE



The 'ISGRI IMA' window contains the following fields and controls:

- IBIS\_IL\_ChanNum: 3
- IBIS\_IL\_E\_band\_min: 15 20 40
- IBIS\_IL\_E\_band\_max: 20 40 300
- IBIS\_IL\_inEnergyValues: [empty] [browse]
- OBS1\_SearchMode: 2
- OBS1\_ToSearch: 15
- OBS1\_MinCatSouSnr: 6
- OBS1\_MinNewSouSnr: 7
- OBS1\_DoPart2: 1
- OBS1\_PixSpread: 1
- OBS1\_SouFit: 0
- SCW1\_BKG\_!\_isgrBkgDot: [empty] [browse]
- brSrcDOL: \$!SDC\_REF\_CAT!ISGRI\_FLAG==1&&ISGR\_FLUX\_1>100 [browse]
- Buttons: Ok, Help



# Check our Documentation:

# When still in doubt ...

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- [-] Operations
- [-] Archive & DB
- [-] Local

### INTEGRAL Data Analysis

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Read first the "Getting Started" document.

If necessary, install the software first from the Software tab.

Title	Issue	Download
<b>General Documents</b>		
Getting Started	1.0	HTML
Introduction to INTEGRAL Data Analysis	5.1	PDF HTML
Cross-Calibration Report	1.0	PDF
A&A special issue: First science with INTEGRAL	Vol. 411 No. 1	HTML
Internal INTEGRAL Science Workshop	--	HTML
<b>IBIS Documents</b>		
IBIS Analysis User Manual	7.0	PDF HTML
IBIS Cookbook	7.0	HTML
ISGRI Science Validation Report - prepared by the IBIS Team	TBD	to be released
ISGRI/OSA 5 spectral analysis and response matrix status - prepared by the IBIS Team	1.0	PDF
PCISIT Science Validation Report - prepared by the IBIS Team	6.0	PDF
PCISIT Data Analysis made easy - prepared by the IBIS Team	--	HTML
<b>JEMX Documents</b>		
JEM-X Analysis User Manual	8.0	PDF HTML
JEMX Cookbook	8.0	HTML
JEM-X Analysis Scientific Validation Report - prepared by the JEM-X Team	5.0	PDF
JEM-X Gain Calibration - prepared by the JEM-X Team	--	HTML
<b>OMC Documents</b>		
OMC Analysis User Manual	7.0	PDF HTML

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### INTEGRAL Helpdesk

The INTEGRAL Helpdesk answers questions from observers about the INTEGRAL mission. This includes questions about proposal submission, observation scheduling, data distribution, data analysis and so on.

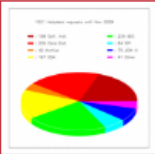
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The E-mail of the INTEGRAL Helpdesk is [inhelp@sciops.esa.int](mailto:inhelp@sciops.esa.int).

There is **only one helpdesk** for all questions related to the INTEGRAL mission, which are answered by the INTEGRAL Science Data Centre (ISDC) or by the INTEGRAL Science Operations Centre (ISOC). The INTEGRAL Helpdesk is **only based on electronic mail** (no phone call, fax or current mail), to allow a proper handling of questions and answers.

When submitting a question to the INTEGRAL Helpdesk:

1. First **check the lists of FAQ** (see below)
2. Send **only one specific question** per e-mail
3. **Summarise your question** in the subject line of your e-mail
4. Your message will receive a **unique identification "helpdesk#nnnnn"** (where "nnnn" is a number) by which we can trace it easily. Please leave this identification (exactly as it is) in the subject line of any follow-up question.
5. In general, **don't acknowledge reception** of an answer. That's very kind for usual e-mail exchanges, but here it would be considered as a follow-up of the initial request, thus increasing the work load of the support team.



### Frequently Asked Questions (FAQ)

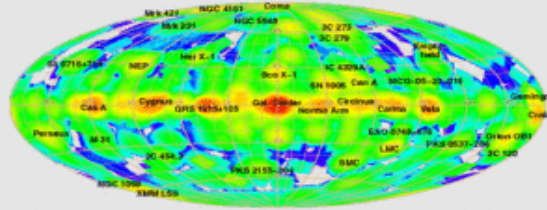
There are two lists of **frequently asked questions (FAQ)** maintained at the ISOC and at the ISDC. The **ISOC FAQ list** includes questions concerning proposal submission, observation scheduling and data rights, while the **ISDC FAQ list** includes questions related to the INTEGRAL archive, data format, data distribution and data analysis software. Please, have a look at these lists before sending your request to the INTEGRAL Helpdesk to check if there is already an answer to your question.





# Access to High Level Data Products of Publication Quality

## A Demo



<http://www.isdc.unige.ch/sfdemo>

▼ Query parameters

Source name:

or RA DEC [degrees]:

Time interval:   MJD

- INTEGRAL JEM-X
- SWIFT BAT
- INTEGRAL ISGRI
- INTEGRAL PICsIT
- INTEGRAL SPI
- INTEGRAL SPI ACS
- HEGRA


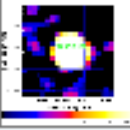
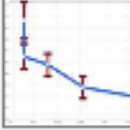
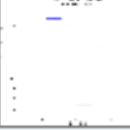
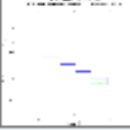


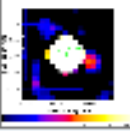
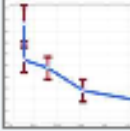
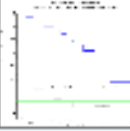
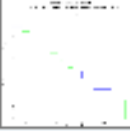

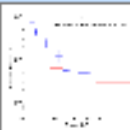

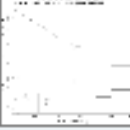
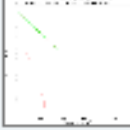


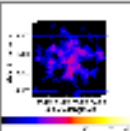
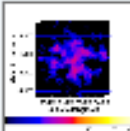
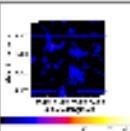
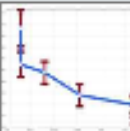
Sky image

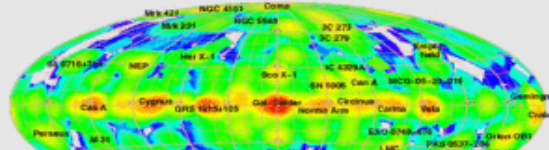
Lightcurve with bin size

Energy band [keV]:

Spectrum

## Science products

 <p><b>INTEGRAL JEM-X</b> 3 - 35 keV ISDC</p>	<p>5.5-25.9 keV</p>  <p>PNG FITS</p>	<p>5.5-25.9 keV</p>  <p>TXT FITS</p>	<p>Counts</p>  <p>PNG PHA ...</p>	<p>Photons</p>  <p>PNG PHA PS RMF ARF &lt;</p>	<ul style="list-style-type: none"> <li>&gt; <a href="#">About JEM-X</a></li> <li>&gt; <a href="#">Analysis software</a></li> <li>&gt; <a href="#">Archive data</a></li> </ul>
 <p><b>SWIFT BAT</b> 15 - 150 keV BAT</p>	<p><b>Data not available.</b></p>				<ul style="list-style-type: none"> <li>&gt; <a href="#">About BAT</a></li> <li>&gt; <a href="#">Analysis software</a></li> <li>&gt; <a href="#">Archive data</a></li> </ul>
 <p><b>INTEGRAL ISGRI</b> 13 keV - 1 MeV ISDC</p>	<p>17.3-80.0 keV</p>  <p>PNG FITS</p>	<p>17.3-80.0 keV</p>  <p>TXT FITS</p>	<p>Counts</p>  <p>PNG PHA ...</p>	<p>Photons</p>  <p>PNG PHA ...</p>	<ul style="list-style-type: none"> <li>&gt; <a href="#">About ISGRI</a></li> <li>&gt; <a href="#">Analysis software</a></li> <li>&gt; <a href="#">Archive data</a></li> </ul>
 <p><b>INTEGRAL PICsIT</b> 200 keV - 6 MeV ISDC</p>	<p>Counts</p>  <p>PNG PS</p>				<ul style="list-style-type: none"> <li>&gt; <a href="#">About PICsIT</a></li> <li>&gt; <a href="#">Analysis software</a></li> <li>&gt; <a href="#">Archive data</a></li> </ul>
 <p><b>INTEGRAL SPI</b> 20 keV - 8 MeV ISDC</p>	<p>Counts</p>  <p>PNG PHA ...</p>	<p>Photons</p>  <p>PNG PHA ...</p>			<ul style="list-style-type: none"> <li>&gt; <a href="#">About SPI</a></li> <li>&gt; <a href="#">Analysis software</a></li> <li>&gt; <a href="#">Archive data</a></li> </ul>
 <p><b>INTEGRAL SPI ACS</b> 80 keV - 8 MeV ISDC</p>	<p><b>Data not available.</b></p>				<ul style="list-style-type: none"> <li>&gt; <a href="#">About SPI</a></li> </ul>
 <p><b>HEGRA</b> 0.5 - 100 TeV</p>	<p>0.5-3 TeV</p>  <p>PNG FITS</p>	<p>0.5-100 TeV</p>  <p>PNG FITS</p>	<p>5-100 TeV</p>  <p>PNG FITS</p>	<p>0.5-100 TeV</p>  <p>FITS TEXT</p>	



## GRS 1915+105

GRS 1915+105 or V1487 Aquilae is an X-ray binary star system which features a regular star and a black hole. It was discovered on August 15, 1992 by Granat. "GRS" stands for "GRANAT source", "1915" is the right ascension (19 hours and 15 minutes) and "105" is declination in units of 0.1 degree (i.e. its declination is 10.5 degrees). The binary system lies 11,000 parsecs away in Aquila. GRS 1915+105 is the heaviest of the stellar black holes so far known in the Milky Way Galaxy, with 10 to 18 times the mass of the Sun. It is also a microquasar, and it appears that the black hole may rotate at 1,150 times per second.

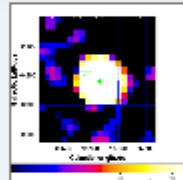
<b>RA</b>	288.7983	» <a href="#">SIMBAD</a>
<b>DEC</b>	10.9456	» <a href="#">ADS</a>
		» <a href="#">Wikipedia</a>

## Science products



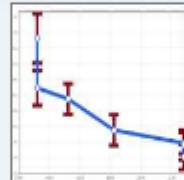
**INTEGRAL  
JEM-X**  
3 - 35 keV  


5.5-25.9 keV



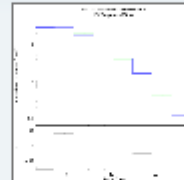
[PNG](#) [FITS](#)

5.5-25.9 keV



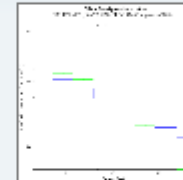
[TXT](#) [FITS](#)

Counts



[PNG](#) [PHA](#) ...

Photons




[PNG](#) [PHA](#)  
[PS](#) [RMF](#) [ARF](#) <

- » [About JEM-X](#)
- » [Analysis software](#)
- » [Archive data](#)



**SWIFT  
BAT**  
15 - 150 keV  

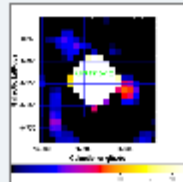

 Data not available.

- » [About BAT](#)
- » [Analysis software](#)
- » [Archive data](#)



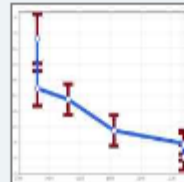
**INTEGRAL  
ISGRI**  
13 keV - 1 MeV  


17.3-80.0 keV



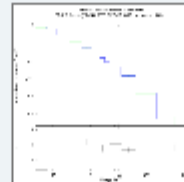
[PNG](#) [FITS](#)

17.3-80.0 keV



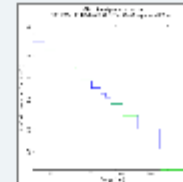
[TXT](#) [FITS](#)

Counts



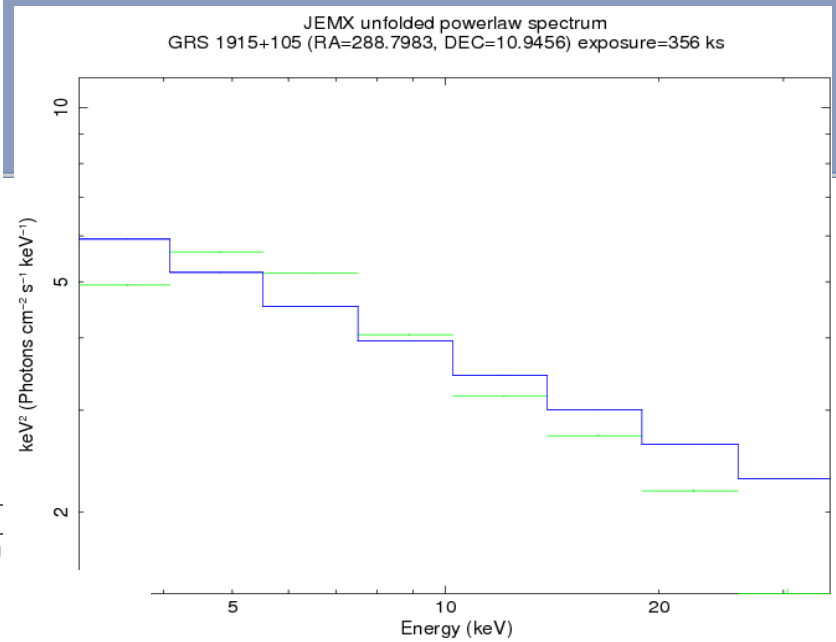
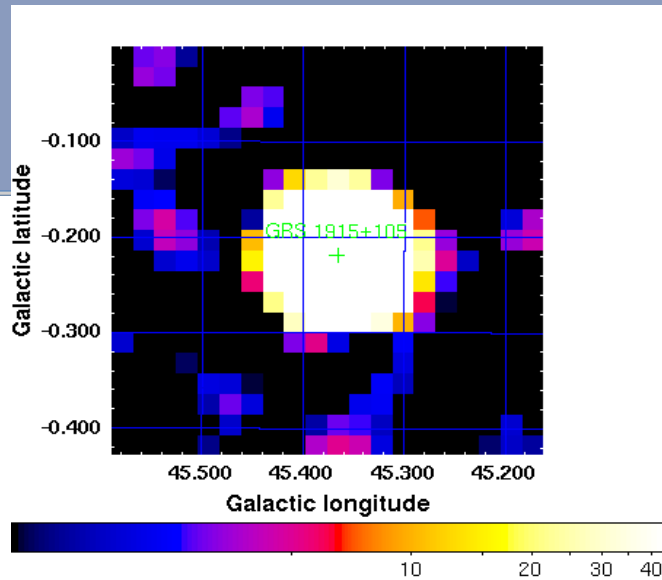
[PNG](#) [PHA](#) ...

Photons



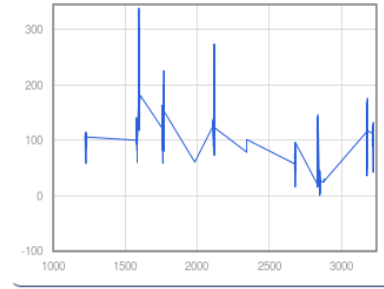
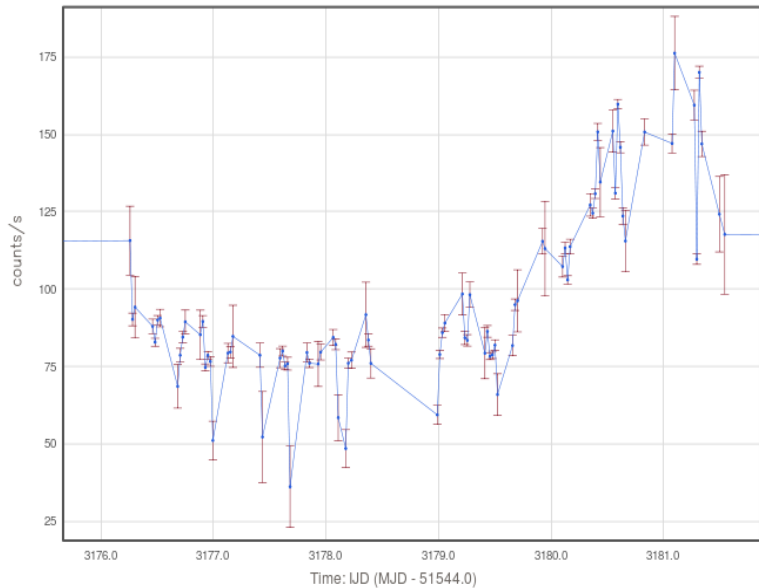
[PNG](#) [PHA](#) ...

- » [About ISGRI](#)
- » [Analysis software](#)
- » [Archive data](#)



### GRS 1915+105

INTEGRAL JEM-X (5.5-25.9 keV)



#time [IJD] #	flux	error	effective bin size [sec]
1223.7945017	104.195875	3.999864	2201
1223.8213651	102.527004	2.148349	2201
1223.8482401	106.349466	2.048728	2202
1223.8751151	82.790124	3.803031	2200
1223.9019785	111.026728	1.742260	2200
1223.9288304	106.885157	1.089603	2200
1223.9556822	101.401789	1.139992	2201
1223.9825457	115.122302	1.583156	2201
1224.0093975	64.058573	3.624525	2200
1224.0363998	113.099266	4.068203	2200
1224.0632517	104.834569	2.145118	2201
1224.0901151	106.733035	2.024688	2201
1224.5082980	101.657063	1.051394	2226
1224.5352540	103.396758	1.249822	2200
1224.5621753	105.558494	1.080910	2201
1224.5889924	105.971163	1.042491	2200
1224.6159137	104.550339	0.869931	2201
1224.6492818	97.863112	0.845267	3332
1224.6755086	97.042309	1.362438	1201
1224.7027887	101.535681	0.884739	3228
1224.7355318	102.665988	1.121801	2201
1224.7624646	107.172737	1.078212	2201
1224.7892818	107.297023	1.044730	2200
1224.8162031	105.613395	0.882731	2201
1224.8430202	101.324429	1.031103	2200
1224.8699415	105.090697	1.132519	2201





▼ Query parameters

Source name:  for example Eta Carinae

or RA DEC [degrees]:

Time interval:

INTEGRAL JEM-X  
  SWIFT BAT  
  INTEGRAL ISGRI  
  INTEGRAL PICsIT  
 INTEGRAL SPI  
  INTEGRAL SPI ACS  
  HEGRA

Sky image  
 Energy band [keV]:   
 Lightcurve with bin size    
 Min - Max:    
 Spectrum

use huge time bin size

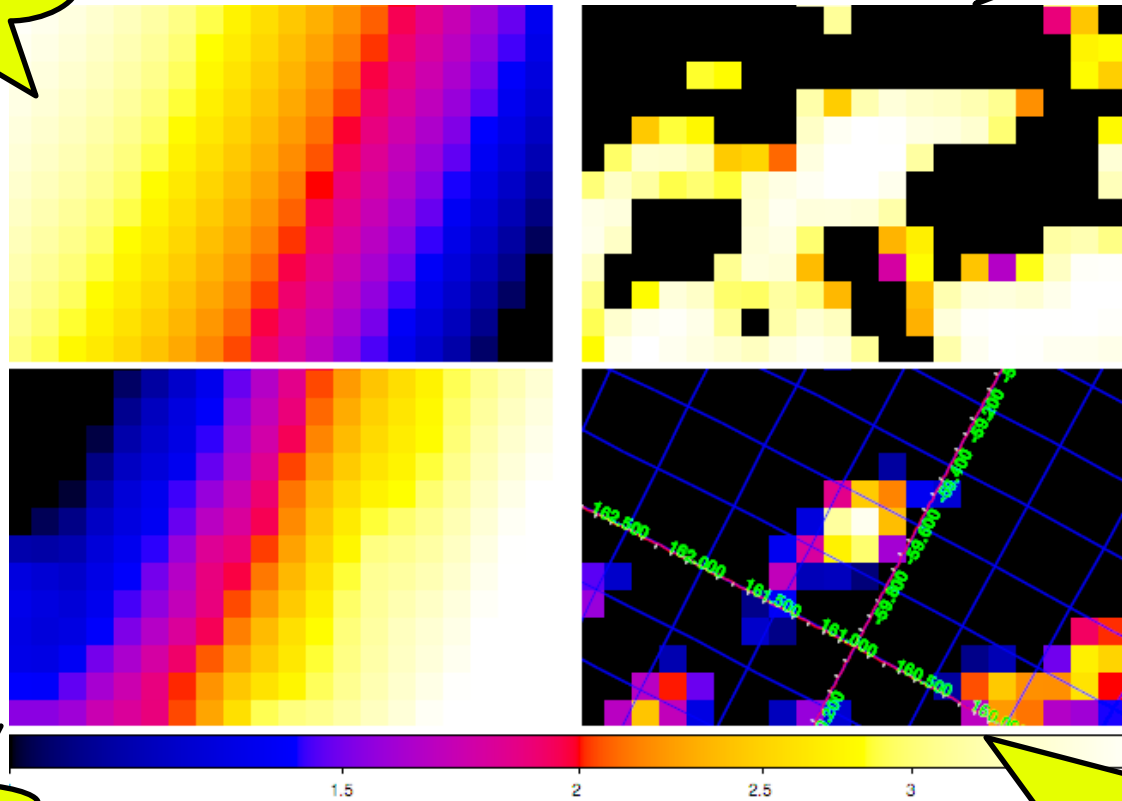
get average flux

```
#time [IJD]    flux          error    effective bin size [sec]
#
1901.1980718  0.179777    0.048505  1915631
```

## Eta Carinae (partial data set)

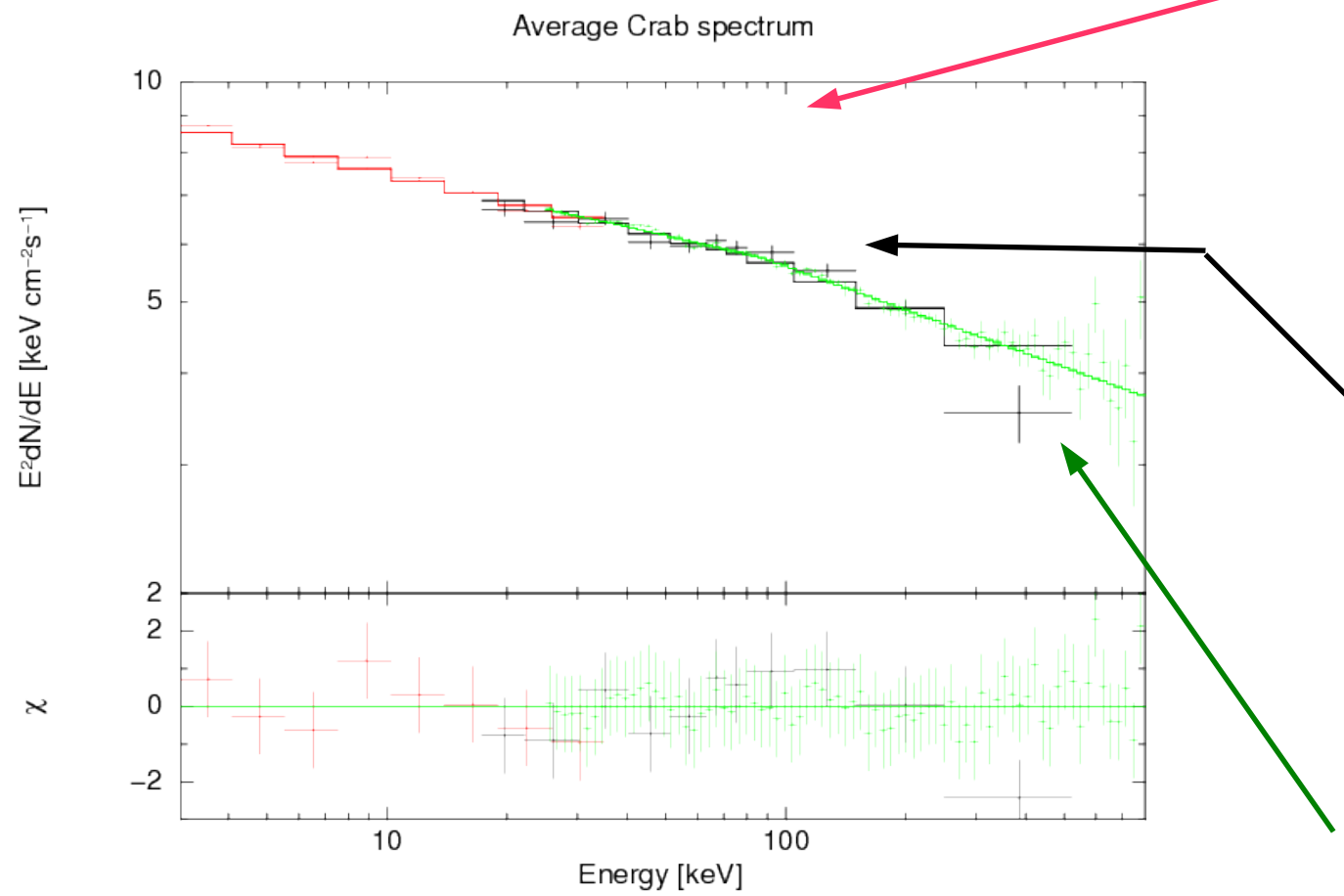
Exposure map  
from 380 ks to  
450 ks

Intensity map



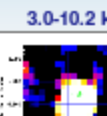
Variance map

Significance map (max: ~4)  
marginal detection due to limited dataset

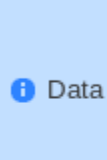


## Science products

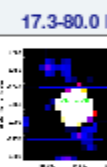
**INTEGRAL JEM-X**  
3 - 35 keV  
ISDC



**SWIFT BAT**  
15 - 150 keV  
INAF



**INTEGRAL ISGRI**  
13 keV - 1 MeV  
ISDC



**INTEGRAL PICsIT**  
200 keV - 6 MeV  
ISDC



**INTEGRAL SPI**  
20 keV - 8 MeV  
ISDC

