Release note for HerMES

User Provided Data Product

The Herschel Multi-tiered Extragalactic Survey: Measuring the Infrared Galaxy Formation History of the Universe

S. Oliver et al.

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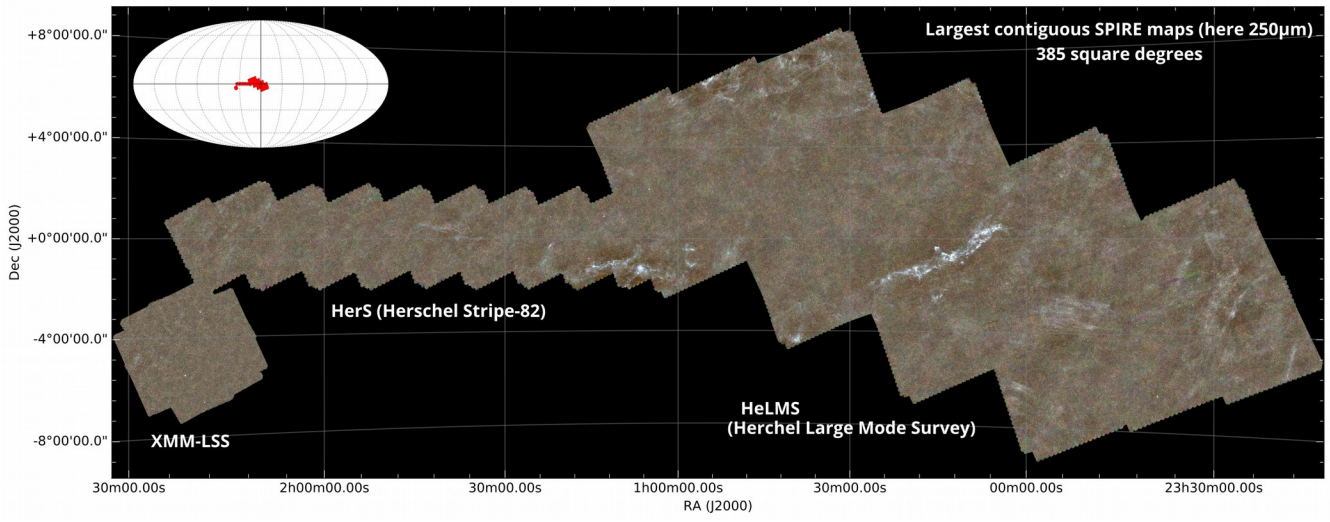

HerMES Data Releases

Below you can find a short description of the four HerMES data releases made available to the community as of June 2016. This information is also provided in more detail at the Herschel Database in Marseille.

2nd and 3rd Data Releases (DR2 & DR3)

The HerMES project has released Herschel SPIRE maps and catalogues. There are two kinds of catalogues, blind extractions on the SPIRE maps (DR2) and flux extractions at Spitzer prior positions.

Data Release 2

The second *Data Release* (**DR2**) of HerMES data occurred in November 2013. It consists in Herschel SPIRE maps associated with blind extraction catalogues at each wavelength (Starfinder catalogues sf* and SUSSEXtractor catalogues sx*) plus band-merged catalogues extracted at SPIRE 250 µm positions (merge).

You may want to read the Readme file for the catalogues, the Readme file for the maps and the document describing the nested fields.

Data Release 3

The third *Data Release* (**DR3**) occurred in July 2015. It is composed of catalogues of SPIRE fluxes extracted at Spitzer prior positions with the methods developed by Roseboom et al. 2010.

You may also want to read the Readme file for the DR3 release.

Please, note that the DR3 also contains the SPIRE maps from the HerMES Large Mode Survey (HeLMS). Readme file for HeLMS maps.

It's important to keep in mind that **the DR3 does not replace the DR2 but comes in complement to it**.

4th Data Release (DR4)

The fourth HerMES data release consists of several data products, some of them superseding some of the products from DR2/DR3.

- The version 6.0 of SPIRE maps (SMAPs) contains all the SPIRE observations made for HerMES. On each field, the maps combine (“nest”) all the observations. We don't provide separated maps for deep fields as they are included in the nested maps; we only provide some shallow maps for the large fields. Please, read the documentation for the SMAP maps.
- As part of the Herschel Extragalactic Legacy Project (HELP) we provide all-band catalogues extracted on blind 250µm positions (xID250) obtained using the new SPIRE maps. Please, read the documentation of the HerMES-DR3 for a description of the xID250 catalogues.
- This is the first release of maps for PACS observations made for HerMES. Please, note that the

PACS maps are not nested as the SMAP maps are, so several PACS maps may correspond to one SPIRE map. Please, read the documentation for PACS maps.

- On these maps, we extracted PACS fluxes at MIPS 24µm prior positions (xID24-PACS). Please, read the documentation for xID24-PACS catalogues.
- As part of HELP, we also provide a catalogue of SPIRE fluxes extracted at MIPS 24µm prior position using the new XID+ software. Please, read the documentation for the COSMOS-XID+ catalogue.

The following table summarises this information:

SPIRE Data:

Field	DR4 SPIRE maps	DR4 SPIRE catalogues	DR2&3 SPIRE catalogues	DR2&3 SPIRE maps
Abell 2218	250 350 500		xid250 scat350 scat500	250 350 500
Abell 1689	250 350 500		xid250 scat350 scat500	250 350 500
MS0451.6-0305	250 350 500		xid250 scat350 scat500	250 350 500
RXJ13475-1145	250 350 500		xid250 scat350 scat500	250 350 500
Abell 1835	250 350 500		xid250 scat350 scat500	250 350 500
Abell 2390	250 350 500		xid250 scat350 scat500	250 350 500
Abell 2219	250 350 500		xid250 scat350 scat500	250 350 500
Abell 370	250 350 500		xid250 scat350 scat500	250 350 500
MS1358+62	250 350 500		xid250 scat350 scat500	250 350 500
CS Cl0024+16	250 350 500		xid250 scat350 scat500	250 350 500
MS1054.4-03219	250 350 500		xid250 scat350 scat500	250 350 500
RXJ0152.7-1357	250 350 500		xid250 scat350 scat500	250 350 500
ECDFS	*Nested in CDFS-SWIRE*		xid250 scat350 scat500 xid24 (cats & maps)	250 350 500
COSMOS	250 350 500	xid250 XID+	xid250 scat350 scat500 xid24	250 350 500
GOODS-North	250 350 500	xid250	xid250 scat350 scat500 xid24	250 350 500
Groth-Strip	*Nested in EGS*		xid250 scat350 scat500 xid24	250 350 500
Lockman-East-ROSAT	*Nested in Lockman-SWIRE*		xid250 scat350 scat500 xid24	250 350 500
Lockman-North	*Nested in Lockman-SWIRE*		xid250 scat350 scat500 xid24	250 350 500
UDS	*Nested in XMM-LSS-SWIRE*		xid250 scat350 scat500	250 350 500

VVDS	*Nested in XMM-LSS-SWIRE*		xid250 scat350 scat500	250 350 500
CDFS-SWIRE	250 350 500	xid250	xid250 scat350 scat500 xid24	250 350 500
Lockman-SWIRE	250 350 500	xid250	xid250 scat350 scat500 xid24	250 350 500
EGS	250 350 500	xid250	xid250 scat350 scat500	250 350 500
Boötes	250 350 500	xid250	xid250 scat350 scat500 xid24	250 350 500
ELAIS-N1	250 350 500	xid250	xid250 scat350 scat500 xid24	250 350 500
XMM-LSS-SWIRE	250 350 500	xid250	xid250 scat350 scat500 xid24	250 350 500
ADFS	250 350 500	xid250	xid250 scat350 scat500 xid24	250 350 500
ELAIS-S1	250 350 500	xid250	xid250 scat350 scat500 xid24	250 350 500
FLS	250 350 500	xid250	xid250 scat350 scat500 xid24	250 350 500
HeLMS				250 350 500
HeLMS+XMM+HerS	250 350 500			
ELAIS-N2	250 350 500	xid250		
SA-13	250 350 500	xid250		
XMM-13h	250 350 500	xid250		

PACS Data:

Field	DR4 PACS maps	DR4 PACS catalogues
ADFS	100 160	pacs-xID24
Boötes-HerMES (level 5)	100 160	pacs-xID24
Boötes-NDWFS (level 6)	100 160	pacs-xID24
CDFS-SWIRE	100 160	pacs-xID24
EGS	100 160	pacs-xID24
ELAIS-N1-HerMES (level 5)	100 160	pacs-xID24
ELAIS-N1-SWIRE (level 6)	100 160	pacs-xID24
ELAIS-N2-SWIRE	100 160	pacs-xID24
ELAIS-S1-VIDEO	100 160	pacs-xID24
ELAIS-S1-SWIRE	160	pacs-xID24
FLS	100 160	pacs-xID24
Lockman-North (SDP)	100 160	pacs-xID24
Lockman-North	100 160	pacs-xID24
Lockman-SWIRE	100 160	pacs-xID24
XMM-LSS	100 160	pacs-xID24
XMM-VIDEO1	100 160	pacs-xID24
XMM-VIDEO2	100 160	pacs-xID24
XMM-VIDEO3	100 160	pacs-xID24
UDS (level 4)	100 160	pacs-xID24
UDS-HerMES (level 3)	100 160	pacs-xID24

The documentation for each product is given in:

- Appendix A: Documentation for the DR4 SPIRE maps.
- Appendix B: Documentation for the SPIRE catalogues.
- Appendix C: Documentation for the COSMOS XID+ catalogue.
- Appendix D: Documentation for the PACS maps.
- Appendix E: Documentation for the PACS-xID24 catalogues.

Appendix A: DR4 SPIRE Maps

HerMES-DR4 - SPIRE Maps (SMAP) July 2016

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Contact: smap@astro.caltech.edu

A. Conley, G. Marsden, M. Zemcov, M. Viero 2015-05-12

Description:

This is the README file for the SPIRE map files associated with the fourth Herschel-SPIRE/SAG-1/HerMES public data release (DR4), known as version 6. The HerMES program is presented in [1].

The primary changes in this release relative to previous releases are low-level reprocessing and calibration updates, and the fact that all of the HerMES data is now included. In addition, we no longer provide maps constructed from observations of individual AORs when nested data are available. Instead, only the full nest is provided. Thus, for example, there is no longer an individual map for the UDS field because it is part of XMM-NEST. We only provide on nested fields some shallow maps for people needing homogeneous noise properties over large areas. Also, point source filtered maps are no longer provided. More details are provided below.

If you have any questions, comments or concerns please contact the SMAP team at smap@astro.caltech.edu

File names:

The file names indicate the field, image type, band, and version number:

<field>_<type>_<band>_SMAP_<version>.fits

For instance, Bootes-HerMES-NEST_image_250_SMAP_v6.0.fits is the DR4 (SMAP version 6) image map at 250 μm of the Bootes field, including all nested data.

File content:

Each fits file in this data release contains 4 extensions:

1 - signal map [Jy / beam]

2 - error map, based on propagation of time-stream weights [Jy / beam]

3 - exposure map [sec]

4 - mask map with the following values:

0: no mask (ie good data)

1: regions with low depth relative to the rest of the map

Definition of the fields released:

Clusters:

- Abell-370
- Abell-1689
- Abell-1835
- Abell-2218
- Abell-2219
- Abell-2390
- Cl0024+16
- MS0451.6-0305
- MS1054.4-0321
- MS1358+62
- RXJ0152.7-1357
- RXJ13475-1145

Blank fields:

- ADFS
- Bootes-HerMES-NEST (observations of Bootes with a deeper central region)
- Bootes-HerMES (like Bootes-HerMES-NEST but without the deeper observations in the central region - shallow map)
- COSMOS-NEST
- CDFS-SWIRE-NEST (includes deeper data in GOODS-S and ECDFS)
- CDFS-SWIRE (the same as CDFS-SWIRE-NEST but without the GOODS-S and ECDFS data - shallow map)
- EGS-NEST (observations of the EGS-SCUBA field with deeper observations in the Extended Groth Strip)

- EGS-HerMES (like EGS-NEST but without the deeper Extended Groth Strip data - shallow map)
- ELAIS-N1-NEST
- ELAIS-N2
- ELAIS-S1-NEST (observations of Elais-S1 with deeper observations in the S1-VIDEO subfield)
- GOODS-N-NEST (includes data from HerMES and the Goods-Herschel project)
- FLS
- Lockman-NEST (observations of the Lockman field with deeper observations in Lockman-North, Lockman-East-ROSAT, and the Global-Epicentre-1 fields)
- Lockman (like Lockman-NEST but without the deeper sub-fields - shallow map)
- SA13
- XMM-LSS-NEST (maps of the XMM-region with deeper data in the UDS and VVDS regions)
- XMM-LSS (like XMM-LSS-NEST but without the deeper UDS, VVDS data - shallow map)
- XMM13hr

The fields with additional data not included in previous releases are:

- Abell-370 (includes new wider but shallower data)
- EGS-NEST and EGS-HerMES (include new wide area data)
- FLS (includes small area, slightly deeper observations -near the z=6.3 source FLS3
- Lockman-NEST and Lockman (include new wide area shallow data)
- RXJ13475-1145 (includes new wider but shallower data)
- SA13 (is a new field)
- XMM13hr (is a new field)

In addition, only Bootes-HerMES-NEST was available in previous releases; Bootes-HerMES is new.

The exact list of Herschel/SPIRE OBSIDs used in each map are provided in the headers of each file.

Additional new composite field HeRS/HeLMS/XMM-LSS:

As a contribution to the Herschel Extragalactic Legacy Project (HELP, herschel.sussex.ac.uk) we also provide a new map that combines the HerMES HeLMS field, the Herschel Strip 82 Survey (Viero et al. 2014 [5] and the HerMES XMM-LSS-NEST field). This field is the largest contiguous extra-galactic field observed by Herschel covering 385 deg^2 and roughly 50 deg tip-to-tip. The overlap between HeRS and HeLMS where the map is more sensitive has been nicknamed Helm's Deep after the valley in middle earth from Tolkien's 'Lord of the Rings' trilogy.

Complementary maps *** (not available for all fields) ***:

ang1: sub-map made from all scans in one orientation on sky (eg horizontal)

ang2: sub-map made from all scans in other orientation on sky (eg vertical)

bolo1: sub-map half of detectors in focal plane

bolo2: sub-map other half of detectors in focal plane

half1: sub-map made from first half (in time) of data

half2: sub-map made from second half (in time) of data

subfield: e.g., UDS for XMM-LSS-NEST. Only contains data for a particular AOR set.

In some fields, there is more than one set of rotation angles. Here, we provide, e.g., ang1a/ang2a and ang1b/ang2b jack-knife maps where possible.

The complementary maps are not iterated, but simply use the offset and weights solution calculated for the full "image" map, as well as the cosmic ray information.

Details of the Map Making process:

HerMES maps are created by the SMAP pipeline. The SMAP map-maker iteratively removes a low-order polynomial baseline from each scan. At each iteration i a polynomial is fit to the time-stream residual R_i = S - M_{i-1}, where S is the time stream and M_{i-1} is the predicted time stream given the map calculated on the previous iteration. Additionally, each scan is given a weight based on the inverse variance of the time-stream residual. The order or the polynomial baseline varies from 0 to 9, depending on the scan length, with longer scans requiring higher order polynomials. The polynomial order is chosen using an automated algorithm which is only a function of the scan length. These maps are made with 20 iterations, which appears to provide sufficientconvergence. The mapping algorithm is described in [3] and [4].

Additional Notes:

Changes to the SMAP algorithm as described in [3] and [4] compared with the DR1 release:

* The algorithm for the temperature-correlation removal has been modified slightly to use more robust fitting.

* One must use a full implementation of the WCS specification to use the astrometry for these (and all previous) SMAP maps. In particular, for far northern or southern fields, LATPOLE and LONPOLE do not have their standard values to reduce field distortion. Currently, this only affects the GOODS-N and MS1358 fields.

References:

[1] Oliver, S.~J., Bock, J., et al. 2012, MNRAS, 424, 1614

[2] Chapin, E.L., et al. 2011, MNRAS, 411, 505

[3] Levenson, L., Marsden, G., Zemcov, M., et al. 2010, MNRAS, 409, 83

[4] Viero, M., et al. 2013, ApJ, 772, 77

[5] Viero, M., et al. 2014, ApJS, 210, 22

History: July 1st, 2015: Fourth Hermes data release.

The research leading to these results has received funding from the Cooperation Programme (Space) of the European Union's Seventh Framework Programme FP7/2007-2013/ under REA grant agreement n° 607254

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Herschel Extragalactic Legacy Programme (HELP) July, 2016

Appendix B: SPIRE Catalogues

HerMES XID 24 (version Apr-11)

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Description:

This readme file accompanies the release of the HerMES SPIRE photometry for objects whose positions are taken from catalogues extracted from Spitzer MIPS 24 micron maps (or in one case from a radio catalogues). The positional prior based methodology is described in Roseboom et al. 2010 (2010MNRAS.409...48R) with modifications described by Roseboom et al. 2012 (2012MNRAS.419.2758R).

The fourth HerMES data release (DR4) occurred in July 2016. It contains the xID250 catalogues extracted on blank fields using the last SPIRE maps. The column names of these catalogues are a little different. Also, note that the 500µm flux extraction on the Boötes field had problems and that the 500µm data is missing for this field.

Acknowledgements:

Use of these data should cite Roseboom et al. 2010 2010MNRAS.409...48R, Roseboom et al. 2012 2012MNRAS.419.2758R, for the methodology and the HerMES project Oliver et al. 2012 2012MNRAS.424.1614O. Individual data files may require additional citations (see below).

The following acknowledgements should also be included.

"This research has made use of data from HerMES project (http://hermes.sussex.ac.uk/). HerMES is a Herschel Key Programme utilising Guaranteed Time from the SPIRE instrument team, ESAC scientists and a mission scientist."

"The HerMES data was accessed through the Herschel Database in Marseille (HeDaM - http://hedam.lam.fr) operated by CeSAM and hosted by the Laboratoire d'Astrophysique de Marseille."

"HerMES DR3 was made possible through support of the Herschel Extragalactic Legacy Project, HELP (http://herschel.sussex.ac.uk)."

Facility/instrument:

Photometry is from Herschel observatory using the SPIRE instrument. Prior positional catalogues come from the Spitzer space telescope using the MIPS instrument

Filters:

SPIRE PSW (250 micron), SPIRE PMW (350 micron), SPIRE PLW (500 micron)

Fields:

ADFS, Bootes-HerMES, CDFS-SWIRE, COSMOS, ECDFS, ELAIS-N1-HerMES, ELAIS-S1-SWIRE, FLS, GOODS-North, GOODS-South, Groth-Strip, Lockman-East-ROSAT, Lockman-North, Lockman-SWIRE, XMM-LSS-SWIRE

Note on the coverage:

The xID24 catalogues where extracted on SPIRE maps from a previous version of the SMAP pipeline compared to the current HerMES maps. There are thus some depth and coverage differences; the list of Herschel observation IDs (obsids) are in the header of the maps and of the catalogues. In particular, on ECDFS, there is an extraction on the deep GOODS-South field (AOR set #13 in Oliver et al., 2012) and another on the shallower ECDFS field (set #15).

General Notes:

In many fields there are sources at the edge of the maps where the total error (ET) values have been set to zero. These fluxes should be treated with caution. There are a handful of cases where fluxes are recorded as negative. These negative fluxes should be treated as non detections.

Column descriptions for the catalogues:

Column	Unit	Description
xID24_ID		HerMES xID24 source identifier
RA	deg	Right Ascension (J2000)
DEC	deg	Declination (J2000)
F24	μJy	Flux density at 24 micron
e_F24	μJy	Error (inst.) in flux density at 24 micron
F250	mJy	Flux density at 250 micron

e_F250	mJy	Error (inst.) in flux density at 250 micron
et_F250	mJy	Total error (inst.+conf.) in flux density at 250 micron
chi250		Local reduced chi2 statistic of photometry fit in 11x11 pixel window
F350	mJy	Flux density at 350 micron
e_F350	mJy	Error (inst.) in flux density at 350 micron
et_F350	mJy	Total error (inst.+conf.) in flux density at 350 micron
chi350		Local reduced chi2 statistic of photometry fit in 11x11 pixel window
F500	mJy	Flux density at 500 micron
e_F500	mJy	Error (inst.) in flux density at 500 micron
et_F500	mJy	Total error (inst.+conf.) in flux density at 500 micron
chi500		Local reduced chi2 statistic of photometry fit in 11x11 pixel window
gID		ID of the segment where the source is

gSize		Number of sources in the segment gid
bkg250	mJy/beam	Background subtracted from 250 micron map
bkg350	mJy/beam	Background subtracted from 350 micron map
bkg500	mJy/beam	Background subtracted from 500 micron map
index_spitzer		Identifier in the prior catalogue

MIPS24 prior catalogues references:

Field	Prior catalogue
ADFS	Scott, et al. 2010, 2010ApJS..191..212S
XMM-LSS	SWIRE Lonsdale et al. 2003, 2003PASP..115..897L, DR5 Surace et al. 2005 DRAFT August 31, 2005 [1] Vaccari, M. et al. 2010, 2010A&A...518L..20V [2]
COSMOS	Magnelli et al. 2011, 2011A&A...528A..35M
GOODS-North	Magnelli et al. 2011, 2011A&A...528A..35M
GOODS-South	Magnelli et al. 2011, 2011A&A...528A..35M

ECDFS	Magnelli et al. (following methods in Magnelli et al. 2011 2011A&A...528A..35M)
Lockman-North	Owen et al. 2008, 2008AJ....136.1889O SWIRE Lonsdale et al. 2003, 2003PASP..115..897L, DR5 Surace et al. 2005 DRAFT August 31, 2005 [1] Vaccari, M. et al. 2010, 2010A&A...518L..20V [2]
Lockman-East-ROSAT	Fotopoulou, S et al. 2012, 2012ApJS..198....1F
Groth-Strip	Barro, G. et al. 2011, ApjS, 193, 13
Lockman-SWIRE	SWIRE Lonsdale et al. 2003, 2003PASP..115..897L, DR5 Surace et al. 2005 DRAFT August 31, 2005 [1] Vaccari M. et al. 2010, 2010A&A...518L..20V [2]
FLS	Vaccari, M. et al. 2010, 2010A&A...518L..20V [2]
ELAIS-N1-HerMES	SWIRE Lonsdale et al. 2003, 2003PASP..115..897L, DR5 Surace et al. 2005 DRAFT August 31, 2005 [1] Vaccari, M. et al. 2010, 2010A&A...518L..20V [2]
ELAIS-S1-SWIRE	SWIRE Lonsdale et al. 2003, 2003PASP..115..897L, DR5 Surace et al. 2005 DRAFT August 31, 2005 [1] Vaccari, M. et al. 2010, 2010A&A...518L..20V [2]
CDFS-SWIRE	SWIRE Lonsdale et al. 2003, 2003PASP..115..897L, DR5 Surace et al. 2005 DRAFT August 31, 2005 [1] Vaccari, M. et al. 2010, 2010A&A...518L..20V [2]

Bootes-HerMES	Vaccari, M. et al. 2010, 2010A&A...518L..20V [2]

[1] http://swire.ipac.caltech.edu//swire/astronomers/publications/SWIRE2_doc_083105.pdf

[2] http://www.mattiavaccari.net/df/

Notes on some catalogues (for DR3 release):

Field	Notes
ADFS	270 objects near edges of map have total errors set to zero and fluxes are not reliable.
XMM-LSS-SWIRE	Slightly updated XID algorithm
COSMOS	Slightly updated XID algorithm
Lockman-North	A radio catalogue has been used for the prior, the 24 micron fluxes we quote are those that come from a cross-identification of the radio catalogues to the MIPS 24 micron catalogues of Lockman hole. 4 objects negative fluxes at either 250 or 350 micron (2 in each). This maybe due to a non-standard running of the pipeline as the prior catalogue did not have 24 micron fluxes. 23 objects near edges of map have total errors set to zero and fluxes are not reliable.
Lockman-East-ROSAT	33 objects have negative fluxes. This maybe due to a

		non-standard running of the pipeline as the prior catalogue had non standard format. 232 objects near edges of map have total errors set to zero and fluxes are not reliable.
Groth-Strip		8 objects have negative fluxes at 250. This maybe due to a non-standard running of the pipeline as the prior catalogue had non standard format. 964 objects near edges of map have total errors set to zero and fluxes are not reliable.
Lockman-SWIRE		950 objects near edges of map or on a N/S aligned rectangle have total errors set to zero and fluxes are not reliable.
FLS		10 objects have negative fluxes at 250. This maybe due to a non-standard running of the pipeline.
ELAIS-N1-HerMES		50 objects near edges of map have total errors set to zero and fluxes are not reliable.
ELAIS-S1-SWIRE		273 objects near edges of map have total errors set to zero and fluxes are not reliable.
CDFS-SWIRE		770 objects near edges of map have total errors set to zero and fluxes are not reliable.
Bootes-HerMES		438 objects near edges of map have total errors set to zero and fluxes are not reliable.

Content description for the SMAP v2.0 maps:

Extension	Description
1	signal map [Jy/beam]
2	error map, based on propagation of time-stream weights [Jy/beam]
3	exposure map
4	flag (mask map)

The possible values for the mask map flag are:

0: no mask (good data)

1: no data

2: no cross-linking

For GOODS-South and CDFS-SWIRE, the maps were not produced by the SMAP pipeline but by the standard HIPE map making tool. They only contain the signal map extension.

References:

Oliver et al. 2012 2012MNRAS.424.1614O

Roseboom et al. 2010 2010MNRAS.409...48R

Roseboom et al. 2012 2012MNRAS.419.2758

Levenson et al. 2010 2010MNRAS.409...83L (SMAP maps)

Smith et al. 2012 2012MNRAS.419..377S (HIPE maps)

History:

July 2016: Fourth HerMES data release (DR4)

July 2015: Third HerMES data release (DR3)

The research leading to these results has received funding from the Cooperation Programme (Space) of the European Union’s Seventh Framework Programme FP7/2007-2013/ under REA grant agreement n° 607254

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Herschel Multi-tiered Extragalactic Survey (HerMES) July 2015

Appendix C: COSMOS XID+ Catalogue

HELP COSMOS-XID+ July 2016

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Description:

XID+ is developed using a probabilistic Bayesian framework which provides a natural framework in which to include prior information, and uses the Bayesian inference tool Stan to obtain the full posterior probability distribution on flux estimates (see Hurley et al. 2016 for more details).

This catalogue uses 24 micron detected sources from the MIPS 24 catalogue (Le Floc'h et al. 2009) as a prior list for extracting SPIRE fluxes from the Herschel Multi-Tiered Extragalactic Survey (HerMES) SPIRE maps (Oliver et al. 2012).

The resulting marginalised flux probability distributions for each source, are described by the 50th, 84th and 16th percentiles. For those wanting to assume Gaussian uncertainties, take the maximum of (84th-50th percentile) and (50th-16th percentile).

We note the Gaussian approximation to uncertainties is only valid for sources above:

~ 5mJy at 250 μm

~ 5mJy at 350 μm

~ 7mJy at 500 μm

Column descriptions:

ID	-	ID
RA	degrees	Right Ascension (J2000)
Dec	degrees	Declination (J2000)
F_SPIRE_250	mJy	Flux density at 250 μm (Median)
FErr_SPIRE_250_u	mJy	Flux density at 250 μm (84th Percentile)
FErr_SPIRE_250_l	mJy	Flux density at 250 μm (16th Percentile)
F_SPIRE_350	mJy	Flux density at 350 μm (Median)
FErr_SPIRE_350_u	mJy	Flux density at 350 μm (84th Percentile)
FErr_SPIRE_350_l	mJy	Flux density at 350 μm (16th Percentile)
F_SPIRE_500	mJy	Flux density at 500 μm (Median)
FErr_SPIRE_500_u	mJy	Flux density at 500 μm (84th Percentile)
FErr_SPIRE_500_l	mJy	Flux density at 500 μm (16th Percentile)
Bkg_SPIRE_250	mJy/Beam	Fitted Background of 250 μm map (Median)

Bkg_SPIRE_350	mJy/Beam	Fitted Background of 350 µm map (Median)
Bkg_SPIRE_500	mJy/Beam	Fitted Background of 500 µm map (Median)
Sig_conf_SPIRE_250	mJy/Beam	Fitted residual noise component due to confusion (Median)
Sig_conf_SPIRE_350	mJy/Beam	Fitted residual noise component due to confusion (Median)
Sig_conf_SPIRE_500	mJy/Beam	Fitted residual noise component due to confusion (Median)
Rhat_SPIRE_250	-	Convergence Statistic (ideally <1.2)
Rhat_SPIRE_350	-	Convergence Statistic (ideally <1.2)
Rhat_SPIRE_500	-	Convergence Statistic (ideally <1.2)
n_eff_SPIRE_250	-	Number of effective samples (ideally >40)
n_eff_SPIRE_350	-	Number of effective samples (ideally >40)
n_eff_SPIRE_500	-	Number of effective samples (ideally >40)

References:

Hurley, P. et al. 2016, arXiv:1606.05770

Oliver, S. et al. 2012, MNRAS 424, 1614

Le Flocâ h E., et al., 2009, Astrophys. J., 703, 222

History:

July 1st, 2015: Fourth Hermes data release.

The research leading to these results has received funding from the Cooperation Programme (Space) of the European Union's Seventh Framework Programme FP7/2007-2013/ under REA grant agreement n° 607254

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Herschel Extragalactic Legacy Programme (HELP) July, 2016

Appendix D: PACS Maps

HerMES-DR4 - PACS Maps (PMAP) July 2016

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Contact: eduardo.ibar@uv.cl

E.Ibar 2016-06-29

Description:

This is the README file for the PACS map files associated with the fourth Herschel-SPIRE/SAG-1/HerMES public data release (DR4).

The HerMES program is presented in [1].

The maps are produced using the Unimap software [2,3,4]

If you have any questions, comments or concerns please contact Edo Ibar

File names:

The file names indicate the level, field, and band:

“HerMES_PACS_”<level>”_”<field>”_”<band>”um_EdoIba_Unimap.fits”

For instance, HerMES_PACS_level5_Bootes_HerMES_100um_EdoIbar_Unimap.fits

The <Levels> and <fields> and raw data correspond to the names and AOR sets listed in Table 1 of reference [1]

The two bands presented at the PACS Green band (<band>=”100”) and the PACS Red band (<band>=”160”)

File content:

Each fits file in this data release contains 4 extensions:

1 – “image” signal map [Jy / pixel]

2 - “error” standard deviation in signal [Jy / pixel]

3 - “coverage” detector counts per pixel

4 – “mask” mask map with the following values:

0: no observed pixel

1: observed pixel

The Error is estimated my assuming the fluctuations in the image are all noise variations and the variance is inversely proportional to the coverage.

Definition of the fields

The fields released here are:

- level3_LHN
- level3_SDP_LHN
- level3_UDS_HerMES
- level4_UDS
- level5_Bootes_HerMES
- level5_CDFS_SWIRE
- level5_EGS
- level5_ELAIS_N1_HerMES
- level5_Lockman_SWIRE
- level5_XMM_VIDEO1
- level5_XMM_VIDEO2
- level5_XMM_VIDEO3
- level6_ADFS
- level6_Bootes_NDWFS
- level6_ELAIS_N1_SWIRE
- level6_ELAIS_N2_SWIRE
- level6_ELAIS_S1_VIDEO
- level6_FLS
- level6_XMM_LSS_SWIRE

Details of the Map Making process:

HerMES PACS scanning mode observations are obtained using PACS prime (levels 3 & 4) and SPIRE/PACS parallel modes (levels 5 & 6). All observations are reduced considering the following stages: (a) raw data (level-0) are retrieved from the Herschel Science Archive (HSA); (b) level-0 data are processed within HIPE up to level-1 (calibrated timelines) following a similar approach as described in [5]; (c) these calibrated data are then converted to timeseries using the interface UniHIPE (a tool developed by the ASI Science Data Center), (d) and finally run a maximum likelihood imaging approach using Unimap.

References:

[1] Oliver, S.J., Bock, J., et al. 2012, MNRAS, 424, 1614

[2] Piazzo, et al., 2012, ITIP, 21, 3687. http://infocom.uniroma1.it/unimap/

[3] Piazzo, et al., Signal Processing, vol. 108, pp. 430-439, 2015.

[4] Piazzo L et al., MNRAS, 2015, 447, pp. 1471-1483.

[5] Ibar et al., 2010, MNRAS, 409, 38

History:

July 1st, 2015: Fourth Hermes data release.

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Appendix E: xID24 PACS Catalogues

HerMES-DR4 - xID24-PACS catalogues July 2016

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Contact: S.Oliver@Sussex.ac.uk

Seb Oliver

2016-06-29

Description:

This is the README file for the PACS photometry associated with the fourth Herschel-SPIRE/SAG-1/HerMES public data release (DR4).

The HerMES program is presented in [1].

These catalogues record 100 and 160 micron photometry at the positions of known sources from “prior” catalogues.

The photometric imaging data comes from maps from the Herschel PACS instrument taken as part of the HerMES survey. The map data was reduced using the Unimapper software [2] by Edo Ibar and is described in the PMAP Readme file for HerMES DR4.

The known source positions came from Spitzer 24 micron catalogues collated by Mattia Vaccari and Isaac Roseboom, these are identical to those used in the prior based SPIRE photometry in the xID24 products delivered in HerMES DR3 and described in the xID24 Readme.

Fluxes are reported with aperture photometry in various apertures and with point response function (PRF) fitting. The shape of the PRF, used in fitting and aperture corrections, was estimated by stacking the PACS maps at the positions of known sources with 24micron fluxes in the range 250muJy < f24 < 1000 muJy. The stacking code was based on that used in [3].

In the absence of clustering the shape of this empirical PRF should be an unbiased estimate of the PRF in the map including all effects from the intrinsic beam, map building, astrometry errors. The normalisation however, needs additional information. We thus normalised the PRF using the MIPS 24 micron photometry to have a peak intensity, P_max:

1./P_max = CONST * mean_24/410.2

where mean_24 is the mean 24 micron flux of the stacked 24 micron sample in muJy and the CONST was 9361 for the 100 micron data and 164.1 for the 160 micron data. This calibration give photometry consistent with the PEP team's photometry in the COSMOS field [4]. This method avoids the requirement of extensive simulations. However, it introduces an (as yet) unquantified calibration error from the sampling of the distribution of PACS/MIPS galaxy colours.

Flux errors are estimated using error propagation and do not take into account correlated errors or

calibration errors.

If you have any questions, comments or concerns please contact Seb Oliver

File names:

<field>_PACSxID24_<version>.fits

with <field> corresponding to the HerMES field name as used in the PACS maps and described in Table 1 of reference [1].

PRFS: the empirical PRFS are also available (normalised as described above) so that a 1 Jy point source would be fit with a scaling of the PRF by 1 with the following naming convention:

"HerMES_PACS_PRFS_V1.0_l"<level>"_"<field>"<band>"um_stack.fits"

with <band> as 100 or 160 for the green and blue PACS bands.

(Note that the PSF files are available alongside the maps).

Details about columns:

?IDS?

RA

DEC

F_PACS_<BAND>_Ax	Flux in <band> in mJy in Aperture of x diameter arc seconds
Ferr_PACS_<BAND>_Ax	Error in above flux in mJy
F_PACS_<BAND>	Flux in <band> in mJy using PRF fitting
Ferr_PACS_<BAND>	Flux in <band> in mJy using PRF fitting
F_PACS_<BAND>__SKY	Sky background in mJy/pixel

It is recommended to use the aperture fluxes in smaller apertures.

Cross matching to xID24 SPIRE:

The PACS photometry measurements were linked to the SPIRE photometry. This was done using a positional cross-match based on RA, DEC though this is a unique and unambiguous as both sets of photometry were based on the same prior catalogues.

Definition of the fields:

The fields released here are:

- level3_LHN
- level3_SDP_LHN
- level3_UDS_HerMES
- level4_UDS
- level5_Bootes_HerMES
- level5_CDFS_SWIRE
- level5_EGS
- level5_ELAIS_N1_HerMES
- level5_Lockman_SWIRE
- level5_XMM_VIDEO1
- level5_XMM_VIDEO2
- level5_XMM_VIDEO3
- level6_ADFS
- level6_Bootes_NDWFS
- level6_ELAIS_N1_SWIRE
- level6_ELAIS_N2_SWIRE
- level6_ELAIS_S1_VIDEO
- level6_FLS
- level6_XMM_LSS_SWIRE

References:

[1] Oliver, S.~J., Bock, J., et al. 2012, MNRAS, 424, 1614

[2] Piazzo L et al. MNRAS, 2015, 447, pp. 1471-1483 and http://infocom.uniroma1.it/unimap/

[3] Oliver, S. et al. MNRAS, 2010, 405, 2279

[4] Lutz, D. et al. A&A, 2011, 532, L30

History:

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Herschel Extragalactic Legacy Programme (HELP) July, 2016