SPIRE Scan-Map AOT and Data Products

Addendum to the SPIRE Scan-Map Release Note (Issue 2, Oct. 21 2009)

Prepared by the SPIRE ICC

2 June 2010

Contents

1. Introduction

This addendum to the previous release note (Issue 2, Oct. 21 2009) documents

(i) the release of, and new information on, the bright source settings;
(ii) updated information on the flux calibration (for both nominal and bright source settings);
(iii) the release of, and advice on, map offsetting.

2. Use of bright source settings

SPIRE Photometer scan map AOTs have already been released for observations with the nominal bias settings (optimised for faint or moderately bright astronomical sources). They have now also been released for bright source settings.

Bright sources can lead to saturation of the analogue-to-digital converters (ADCs) in the detector channels of the SPIRE on-board electronics. This does not happen at exactly the same brightness for each individual detector. Increasingly strong sky brightness will result in increasingly large numbers of channels becoming saturated, resulting in worsening overall sensitivity and data redundancy. To allow observations of bright sources, detector settings have been defined which reduce detector responsivity and achieve larger dynamic range at the expense of lower sensitivity. Users planning to map very bright regions or seeking to achieve uniform coverage of regions containing both bright and faint emission are advised to adopt these bright source settings.

The flux density thresholds at which use of bright source settings are recommended is 200 Jy in any band.

The maximum flux densities for which bright source settings flux calibration is guaranteed are (3200, 2400, 1400) Jy for (250, 350, 500) μm.

The sensitivity degradation factors (with respect to nominal setting) for the three bands are (3.8, 3.2, 2.6) for (250, 350, 500) μm. Users should note that a S/N > 200 cannot be trusted in any case.

3. Flux density calibration update

At the time of writing, a revised photometer flux calibration based on Neptune is in preparation, and it will be incorporated into the next version of the pipeline. In the interim, the following multiplicative correction factors may be applied to the flux density values produced by the current pipeline (HCSS v3.0): (1.02, 1.05, 0.94) for (250, 350, 500) μm respectively.

SPIRE photometer observations are subject to two kinds of uncertainty. The first is the absolute uncertainty associated with our knowledge of the brightness of the primary calibrator, Neptune. This is estimates at ± 5%, and is correlated across the three bands (i.e., flux densities in the three bands will move up or down together in the event of this calibration being revised. The second component of uncertainty is due to the statistical errors of the measurement, taking into account all forms of noise (e.g., detector noise, pointing uncertainty and jitter, etc.). This can be regarded as random component. At present, since the Neptune-based calibration has yet to be introduced, we recommend that a conservative uncertainty of ±15% be adopted for the photometer.

4. Map offsetting

SPIRE Photometer scan map AOTs have already been released for observations. With this note we also release the use of the Y and Z Offset parameters.

The use of the spatial offset setting option for Large Scan Map, Small Scan Map and PMODE is allowed by HSpot for both fixed and moving targets. The offset can be specified in units of 0.001 arcmin. However, the user needs to be aware of the fact that each AOR, regardless of the specified offset, is subject to the general pointing error of about 2".

Due to a bug in the system the definition of the centre of the map could be currently off by ~1 arcmin (depending on scan speed). This means that although the object specified in the AOR will come up in the centre of the map-image the whole field itself might be off by ~1 arcmin (e.g. at fast scan speed) with respect to the boundaries of the map-data so that the object could drop off the final map. Therefore, the user has to be very careful if offsetting the object very close to the map boundary. The missing region can always be recovered by processing the data associated with the building block that collects the data taken during the turnaround. However this is not done by the standard pipeline.