RevMexAA (Serie de Conferencias), **16**, 311–312 (2003)

Science with the GTC 10-m Telescope (Granada, España, 5-8 febrero 2002)
Editors: José Miguel Rodríguez Espinosa, Francisco Garzón López & Verónica Melo Martín

A *K* BAND SURVEY IN THE GROTH STRIP FLANKING FIELDS

Á. Serrano,[1] N. Cardiel,[1] J. Gallego,[1] M. Balcells,[2] M. Prieto,[2] D. Cristóbal,[2] R. Guzmán,[3] R. Pelló,[4] J. Gorgas,[1] and J. Zamorano[1]

RESUMEN

Como parte de nuestra colaboración en el Proyecto COSMOS, dedicado a la caracterización de galaxias pertenecientes a la época de máxima formación estelar del Universo, hemos realizado una exploración fotométrica profunda con un área aproximada de 380 arcmin^2 de la zona adyacente al llamado Campo de Groth. Las observaciones se han obtenido en la banda K' con la cámara infrarroja OMEGA-PRIME del telescopio de 3.5 m del Observatorio Hispano–Alemán de Calar Alto. Se pretende realizar conteos de galaxias y calcular desplazamientos al rojo fotométricos para la preparación de futuras observaciones con EMIR.

ABSTRACT

As a part of our collaboration in the COSMOS Project, devoted to the characterization of galaxies during the epoch of maximum star formation in the history of the Universe, we have carried out a deep photometric survey covering about 380 arcmin^2 in the so-called Groth Strip Flanking Fields. The observations were obtained in the K' band with the OMEGA-PRIME infrared camera at the 3.5 m telescope at the Hispano–German Calar Alto Observatory. Galaxy counts and photometric redshifts will be computed in order to prepare future observations with EMIR.

Key Words: **COSMOLOGY: OBSERVATIONS — GALAXIES: PHOTOMETRY — INFRARED: GALAXIES — SURVEYS**

1. INTRODUCTION

The COSMOS Survey[5] intends to map 0.5 square degrees of high-latitude sky to limiting AB magnitude $K_s = 22$ (5 sigma, 1 arcsec aperture), using 4 m class telescopes, in order to characterize the galaxy population at $z > 2$ with EMIR and OSIRIS on the GTC. This redshift regime is believed to correspond to the epoch of maximum star formation activity in the Universe.

One of the selected fields for our survey is the so-called Groth Field, a 45 arcmin-long strip, with a position angle of about 40°, centered on R.A. = 14^h20^m, Dec. = 52°20′ (J2000.0). It was chosen because of its high galactic and ecliptic latitudes. It has already been observed with many different telescopes—*HST* (Groth et al. 1994), *Chandra* (X-ray), VLA (radio), LRIS/Keck, KPNO, CFHT, etc.—so a multiwavelength view is available.

[1]Universidad Complutense de Madrid (UCM), E-28040 Madrid, Spain.

[2]Instituto de Astrofísica de Canarias, E-38205 La Laguna, Tenerife, Spain.

[3]Department of Astronomy, 422 Bryant Space Science Center, P.O. Box 112055, University of Florida, Gainesville, FL 32611-2055, USA.

[4]Laboratoire d'Astrophysique, Observatoire Midi-Pyrénées, 14 Avenue Edouard Belin, F-31400 Toulouse, France.

[5]http://www.iac.es/proyect/cosmos/iac-cosmos.html.

2. OBSERVATIONS

The UCM group has observed the Groth Strip Flanking Fields with the Calar Alto 3.5 m telescope and the near-infrared camera OMEGA-PRIME, while the IAC group has observed the Groth Field with INGRID at the WHT on La Palma (see Cristóbal et al., this volume, p. 274).

The OMEGA-PRIME observations were taken with a K' filter. A set of ten fields was observed along the flanks of the Groth Strip (Figures 2 and 3). The width of these flanks is 7 arcmin. The total area covered was 450 arcmin^2, but the effective area decreases to 380 arcmin^2 because of overlapping between adjacent fields. The total exposure time achieved for each field was 84 min. Standard stars, selected from the Hunt et al. (1998) and Persson et al. (1998) catalogues, were observed over a wide range of airmasses.

3. REDUCTION PROCESS

An iterative sequence was followed. After dark subtraction, a "superflat" frame was obtained by combining all the frames, using an object mask computed in a previous iteration. After flatfielding, a 2D sky image was obtained for each frame by computing the median in small boxes over the entire frame. After sky subtraction, the frames were combined with a sigma-clipping algorithm, taking into account their

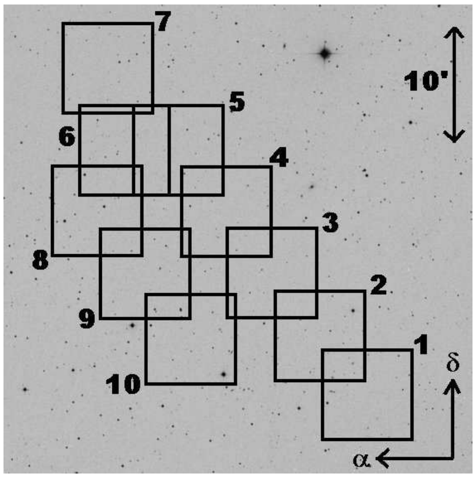

Fig. 1. Scheme of the Groth Strip Flanking Fields observed with the Calar Alto 3.5 m telescope. The total area of the figure is 40×40 arcmin^2. Our sixth field is located in the central part of the Groth Strip.

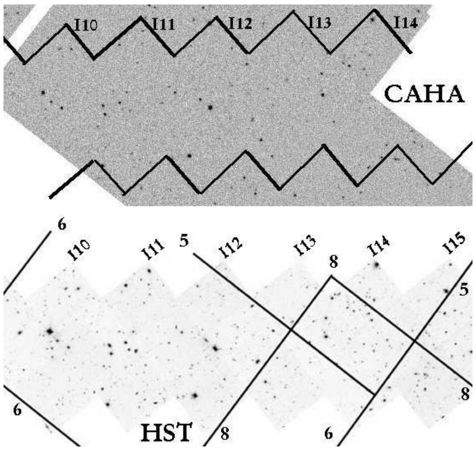

Fig. 2. Top: Piece of a mosaic of Calar Alto K band images of the Groth Strip Flanking Fields. The intersection with five *HST* fields (I10–I14, Groth et al. 1994) has also been drawn. Bottom: Piece of a mosaic of *HST I* band images of the Groth Strip, showing the fields I10–I15 with the intersection with our fields 5, 6, and 8.

relative offsets and avoiding objects and cosmetic defects. In the final combined frame, astronomical objects were detected and an object mask was generated for further iterations. In the first iteration, no object mask was used. About four iterations were needed to reduce each field.

4. IMMEDIATE FUTURE

For the Groth Strip and its Flanking Fields, we will obtain galaxy counts in the K band, which provide one of the best tests for the cosmological parameters (e.g., Gardner et al. 1996; Bershady, Lowenthal, & Koo 1998). Photometric redshifts (Bolzonella, Miralles, & Pelló 2000) will also be computed, in order to select spectroscopic candidates to be observed with EMIR in the future.

A new observing run at the Calar Alto 3.5 m telescope is planned for late March, 2002. It will include further observations of the Groth Strip Flanking Fields to obtain a total final coverage.

Financial support for this research was partially provided by the Spanish Programa Nacional de Astronomía y Astrofísica under grants AYA2000-977 and AYA2000-1790.

REFERENCES

Bershady, M. A.; Lowenthal, J. D.; Koo, D. C. 1998, ApJ 505, 50

Bolzonella, M.; Miralles, J.-M.; Pelló, R. 2000, A&A 363, 476

Gardner, J. P.; Sharples, R. M.; Frenk, C. S.; Baugh, C. M.; Carrasco, B. E. 1996, MNRAS 282, L1

Groth, E. J.; Kristian, J. A.; Lynds, R.; O'Neil, E. J., Jr.; Balsano, R.; Rhodes, J. & Idt, Wfpc-1. 1994, AAS 185, 5309

Hunt, L. K.; Mannucci, F.; Testi, L.; Migliorini, S.; Stanga, R. M.; Baffa, C.; Lisi, F.; Vanzi, L. 1998, AJ 115, 2594

Persson, S. E.; Murphy, D. C.; Krzeminski, W.; Roth, M.; Rieke, M. J. 1998, AJ 116, 2475

Science with the GTC 10-m Telescope (Granada, España, 5-8 febrero 2002)
Editors: José Miguel Rodríguez Espinosa, Francisco Garzón López & Verónica Melo Martín