NACO Observations of a Deep NICMOS field in the Bulge

1 Introduction

Deep NICMOS/NIC2 J and H imaging were obtained to get the IMF of bulge stars down to $\sim 0.15\,M_{\odot}$ (Zoccali et al. 2000, ApJ, 530, 418). Fig. 1 shows the J band image of the field.

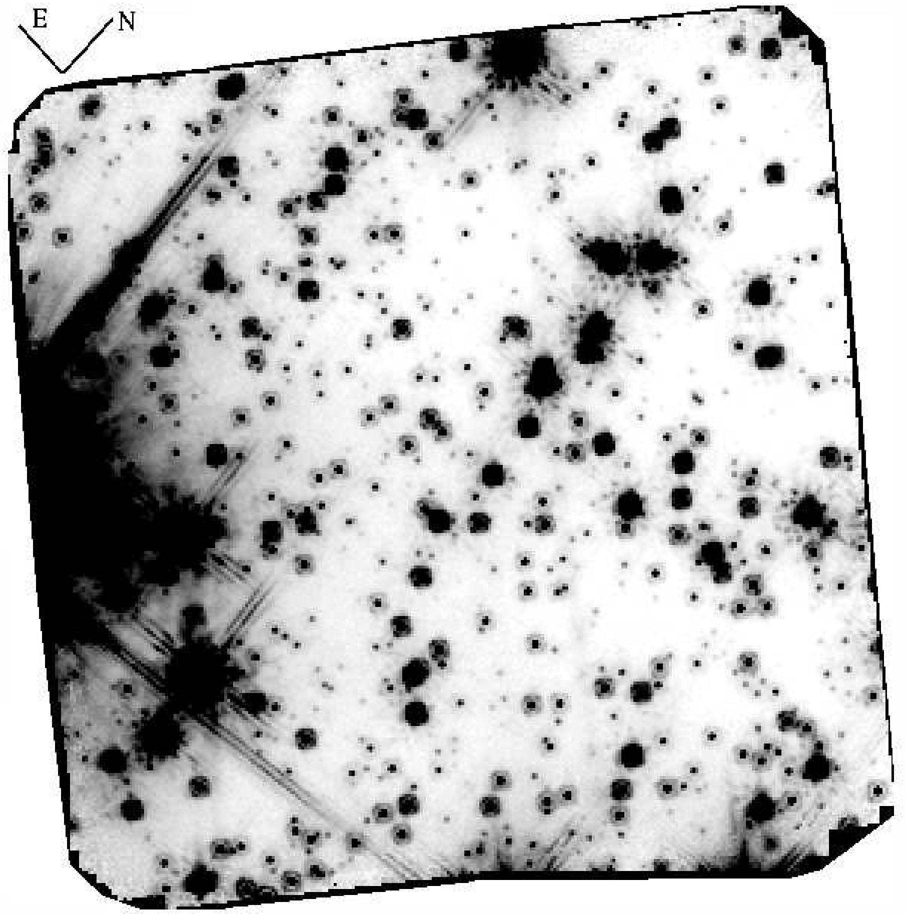

Fig. 1. J band image of the $22'' \times 22''$ NIC2 field.

Fig. 2 shows a cutout WFI I-band image including the NIC2 field. For orientation purposes, the brightest star in this image (Star-1) is the one (just outside the NIC2 field) responsible for the macroscopic diffraction spikes visible on the

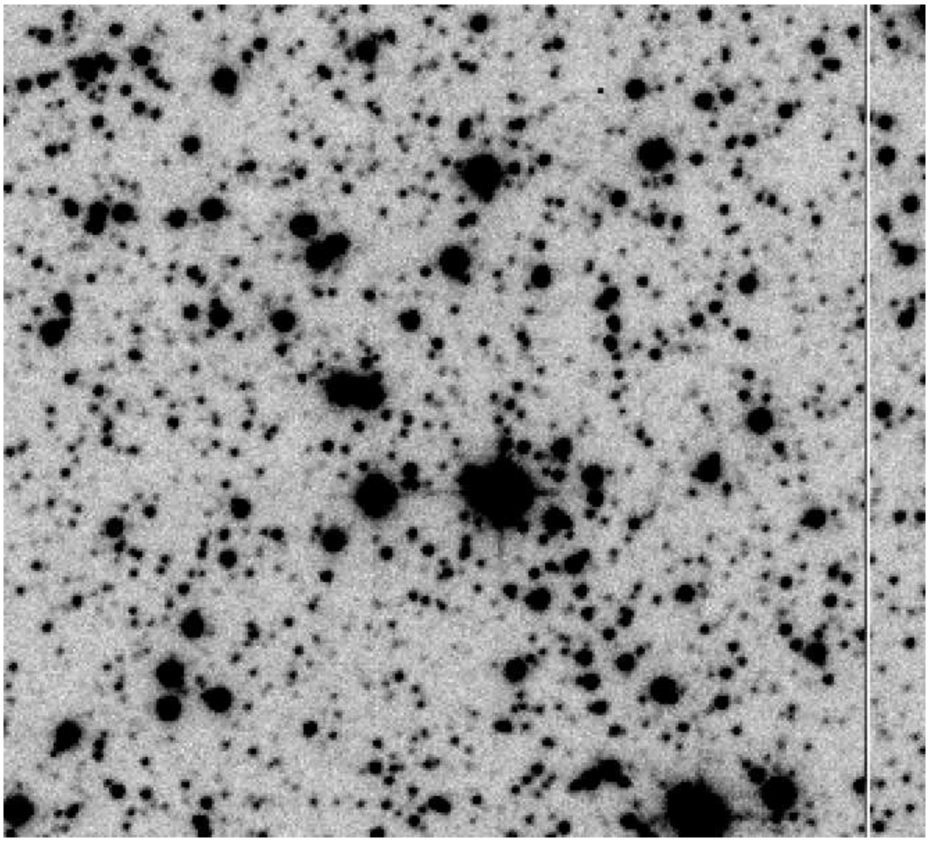

Fig. 2. *I* band WFI image including the NIC2 field.

left side of the NIC2 field. A second bright star (Star-2) lies $\sim 30''$ North of Star-1. Positions and magnitudes of these two stars are given in the following Table.

	WFI-ID	X	Y	V	I	J	H	K
Star-1	570404	1252.828	416.286	15.717	11.721	9.669	8.656	8.263
Star-2	105254	1523.198	4015.261	13.971	12.958	12.480	12.221	12.082

2 Scientific and Technical Goals

The NICMOS data are public. Accurate J and H photometry exists down to $J \simeq 24.5$ and $H \simeq 23.5$ (Vega system) (Zoccali et al. 2000) and can be retrived at www.eso.org/ ....

Using the NIC2 JH photometry as a comparison, the NACO experiment should allow to check the photometric accuracy on point sources that can be obtained in crowded fields as a function of the distance from the guide star used for the AO correction. It may also allow to check whether deeper magnitude limits can be reached.

NACO would also add the deep K band data that are missing in the NICMOS database, allowing a more robust derivation of the bulge IMF compared to the quoted attempt.

If actually reaching deeper limits, the experiment may allow to reach the bottom of the main sequence, at $M \simeq 0.09\,M_{\odot}$, $J \simeq 25$, $J - K \simeq 1$.

Coordinates of the center of the NIC2 field: $\alpha = 18^{\rm h}11^{\rm m}05^{\rm s}$; $\delta = -31^{\circ}45'49''$
Coordinates of STAR-1: $\alpha = 18^{\rm h}11^{\rm m}04^{\rm s}.54$; $\delta = -31^{\circ}46'01''.06$
Coordinates of STAR-2: $\alpha = 18^{\rm h}11^{\rm m}04^{\rm s}.66$; $\delta = -31^{\circ}45'33''.74$

3 Observations

The C25 camera of CONICA is being used, as it ensure the virtually complete coverage of the NIC2 field. Exposure times are calculated with the following input, other than the default in the NACO ETC:

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Reference Source Setup:

Reference Source spectral type  : M6
Reference Source magnitude      : V = 16.00
Reference Source / Target Separation : 10.00
Reference Source geometry       : Point source
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Integration times to reach the given magnitudes with S/N=5 are listed below as indicated by the ETC, together with the Strehl ratio on target (i.e. 10″ from the reference star.

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$J=25$     Time = 21900 s  SR = 0.065  Overhead (3 acquisitions) = 1440 s
$H=24$     Time = 4020 s   SR = 0.191  Overhead (1 acquisition)  =  480 s
$K=24$     Time = 16020 s  SR = 0.376  Overhead (3 acquisitions) = 1440 s
Total Exp. Time = 41940                Total Overhead            = 3360 s

Grand total telescope time: 45300 s = 12.58 h
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