



# HerM33es : Herschel M33 extended survey

## PACS Data Products Delivery User's Guide

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### 1. Introduction

This document describes the delivery of the PACS photometer high level data products of the Herschel Open Time Key Project HerM33es (Herschel M33 extended survey; P.I.: C. Kramer) to the Herschel Science Center.

In the framework of HerM33es, we use all three instruments onboard the ESA Herschel Space Observatory (Pilbratt, G. L., et al. 2010, A&A, 518, L1) to study the dusty and gaseous ISM in M33. One focus of HerM33es is on maps of the FIR continuum observed with PACS (Poglitsch, A., et al. 2010, A&A, 518, L2) and SPIRE (Griffin, M. J., et al. 2010, A&A, 518, L3), covering the entire galaxy. A second focus lies on observing diagnostic FIR and submillimeter cooling lines [C II], [O I], [N II], and H<sub>2</sub>O, toward a 2'x40' strip along the major axis with PACS and HIFI (de Graauw, Th., et al. 2010, A&A, 518, L6).

This delivery includes the PACS imaging of M33. The SPIRE imaging data products have already been delivered in October 2011. More details on the project can be found in the paper by C. Kramer et al. (2010, A&A, 518, 67).

### 2. PACS Observations, Data Reduction, and the final MAPS

#### 2.1 PACS Observations

M33 was mapped with PACS & SPIRE in parallel mode in two orthogonal directions, in 6.3 h on January 7, 2010. Observations were executed with slow scan speed of 20"/s, covering a region of about 70'x70'. Data were taken simultaneously with the PACS green and red channel, centered on 100 and 160  $\mu$ m. SPIRE observations were taken simultaneously at 250, 350, and 500  $\mu$ m.

#### 2.2 PACS Data Reduction

PACS data were reduced in a standard way to level 1 using HIPE 8.0.1:

- Calibration blocks were removed and the latest version of the calibration tree was obtained from HIPE
- Bad and saturated pixels were flagged
- Frames were converted to units of Volt
- Astrometry was added
- Finally flat field correction and conversion to units of Jy was performed

From level 1 data cubes, the maps were made using the Scanamorphos software (Roussel 2012, submitted; <http://www2.iap.fr/users/roussel/herschel/>), version 16. In a first step the HIPE level 1 data cubes were converted to a Scanamorphos-compatible format while preserving the Badpixels, Nonscience, Saturation, and Glitchmask masks. From then we converted the cubes to IDL structures. Scanamorphos was run with the /parallel option.

### **2.3 PACS Maps**

The two maps for each of the PACS bands (100 and 160  $\mu\text{m}$ ) are delivered as 5-extension FITS files. For each plane the plate scale is 1.70" and 2.85" at 100 and 160  $\mu\text{m}$ . The 5 planes are:

1. signal map in Jy/pixel,
2. error map in Jy/pixel,
3. total drifts (excluding flux calibration offsets),
4. weight map,
5. signal map weighted to exclude noisy scans.

The absolute flux calibration is about 5%.

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