LVL: The Local Volume Legacy survey
Data Products Delivery – DR5
User's Guide
December 15th, 2009

1. Introduction

This document describes the fifth delivery (DR5) of the high level data products of the Cy4 Spitzer legacy project LVL (Local Volume Legacy; P.I.: J.C. Lee; Deputy-P.I.: R.C. Kennicutt) to the Spitzer Science Center/IRSA. ***DR5 is LVL's final delivery***. Thus, the present document provides a cumulative description of all LVL data products as delivered in DR1 to DR5, inclusive.

LVL consists of a sample of 258 galaxies, which have been mapped with both IRAC (4 bands) and MIPS (3 bands). In addition, ancillary data products consisting of images in the narrow-band Hα line emission and broad-band R (from the ground) and the UV continuum (2 bands) from GALEX are also available for most of the sample, and are part of the delivered data products for the LVL project.

The previous delivery (DR4) contained IRAC and MIPS mosaics for the LVL galaxies, while the current delivery (DR5) is a cumulative delivery of all GALEX and optical (Hα and R) images obtained by the precursor surveys of Kennicutt et al. (2008) and Lee et al. (2010, in preparation). van Zee et al. have undertaken additional observations to complete the Hα and R-band imaging of the LVL sample, and these data will become available in the future. The combination of DR5 and previous deliveries thus provides to the community:

- IRAC mosaics (4 bands, centered at 3.6, 4.5, 5.8, and 8.0 μm) for 256 galaxies;
- MIPS mosaics (3 bands, centered at 24, 70, and 160 μm) for 256 galaxies;
- GALEX images (2 bands: FUV, centered at ~ 0.1516 μm, and NUV, centered at ~0.2267 μm) for 249 galaxies;
- optical images (narrow—band centered at the wavelength of Hα+[NII] emission and scaled broad—band R) for 175 galaxies.

The final data products include recalibrated (through the S18 pipeline) mosaics for any archival IRAC data in the LVL sample, and MIPS mosaics corrected for the effects of non-linearity, negative streaking, and asteroids.

The LVL public website is currently hosted at:
http://www.ast.cam.ac.uk/research/lvls/

2. Content of the Fifth Data Delivery

2.1 Sample and Summary of Data Products

The LVL sample contains 258 galaxies, representing an approximately volume-complete survey of galaxies within the 11 Mpc Local Volume. IRAC and MIPS mosaics for the LVL galaxies represent a combination of new and pre-existent archival images (the latter being 57 for MIPS and 78 for IRAC, 33 of which from the SINGS [the Spitzer Infrared Nearby Galaxies Survey; one of the original Spitzer Legacy programs] project); the archival images were re-processed by our team to provide a common product together with the rest of the LVL sample. Two LVL galaxies, the Magellanic Clouds (SMC and LMC), were observed and delivered as part of other Spitzer Legacy Programs, SAGE (P.I.: Meixner) and SAGE-SMC (P.I.: Gordon). *Thus, LVL deliveries contain MIPS and IRAC mosaics for a total of 256 LVL galaxies. A cumulative delivery of MIPS mosaics was performed in DR4, while IRAC mosaics were delivered across all four earlier deliveries (13 in DR1; 136 in DR2; 31 in DR3; and 76 in DR4; see Tables 1, 2, 3, 4).*

DR5 contains the cumulative delivery of GALEX images for 249 galaxies and optical (Ha and R) images for 175 galaxies (in 174 frames: NGC1800 and MCG-05-13-004 are contained in the same image). DR5 contains all UV and optical images available from Kennicutt et al. (2008) and Lee et al. (2010, in preparation), and includes images for 13 galaxies that were already delivered in DR1.

Summaries of the data products are given below, and details on the data processing are provided in the following sections.

2.1.1 IRAC Mosaics

For each galaxy, 4 mosaics (together with their associated coverage map, see below), one for each of the four IRAC bands are delivered as single-extension FITS files. The size of the mosaics is between 2xD_{25} and 2.5xD_{25}, depending on the galaxy. The pixel scale of the mosaics is 0.75 arcsec, and the flux units are MJy sr^{-1}, the latter obtained directly from the BCD's images header. The mosaics have FITS-compliant WCS headers, are background-subtracted, and have standard orientation, with North up, East left.

The coverage maps each contain effective exposure times calculated on a pixel-by-pixel basis. These maps are in units of seconds and named using the standard IRAC convention with an additional identifier concatenated to the end (e.g., ngc0672_irac1.cov.fits). The coverage maps are especially important in cases where archival data was used, and the image layout may differ from the standard LVL observing strategy.

2.1.2 MIPS Mosaics

For each galaxy, 6 mosaics, two for each of the MIPS bands (one mosaic is cropped to the region around the galaxy to a size of about 2xD_{25}, the other contains the full image) are delivered as single-extension FITS files. The pixel scale of the MIPS mosaics is wavelength-dependent: 1.5 arcsec at 24 μm, 4.5 arcsec at 70 μm, and 9.0 arcsec at 160 μm. The flux units are MJy sr^{-1}. The mosaics have a median background removed, and have orientation North up, East left. Similarly to IRAC, weight maps are delivered as well; however, unlike the IRAC coverage maps, the values of the pixels in the MIPS weight maps store the number of images stacked at that point in the map.

For 38 galaxies, two additional mosaics at 70 μm (section 4.5), one a full image, the other a cropped image, with values interpolated over low-weight pixels are added; these images have suffix 'interp' in the file name.

2.1.3 GALEX UV Images

GALEX ultraviolet imaging for the LVL galaxies has been/is being obtained through the 11 Mpc Hα UV Galaxy Survey (11HUGS) Cycle 1 (P.I.: R.C. Kennicutt) and Cycle 4 (P.I.: J.C. Lee) programs, through a Cycle 3 ACS Nearby Galaxies Treasury Survey program (P.I.: E. Skillman), as well as from the GALEX PI-programs Nearby Galaxies Survey (NGS), Medium-deep Imaging Survey (MIS), and All-sky Imaging Survey (AIS), plus a handful of Guest Investigators' (GI) archival data. The combined programs will provide UV data for 249 of the 258 galaxies in the LVL sample. The remaining 9 galaxies cannot be observed due to bright-object avoidance constraints. . These are SMC, LMC, UGC05076, NGC3077, ISZ399, UGC07490, UGC08508, UGC08837, and NGC7713. Full description of the ensemble dataset and observations will be given in Lee et al. (2010, in preparation).

For each galaxy, 4 intensity images, two for each GALEX band (FUV at ~1516 A and NUV at ~2267 A; one image per band containing the full GALEX field-of-view, 1.2 degrees, and the other cropped to a size of $4xD_{25}$), is being delivered, with 5 arcsec resolution. The pixel scale of the images is 1.5".

In addition to the intensity maps (calibrated in units of counts/sec/pix), the high-resolution response maps (needed to calculate photon noise) are being delivered. The two GALEX images are calibrated, registered to a common frame, and have standard WCS headers in FITS-compliant format. The images will have standard orientation, North up East left.

2.1.4 Optical Images/Mosaics

Optical imaging data in the standard R broad-band filter and in narrow-band filters at the wavelength of the Hα+[NII] emission have been obtained for most of the LVL galaxies (described in Lee 2006, PhD thesis; Kennicutt et al. 2008, ApJS 178, 247). The delivery includes: emission-line-only images (*_HA_SUB.fits), and scaled R-band images (*_CONT.fits).

The images are registered to a common frame, have standard astrometric solutions, and are flux calibrated. The images have been rotated to standard orientation (North up, East left).

All optical data are single extension FITS files. Photometric and astrometric keywords are stored in the FITS headers and the images have standard WCS headers in FITS-compliant format.

2.2 File Name Convention

For each galaxy, multiple datasets are delivered, with the following filename convention:

- *IRAC mosaics and weight maps*: ngcXXXX_irac#.fits, ngcXXX_irac#.cov.fits (with #=1,2,3,4; e.g., ngc1800_irac1.fits, ngc1800_irac1.cov.fits)
- *MIPS mosaics and weight maps*: ngcXXXX_mips#_[crop,image]_v@.fits, ngcXXXX_mips#_[crop,image]_v@_wt.fits (with #=24,70,160 and v@=version number; e.g., ngc1800_mips24_crop_v3-0.fits, ngc1800_mips24_crop_v3-0_wt.fits). For 38 galaxies, the 70 μm images have additional mosaics where low-weight pixels are interpolated (sections 2.1.2 and 4.5): the suffix for these images is `interp'.
- *GALEX images*: ngcXXXX_galex_#_[int,rrhr]_[crop,image].fits (with #=FUV,NUV, e.g., ngc1800_galex_FUV_int_crop.fits; [int,rhrr] refers to the intensity or the high-resolution response maps, respectively).
- *Optical images/mosaics*: ngcXXXX_#_dr1.fits (with #=CONT,HA_SUB, e.g., ngc1800_HA_SUB_dr1.fits)

3. IRAC Data Products and Post-BCD Processing

3.1 Introduction

The LVL IRAC images are created from multiple Spitzer images in either a mosaic or single field dither pattern. The fundamental data used for the mosaics are Version 16-18 Basic Calibrated Data (BCD) images produced by the Spitzer Science Center (SSC) and available in the Spitzer archive. These data have already undergone a number of processing steps including conversion from engineering to scientific units, flat fielding and bias subtraction. The LVL IRAC pipeline further processes these data to deal with a number of issues including frame geometric distortion and rotation, cosmic rays, frame alignment, and bias drift. The LVL post-processing insures that all images are of uniform quality, regardless of the base data's specific BCD pipeline version, due to our incorporation of additional artifact corrections that surpass those of any SSC pipeline version. Frames are combined using a drizzle algorithm to maximize resolution from the individual sub-sampled images. The major observation and processing steps are detailed below.

3.2 Data Products

The IRAC data products contained in this delivery are single-extension FITS files, two files for each IRAC band for each galaxy: science mosaics (*_irac1.fits, *_irac2.fits, etc.) and coverage maps (*_irac1.cov.fits, *_irac2.cov.fits, etc.). The science images are calibrated in MJy sr^{-1}, and have pixel sizes of 0.75 arcsec. The coverage maps contain the information on the integration time in seconds at each pixel; the pixel size of the coverage maps is the same as the science mosaics.

Astrometry is stored using FITS standard WCS coordinate keywords. The flux scale is stored in the BUNIT keyword. A boolean keyword BACK_SUB indicates if sky subtraction has occurred, and, if true, the sky value is stored under the keyword BACKGRND; BCKNOISE provides the standard deviation in the sky.

A note about sky subtraction: only constant level backgrounds have been subtracted from the images. Spatially variable backgrounds have not been removed.

3.3 Observational Strategy

IRAC observations for the 180 galaxies taken as part of the LVL project were carried out following the same strategy used for the SINGS IRAC campaign (Kennicutt et al. 2003, PASP 115, 928). All individual frames are 30 sec in duration and are taken in HDR mode; an additional 1.2 sec exposure is taken at each pointing to allow for recovery of data in the case of pixel saturation during the main observation (see Section 3.4 for description of saturation recovery procedure). These observations can be divided into two categories: single field of view or mapped observations. Galaxies fitting within a single 5' IRAC field of view are imaged in two separate AORs, each consisting of four dithered frames, yielding eight 30 sec exposures for each target. Galaxies larger than the IRAC field of view are taken in a mosaic pattern, offsetting the field of view by ~50% for each frame. This pattern is observed twice in two individual AORs, yielding a final mosaic where the central region has coverage in eight 30 sec exposures, while a border around the outermost parts of the mosaic has coverage in four 30 sec exposures. LVL IRAC images have 24 sec (8 x 30) coverage over the cores of our maps, except in a small number of cases where additional frames were incorporated to increase this final coverage. These deeper mosaics are identified in Section 3.7.

IRAC observations for the remaining 76 galaxies released as part of the LVL project (in DR4; see Table 1) were carried out through a series of 19 different observing programs and data were obtained through the Spitzer archive. Notably, 33 of the 76 IRAC DR4 galaxies were observed as part of the SINGS IRAC campaign (Kennicutt et al. 2003, PASP 115, 928), whose observing strategy matches that of the galaxies newly observed for LVL. S18 pipeline data were used to produce mosaics from these programs, mosaics that vary in integration from 30 sec/pixel to 1000 sec/pixel, with a median of ~200 sec/pixel. For reference, the SINGS and LVL IRAC images were taken to a standard depth of 240 sec/pixel. Due to the variation in IRAC observing strategies for the archival galaxies delivered in DR4, we encourage users to refer to the coverage maps provided in order to determine the sensitivity for any location in any image.

3.4 Image Processing

The steps performed by the LVL IRAC pipeline are the following:

a. Geometric Distortion and Image Rotation

BCD images contain geometric distortions caused by IRAC's off-axis location in the Spitzer focal plane. These are corrected for utilizing MOPEX. Frames are rotated to the standard North-up, East-left.

b. Bias Structure

There is residual bias structure in many IRAC band 3 frames due to the "first-frame effect". For galaxies that fit within the IRAC FOV, all BCD frames are binned according to the gradient across the frame, as measured in 12 columns near left and right edges. The median (source-free) gradient profile within each bin is used to correct for the gradient in each frame. A similar routine is followed for each extended (mosaicked) galaxy, but the binning and correcting is only based on data for that particular galaxy.

c. Bias Drift

IRAC images are subject to full frame DC bias drift with time. To correct for this, the LVL IRAC pipeline employs the MOPEX script overlap.pl to level the individual frame backgrounds. This offset is assumed to be due to the bias drift.

d. Cosmic Rays

Cosmic ray removal is accomplished using a dual outlier detection scheme within MOPEX: "radhits" are identified by their spatial appearance (smaller than PSF area, high counts) and confirmed using temporal filtering (looking for features that appear in less than a majority of the individual frames).

e. Saturated Pixel Recovery

In cases where exceptionally bright target sources (foreground stars are left uncorrected) saturated or entered the non-linear regime of the detector during the 30 sec exposure, additional 1.2 sec high dynamic range (HDR) images are used to allow for data recovery. Pixels affected by these issues, typically in the band 3 and 4 frames, are flagged by MOPEX during processing. Correction begins by creating a mosaic of the 1.2 sec exposures interpolated onto the same pixel grid as the original mosaic. A difference image is then created from the two mosaics and any residual, systematic difference in the background sky levels is removed. Pixels in the difference image valued at 1 MJy/sr or higher are flagged (routinely regions of ~400 pixels) and these pixels in the long integration mosaic are replaced by their counterparts in the short integration mosaic. Mosaics that undergo this recovery procedure are identified in Section 3.7.

f. Background Subtraction

Background levels are determined from a Gaussian fit to the histogram of the pixel levels in regions free of any sources. The peak of the Gaussian is adopted as the constant sky level for the mosaic, subtracted from the mosaic, and stored in the keyword BACKGRND.

The user is cautioned that in some cases, a constant sky level is only an approximation of the actual value. Variations across the mosaic may occur in some cases, especially in IRAC Band 4.

g. Drizzle Interpolation and Pixel Scale

The final mosaic of the corrected BCD frames is constructed using the MOPEX mosaic.pl script. Drizzle interpolation (drop factor of 0.75) is employed to determine the pixel values on a final grid of 0.75 arcsec/pixel, which is chosen to yield fully-sampled images with maximal resolution. The reference pixel for the WCS header keywords of the final mosaic is selected to be at the center of the galaxy. Blank pixels in the final mosaic images are set to NaN (not a number). The final drizzle step combines BCD frames from two different AORs, removing asteroids in the process.

3.5 **Known Problems and Image Artifacts**

Users are cautioned to be aware of standard IRAC detector artifacts that may be present in the LVL data, even though our observing and data processing strategies are designed to attempt to minimize these artifacts. These are detailed extensively in the IRAC Data Handbook, and include: persistent images in s 1 and 4, diffuse stray light, stray light from point sources, muxbleed, column pulldown and banding, remaining full-frame bias and ghost images.

3.6 Important Note on Photometric Calibration

The units of the LVL IRAC mosaics are the same as the original BCDs delivered by the SSC. IRAC calibrations are performed using a 12” radius aperture on stars, and the units of MJy/sr of the mosaics refer to this specific aperture.

Users should be cautioned that when performing aperture photometry, aperture corrections need to be applied even for relatively large apertures (see the IRAC Data Handbook, Section 5.5); the calibration for point sources is different from that of extended sources (http://ssc.spitzer.caltech.edu/irac/calib/extcal/).

3.7 Notes on Individual Galaxies

BK03N & UGC05336: Additional frames were added to original mosaics to produce deeper final images. Please consult coverage maps as depth varies across the final mosaic. In addition, the proximity of M81 causes variable backgrounds in the Band 4 mosaics.

CGCG217018, ESO245G005, ESO486G021, FM20001, KKH086, MRK475 & NGC7064: Muxbleed and banding effects occur on or near target galaxy.

DDO078: A bright foreground star partially obscures target galaxy.

ArpsLoop, ESO321G014, HS98117, LEDA166101 & NGC2976: Band 4 has a variable background.

ESO410G005: An extremely bright foreground star just out of the field of view causes strong latent images that remain uncorrected in the final mosaics.

ESO540G030 & IC1574: Band 1 images have residual artifacts due to latent correction.

F8D1: Bands 1-4 have variable backgrounds.

IC5152: No data exist in Band 1 and Band 3 for this target, and in Bands 2 and 4 a bright star off the edge of the frame causes an uncorrected stray light artifact.

KK98208: A bright star off the edge of the frame causes an uncorrected stray light artifact in Band 2.

KKH037: Stray light mask causes low-coverage patch of pixels in southern corner of Band 1 image.

NGC0045 & Sextans A: A bright foreground star lies projected on top of target galaxy.

NGC0404: A bright star off the edge of the frame causes an uncorrected stray light artifact in Bands 1-4.

NGC0672, NGC1510, & UGC01249: Additional frames were added to original mosaics to produce deeper final images. Please consult coverage maps as depth varies across the final mosaics.

NGC1311 & NGC4068: Persistent latent artifacts remain in Bands 1 and 2.

NGC1744: Band 1 and 3 images have residual image artifacts, due to bright, saturated foreground stars on frame.

NGC1800 & MCG-05-13-004: Both galaxies included in same IRAC mosaic. Four separate AORs were combined to produce 480 sec integration (twice normal depth) final images.

NGC2500: A bright star causes uncorrected diffraction spikes and muxbleed artifacts to remain atop the target galaxy.

NGC0253, NGC1291, *NGC2903, NGC3031, NGC3627, NGC3628, & NGC5236*: Galaxy nuclei suffered from saturation issues, and were corrected by means described in Section 3.4.

NGC4096: Two persistent latent artifacts (just west of galaxy) remain in Band 1.

NGC4485 & NGC4490: Both galaxies included in the same IRAC mosaic. Two separate AORs were combined to produce a deeper (~700 sec/pixel) final image.

NGC4631: Persistence banding artifacts remain in Band 4.

NGC5194 & NGC5195: Both galaxies included in the same IRAC mosaic. Both galaxy nuclei suffered from saturation issues and were corrected by means described in Section 3.4.

NGC5253: A bright, unresolved super star cluster belonging to the target galaxy causes prominent spikes across the image in Bands 3 and 4. Galaxy nucleus suffers from saturation issues, corrected by means described in Section 3.4.

UGCA320: Persistence banding artifacts remain in Band 3.

UGC08760: Persistent stray light artifacts remain in Bands 1 and 2.

UGC07242: A bright foreground star fully obscures target galaxy.

4. MIPS Imaging Data Products and Post-BCD Processing

4.1 Introduction

The LVL MIPS mosaics are created from multiple Spitzer images obtained in scan-mapping mode, and fully processed with the MIPS Data Analysis Tool (MIPS DAT, Gordon et al. 2005, PASP, 117, 503). The LVL observing strategy is nearly identical to that of the SINGS MIPS observations (Kennicutt et al. 2003, PASP, 115, 928). The major observation and processing steps are detailed below. The images are calibrated using the latest calibration factors computed by the instrument team and the SSC (Engelbracht et al. 2007, Gordon et al. 2007, and Stansberry et al. 2007 at 24, 70, and 160 μm, respectively).

4.2 Data Products

The LVL MIPS data products are single-extension FITS files, four files for each MIPS band (plus two interpolated images for 38 70 μm mosaics - see section 4.5): the full scan map (*_mips#_image_v3-0.fits), an image cropped to the region around the galaxy (*_mips#_crop_v3-0.fits), and the weight map associated with each image. The images are calibrated in MJy sr^{-1}, and have pixel size 1.5, 4.5 and 9.0 arcsec for the 24 μm, 70 μm, and 160 μm mosaics, respectively. The pixel sizes of the MIPS mosaics have been chosen to sample adequately the point spread function and at the same time be an approximate integer multiple of the IRAC mosaics' pixel scale (approximately 0.75 arcsec, see section 3). Constant backgrounds have been subtracted from the data as part of the data processing. Spatially variable backgrounds, such as cirrus structure, have not been removed.

All original fits header information has been retained. The headers' content has been re-arranged so that basic information on the observations, the target, and coordinates, and the pixel sizes appears first in the listing. Among the relevant keywords: the mosaics' astrometry is stored in the standard FITS WCS keywords; the flux units are stored in ZUNITS; and the median background subtraction and its value are stored in the keywords BACK_SUB (performed=T, not performed=F) and BACKGRND (value), respectively. The EXPTIME keyword indicates the total exposure time, in seconds, for an average pixel in the center of the map (i.e., the exposure time for any pixel is equal to EXPTIME * weight map / <average value in center of weight map>). In addition, a linearity correction has been applied to the 70 μm data - this is indicated by the LINCOR70 keyword. All other information, which includes details on the observations and the data processing, is located after these basic keywords.

4.3 Observational Strategy

The new LVL MIPS observations were obtained using the scan-mapping mode in two separate visits to the galaxy. Separate visits allow asteroids to be recognized and provide observations at orientations up to a few degrees apart to ease removal of detector artifacts. As a result of redundancy inherent in the scan-mapping mode, each pixel in the core map area was effectively observed at least 40, 20, and 4 times at 24, 70, and 160 microns, respectively, resulting in integration times per pixel of at least 160 s, 80 s, and 16 s, respectively. The exact depth of any observation can be found in the weight maps discussed in section 2.1.2.

4.4 Post-BCD Image Processing

The MIPS data were processed using the MIPS DAT versions 3.10 along with additional customized processing software. The processing steps are as follows.

For the 70 and 160 μm data, a linear fit is applied to the ramps (the counts accumulated in each pixel during the non-destructive readouts), and slopes are derived. This step also removes cosmic rays and readout jumps and applies an electronic nonlinearity correction.

The initial processing of the 24 μm data is different from the 70 and 160 μm data, as slopes are already fit to the 24 μm data on the spacecraft. Thus, the 24 μm images are processed through a droop correction (that removes an excess signal in each pixel that is proportional to the signal in the entire array), correction for non-linearity in the ramps, and dark current subtraction.

Telescope optical signatures and time-dependent responsivity variations in the detector elements are removed from the data, in the following way:

> For the 24 μm images, flatfielding is performed in two steps. First, scan mirror position dependent flatfields are applied to the data (to correct dark spots caused by particulate matter on the scan mirror that shift in position from frame to frame). These flatfields are created from a superflat with a superimposed spot map that is shifted to match the spots in the individual scan legs. Next, scan mirror position independent flats are created from off-target data in the data from each AOR; these flatfields are applied to the data to remove any residuals left by the scan-mirror-dependent flats. Additionally, a readout offset correction is applied between the flatfielding steps to correct variations across the columns in the images. Latent images in the 24 μm data (from bright sources and bright cosmic ray hits) are masked out after the flatfielding. The "jailbar" pattern caused by bright sources is corrected, and an additive correction is applied to images with a DC level which is offset by a significant amount from their neighbors (which can happen when the droop correction is underestimated for images containing a saturating source). Following this, the background is subtracted from the individual frames of data. This is done by finding the background levels as a function of time for each individual scan leg while excluding the target and other bright sources, then fitting a third order polynomial to the background values. The function is then used to calculate the background for each frame, and this background is subtracted. Finally, the low-level (~0.2%) scan-mirror-position-dependent scattered light is subtracted from each image.

The stimflash frames taken by the telescope are used for responsivity corrections of the 70 and 160 μm arrays. Next, the dark current is subtracted, and illumination corrections are applied to the data. Following this, short-term variations in the images caused by drift are subtracted. This last step also subtracts the background from the data. At 70 μm we mask pixels for about 20 images that have been subjected to high fluxes. The effect of this is most obvious in bright galaxies, like NGC0253 and NGC3034.

A preliminary mosaic is made with the resolution set to the native pixel resolution of the MIPS detectors. During this mosaicking process, the individual frames of data are rewritten. A statistical analysis is performed on all pixels that overlap, and pixels that deviate at the 3σ level are masked out in the rewritten frames. This step effectively filters out cosmic rays and other transient phenomena.

In all three bands, asteroids are identified by comparing different epochs (or different scan legs, for those archival scan maps that have been obtained only once) and masked from further processing.

Final mosaics are made from the individual frames. Data from all AORs are mosaicked together.

After the mosaics are created, the images are multiplied by a final calibration factor that converts the MIPS units into MJy sr^{-1}. The factors are the following (keyword JANSCALE in the image headers):
24 μm: 0.0454 MJy sr^{-1} $MIPS\_units^{-1}$
70 μm: 702 MJy sr^{-1} $MIPS\_units^{-1}$
160 μm: 41.7 MJy sr^{-1} $MIPS\_units^{-1}$

The cropped mosaics in this delivery have been sized to include all of the galaxies' optical disks and any nearby galaxy or extended structure. The cropped images also include a minimum of 40" space between the edge of the optical disk and the edge of the image, so that sufficient information for measuring the background is provided.

4.5 Special Cases, Known Problems and Uncertainties

Streaking in the 70 μm data

The MIPS 70 μm data is subject to streaks around bright sources, at a level of ~1% of the peak brightness of the source. These manifest most commonly as dark streaks, which are due to a depression in the response of the detectors following the observation of a bright source. We have attempted to mitigate this effect in the LVL data by masking pixel observed after a bright source. For bright, extended sources, this procedure results in many pixels of low weight on either side of the source; for such sources, we have supplied, in addition to the normal maps, maps with the low-weight pixels interpolated over. The interpolated images are designated by the suffix 'interp' in the filename, and are expected to be less accurate photometrically than the default maps. The galaxies affected by this procedure include ISZ399, NGC0055, NGC0253, NGC0404, NGC0625, NGC1313, NGC1512, NGC2403, NGC2683, NGC2903, NGC2976, NGC3031, NGC3034, NGC3077, NGC3351, NGC3368, NGC3521, NGC3593, NGC3627, NGC3628, NGC4214, NGC4258, NGC4449, NGC4460, NGC4485, NGC4490, NGC4605, NGC4631, NGC4736, NGC4826, NGC5055, NGC5194, NGC5195, NGC5236, NGC5253, NGC5457, NGC5477, and NGC7090.

Less often, the 70um data are subject to positive streaks, the origin of which is unknown at this time. Sources subject to positive streaks include ISZ399, NGC0253, NGC2903, NGC3034, NGC3628, NGC4631, and NGC5236.

Artifacts near Bright Sources in the 24 μm data

In some cases, bright sources in the 24 μm data trigger a strong "jailbar" effect and a droop effect visible as a step function in the background. Corrections for these effects have been applied to the data, but a residual offset is still present on the array rows most heavily saturated by the target, which results in a streak perpendicular to the scan direction (i.e., the long axis of the "image" mosaics) and through the center of the bright source.

The three highest-surface-brightness sources, NGC5253, NGC5236, and NGC3034, show this effect.

Photometric Uncertainties

Currently the estimated calibration uncertainties for MIPS extended object photometry are 2%, 5%, and 9% for the 24, 70, and 160 μm data, respectively. The user is advised that aperture corrections, background noise, and color corrections will add to the uncertainty (e.g., Dale et al. 2007, ApJ, 655, 863).

Notes on individual galaxies:

NGC5457 and NGC5477: the two galaxies are in the same MIPS pointing, thus the same MIPS mosaics are delivered for the two galaxies.

5. GALEX Data Products and Pipeline Processing

5.1 Introduction

GALEX images in two ultraviolet bands, far-UV (FUV; λ_{eff}=1516 Å) and near-UV (NUV; λ_{eff}=2267 Å), are delivered. The majority of the LVL images have been obtained as part of the GALEX *Guest Investigator* (GI) Cycle-1 #47 (PI: R.C. Kennicutt), Cycle-3 #61 (PI: E. Skillman), and Cycle-4 #95 (PI: J. Lee) programs and the *Nearby Galaxies Survey* GALEX PI-program. A few objects were observed as part of other public GI datasets and of the *Medium-Deep Imaging Survey* GALEX PI-program.

For 9 objects (SMC, LMC, NGC3077, UGC5076, ISZ399, UGC7490, UGC8508, UGC8837, and NGC7713), GALEX data will not be available, because of Bright Object Avoidance constraints.

The majority of the LVL GALEX imaging has been obtained with exposures of 1,500 sec per galaxy. This compares to 100 sec for the GALEX All-Sky Imaging survey, 1500 sec for the Medium Imaging and Nearby Galaxy Surveys, and 30,000 sec for the Deep Imaging Survey.

The processing steps performed by the GALEX pipeline (v6) include the generation of count maps (in sky coordinates) by the combination of the time-tagged photon positions and the satellite aspect solution, which are then divided by the respective relative response map in order to obtain the intensity images released here. More details on the GALEX data processing are given below.

5.2 Data Products

The GALEX data products delivered are single-extension FITS files. For each object we deliver full-frame intensity FUV (*-fd-int.fits) and NUV images (*nd-int.fits) along with the corresponding high-resolution response maps (*-fd-rrhr.fits, *-nd-rrhr.fits). All four images are registered to a common frame and are WCS-compliant with North up and East left. The images are 1.6^{o}x1.6^o in size but only the central ~1.2 degrees (in diameter) are exposed. The pixel size is 1.5 arcsec in all cases. Additionally, we deliver intensity images and high-resolution response maps cropped to a size equal to 4 times the D_{25} diameter of the galaxies.

The units of the intensity images are *counts/sec/pixel* and can be converted into AB magnitudes via $m_{AB}=ZP-2.5log10(counts/sec)$, where the corresponding zero points are ZP_{FUV}=18.82 mag and ZP_{NUV}=20.08 mag. The high-resolution response map, which is the product of the response by the effective exposure time, can be used to determine the total number of detected photons (and from them the photon noise) simply via multiplication by the intensity image. Exposure times for the images can be obtained from the EXPTIME keyword in the image headers.

5.3 GALEX Pipeline processing

The GALEX images have been processed with the version 6 of the GALEX pipeline. The processing of the GALEX data includes three main steps: *Static Calibration, Dynamic Aspect Correction, and Generation of Data Products*. Here we briefly summarize the operations performed to complete these three steps. See Morrissey et al. (2007, ApJS 173, 682) for an extensive description of the GALEX pipeline and the calibration procedure for the GALEX intensity images.

Static Calibration: In this first stage the time-tagged photon lists (which also include pulse-height information) obtained from the GALEX satellite are processed to derive accurate focal-plane positions for all photon events. This is also the stage when the GALEX pipeline identifies events that are not photon generated, such as the STIM pulses. The first operation to be performed as part of the Static Calibration is the *determination of raw positions* from the coarse-clock counters plus fine position measurements, which are essentially given by the coarse-clock phase. Once these raw positions are assembled, the following (static) corrections are applied: *centering and scaling, wiggle, walk, spatial non-linearity (distortion) at the detector edges, and hot-spot masking.*

Dynamic Aspect Correction**:** Once precise detector coordinates are computed for all photon events, the sky coordinates of these events are determined. In order to do so the GALEX pipeline reconstructs the spacecraft trajectory in the sky (in RA, Dec, and roll angle of the telescope bore-sight) during the exposure as a function of time. The GALEX pipeline makes use of the information provided by the *Attitude Control System*, which is refined by tracking the actual trajectory in the NUV detector of bright stars included in the ACT catalogue. The main objective of this procedure is to remove the spiral dither pattern of ~1 arcmin of amplitude that is applied to the satellite while carrying out the observation and that is intended to homogeneously distribute the detector fatigue.

Generation of Data Products: The corrected photon data, generated at the end of the processing steps described above, are then binned in pixels of 1.5”x1.5” in size in what is called the Count image. The Count image is then divided by the Relative Response image to obtain the Intensity image included as part of this data delivery. The High-Resolution Response map (also delivered) is simply an up-scaled (1.5 arcsec/pixel) version of the 6” Relative Response image. Note that the response images are different for the two bands.

No special post-pipeline procedures were applied to the images included in this data delivery. The full-frame GALEX images of all objects are also available at the *Multimission Archive at STScI* (MAST) as part of the GALEX Data Release 4 (GR4). This excludes the images obtained as part of the programs GI1 #47 (PI: R. Kennicutt), GI3 #61 (PI: E. Skillman), and GI4 #95 (PI: J. Lee) that are still under proprietary period. Intensity images and response maps delivered here are identical to those available at MAST.

Rotation-matrix elements (CD) were added to the image header. These keywords and the CROTA and CDELT-based astrometry keywords already included in the MAST images are redundant with respect to most software applications. In the case of the cropped images we added some extra information to the image header, which includes the position of the galaxy center in pixel coordinates of the cropped image (XCENTER, YCENTER) and the dimensions of the cropped image (NDIMX,NDIMY).

5.4 Known problems and GALEX specifics

The GALEX images show some artifacts that the potential user of these data should be aware of. The most common ones are due to reflections of bright field stars in the dichroic beam splitter or in the window of the NUV detector (associated either to the window itself of to its beveled exterior surface). These latter artifacts are only found in the NUV images. Reflections due to the dichroic usually appear as oblique circles in both the FUV and NUV bands. Reflections in the NUV window are wide circular rings where the shade of the secondary-mirror spider can often be seen. On the other hand, the reflections on the beveled exterior surface of the NUV window of bright stars located just outside the GALEX field of view appear as elongated trails near the edge of the NUV image and perpendicular to it. In rare occasions these trails are accompanied by a (sometimes circular, sometimes bow-shaped) interior ghost that can be seen far inside the field of view. In Section 5.5 we list the most obvious artifacts found in the images included in this data delivery. More details on these artifacts are found in the "GALEX Pipeline Data Guide" at the GALEX GI website (**http://galexgi.gsfc.nasa.gov/docs/galex/Documents/**).

Another peculiarity of the GALEX data is the extremely low background of the images. The typical backgrounds in GALEX fields at high Galactic latitudes are $\sim 10^{-3}$ and 10^{-4} photons s^{-1} $arcsec^{-2}$ in the FUV and NUV bands, respectively. Thus, for an average exposure time of 1,500 seconds we expect roughly 1 (10) counts/pixel in the FUV (NUV). Such low values result in highly non—Gaussian distributions for the sky background, especially in the FUV. Because of this peculiarity we warn against the use of certain estimators of the average background, such as the mode. Should the flux measurements be based on *mean* values (e.g. average surface brightness), the same estimator (i.e., the *mean*) should be used to compute the sky background as well.

5.5 Notes on individual galaxies

AM1001-270: Spatially variable cirrus emission throughout the entire field, clearly visible both in the FUV and NUV images.

BK06N: Reflection from the NUV window (circular shape where the shade of the secondary-mirror spider can be seen) associated to a bright star located NW of the field center.

ESO115-G021: Ghosts from a bright star SE of the position of the galaxy are seen both in the FUV & NUV bands.

ESO149-G003: The center of the GALEX circular field shows a large offset compared to the central pixel of the fits image.

ESO294-G010: Ghost (circular) from a bright star located 15 arcmin NE of the field center of the NUV image.

ESO347-G017: Ghosts from a bright star NW of the field are seen both in the FUV & NUV bands.

ESO444-G084: Ghost (circular) from a bright star located N of the field center of the NUV image.

IC2049: Two ghosts (circular) seen near the NW and S edges of the NUV image.

IC5052: Ghosts from a bright star N of the field center is seen in the NUV image.

IC5332: Ghosts from a bright field star 13 arcmin SW of the galaxy center are seen in the NUV-band image.

KDG061: Multiple reflections at the edges of the NUV image produced by the reflection of light from bright sources in the beveled exterior surface of the NUV window.

KK98_208: Multiple ghosts images of a bright field star are seen NE of the galaxy center (image with multiple visits: 13 ks total integration).

MRK475: Ghost (circular) from a bright star located ~19 arcmin SE of the field center of the NUV image.

*NGC0247**:*** NUV ghost (circular) from a bright star located ~24 arcmin SW of the galaxy center.

*NGC0253**:*** NUV ghost (circular) from a bright star located ~24 arcmin SW of the galaxy center.

NGC0404: Ghosts from a bright star NE of the position of the galaxy are seen both in the FUV & NUV bands.

*NGC0625**:*** Ghost (circular) from a bright star located near the W edge of the NUV image.

*NGC0855**:*** Ghost (circular) from a bright star located near the SE edge of the NUV image.

*NGC1291**:*** NUV ghost (circular) from a bright star located ~12 arcmin SW of the galaxy center.

NGC1313: Two ghosts (bow-shaped) from the beveled exterior surface of the window of the NUV detector are seen near the center of the field.

NGC1522: Two (circular) ghosts near the W edge of the field in the NUV image.

NGC1705: NUV ghost (circular) W of the field.

NGC3109: Diffuse extended emission E of the field seen in both FUV and NUV images.

NGC3239: Reflections (in the beveled exterior surface of the NUV window) W of the field and NUV ghost (circular) near the E edge of the field.

NGC3299: Ghosts from a bright field star are seen 13 arcmin NE of the galaxy center.

NGC3368: Bow-shaped reflection in the NUV image 5-20 arcmin N of the galaxy.

*NGC3486**:*** NUV ghost (circular) from a bright star located ~16 arcmin NE of the galaxy center.

NGC3521: FUV blob near the NE of the field and NUV (circular) ghost 11 arcmin E of the galaxy center.

*NGC3628**:*** The center of the GALEX circular field shows a large offset compared to the central pixel of the fits image.

*NGC4144**:*** NUV ghost (circular) from a bright star located ~23 arcmin W of the galaxy center.

NGC4248: NUV ghost (circular) near the N edge of the field.

NGC4258: NUV ghost (circular) near the N edge of the field.

NGC4707: NUV ghost (circular) near the field center.

NGC5068: NUV ghost (circular) from a bright star located ~25 arcmin W of the galaxy.

NGC5264: Very faint reflection (possibly from the window of the detector) occupying a significant fraction of the SE-half of the NUV image.

UGC00685: NUV ghost (circular) near the SW edge of the field.

UGC00891: NUV ghost (circular) near the field center.

UGC01176: Bow-shaped NUV ghost 6-18 arcmin S of the galaxy.

*UGC02684***:** NUV ghost (circular) near the W edge of the field.

UGC04426: NUV ghost (circular) 23 arcmin NW of the galaxy.

UGC04459: Two NUV circular ghosts NE of the field.

UGC04483: NUV ghost (circular) 18 arcmin NW of the galaxy.

UGC05340: NUV ghost (circular) 22 arcmin NE of the galaxy.

UGC05423: Two NUV ghosts S and SE of the field center.

UGC05666: NUV ghost (circular) near the SE edge of the field.

UGC05923: Ghosts from a bright star E of the field center are seen in both the FUV and NUV bands.

UGC06457: Ghosts from a bright star NE of the field center are seen in both the FUV and NUV bands.

UGC07242: FUV blob near the S edge of the field.

UGC07639: NUV ghost (circular) near the NW edge of the field.

UGC7950: NUV ghost (circular) near the center of the field (and the position of the galaxy).

UGC08201: FUV blob near the S edge of the field.

UGC08331: NUV ghost (circular) 27 arcmin NW of the galaxy.

UGC08638: Ghost from the window of the NUV detector located between 6-16 arcmin N of the galaxy center.

UGC09992: NUV ghost (circular) near the center of the field.

UGCA281: NUV ghost (circular) NW of the center of the field.

UGCA319: NUV ghost (circular) near the E edge of the field.

UGCA320: NUV ghost (circular) near the E edge of the field.

6. Optical Images: Data Products and Processing

6.1 Introduction

Optical imaging data in R broadband as well as in narrowband filters which capture the Hα and [NII]λλ6548,84 emission lines were delivered for 13 galaxies in DR1. DR5 contains a total of 175 galaxies imaged in narrow-band filters (in 174 frames: NGC1800 and MCG-05-13-004 are contained in the same image, see Table 4), and include the DR1 galaxies as well, for homogeneity. The R-band data that are provided have been scaled to match the continuum level in the narrowband filter, while the narrowband data have been continuum subtracted using these scaled R-band images to isolate the Hα+[NII] line emission.

These data are stored in single extension FITS files (one file for each filter), and have astrometric solutions. Flux calibration, as described in more detail below, is performed for the narrowband imaging only. Calibration and astrometric keywords are stored in the FITS headers.

The scaled R-band and continuum-subtracted narrowband images are registered to a common frame. The flux scale is in units of counts, and the flux calibration keywords needed to convert the observed counts to ergs cm^{-2} s^{-1} are RESPONSE, the unit response, and TRANSMISS, the effective transmission of the narrowband filter.

6.2 Observations

The narrowband Hα+[NII] and R-band imaging data in this delivery have been obtained as part of the precursor 11 Mpc Hα Survey. Full details on the observations, data processing, flux calibration and measurements are provided in (Lee 2006, Kennicutt et al. 2008).

Imaging was obtained over a five year period between 2001-2005 using CCD direct imagers on the Steward Observatory Bok 2.3m telescope on Kitt Peak, the Lennon 1.8m Vatican Advanced Technology Telescope (VATT) on Mt. Graham, AZ, and the 0.9m telescope at the Cerro Tololo Interamerican Observatory (CTIO). Below, we reproduce Table 2 from Kennicutt et al. (2008), which summarizes the main properties of the observational set-ups used.

At the Bok 2.3m, the narrowband imaging was obtained using a custom 88 mm Andover 3-cavity interference filter with a high peak transmission of 90%. When combined with the 94% quantum efficiency of the 2K Loral CCD detector this produced a high system throughput that allowed us to achieve relatively deep flux and surface brightness limits (~$2x10^{-16}$ ergs/cm^{-2}/s and ~$4x10^{-18}$ ergs/cm^{-2}/s/$arcsec^{-2}$ respectively) in exposure times of 1000 sec. In order to remove the stellar continuum flux in these images, we also observed the same fields with a Kron-Cousins R filter, with standard integration times of 200 sec.

Most of the observations on the VATT telescope were made using the same narrowband Hα filter. For a few objects, a matching filter centered at 6600 A was used. Longer total integration times of 1800 sec (narrowband) and 360 sec (R) were used to compensate for the smaller telescope aperture and the somewhat lower quantum efficiency of the CCD detector, and yielded the same signal/noise limits as the Bok observations to within 10%.

Southern galaxies that were not reachable from the Northern Hemisphere telescopes were observed with the Cassegrain Focus CCD Imager (CFCCD) on the CTIO 0.9 m telescope. Data were obtained during 3 observing runs in 2001-2002. A 75 A bandpass Hα interference filter from CTIO was used for the observations. Because of the much smaller telescope aperture it was not practical to achieve the depth of the Bok and VATT observations, so exposure times were chosen (2700 sec narrowband, 300-600 sec broadband) to achieve approximately one third of the effective depth. The smaller aperture of this instrument was offset by the wide field of view of the CFCCD camera (13.5 arcmin on the side), which allowed many of the largest galaxies in the project to be imaged efficiently.

The majority (126/175) of the DR5 galaxies for which we are providing optical data have been observed under photometric conditions (all 13 DR1 galaxies are in this category). In these cases, the narrowband data have been flux calibrated using observations of spectrophotometric standard stars from Massey et al. (1988), Oke et al. (1990), and Hamuy et al (1992, 1994). Some observations (27/175) were initially obtained in non-photometric conditions, but were subsequently calibrated with short exposures obtained under photometric conditions. Finally a few galaxies (22/175) were observed under non-photometric conditions, and have flux zero points bootstrapped from measurements in the literature. Notes on the sky conditions and other observing parameters (including telescope and spatial coverage information) for each individual galaxy are summarized in Table 3 of Kennicutt et al. (2008).

Telescope	Detector	CCD Scale	Continuum Filter (CWL/FWHM)	Line Filter(s) (CWL/FWHM)	Exposure Times (line/continuum)
Bok 2.3m	Loral 2K x 2K	0."43/pix	6451A/1473A	6585A/66A "658"	1000s/200s
VATT 1.8m	Loral 2K x 2K	0."40/pix	6338A/1186A	6585A/66A "658" 6600A/69A "660"	1800s/360s
CTIO 0.9m	Tek 2K x 2K	0."79/pix	6425A/1500A	6563A/75A "65" 6600A/75A "66"	2700s/360s

6.3 Data Processing

Data reduction followed standard procedures using IRAF. Bias subtraction, flat-fielding, and cosmic ray removal using the JCRREJ2 package (Rhoads 2000) were performed. Net emission-line images were produced by subtracting a scaled R image from the narrowband image, after aligning the two using foreground stars. The value used to scale the R-band image is stored in the SCALE_R header keyword. Astrometric solutions (with rms deviations typically less than 0."5) were derived for the R images using the USNO-A2 catalog, and the same solution is assumed for the corresponding narrowband image. WCS keywords (FITS standard) stored in the image headers.

6.4 Data Characteristics

The LVL DR1 optical images are in units of counts (COUNTS, stored in the UNITS keyword). For the narrow-band images, the keyword FILTER records the name of the filter used for the observations as indicated in the table above. Original header information from the facility is preserved and information on the subsequent processing, astrometry and flux calibration information has been added. For convenience, a few keywords have also been added which repeat information already contained in the original headers but were recorded under different facility-dependent keywords. These are CCDSCALE, the pixel scale of the image, CCD noise, the readnoise of the detector, and FILTER. The effective airmass for the observations CAIRMASS has also been calculated. All images conform to the North-up/East-left convention.

The narrowband images (*_HA_SUB.fits) have been continuum-subtracted and contain emission from Hα, as well as [NII]λλ 6548,6584A. The scaled R-band images used to perform the subtractions (*_CONT.fits) are also provided. Users can recover the uunsubtracted continuum image by adding the *_HA_SUB.fits and the *_CONT.fits images together. The unscaled R-band image can be recovered by using the SCALE_R keyword value in the headers, to multiply *_CONT.fits image. The images delivered by LVL are not background subtracted.

Photometric zeropoint uncertainties are less than ±2%, as determined from the consistency of the standard star photometry. Uncertainties in the flat-fielding are generally ±1-4%. There is a median uncertainty of ~10% in the determination of the continuum level, with a range of ±5% (for bright spirals with large continuum dominated regions) to ±15-20% (for galaxies with the weakest continua or those with strong diffuse Hα emission). This results in a total median error of 12% for the integrated Hα+[NII] fluxes as reported in Kennicutt et al. (2008). (For a more detailed discussion of uncertainties see Kennicutt et al. 2008, section 3.6).

For studies seeking to examine the fluxes in a spatially-resolved manner (e.g., for determination of Hα surface brightness profiles), extra care must be taken to account for additional systematic uncertainties which may arise from spatial variations in the continuum level (that are not tracked by the broad R band filter) and the [NII]/Hα ratio. Such issues will be most relevant to galaxies with large color and abundance gradients.

6.5 Conversion from count-rates to fluxes/magnitudes

To calculate emission-line fluxes in erg s^{-1} cm^{-2}, the RESPONSE, the unit response, TRANSMISS, the effective filter transmission, keywords are required:

$$F(H\alpha+[NII])\ [erg\ s^{-1}\ cm^{-2}] = RESPONSE/TRANSMISS * (measured\ counts/T\_EXP)$$

The effective filter transmission is calculated by accounting for the presence of both Hα and the [NII] doublet in the filter bandpass, and the variation of the [NII]/ Hα among galaxies (Kennicutt et al. 2008, Appendix A2). Globally averaged [NII]/ Hα ratio values are provided in Kennicutt et al. 2008 Table 3, and can be used to correct the integrated fluxes for contamination by the [NII] lines.

6.6 Notes on individual galaxies*:*

CGCG 217-018: ~3% background gradient in the scaled R-band image.

IC 5152: very bright star next to galaxy.

NGC 625: bad columns through galaxy in the scaled R-band image.

NGC1744, NGC1800: ~2% background gradient in the scaled R-band image.

NGC1522: ~2% background gradient in both scaled R-band and continuum subtracted Hα+[NII] images.

NGC 3077: ~3% background gradient in the continuum subtracted Hα+[NII] image.

NGC 3432: northwest corner of galaxy clipped.

NGC 4605: bad row north of galaxy.

UGC 695: ~3% background gradient in the scaled R-band image.

UGC 2716: ~4% background gradient in the scaled R-band image.

UGC 4483: very bright star nearby.

UGC 5272: ~4% background gradient in the scaled R-band image.

UGC 5340: ~2% background gradient in the scaled R-band image.

UGC 8550: ~3% background gradient in the scaled R-band image.

UGC 7774: ~3% background gradient in the scaled R-band image.

UGC 7916: very bright star nearby, but outside FOV.

UGCA 276: ~3% background gradient in the scaled R-band image.

Table 1: List of IRAC Galaxies in DR4. MIPS higher-level data were delivered for all 256 LVL galaxies in DR4.

CGCG269-049	IC5052	IC5152##	KKR25	M81dwA
NGC0024	NGC0055	NGC0253	NGC0404	NGC0598
NGC0628	NGC0855	NGC1291	NGC1512	NGC1705
NGC2366	NGC2403	NGC2500	NGC2537	NGC2976
NGC3031	NGC3034**	NGC3344	NGC3351	NGC3368
NGC3486	NGC3521	NGC3593	NGC3627	NGC3738
NGC4144	NGC4214	NGC4236	NGC4242	NGC4244
NGC4258	NGC4449	NGC4460	NGC4485^^	NGC4490^^
NGC4594	NGC4618	NGC4625	NGC4631	NGC4736
NGC4826	NGC5023	NGC5055	NGC5194^^	NGC5195^^
NGC5204	NGC5253	NGC5457	NGC5474	NGC5585
NGC6503	NGC7090	NGC7793	SextansA	UGC00668
UGC04278	UGC04305	UGC04459	UGC04483	UGC05139
UGC05340	UGC05423	UGC05666	UGC05923	UGC06541
UGC07321	UGC08024	UGC08201	UGC09128	UGCA292
WLM				

Notes to Table 1:
Only IRAC Band 2 and Band 4 images are available and delivered for IC5152.
** The IRAC high-level data products for NGC3034 are from the SINGS project, that can be found at: http://data.spitzer.caltech.edu/popular/sings/20070410_enhanced_v1/
^^ Each of the two galaxy pairs, NGC4485/4490 and NGC5194/5195, is contained within a single IRAC mosaic.

Table 2: List of Galaxies in DR3. IRAC and MIPS higher-level data only were delivered in DR3.

UGC0521	UGC0685	UGC0695	UGC0891	UGC1056
UGC01104	UGC01176	ESO245-G007	ESO486-G021	UGC4426
NGC2683	UGC4704	UGC4787	UGC5076	ArpsLoop
UGC5364	UGC5373	NGC3109	NGC3077	AM1001-270
UGCA281	UGC8091	IC4247	KK98208	ESO444-G084
NGC5264	MRK475	IC4951	DDO210	UGCA438
UGC12613				

Table 3: List of Galaxies in Previous Delivery (DR2). IRAC and MIPS higher-level data only were delivered in DR2.

BK03N	BK05N	BK06N	CGCG035007	CGCG217018
DDO078	ESO115G021	ESO119G016	ESO149G003	ESO154G023
ESO158G003	ESO245G005	ESO294G010	ESO321G014	ESO347G017
ESO410G005	ESO483G013	ESO540G030	ESO540G032	F8D1
FM20001	HS98117	IC0559	IC1574	IC1959
IC2049	IC5256	IC5332	IKN	ISZ399
KDG061	KDG073	KK98230	KKH037	KKH057
KKH086	KKH098	LEDA166101	MCG-03-34-002	NGC0045
NGC0059	NGC0247	NGC0300	NGC0625	NGC0672
NGC0784	NGC1311	NGC1313	NGC1487	NGC1510
NGC1796	NGC2552	NGC2903	NGC3239	NGC3274
NGC3299	NGC3432	NGC3510	NGC3623	NGC3628
NGC3741	NGC4020	NGC4068	NGC4080	NGC4096
NGC4163	NGC4190	NGC4248	NGC4288	NGC4395
NGC4455	NGC4605	NGC4656	NGC4707	NGC5236
NGC5238	NGC5477	NGC5949	NGC7064	NGC7713
SCULPTOR-DE1	UGC1249	UGC2716	UGC4998	UGC5272
UGC5288	UGC5336	UGC5428	UGC5442	UGC5456
UGC5672	UGC5692	UGC5764	UGC5797	UGC5829
UGC5889	UGC5918	UGC6457	UGC6782	UGC6817
UGC6900	UGC7242	UGC7267	UGC7408	UGC7490
UGC7559	UGC7577	UGC7599	UGC7605	UGC7608
UGC7639	UGC7690	UGC7698	UGC7699	UGC7719
UGC7774	UGC7866	UGC7916	UGC7949	UGC7950
UGC8188	UGC8245	UGC8313	UGC8508	UGC8638
UGC8837	UGC9240	UGC9405	UGC9992	UGCA015
UGCA106	UGCA133	UGCA193	UGCA276	UGCA319
UGCA442				

Table 4: List of Galaxies in the First Delivery (DR1). Full datasets (IRAC, MIPS, GALEX, and optical) were delivered for these galaxies.

Name	Morphology	Reason for Selection
NGC1522	S0:pec	Morphology
NGC1744	SBd	Large angular diam., high inclination
NGC1800+MCG-05-13-004	IBm+N/A	Strong star formation; outflows?
UGCA320	IB(s)m	CenA Group dwarf
UGC8320	IBm	Diffuse Galaxy
UGC8331	IAm	Morphology
UGC8651	Im	Morphology
UGC8760	SABdm	Highly inclined
UGC8833	Im	Intense star formation
NGC5068	SBd	Morphology
NGC5229	SBd?	Highly inclined
NGC5832	SBb	Morphology