

ISDC for the INTEGRAL USERS GROUP

Carlo Ferrigno (ISDC)

ESTEC, 7-8 November 2018

Orgnanization status

- Swiss funding for 2018: approved with minimal direct funding (1 FTE). Operations guaranteed.
- Funding for 2019 asked and expected at the same level after SPC decision.
- Manpower allocation: $\frac{1}{2}$ operator, $\frac{1}{2}$ Savchenko. Contribution from infrastructure (CDCI project, led by S. Paltani) for web mastering, DB support and web-analysis. Contribution from ESA for operations.
- Synergies with other projects and past savings allow us to work. Still missing $\frac{1}{2}$ Savchenko in 2019.
- Operator retires in May 2019, very difficult to replace him.

Quick look analysis of INTEGRAL data

- 4 GRB in the IBIS FOV in 2018 (IBAS energy calibration not updated, yet ~200 GRB/year in SPI ACS. Used for IPN triangulation.
- Inform all PIs of data rights in case of problems or relevant serendipitous sources (no data rights).
- 28 ATeLs and additional 2 GCNs related to INTEGRAL discoveries in 2018
- Four new INTEGRAL source, one of which the 22nd AMSP

IBAS energy calibration with OSA11

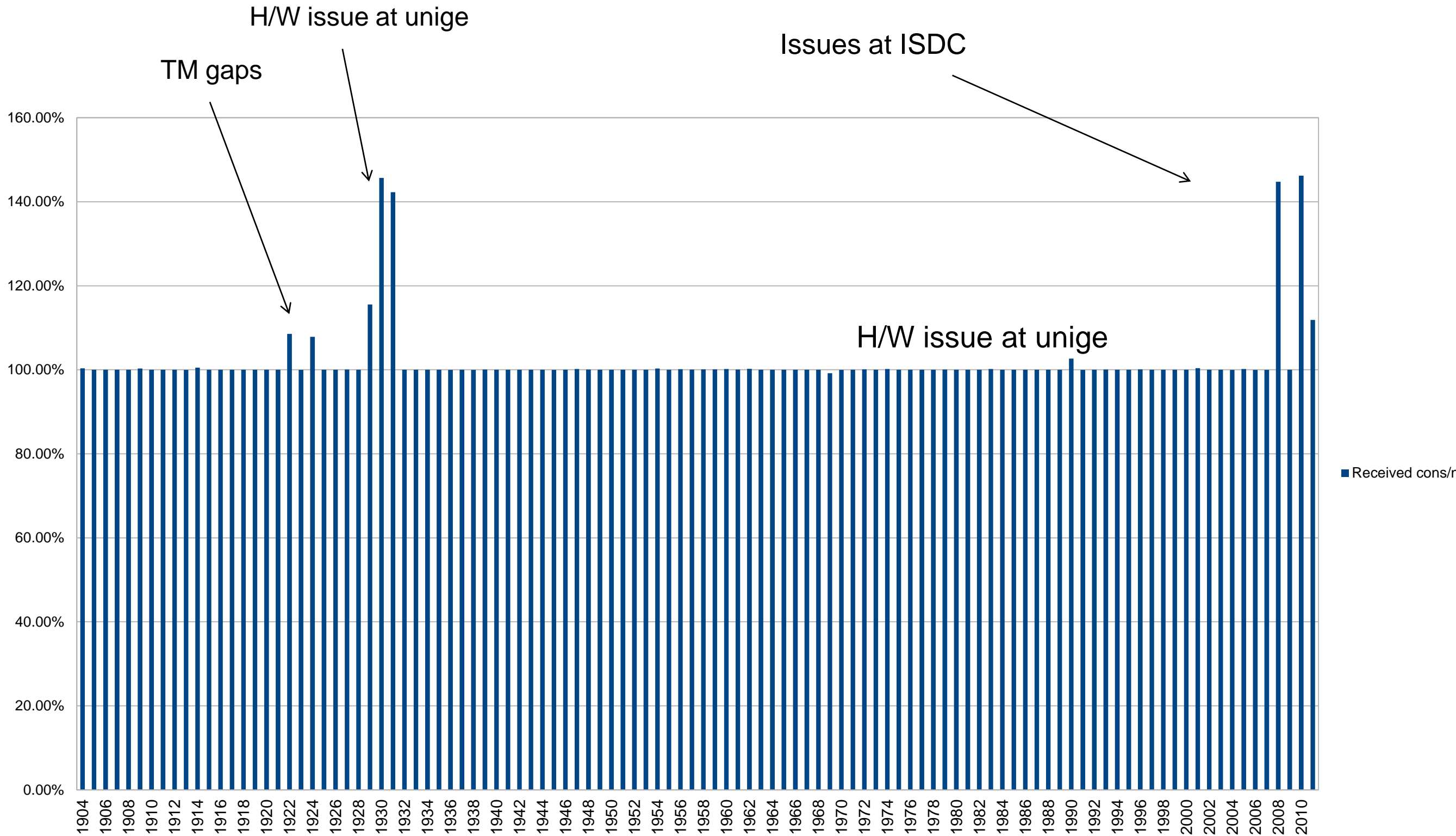
- Outdated energy calibration in IBAS probably causes under detection
- Diego Gotz implemented an update to IBAS code
- Small-scale tests functional tests have been performed
- In November, larger scale tests will be done
- Introduction to operations will be discussed and planned after the tests

ISDC Operations/data distribution

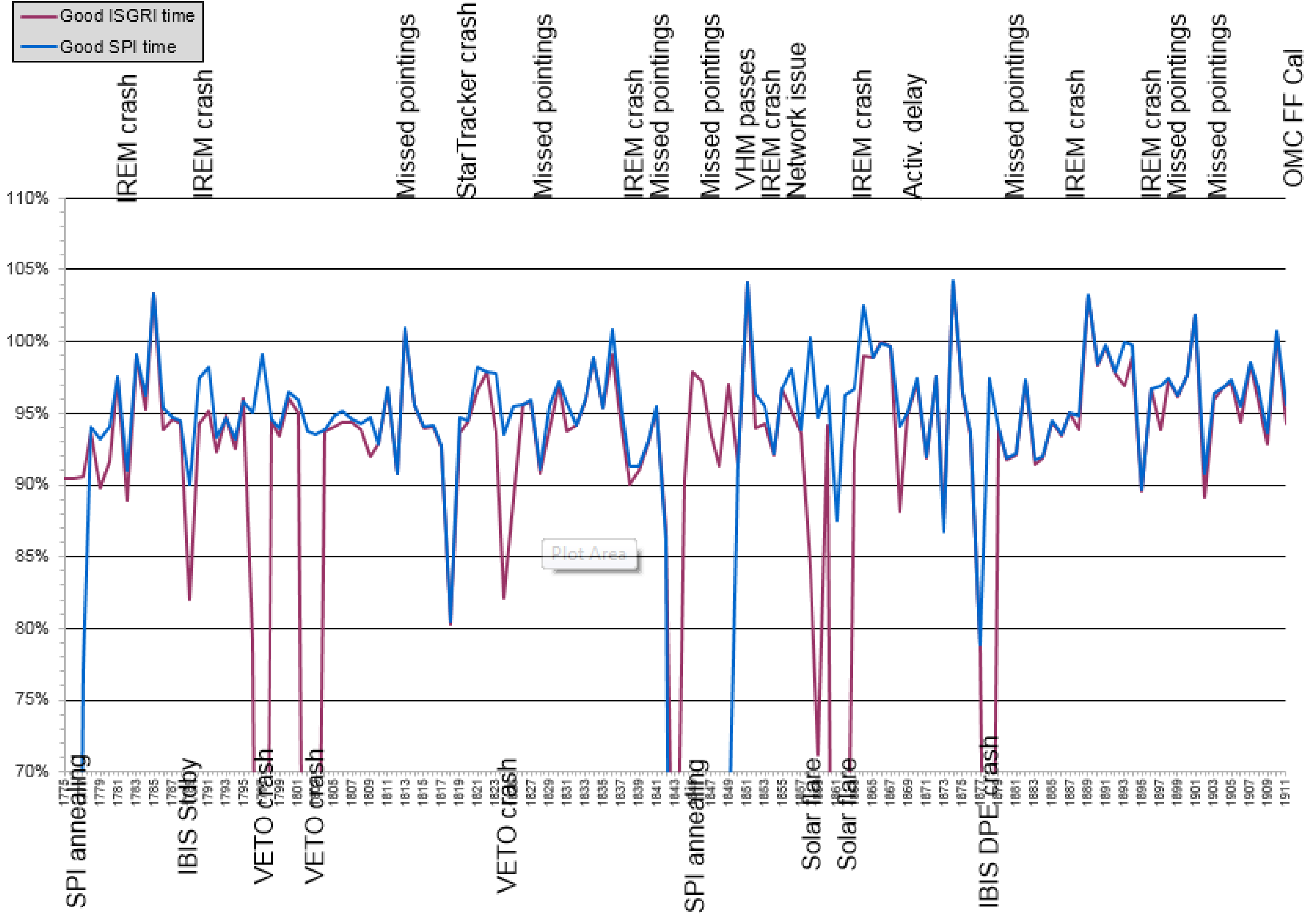
- NRT data are available within 3 hours. Smooth processing.
- Page to distribute data from AO13-AO15, public for serendipitous science. Handled Russian peculiarity.
- JEM-X off-line energy calibration not always used in CONS due to variable delivery time: need of OSA energy reconstruction step. NRT data for JEM-X2 are not always available due to energy reconstruction.
- SPI gain coefficients monitored. Implemented automatic checks
- Occasional gaps in NRT telemetry due to hardware failure of the University infrastructure supporting the data transfer (switch).
- Not feasible to prepare a revision 4 of the archive with updated calibration with the present manpower

Telemetry

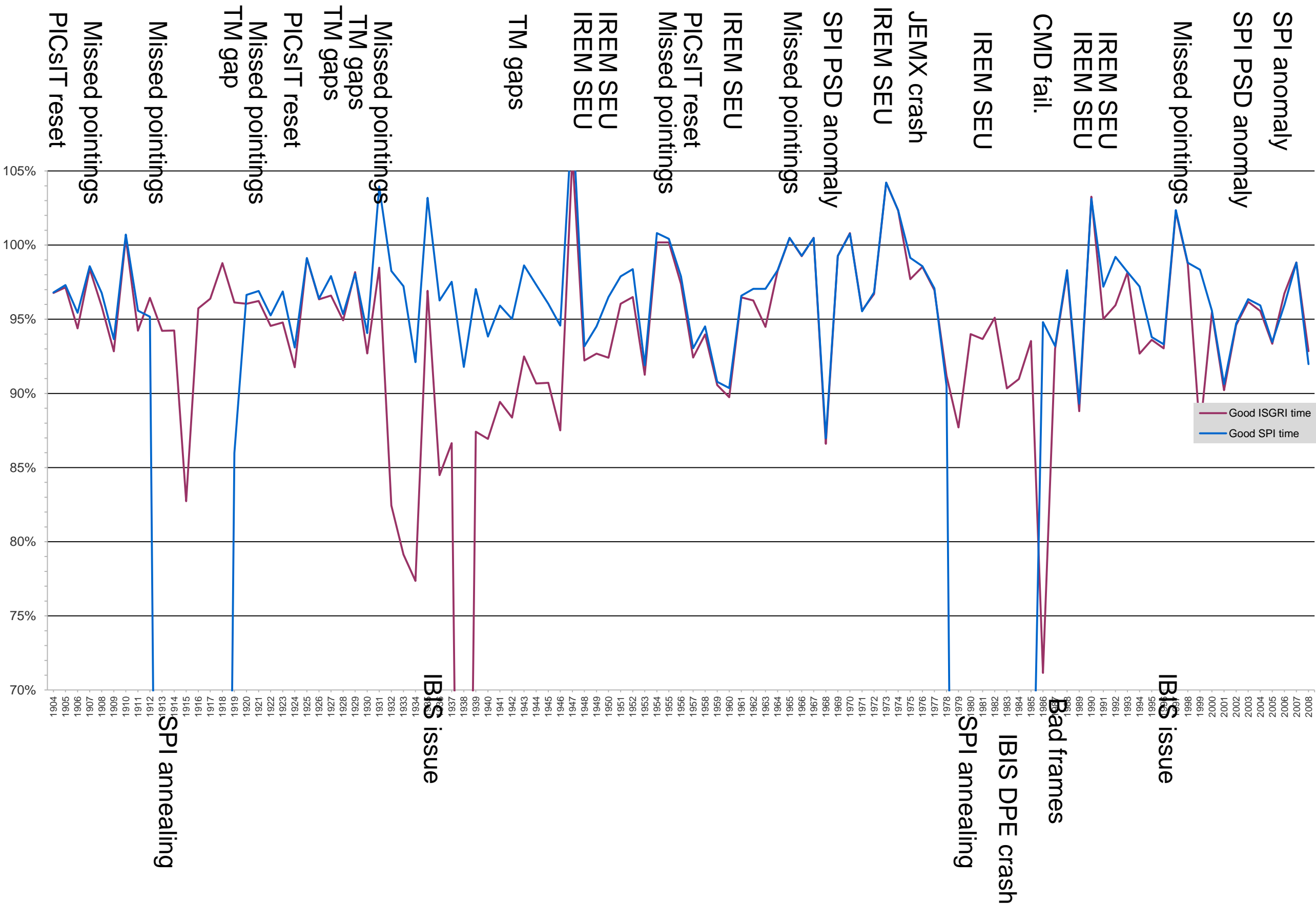
CONS / NRT, rev. 1904 - 2011



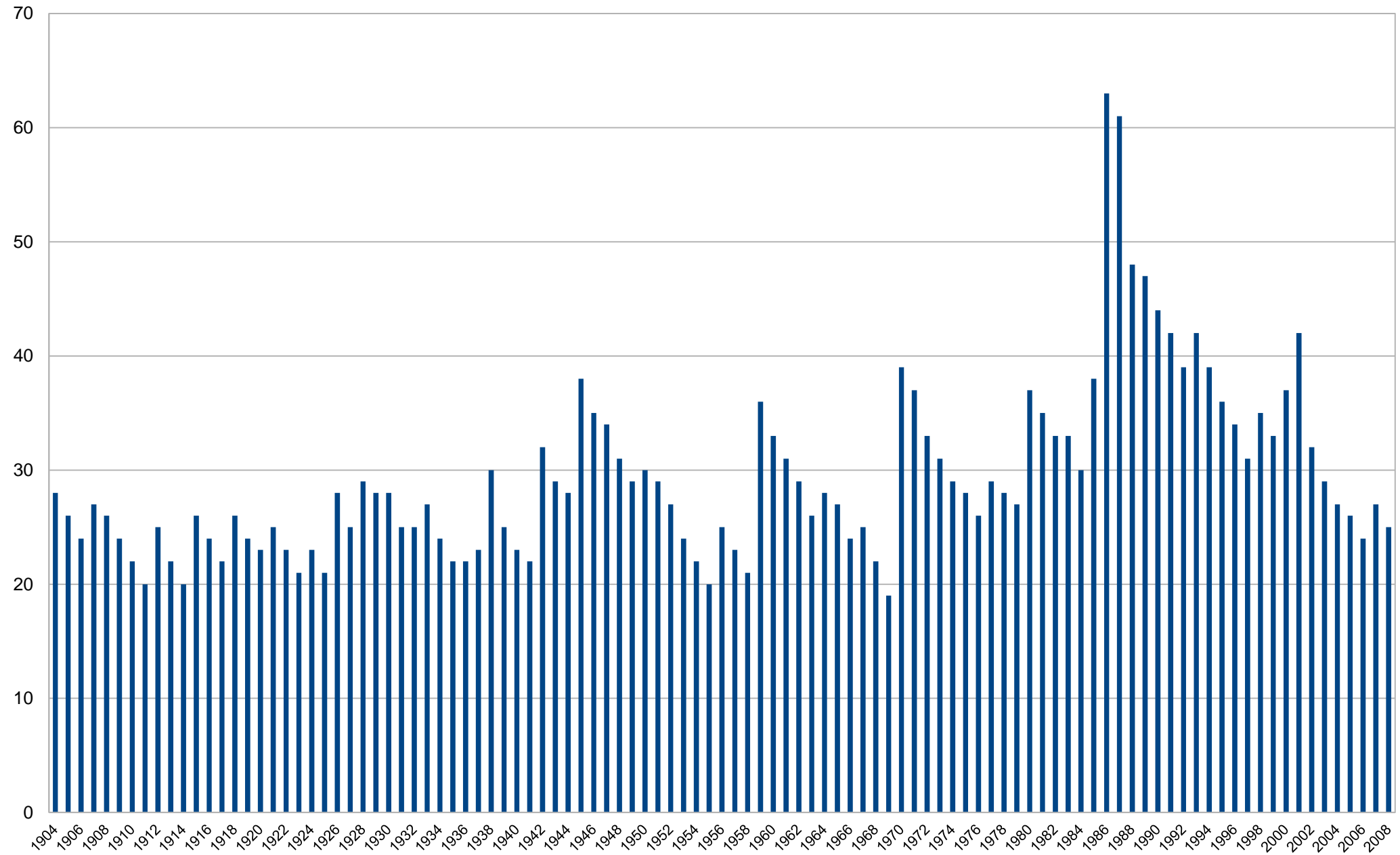
Operations: Good times 1775 – 1911



Operations: Good times 1904 – 2008

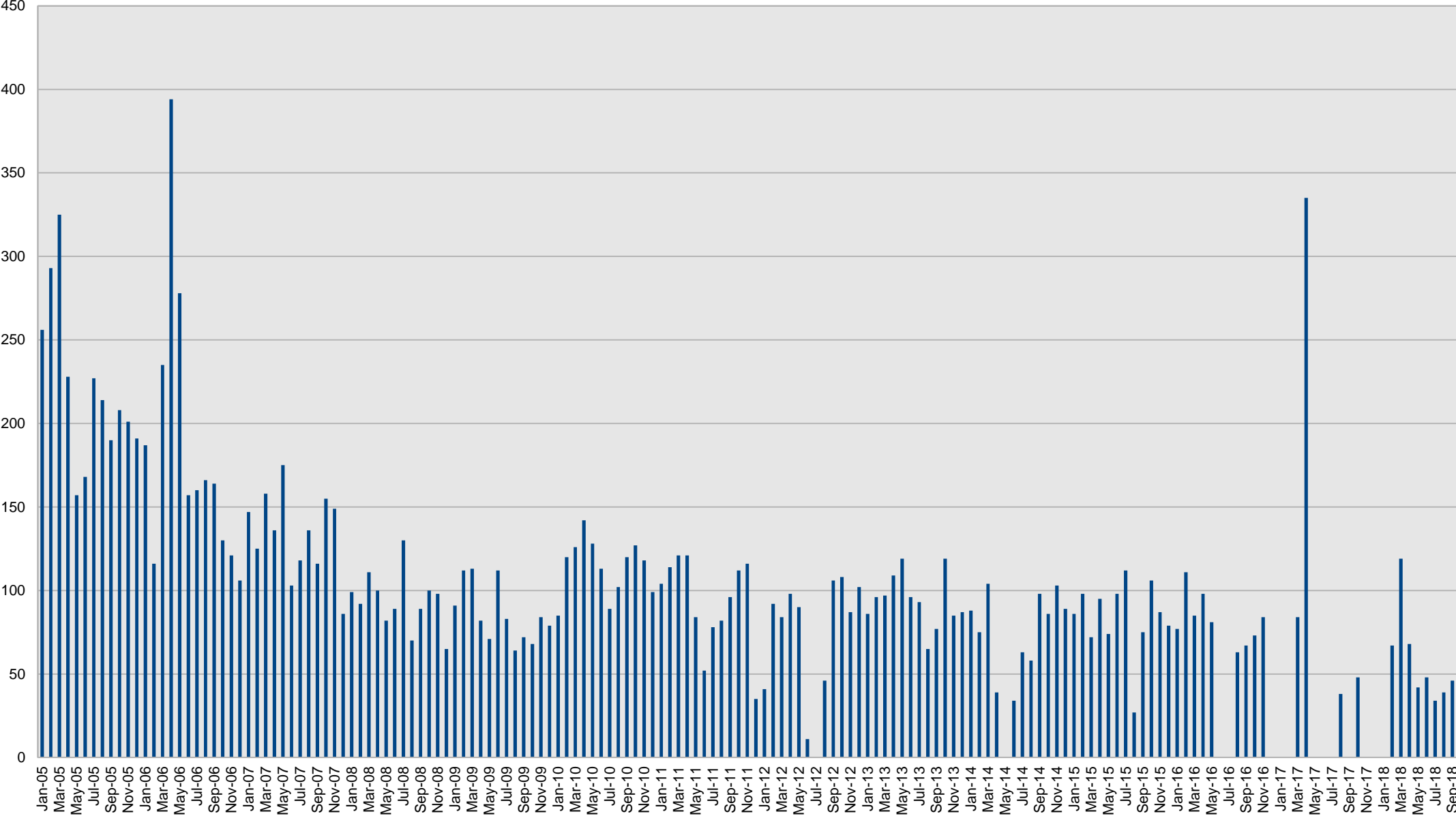


Delay between observation and distribution rev. 1904 - 2008



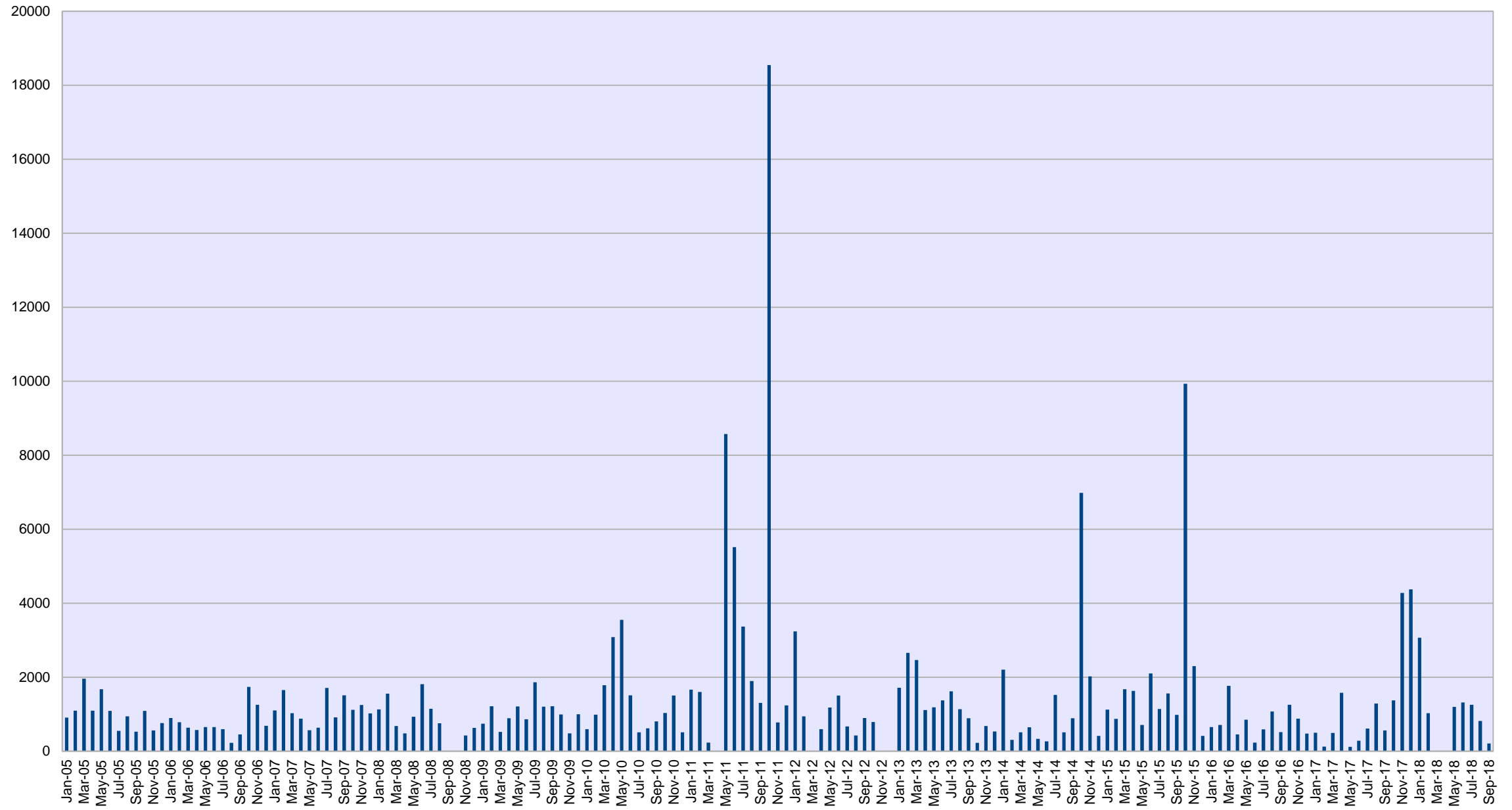
Browse unique visitors

Number of visitors



FTP access statistics

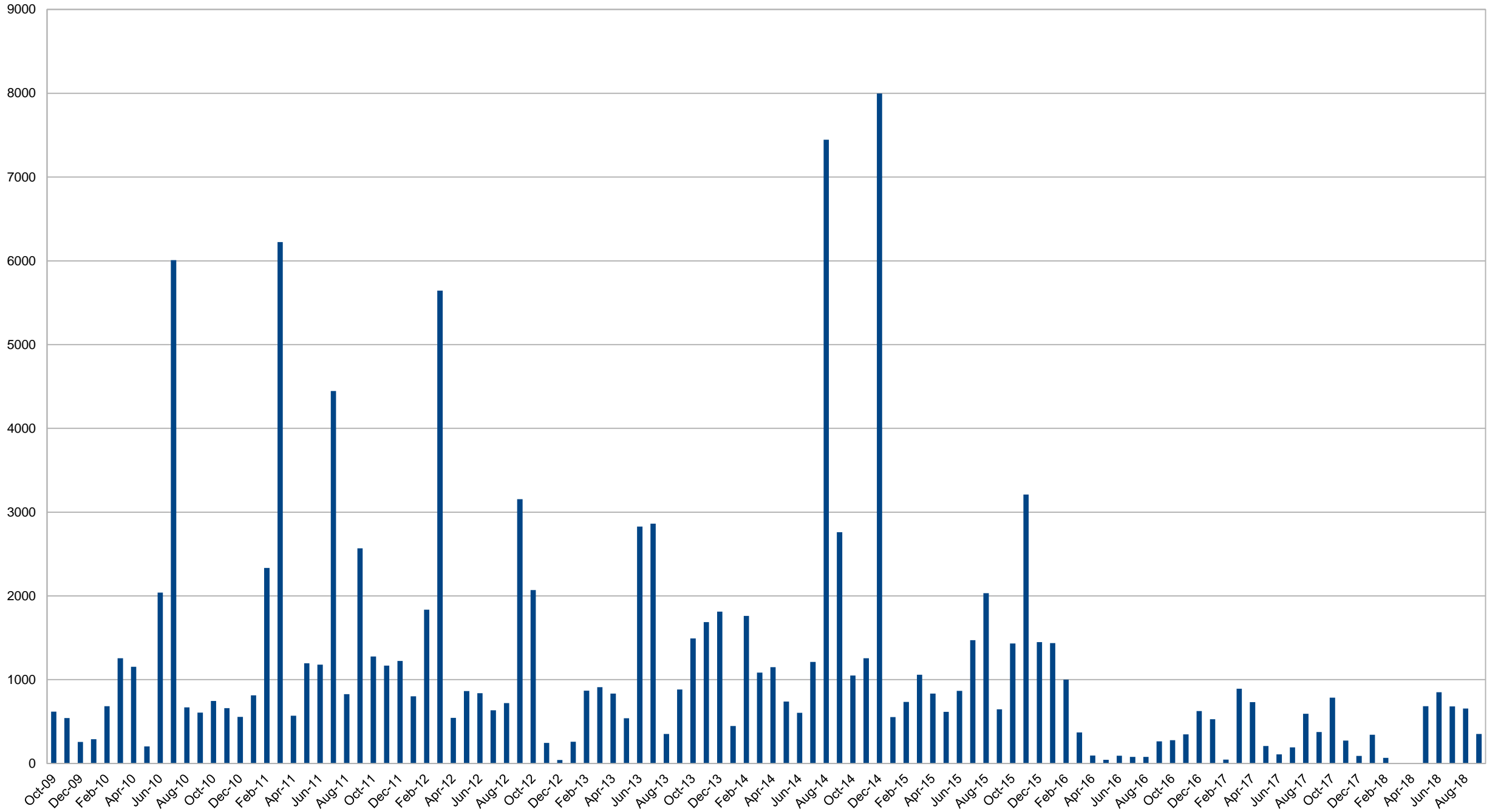
Bandwidth (GB)



Rsync

Bandwidth (GB)

■ Rsync



INTEGRAL SPI-ACS public data service

In 2011, a public service was set up to promptly provide SPI-ACS data with the best timing accuracy

It was extensively used for years by IPN and Konus colleagues

Since 2015, Fermi/GBM team used the service to verify their detections and challenge SPI-ACS

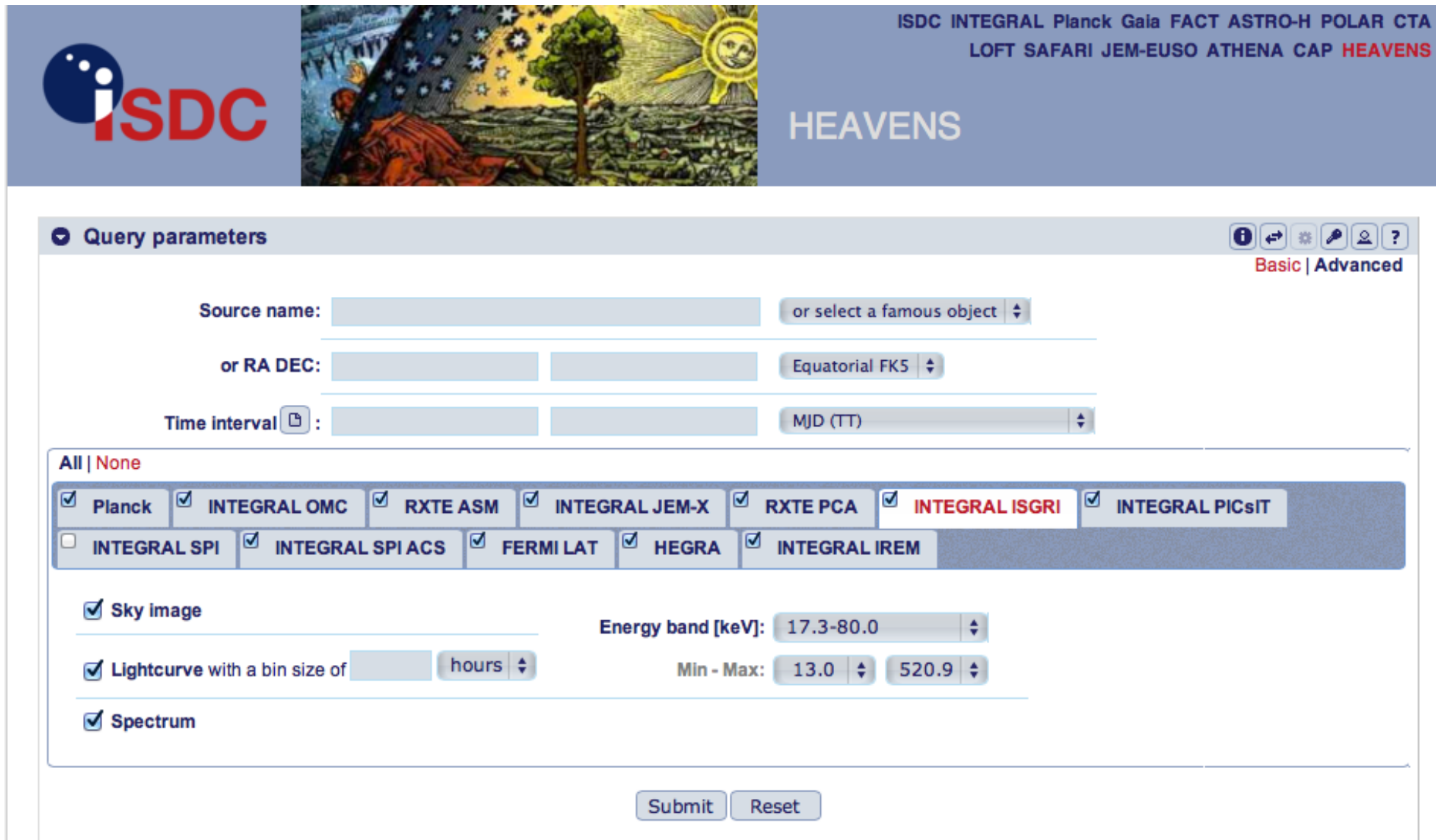
Several other groups started to use it. In total >100 Gb has been served.

IPN format SPI-ACS light curve	<input type="text" value="2008-03-19T06:12:46 200"/>	<input type="button" value="Submit"/>
IPN format INTEGRAL ephemeris	<input type="text" value="2008-03-19T06:12:46"/>	<input type="button" value="Submit"/>
Plot SPI-ACS light curve	<input type="text" value="2008-03-19T06:12:46 200"/>	<input type="button" value="Submit"/>
INTEGRAL Attitude	<input type="text" value="2008-03-19T06:12:46"/>	<input type="button" value="Submit"/>
INTEGRAL HK light curves	<input type="text" value="SPI_VETOGATE 2008-03-19"/>	<input type="button" value="Submit"/>

Try using the [script](#) to access the lightcurves

RESTful service, providing various public INTEGRAL data as well as auxiliary information

High level quick-look products, HEAVENS



The screenshot shows the HEAVENS web interface. At the top, there is a header with the ISDC logo on the left, a central image of a landscape with a tree and a sun, and a list of instruments on the right: ISDC, INTEGRAL, Planck, Gaia, FACT, ASTRO-H, POLAR, CTA, LOFT, SAFARI, JEM-EUSO, ATHENA, CAP, and HEAVENS. Below the header, the word "HEAVENS" is displayed. The main content area is titled "Query parameters" and includes several input fields: "Source name" with a dropdown for "or select a famous object", "or RA DEC" with two input boxes and a dropdown for "Equatorial FK5", and "Time interval" with two input boxes and a dropdown for "MJD (TT)". There are also icons for help, search, and user profile. Below the input fields, there are tabs for "All" and "None". A row of instrument checkboxes is shown, including Planck, INTEGRAL OMC, RXTE ASM, INTEGRAL JEM-X, RXTE PCA, INTEGRAL ISGRI (highlighted in red), and INTEGRAL PICsIT. Below this, there are checkboxes for "Sky image", "Lightcurve with a bin size of" (with a dropdown for "hours"), and "Spectrum". The "Energy band [keV]" is set to "17.3-80.0" with a dropdown, and "Min - Max" is set to "13.0" and "520.9" with dropdowns. At the bottom, there are "Submit" and "Reset" buttons.

- Development on hold
- Used OSA9
- Project to insert OSA11 data

~60 single accesses per month

Routine

- Routine update of IC files
- monitoring of SPI gain at each revolution
- SPI gain coefficients updated in 2018

Time-domain astronomy

- MoU with Antares
- MoU with IceCube for non-public alerts
- LVC will issue public notices

- Implemented the real-time dump of SPI-ACS stream to be used in fast triangulation with GBM and IPN satellites.
- Developing an API to access real-time services via python notebook and quickly react to alerts
- System of “burst advocates” : a teleconf will take place on 19 November to resume activities after writing of (ambitious) requirements in spring

OSA 11 and catalog 41

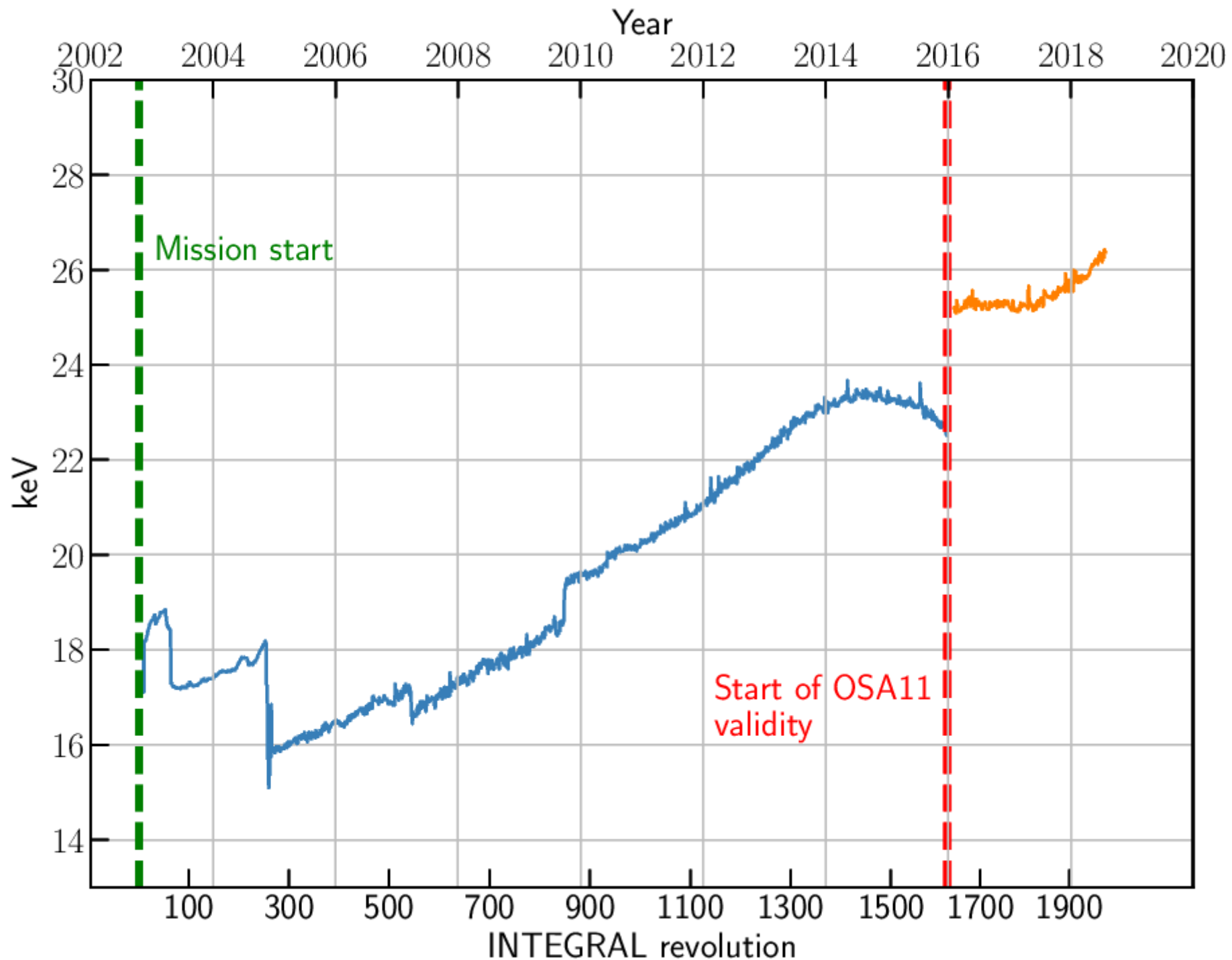
- Released catalog v. 41 in June 2018
- OSA 11 was released on 19 October 2018
 - 4 Linux binaries, source code, docker image for portability on all platforms
 - New JEM-X light-curve extraction method with `j_ima_iros`
 - Automatic burst detection in JEM-X
 - SPI: implemented the PE, SE discriminator and tool to stitch spectra in different energy ranges with flatfield background
 - No Updates for OMC

OSA 11 - IBIS

- New ISGRI time-dependent energy calibration introduced as a “dal” library
- Calibration files such as LUT2 are variable with time
- Calibration files correct the polarization effect causing count-rate drift within single revolutions
- Detector efficiency and background are time dependent
- Responses include redistribution (RMF) and effective area (ARF) over 256 energy channels
- Responses are available **from rev 1627 (2016)** and have been validated **above ~30 keV**
- Automatic rebinning of matrix and spectra from parameters for ISGRI e.g. logarithmic binning from 25 to 200 keV:
IBIS_nregions_spe=1,
IBIS_energy_boundaries_spe="25 200",
IBIS_nbins_spe=-20

Evolution of low threshold

- Due to drift of gain, the energy scale is much more compressed and signal starts at ~ 25 keV rather than at ~ 15 keV as at the mission start



User manuals

- We updated the User manuals and the installation guide
- We updated the “known issues” in collaboration with instrument teams.
- ISDC did not and (will not) update any inter-calibration document or advanced analysis guide etc.
- No additional documents are currently foreseen

OSA downloads

(since release and until 5 November)

- 20 binary
- 9 source code (often the same user as for binaries)
- 18 test data
- 10 catalog bundles
- 326 pulls of the docker image (not possible to trace provenance on dockerhub)

S/W, catalog, and calibration future activities

- ~200 more revolutions in January 2019 to cover from rev ~1400.
- Aim at completing the mission life time with ~100 revolution/month (or larger chunks) possibly within 2019 (However, it depends on financial support for the key person and his involvement in other tasks)
- No document on ISGRI calibration is foreseen at the moment
- Routine update of SPI, OMC, and JEM-X calibration files
- Catalog 42 with new sources and correction of some errors by March 2019

Long-term preservation: from ISDC to CDCl

- Raw data are not enough, we need to have the ability to run a streamlined analysis and easily access high-level data.
- Unige has obtained financial support for a **common data center infrastructure (CDCl)**
- As part of this, we are making **a pilot project** for an online tool for INTEGRAL data analysis and data preservation
- It will be extended to other missions at UNIGE (e.g, Polar)

Offline Data Analysis (from OSA to ODA)

- We run OSA executable from a web tool (only IBIS/ISGRI for now and 50 scw per chunk).
- We will have a public version for public data (~1-year old)
- We have a private internal version with access to NRT data for operations. EX: Galactic bulge of rev 2016

The screenshot displays the 'Online Data Analysis' web interface for INTEGRAL ISGRI. The browser address bar shows the URL: <https://analyse-staging-1.1.reproducible.online/astrooda/astrooda>. The interface includes the following fields and options:

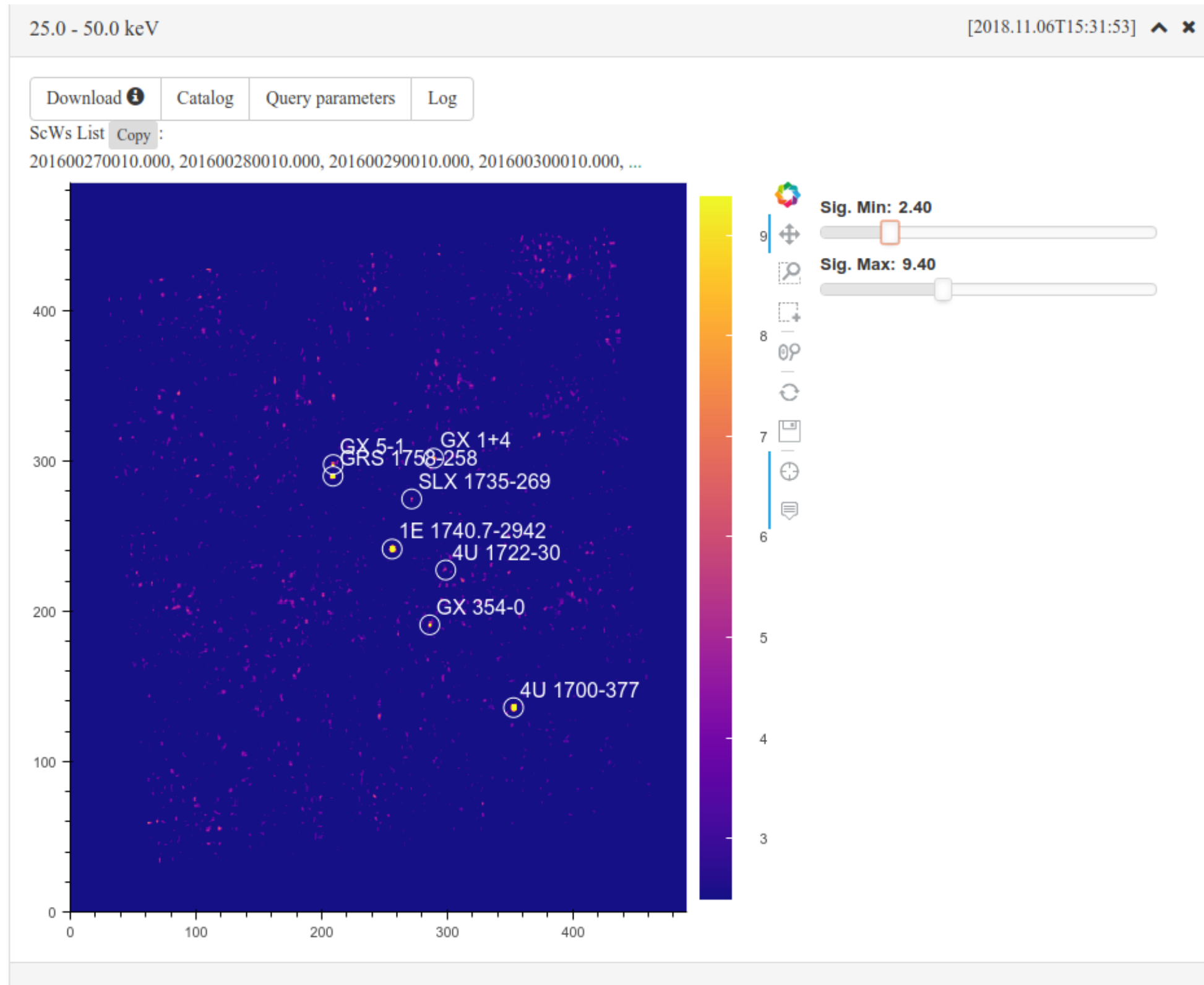
- Object name ***: Input field containing 'Sgr a*' with a 'Resolve' button.
- RA ***: Input field containing '266.416817' (The right ascension).
- Dec ***: Input field containing '-29.007825' (The declination).
- Start time ***: Input field containing '2018-10-29T00:44:57'.
- End time ***: Input field containing '2018-10-29T04:26:46'.
- Time unit**: Dropdown menu set to 'ISO/ISO'.

The 'INTEGRAL ISGRI' section contains 'Instrument query parameters':

- OSA Version**: Dropdown menu set to 'OSA11.0'.
- Radius**: Input field containing '15'.
- Use Science Windows - ScWs**: Radio buttons for 'No' (selected), 'List', and 'File'. Note: 'Maximum number of ScWs is 50.'
- Energy Min ***: Input field containing '25.0' (The minimum of the energy band).
- Energy Max ***: Input field containing '50.0' (The maximum of the energy band).
- Query Type**: Dropdown menu set to 'Real' (Select query type).
- Detection Threshold**: Input field containing '5.0' (Output catalog significance threshold).

ODA v 1.0 - Imaging

- Possible to make images in one energy range



ODA 1.0 - Central role of the catalog

- Easy handling of source catalog.
- You can delete, add sources found from imaging
- You can load a catalog from a file.

Source : Sgr a* - Image catalog

Select all Deselect all New Edit Delete

Showing 1 to 8 of 8 entries

Search:

	src names	significance	ra	dec	NEW SOURCE	ISGRI FLAG	FLAG	ERR RAD
<input type="checkbox"/>	1E 1740.7-2942	39.7975	265.9794	-29.7482	0	2	0	0.0000
<input type="checkbox"/>	4U 1700-377	31.1975	255.9964	-37.8460	0	2	0	0.0003
<input type="checkbox"/>	4U 1722-30	5.4710	261.8883	-30.8019	0	2	0	0.0003
<input type="checkbox"/>	GRS 1758-258	27.0265	270.3057	-25.7378	0	2	0	0.0003
<input type="checkbox"/>	GX 1+4	8.6322	263.0458	-24.7477	0	2	0	0.0003
<input type="checkbox"/>	GX 354-0	10.7631	262.9798	-33.8281	0	2	0	0.0003
<input type="checkbox"/>	GX 5-1	9.7901	270.2689	-25.1035	0	2	0	0.0008
<input type="checkbox"/>	SLX 1735-269	6.0459	264.5713	-26.9941	0	2	0	0.0002

Show 25 entries

Previous 1 Next

Use catalog

ODA 1.0 - Spectra and online fitting

- From the catalog, you get all spectra simultaneously at full 256 channel resolution
- Fit individual spectra and download in fits format

Processing ...

Session : 2a10871c8d4db1429e62d218acd7b2d1 | Job Id : -7594506992834016721

2018.11.06T15:48:58 Status : ready

Data unit		ISGRISpectraSum	ii_spectra_extract	ii_skyimage	ibis_gti	ibis_dead	ISGRIEvents
001	201600270010.000						
002	201600280010.000						
003	201600290010.000						
004	201600300010.000						
005	201600310010.000						
006	201600320010.000						

2018.11.06T15:49:56 done

[More details >](#)

Source : Sgr a* [2018.11.06T15:49:56] ^ x

Query parameters Log

Showing 1 to 10 of 27 entries

Search:

Source Name	Xspec Model	Spectrum
1E 1740.7-2942	powerlaw	Fit
1RXS J175113.3-20121	powerlaw	Fit
4U 1700-377	powerlaw	Fit
4U 1722-30	powerlaw	Fit
Background	powerlaw	Fit
GRS 1758-258	powerlaw	Fit
GX 1+4	powerlaw	Fit
GX 349+2	powerlaw	Fit
GX 354-0	powerlaw	Fit
GX 5-1	powerlaw	Fit

Show 10 entries Previous 1 2 3 N

Source : 4U 1700-377 [2018.11.06T16:23:11] ^ x

Download ⓘ

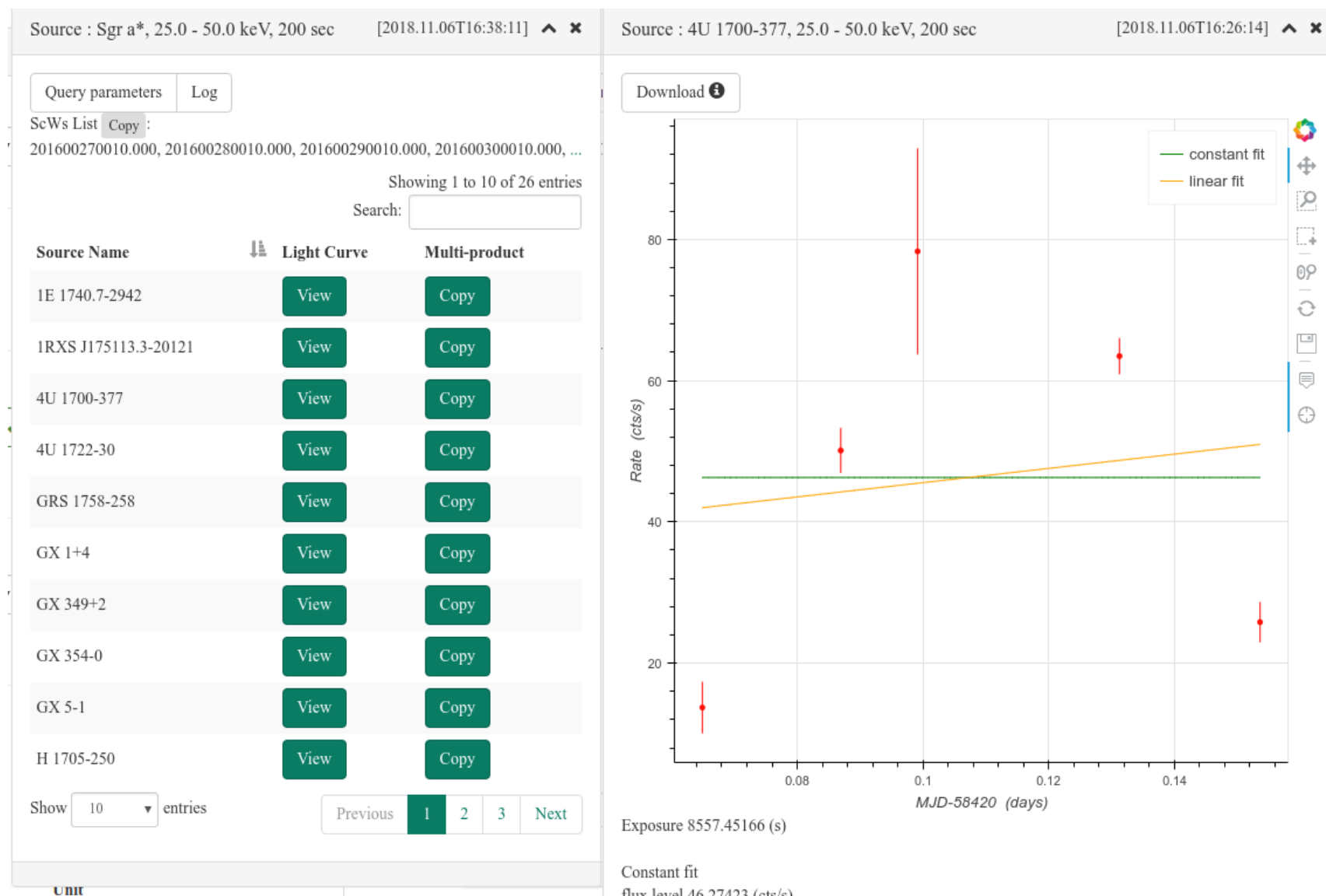
Exposure 4105.984863 (s)
Fit report for model powerlaw

Component	Par name	Value	UnitsError	Range-	Range+
powerlaw	PhoIndex	3.35404	0.17823	3.52918	3.68167
powerlaw	norm	180.31172	97.54068	349.13805	578.22412

dof 104
Chi-squared 131.64611

ODA 1.0 Light curves

- From the catalog, you can create light curves with time bins larger than 10 seconds as for OSA limitations and display them individually
- Here at science window resolution
- Downloaded in OGIP format



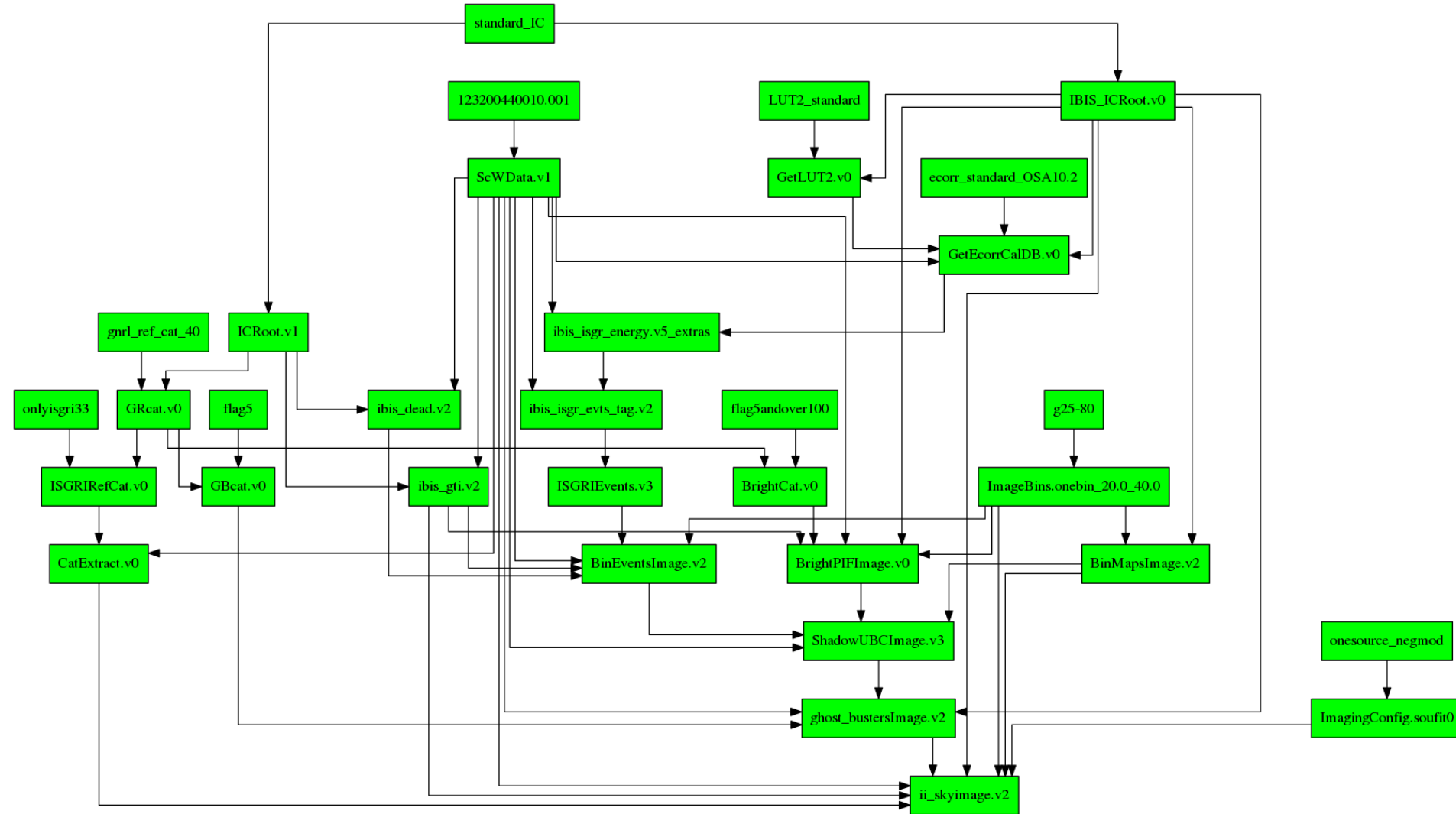
Reproducible and storable

- The system is built with internal cache to save intermediate products.
- The second time you make the same query, results are almost instantaneous.
- Backend can be deployed virtually anywhere, because it is based on a “singularity” cluster, which runs science windows in parallel.
- Singularity is very similar to docker as a principle, it runs virtual machines with OSA inside and passes commands while returning results

ODA 1.0 current limitations

- We have implemented only IBIS/ISGRI exploiting existing work
- We have very limited computing resources and virtually no sysadmin supports (self administrated cluster)
- We need to limit science window number to 50 to avoid overcharge (it can be changed)
- We have very limited human resources (~2 FTEs)
- We are implementing Polar, SPI-ACS and IBIS VETO, while JEMX is on hold

Future plans and wishes



- The current archive of cached data is constructed with a lineage of data and dependencies as in a arborescence, a noSQL database.
- User requests will effectively create an archive of results accessible with a limited latency.
- This analysis is completely reproducible, so for a *legacy archive*, we should create a SQL data base of pre-computed results with active links to the processing. This will allow an easy access to spectra, light curves and images.

A page with all transients

Home Data

INTEGRAL Transients

Time: Class: Instrument:

Class dropdown: FRB, GW, Neutrino
Instrument dropdown: INTEGRAL ISGRI, INTEGRAL JEMX, INTEGRAL SPI-ACS

Name	Instrument	Class	Time
GW150914	INTEGRAL ISGRI	GW	2015-09-14T09:50:45.000000
GW151226	INTEGRAL ISGRI	GW	2015-12-26T03:38:53.000000
GW170104	INTEGRAL ISGRI	GW	2017-01-04T10:11:58.000000
GW170608	INTEGRAL ISGRI	GW	2017-06-08T02:01:16.000000
GW170814	INTEGRAL ISGRI	GW	2017-08-14T10:30:43.000000
GW170817	INTEGRAL ISGRI	GW	2017-08-17T12:41:04.000000
LVT151012	INTEGRAL ISGRI	GW	2015-10-12T09:54:43.000000

Instrument:

INTEGRAL ISGRI

Class:

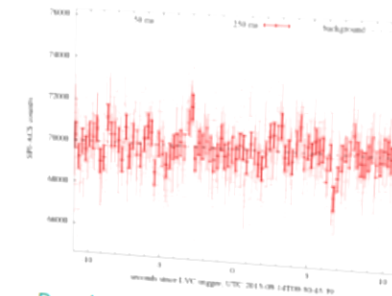
GW

Time:

2017-08-17T12:41:04.000000

Light curves:

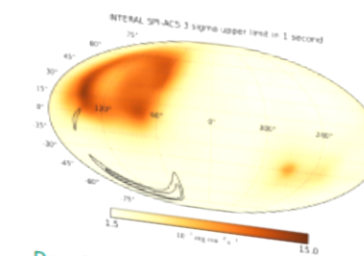
GW170817 light curve



Read more

All sky images:

GW170817 all-sky image



Read more

Localization summaries:

GW170817 localization summary

- For now, a static collection of pages.
- In future, populated dynamically by online analysis.

INTEGRAL conference 2019

<https://www.astro.unige.ch/integral2019/>

- 11-15 February 2019 at Campus Biotech in Geneva
- Co-organized AHEAD workshop on future gamma-ray missions (two half days)
- Fee is 200 CHF per person including lunches
- We have 22 confirmed invited and solicited speakers plus 3 to be confirmed
- 20 November abstract submission deadline
- 4 January inscription/payment deadline
- Limited support for speakers but we will have fee waived for several participants
- Dinner at Ecole hoteliere de Geneve
- Please advertise it, we have a few inscriptions so far !

Venue



→ INTEGRAL LOOKS AHEAD TO MULTI-MESSENGER ASTROPHYSICS

12th INTEGRAL Conference - 1st AHEAD Gamma-ray Workshop

11-15 February 2015 - Campus Biotech, Geneva, Switzerland

Invited Speakers

Maria Brando, Ugo Fusco,
Ralf Faltenbacher, Vincent Fortbery,
Joel Kluwe, Richard Leach,
Andri Karason, Peter Meszaros,
Massimo Paoletti, Frank Paulson,
Julio Pérez García-Berco, Wolfgang
Scheidt, Wafa Sakhir, Thomas Torgler,
and more to be announced.

Scientific Organising Committee

Julian Baumann, Carlos Basso, Tony Bell,
Maria Brando, Susana Casanova, Mark
Côté, David Clark, Felix Fürger, David
Gunn, Gita, Anders Östberg, Helmut
Krauss, Günther Kötzler, Stefan Krauss,
Margherita Ferraro, Roberto Innes, Ed
Kochan, Jan-Jaap, Philippe Laurent,
Massimo Lattanzi, Angelo Morsì, John
McEvoy, Peter Meszaros, Lorenzo Natalucci,
Stephan Pekar, Alessandro Paoletti, Elena
Pier, Luigi Pilo, Jean Pierre Rieger, An-
thony Soffel, Werner Sturrock, John Terzetti,
Giovanni Tosti, Fabio Ubertini, Peter van
der Plas, and more.

Local Organising Committee

Luigi Fortin, Elena Basso, Nellyaoy,
Tara Latta, William, and more to be
announced.



integral2015@unige.ch
http://www.unige.ch/integral2015/

