Herschel Data Processing – Status and Outlook

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Map Making Workshop
28th January 2013

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- ➢ **Data Processing Overview**
  - ➢ **System**
  - ➢ **Activities & Events**
  - ➢ **Priorities for HCSS 11**
- ➢ **Post-Operations**
  - ➢ **Priorities**
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  - ➢ **HCSS schedule**
- ➢ **Some things you might not know about HIPE**
- ➢ **Maps, maps, maps!**
- ➢ **Scientific productivity of Herschel**
- ➢ **On-demand profiles: HIPE light**

Herschel observation used as backdrop in the entrance of the new ESAC multipurpose facility showing Álvaro Giménez, ESA's Director of Science and Robotic Exploration and Head of ESAC and ESA's Director General Jean-Jacques Dordain at the opening event

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Data Processing Overview: System

- ➢ **System combines data access, pipeline execution, data reduction and scientific analysis in one single environment**

- ➢ **Community has access to the same system as the instrument experts**

- ➢ **The Herschel Data Processing software is coded in Java/Jython to be license free and portable for different operating systems**

- ➢ **Formal support is provided for Windows XP, Vista and Windows 7,Linux, Mac OS X 10.5 ("Leopard"), 10.6 ("Snow Leopard") and 10.7 ("Lion")**

- ➢ **Herschel Data Processing is a major project, with over 200 contributors and currently 60 full-time equivalents working on calibration, coding, documentation, pipeline operations, quality control, testing and tutoring**

- ➢ **Major version are released each six months. Minor versions are released each month. Herschel Science Centre uses these versions to generate the standard products which are distributed via the Herschel Science Archive**

- ➢ **Herschel Science Centre (ESA), the Instrument Control Centres (HIFI, PACS and SPIRE) and NHSC jointly manage and contribute to the Herschel Data Processing System**

Data Processing Development

Data Processing Overview: Activities and Events

➤ **22nd of January 2013**   **HCSS 10.0 installed as operational version**

➤   **Bulk reprocessing of Herschel observations with HCSS 9.1**

➤ **14th of February 2013**   **Branch-off point for HCSS 10.1. It is expected that HCSS 10 bulk reprocessing will be performed with this version**

➤ **25 – 27th of March 2013**   **Herschel Calibration Workshop: Only the Best Data Products for the Legacy Archive (ESAC)**

http://herschel.esac.esa.int/CalibrationWorkshop5.shtml

➤ **Summer 2013**   **Herschel Data Processing Workshop & HIPE Forum 2013: Expanding the Herschel community (ESAC)**

Data Processing Overview: Priorities for HCSS 11

1. **Improvements of calibration, pointing reconstruction and data reduction pipelines**

2. **Introduction of on-demand processing profiles**

3. **Migration to Java 7**

4. **Reduction/optimisation of memory use**

5. **Harmonisation of Python syntax in HIPE**

6. **Code improvements, including test harness coverage**

7. **User-friendliness**

Post-Operations readiness review: Development priorities for Data Processing @ HSC

➢ **Most important are the archive products that come from standard pipeline processing of the science and calibration observations that were made throughout the mission lifetime. Therefore the support to the pipeline processing environment and the generation and quality control of products has the highest priority**

➢ **The second highest priority is the maintenance of the interactive data processing system so that the astronomical community has the best means to exploit Herschel data in detail, and the experts from the HSC, ICCs and NHSC can continue to improve algorithms and calibration**

➢ **Documentation is the third highest priority as the analysis software and data products need to be well described so that the best science results can be extracted**

Post-Operations readiness review:
Board recommendations

➢ **Review board emphasised importance of products as lasting legacy of Herschel. All ICC managers confirmed this as in line with ICC priorities**

➢ **Review board emphasised importance of prioritisation as we are resource limited and key personnel might leave the project earlier than envisaged**

➢ **Review board urged to develop the Herschel Legacy in conjunction with the emergence of other major facilities (ALMA, SOFIA)**

➢ **Review board asked to raise the awareness of the community to the resource limited character what might be achieved in post-operations**

Herschel post-operations readiness review

Manpower (staff years) available in post-operations

	DP developers	Calibration	Documentation	end
HIFI	11	29	3	31/03/2016
DP @ HSC	7		3.9	28/02/2017 *
CS @ HSC			26	31/12/2017
NSHC	14.2	5	7.8	30/09/2017
PACS	17.5	17.5	15	31/12/2016
SPIRE	29.5	1	3	31/07/2016

Best information

Best information

* Completion of bulk reprocessing, last development activities end mid 2016

Data Processing Development

Future HCSS Releases

HCSS version	Branch-off Point	Installation	Rationale
11.0	11 April 2013	June 2013	Full staff complement still available
12.0	26 Sept. 2013	December 2013	Last bi-annual release
13.0	18 Sept. 2014	December 2014	Annual release
14.0	17 Sept. 2015	December 2015	Annual release
14.1	February 2016	March 2016	End of HIFI POPs
14.2	June 2016	July 2016	End of SPIRE POPs
15.0	15 Sept. 2016	December 2016	End of PACS POPs; Legacy version for Herschel Science Archive

**Bulk reprocessing of all Herschel observations
will be performed with each of these versions**

Some things you might not know about Herschel Data Processing

➤ **ESAC hosts a on-demand processing pipeline and calibration files**

➤ **Bulk reprocessing with peaks of 60 OD performed for SPIR 42000 observations**

➤ **HIPE has a plug-in**
   http://herschel.esac

   If you have a HIPE
   Paul.Balm@esa.int

➤ **You can access the InterOperability Sys**

   http://archives.esac

Herschel Interactive Processing Environment

Download and reprocess Herschel data, perform interactive analysis, export your results to FITS and to other applications!

Download

Install HIPE 10.0.0 on your favourite platform:

Windows 32 bit

Read me first

Get Herschel data

Or browse them from your smartphone!

Herschel Archive

iPhone app

Android app

Documentation

Learn about HIPE and instrument data reduction.

HIPE help

Watch us

Support

Ask the Helpesk or look for our tips on Twitter.

Helpdesk

Follow us

Community

Discuss with peers and contribute to HIPE.

Community

Contribute

Plug-ins

About Herschel

Learn more about Herschel and its instruments.
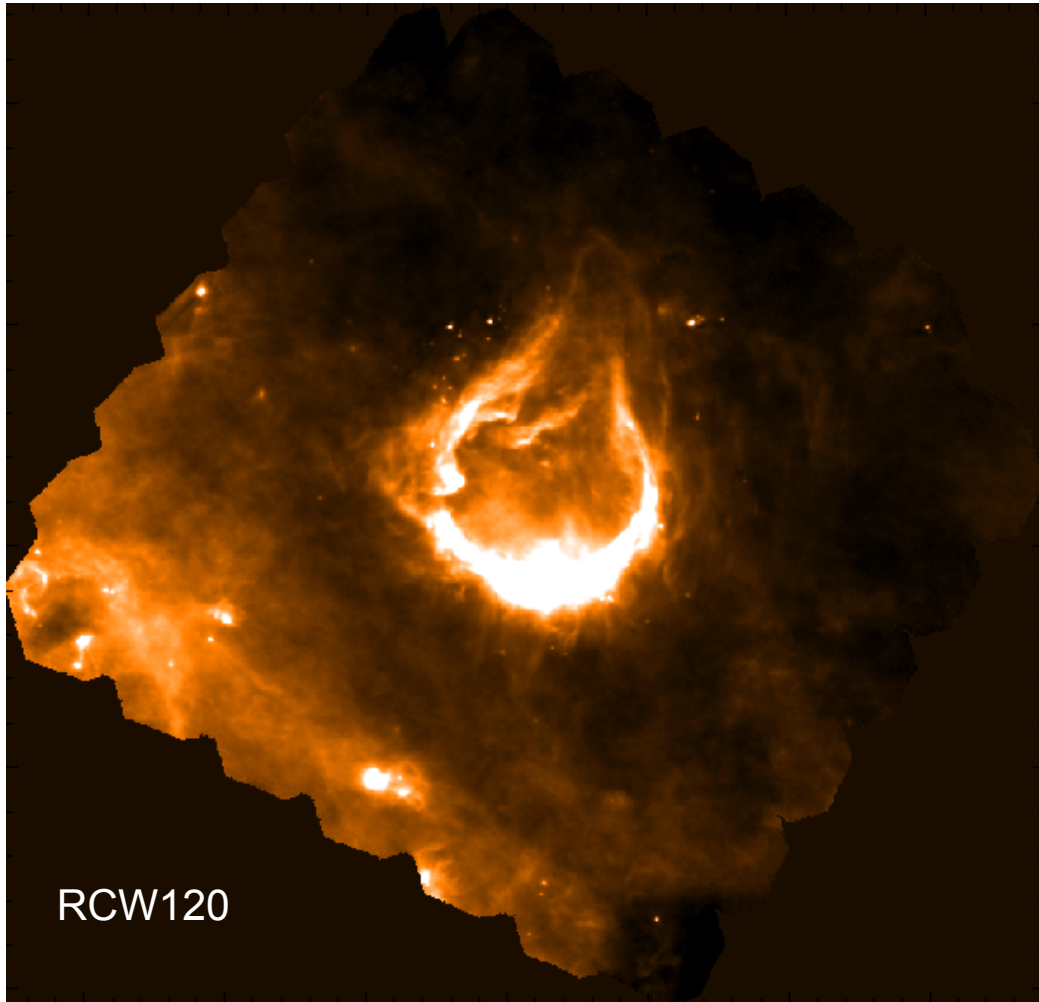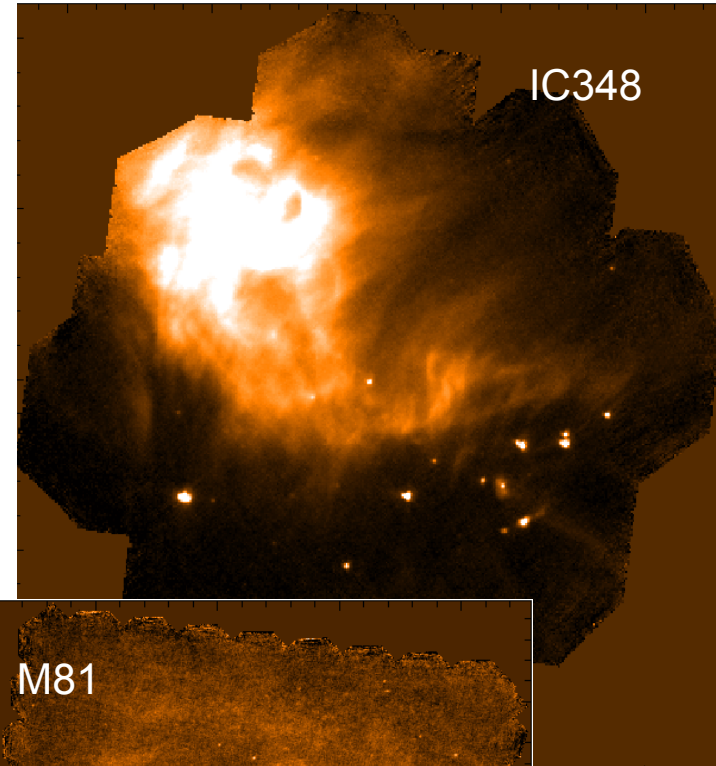
Herschel home

HIFI   PACS   SPIRE
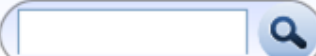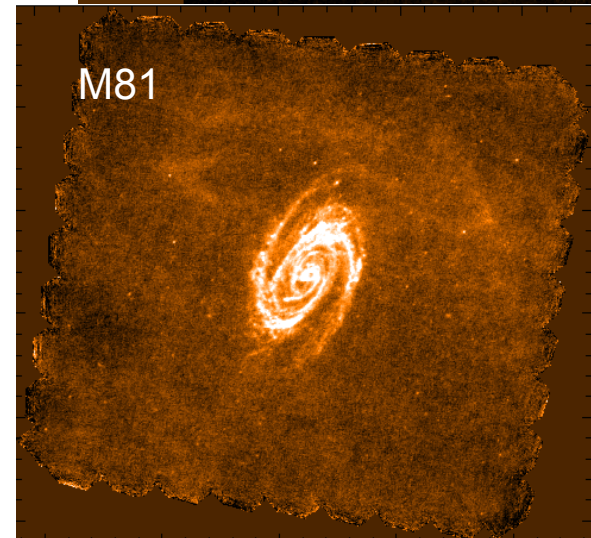
PACS SPG maps

IC348

M81

RCW120

PACS SPG maps

Rossete

Left-over of calibration blocks

M31

Non suitable baseline drift correction

SPIRE SPG map

RCW49
PSW map
Level 2
(PI R. Paladini)
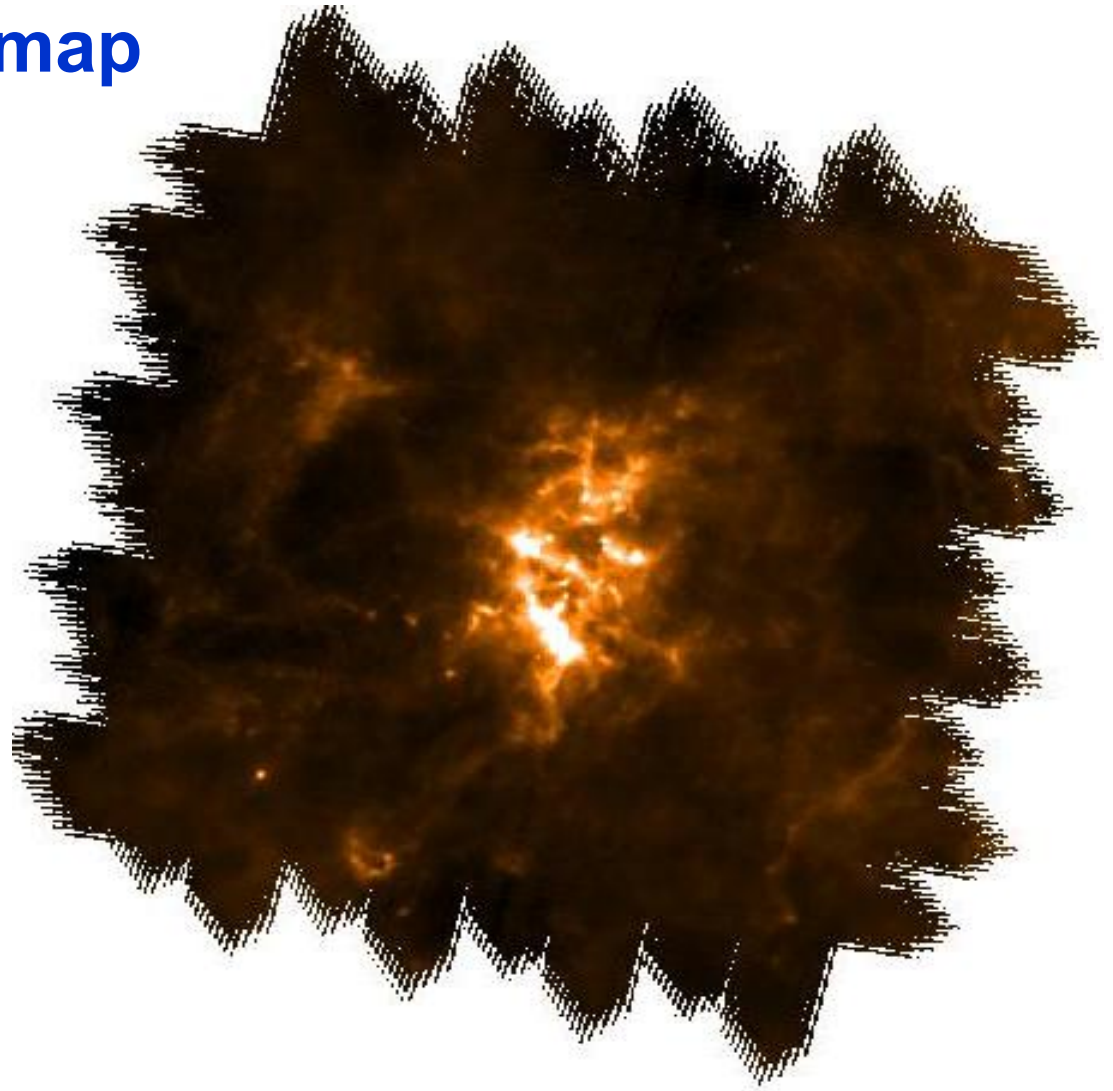
SPIRE Browse Image

Draco
Level 2.5
(PI M-A Miville-Deschenes)

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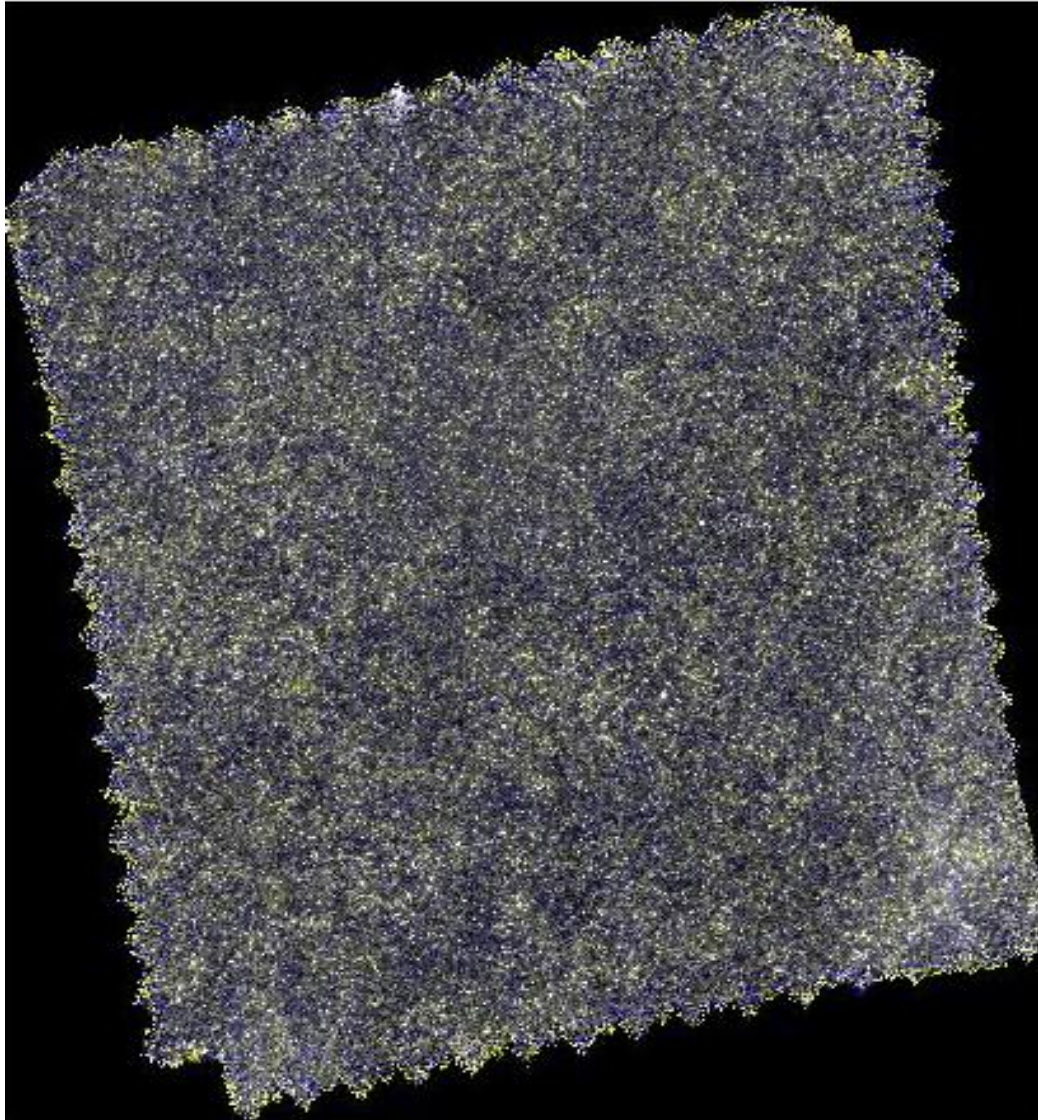
SPIRE SPG map

ECDFS
Level 2.5
(PI S. Oliver)

Composite of 105 single observations

SPIRE SPG map

Unmasked noisy detector
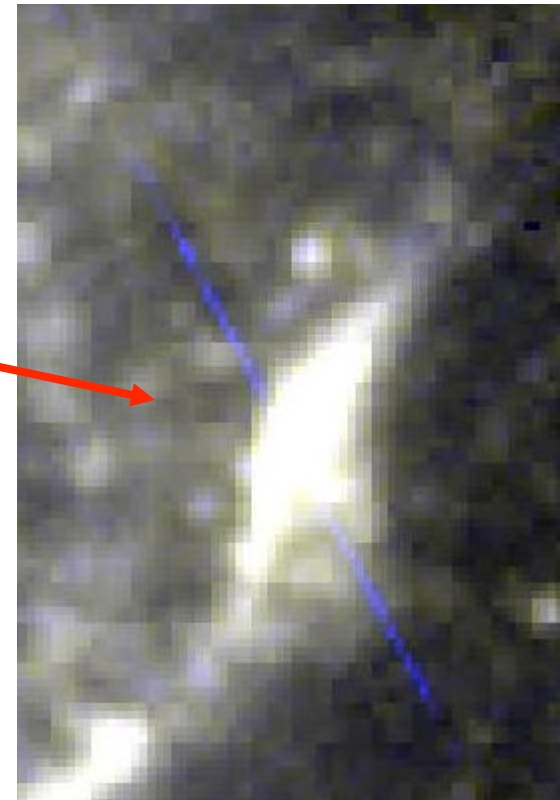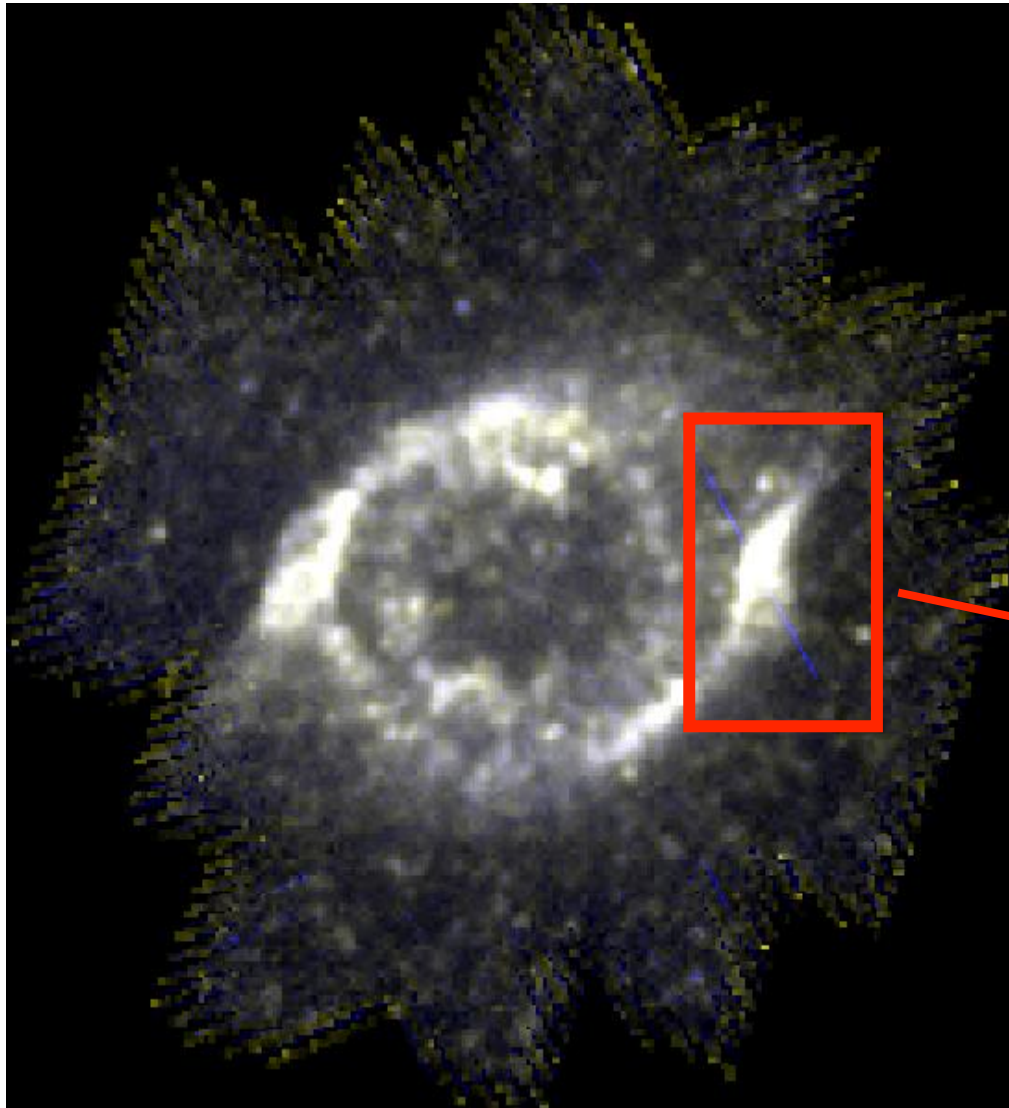
Helix
3 color image
Level 2
(DDT)

Data Processing Development
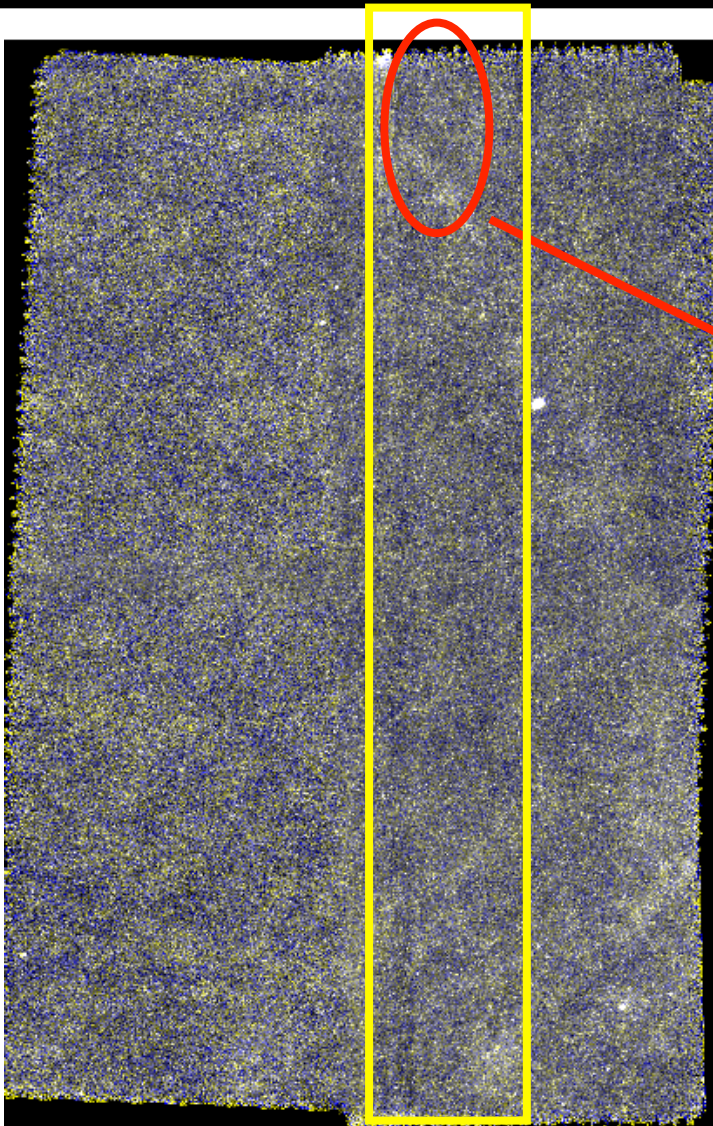
SPIRE SPG map

Cooler burp
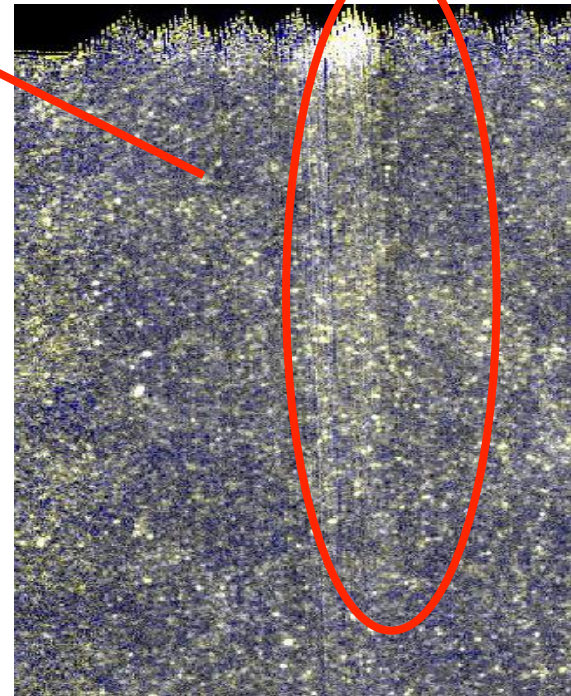
H-Atlas
Level2.5
3 colors
KPOT
(PI S. Eales)

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SPIRE SPG map

Unsuitable baseline removal

This effect is not removed even coadding the two maps
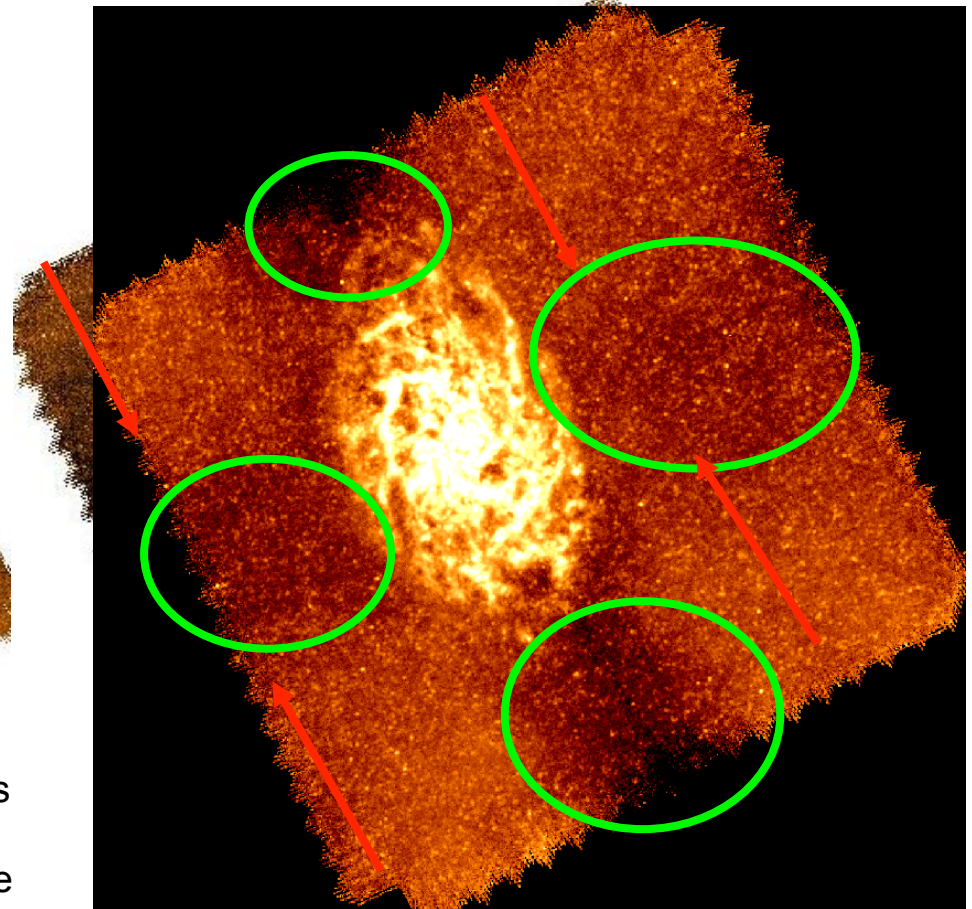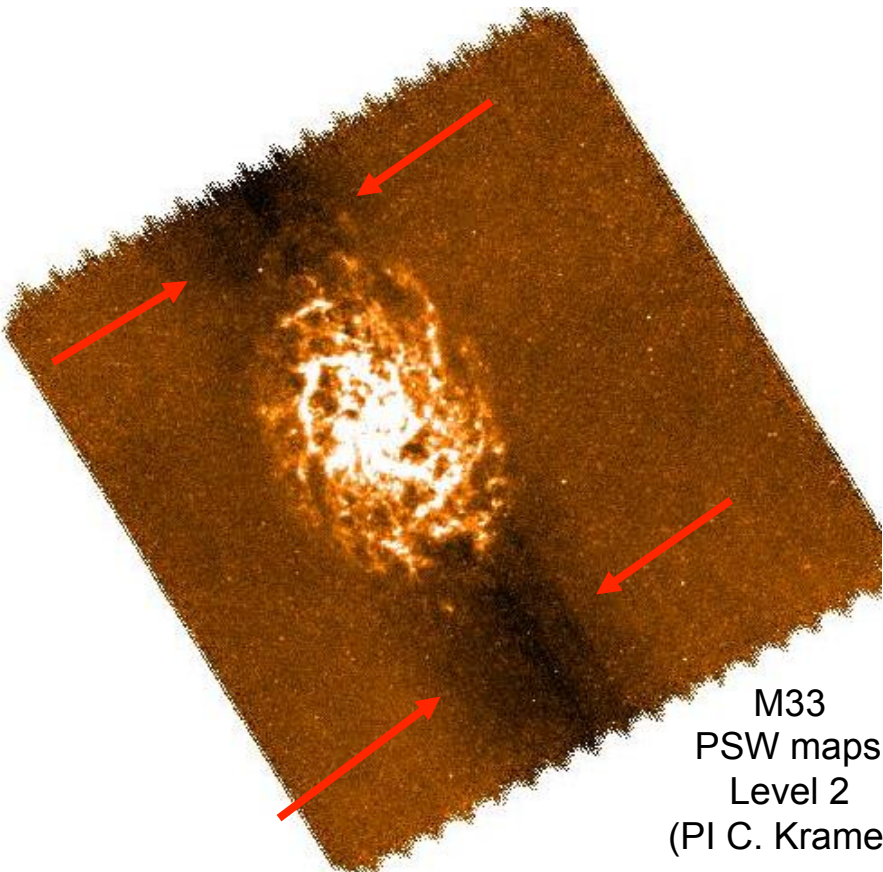
M33
PSW maps
Level 2
(PI C. Krame

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Scientific productivity of Herschel

Science papers in early years after launch

Legend:
- Herschel (May 2009)
- ISO (Nov 1995)
- HST (April 1990)
- XMM-Newton (Dec 1999)
- INTEGRAL (Oct 2002)

Axes: Number of refereed publications (y) vs Years after launch (x)
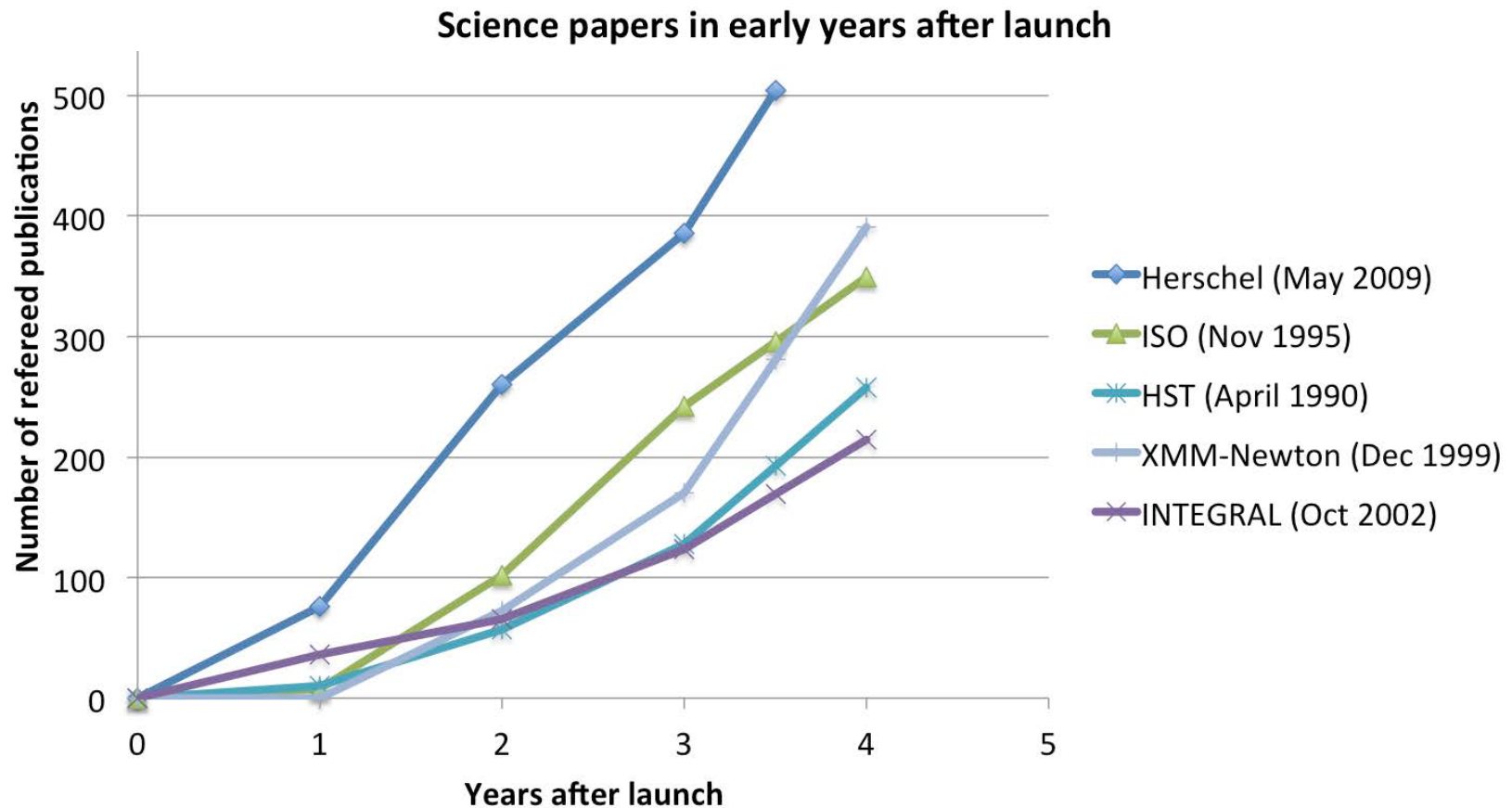
Long Term Preservation of Data Processing – a low-cost outlook beyond 2016

➢ **Even without maintenance HIPE will continue to work. HIPE will only stop working when operating systems / Java versions become incompatible. Virtualisation could ensure long-term accessibility**

➢ **Improved knowledge for and from experts can be fed-back via updates of plug-ins and scripts**

➢ **Non-experts could continue to use on-demand pipeline processing profiles (HIPE light) to receive pipeline products tuned to their scientific objectives**

HIPE light: On demand processing profiles

- ➢ **minimalistic** ... **Archive tha** ...
- ➢ **Products o** ...
- ➢ **better than** ... **HIPE sessic** ...
- ➢ **minimal lea** ...
- ➢ **processing** ... **install HIPE** ...

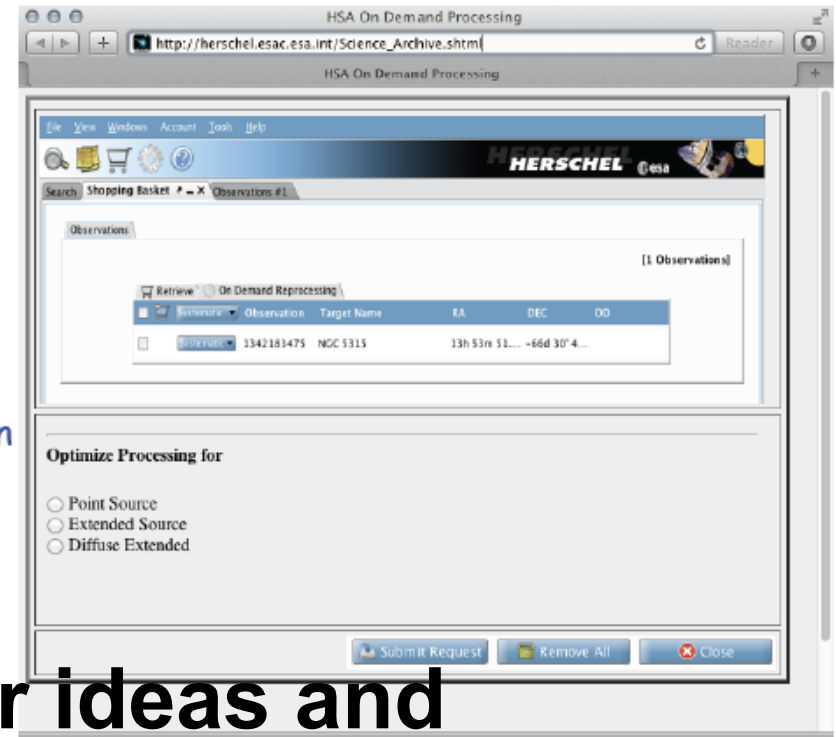➢ **Please think how your ideas and software could fit in**

SPIRE

(1) Dedicated Pipeline Scripts

Dedicated pipeline scripts optimized for a given type of observation, e.g.

- Point source
- Small extended source
- Diffuse extended emission

HSA On Demand Processing

http://herschel.esac.esa.int/Science_Archive.shtml

HSA On Demand Processing

HERSCHEL esa

Search | Shopping Basket | Observations #1

Observations

[1 Observations]

Retrieve | On Demand Reprocessing

| Observation | Target Name | RA | DEC | OD |

1342183475 | NGC 5315 | 13h 53m 51... | −66d 30' 4... |

Optimize Processing for

- ○ Point Source
- ○ Extended Source
- ○ Diffuse Extended

Submit Request | Remove All | Close

e.g. http://www.ir.isas.jaxa.jp/~cpp/herschel/UserProfiles/UserProfileGUIscenario.html

Chris Pearson: HIPE FORUM 2012

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herschel

Please contribute your software!

http://herschel.esac.esa.int/UserContributedSoftware.shtml

contains all information!

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herschel

E komo mai, e noho mai, wala`au a me ho`olohe

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