VNGS (Very Nearby Galaxies Survey)
public release of PACS maps
April 2013

This document accompanies the first public release of maps obtained from the PACS bolometer arrays for the Herschel key program *Very Nearby Galaxies Survey* (VNGS; P.I. Christine Wilson). The VNGS targets 13 nearby galaxies in imaging with the PACS and SPIRE photometers, and in spectroscopy with the PACS integral-field unit and the SPIRE Fourier-transform spectrometer.

The present data release is made of the PACS maps at 70 and 160 μm of the 12 sample galaxies or galactic systems observed as part of the VNGS, i.e. Arp 220, Cen A, M 51 (NGC 5194-95), M 81, M 82, M 83, NGC 205, NGC 891, NGC 1068, NGC 2403, NGC 4125 and NGC 4151; and the PACS maps at 70, 100 and 160 μm of the Antennae system (NGC 4038-39), observed as part of the SHINING key program (P.I. Eckart Sturm). All targets were observed in the nominal large-scan mode at a scan speed of 20 arcsec/s.

Recent studies partly based on these data include those of Mentuch Cooper et al. (2012, ApJ 755, 165), De Looze et al. (2012, MNRAS 423, 2359), Parkin et al. (2012, MNRAS 422, 2291), Foyle et al. (2012, MNRAS 421, 2917), Bendo et al. (2012, MNRAS 419, 1833).

Processing summary:

The level-1 data were downloaded from the Herschel archive, using HIPE 9.0, thus with the latest flux calibration set for the PACS photometer (PACS_CAL_41_0). The masks of bad pixels and saturated samples were transferred, but not the glitch mask. The level-1 data were then reformatted and processed with *Scanamorphos* version 21 (Roussel 2012, arXiv:1205.2576). The steps performed for this release include the subtraction of the brightness drifts caused by the low-frequency noise (comprising both the thermal drifts of the telescope and detectors and the flicker noise of the bolometers), deglitching, the masking of unstable bolometers and brightness discontinuities, and the masking of large position errors (affecting 1 to 2% of all samples in the observations of M 82, M 83 and NGC 2403). The data are weighted by the inverse square high-frequency noise of each bolometer in each scan, and mapped using the gnomonic projection. The documentation of the software can be found at `http://www2.iap.fr/users/roussel/herschel` .

Known features:

Some maps show a very faint striped pattern in a portion of the field of view (see illustrations of this pattern in the PACS data release note for the KINGFISH key program). This is due to electrical interferences affecting the readout, that cannot be corrected at the moment. Their impact on the map quality is very minor.

The sky background around the galaxies shows faint structures that may not all be real, and are likely caused by drift residuals. Simulations have shown that these artefacts have a brightness well below the 3σ significance level computed from the error map.

Map edges covered in only one scan direction may be affected by strong drifts that

cannot be corrected because the redundancy is too low. Therefore, it is advised to quantitatively use only the part of the map with nominal coverage.

Format of the data products:

For each galaxy and each filter, four different planes are assembled into a cube, the plane index corresponding to the third dimension. The first plane is the signal map, the second plane is the error map (unbiased weighted estimate of the error on the mean brightness), the third plane contains the drifts subtracted during the processing, and the fourth plane is the weight map.

Each cube is stored into a file conforming to the Flexible Image Transport System (fits) standard (Wells et al. 1981, A&AS 44, 363; Hanisch et al. 2001, A&A 376, 359).

The obsids and the number of combined scans are indicated in the fits headers.

Map parameters:

The maps are in the standard astronomical orientation (North up and East left). The adopted pixel scale is approximately one fourth of the point spread function full width at half maximum (FWHM), i.e. $1.4''$ at $70\,\mu$m, $1.7''$ at $100\,\mu$m, and $2.85''$ at $160\,\mu$m. The surface brightness unit is that of the processing output, Jy/pixel.

The residual sky background has not been removed from the maps, and no adjustment to the pointing was made.