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Near-IR Imaging of Star-forming Regions with IRAF

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Abstract. We report on our ongoing project "Infrared Study of H II Regions Associated with Small Clouds." Several tasks are being developed under the IRAF environment for efficiently reducing and analyzing the near-infrared data obtained from the Teide observatory with the IAC infrared camera (IAC-IRCAM).

1. Introduction

Several galactic H II regions associated with small molecular clouds were observed with the IR-Camera on the 1.5 m CST (Carlos Sánchez Telescope) of the Teide Observatory in October 1996. These IR data, combined with optical imaging (which will be obtained from the IAC-80 telescope), IRAS survey maps, and existing CO observations of the associated clouds, will allow us to undertake a detailed investigation of the gas-to-dust mass ratio, initial mass function and the star-formation efficiency in these complexes. Studies of the embedded clusters also allow us to derive the luminosity function and thus, using an appropriate mass-luminosity relation, to determine the stellar mass spectrum. The near-IR imaging study will allow us to search systematically for exciting sources and the low-mass stars associated with the nebulæ.

Some data were obtained during the test run of the IAC-IRCAM on February 1996. We are using these data to test our new IRCAM package, developed under the IRAF environment.

2. IRCAM Package

2.1. IAC-IRCAM

The IAC-IRCAM is based on a 256×256 NICMOS 3 array and has a plate scale of $0.4''$/pixel. Currently, the camera contains seven filters covering the wavelength range from $1.2\,\mu$m to $2.32\,\mu$m. The 3σ 60 s limiting magnitudes for point sources were 18.8 mag at J, 18.5 mag at H, and 16 mag at K.

2.2. Preliminary Tasks in the IRCAM package

At the time of writing this paper, eighteen preliminary tasks have been written. A common characteristic of these tasks is ease in handling the bookkeeping of data reduction/analysis history. The tasks are as follows:

- APCOR: estimate the aperture correction,

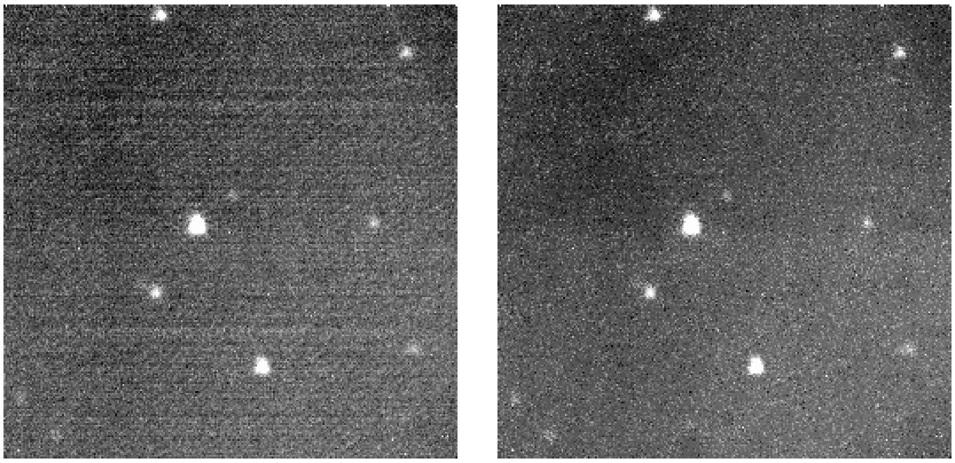

Figure 1. Part of the S269 field: left—before MDRIPNEW processing; right—after MDRIPNEW processing.

- CHECKPSF: check the PSF (Point Spread Function) model,
- DUMPMARK: mark and label objects on the displayed frame,
- EXAMPSFGP: examine the PSF model,
- FINMISS: find missing stars not found with DAOFIND,
- FINSHIFT: find the image shifts with respect to the reference image,
- FINFIT: fit all the stars, including the missing stars, with the final PSF model,
- FIRSTPSF: obtain the first iteration of a PSF model,
- MARK3FR: display all the frames and mark the stars,
- MATCHMARK: find the stars which match all the frames,
- MATCHPHOT: obtain the photometry from the match frame and produce a final list,
- MDRIPNEW: reduce the "drip" noise produced by the IAC-IRCAM (see Figure 1),
- NITERPSF: obtain the nth iteration PSF model,
- PARFIND: find the critical parameters from the frames,
- SELBRIGHT: select well isolated bright stars,
- SELPST1: select first iteration PSF candidates, and
- SUBMARK: subtract the neighbours and their friends from the PSF stars and display the subtracted image.

2.3. Future Development of IRCAM

Future tasks include:

- writing help pages for the tasks,
- using new IRCAM data to test every detail of the package,
- write more tasks based on IMAGES, IMMATCH, and DIMSUM packages (brand-new tasks will be written if necessary),
- combine several small tasks into a single task, and
- if satisfied with the performance of this package, release it to the public.

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