NGC 7027 Cross Calibration of ISO CVF and MIRAC data: A Progress Report

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To: Document review

From: B. Ali

This will form the bulk of the information on the poster paper. The MIRAC image (which looks similar to CAM CVF image) will be included when it is available.

Abstract

We present a status report of our current efforts to compare ISOCAM CVF data to ground-based, calibrated mid-infrared CVF observation of the planetary nebula NGC 7027. The main focus of this work is directed towards understanding the CAM transients and the CAM CVF calibration. The scientific highlights from this work will be presented by Dayal et al. in the 195^{th} meeting of the American Astronomical Society.

Background

1. What is NGC 7027? NGC 7027 is a well studied, young planetary nebula. Its brightness makes it an ideal target for comparing ground based observations with ISOCAM.

2. Goals:

   - Obtain an independent calibration for ISOCAM CVF based on ground based data.
   - Obtain an estimate of the effects of ghosting in CAM CVF images.

3. The above goals are crucial steps towards understanding the data from ISOCAM.

Observations

1. Calibration Target: NGC 7027; the inner 40″
2. ISO observations:
   - CAM CVF 4.5–15 μm.
   - SWS spectrum.
3. Ground-based Observations:
   - MIRAC CVF 4.5–19 μm.

List of Images to Include

- CAM CVF 2 clr image.
- MIRAC single wavelength image.

Data Reduction

We used the Cam Interactive Analysis (CIA) package to perform one so called "standard" reduction, as highlighted in the CIA manual. A second reduction is obtained by fitting each CVF step with a linear model $(a+bx)$. Glitch events are recognized as those point which deviate significantly from the linear model. The data values of the cube are replaced the average value of the linear model. CAM CVF flux calibration is from the CIA.
The data from MIRAC are currently being reduced.

Calibration Issues (I)

The MIRAC data are at higher spatial and spectral resolution than the CAM CVF data. The comparison requires: (1) spatially rebinning the MIRAC data to CAM's pixel field of view. The code is already available for this purpose, and (2) reporting the flux density at CAM's CVF wavelengths. Since the CVF filters are quite narrow ($\leq$ 2simply interpolate and report the flux-density at the wavelength of CAM filter.

Calibration Issues (II)

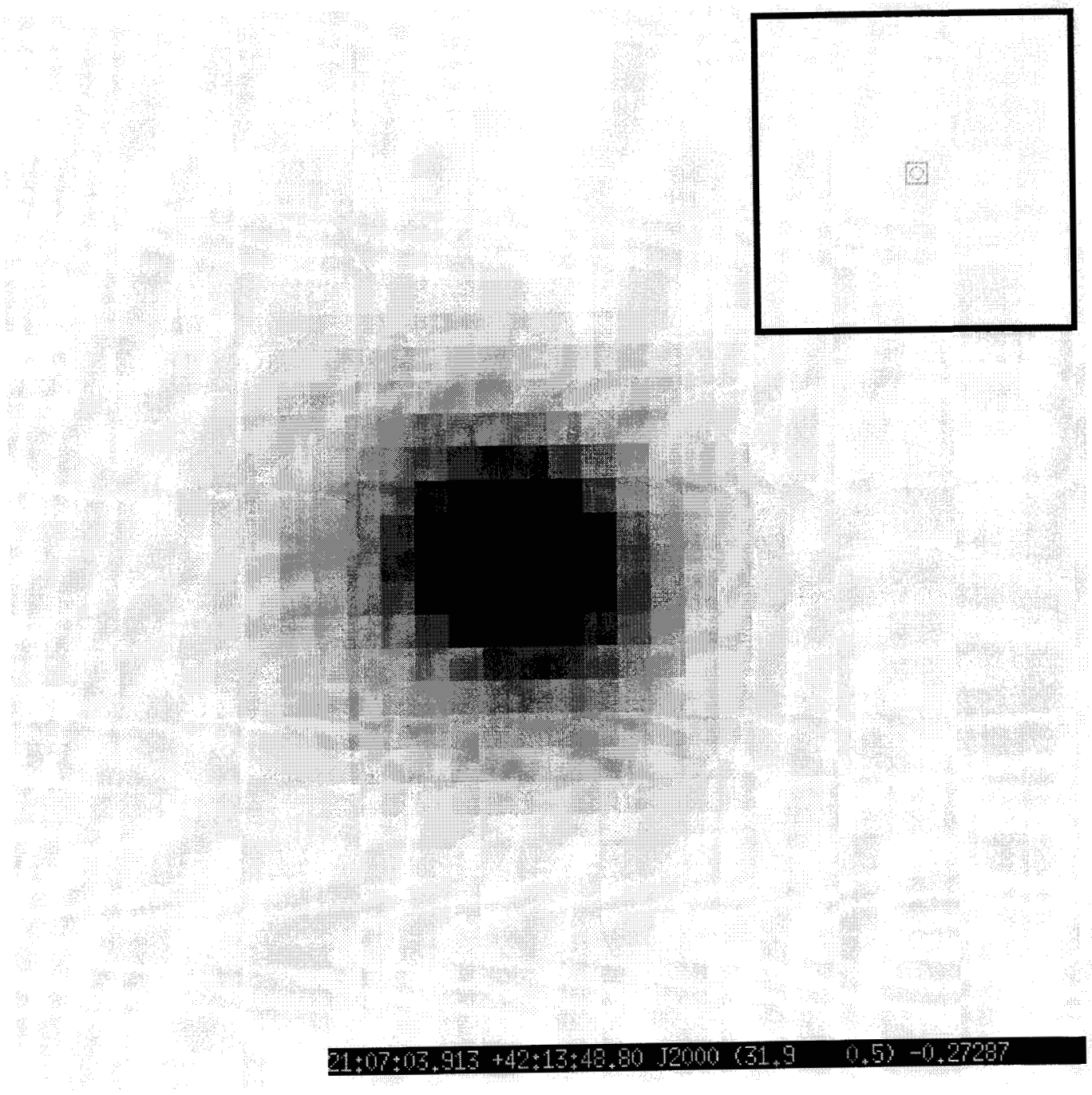
1. Linearity. Is the relationship between the CAM CVF flux and MIRAC flux linear?

2. The effects of upward and downward transients. In the non-std linear model reduction, we replace the data cube values by the average of the linear model. This will likely result in underestimating the flux of an upward step, and overestimating the flux of a downward step. The MIRAC data will be used to find correction terms which are applied to the reduced data. The correction terms are dependent on two parameters: (a) the magnitude of the flux step and (b) the previous flux level, for downward step or the final flux level, for an upward step.

3. Effects of scattered light. Since the MIRAC data are free of ghosting or scattered light effects, a simple morphological comparison between the ISO and the MIRAC data will constrain the magnitude of ghosting in the CAM CVF data.

Summary

- The MIRAC data set (when available) is ideal for cross-calibration of the CAM CVF data.
- Since MIRAC data are not affected by scattered light, it will be possible to estimate the effects of ghosting in CAM CVF images.
- The MIRAC data will become available in the next 3 months.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