1. INTRODUCTION

This note gives an introduction to the data products to be expected from the SPIRE instrument.

2. PRODUCTS

2.1 Level-0 products

These products are the starting point for the pipeline processing (TBC). They contain the raw telemetry data re-arranged into convenient format. (e.g. SPIRE Data Frames)

2.2 Level-1 Products

These products are usually related to the mode of operation used for the observation

2.2.1 Detector Timeline

This product is generated by all photometric observations using chopping.

This gives the calibrated signal with astrometric positions, statistical and pointing uncertainties for all bolometers (in addition to the prime set corresponding to the source position) as a function of time.

Statistical errors will be based on mean and standard deviation of the set of de-glitched On-Off pairs.

2.2.2 Point Source Estimate

This product will hold an array of fluxes, one for each of the photometer detectors resulting from a simple fit to the signal and position when using the 7-point photometry mode of the instrument. It will include a quality caveat (TBC).

2.2.3 Scan Timeline

These are generated by the photometric large map observations which use scanning mode (without chopping – it is TBC if scanning with chopping can be accommodated in this product)

These contain the deglitched time-ordered data for each detector (signal vs. position). Telescope turn-around periods will be flagged as astrometrically uncalibrated data.

2.2.4 Spectral Data Cube

This product will be generated for all spectrometer modes of the instrument

Cubes will be 3D structures giving astronomical flux as a function of position (in 2 dimensions) and wavelength or frequency (in the third). Position will be in one of the standard astronomical coordinate systems (eg. Equatorial RA/Dec, Ecliptic, Galactic). Flux will be in calibrated units (ie. W/m^2/Hz), but other options are possible (eg. Jy km/s). The third dimension will be wavelength or frequency. The initial calibration is likely to be per beam, but conversions for other surface brightness measures (eg. MJy/sr) will be needed (TBD).
This product will be generated for all spectrometer modes of the instrument

Notes:

- Multiple pointings will be treated separately and no attempt to combine these into a singl edatat cube will be made
- All observations are reduced and calibrated as point sources - extended source observations are to be encouraged only for expert observers
- Residual telescope emission will not be removed – this will be done by the astronomer using adjacent pixels or observation of adjacent patch of sky with the central pixel

2.3 Level-2 Products

2.3.1 Map Product

This product is generated from both the small and large map photometer AOTs and is independent of the method used to obtain a large map (scanning or rastering)

Maps will be 2D structures giving astronomical flux as a function of position. Position will be in one of the standard astronomical coordinate systems (eg. Equatorial RA/Dec, Ecliptic, Galactic). Flux can be in raw calibrated units (ie. W/m^2/Hz), or colour corrected for a given emission spectrum to provide Jy. The initial calibration is likely to be per beam, but conversions for other surface brightness measures (eg. MJy/sr) will be needed (TBD).

2.3.1.1 Error Map

Associated with this 2D map of flux as a function of position will be an error map, giving flux error (in appropriate units as given above) as a function of position (in coordinate systems matching those above). Whether this error map is an inherent part of the map object is TBD.

2.3.1.2 Diagnostics

Diagnostic products will also be produced eg. bolometer background drift product. Details of these are TBD. These will be of more use to the instrument and quality control teams than to the general observer.

2.3.2 Spectral Data Cube

This product will be generated for all spectrometer modes of the instrument

Cubes will be 3D structures giving astronomical flux as a function of position (in 2 dimensions) and wavelength or frequency (in the third). Position will be in one of the standard astronomical coordinate systems (eg. Equatorial RA/Dec, Ecliptic, Galactic). Flux will be in calibrated units (ie. W/m^2/Hz), but other options are possible (eg. Jy km/s). The third dimension will be wavelength or frequency. The initial calibration is likely to be per beam, but conversions for other surface brightness measures (eg. MJy/sr) will be needed (TBD).
This product will be generated for all spectrometer modes of the instrument

Notes:

- This product differs from the level-1 product in that multiple pointings are combined into one data cube
- Residual telescope emission will not be removed – this will be done by the astronomer using adjacent pixels or observation of adjacent patch of sky with the central pixel

2.3.2.1 Error Map

Associated with this 3D map of flux as a function of position and wavelength will be an error cube, giving flux error (in appropriate units as given above) as a function of cube position (in coordinate systems matching those above). Whether this error map is an inherent part of the map object is TBD.

2.3.2.2 Diagnostcs

Diagnostic products will also be produced eg. bolometer background drift pipeline. Details of these are TBD. These will be of more use to the instrument and quality control teams than to the general observer.

2.3.3 Point Source List

This product is the result of processing Maps or Spectral Data Cubes to extract point sources.

This will be a list giving the position in the map (typically RA, Dec), photometric information (flux), and other parameterisations of the source (eg. image shape).

The typical way in which this kind of product is handled by existing routines is the production of an ASCII catalogue with the relevant parameters for each object detected. It is unclear if such a text-based structure fits with the current DP philosophy, but it is the standard form used elsewhere.

It is also possible that a 'bandmerging' routine will be applied so that that the flux at a given position in each of the 3 channels will be combined into one table entry.

2.3.4 Line Source List

This product is the result of processing Spectral Data Cubes to extract line sources.

This will be a list giving the position in the cube (typically RA, Dec and wavelength), photometric information (flux), and other parameterisations of the source (eg. line shape).

The typical way in which this kind of product is handled by existing routines is the production of a ASCII catalogue with the relevant parameters for each object detected. It is unclear if such an text-based structure fits with the current DP philosophy, but it is the standard form used elsewhere.