WIDE-FIELD GALAXY AND CLUSTER SURVEYS USING COSMOS

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We have recently completed a catalogue of ~ 5 million galaxies in the Southern sky down to a limit of b_j = 20.5. The catalogue is based on the ROE/NRL Southern Sky Object Catalogue (Yentis et al. 1992), which is the result of processing of scans made with the COSMOS machine at the Royal Observatory Edinburgh (ROE) on glass copies of the IIIa-J survey carried out with the UK Schmidt Telescope (UKST) in Australia. The 'COSMOS/UKST Southern Sky Galaxy Catalogue' is based on 500 fields with $|b| > 25$ degrees and outwith the Magellanic Clouds.

The techniques used in the processing of the data are described in Yentis et al. (1992). Briefly, the COSMOS scans (see MacGillivray & Stobie 1984) were processed using the COSMOS crowded-field software analyser (Beard et al. 1990) to produce raw 'Image Analysis mode' data consisting of 32 parameters for each object. Star/galaxy separation techniques described in Heydon-Dumbleton et al. (1989) were subsequently applied to the data to produce the final galaxy catalogue. Calibration of the entire catalogue is provided using plate overlaps to obtain a global internal solution. This global solution was subsequently zero-pointed using available CCD sequences (principally in the SGP region) in order to put the photometry onto a true magnitude scale.

Figure 1 shows an isoplethal map of part of the catalogue. This is an area of 400 square degrees centred on the ESO/SERC field number 349 (with 1950 coordinates:- R.A. = 0h, Dec = –35 deg). A large-scale feature in the galaxy distribution is clearly delineated in the map. The presence of 'filamentary' structure in the galaxy distribution in this region of sky was first noted by Parker et al. (1987).

Figure 2 shows the clusters detected in the area from our automated cluster detection algorithm. The techniques developed for cluster detection have also been first described in Yentis et al. (1992). We show here only the richer systems (i.e. with N > 0 galaxies in the magnitude range m3 to m3+2), although our technique records the entire range of clusters down to small groups with only a handful of members. Very rich 'Abell-type' clusters (i.e. with N > 29 galaxies in the range m3 to m3+2) are shown as the filled circles. The highly non-random nature of the distribution of clusters is evident in the figure. We have undertaken a major programme of automated cluster detection in the Southern sky from the application of our techniques to the entire galaxy catalogue. The results are due to appear in print shortly.

With the SuperCOSMOS facility at the ROE, we are now extending our galaxy and cluster catalogues to the red plates from the UKST in the Southern sky, and to glass copies of the

H. T. MacGillivray et al. (eds.), Astronomy from Wide-Field Imaging, 632–634.

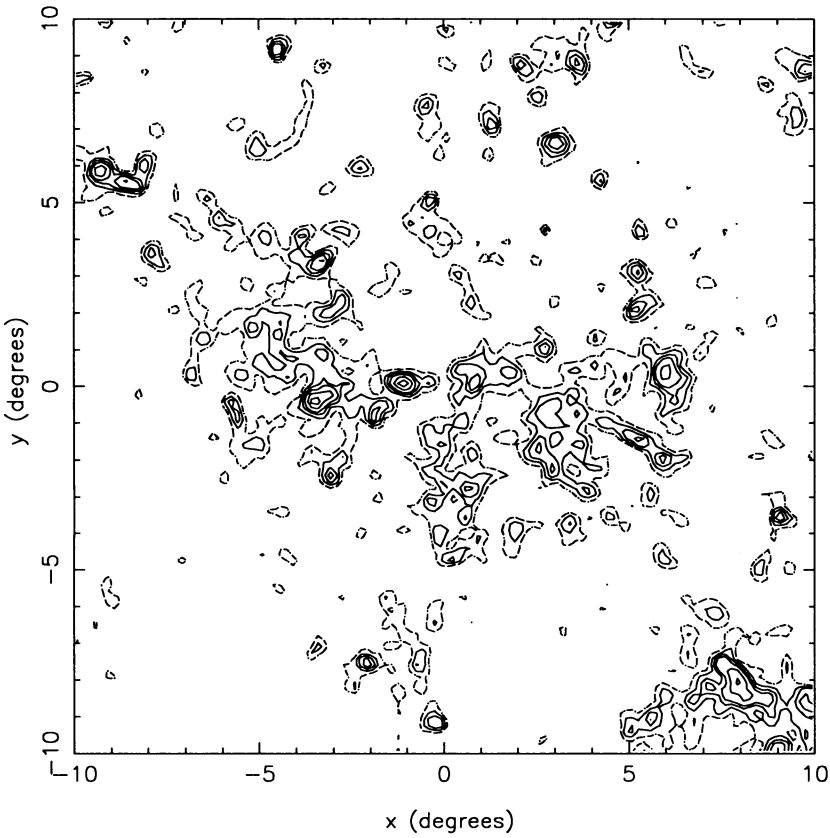

Figure 1. Isoplethal map representing the distribution of galaxies in a 20 x 20 square degree area of the galaxy catalogue centred on R.A. (1950) = 0h, Dec (1950) = -35 deg. North is at the top, East to the left.

POSS II plates in the Northern sky. Our ultimate aim is to provide a homogeneous, all-sky galaxy and cluster catalogue in 2 colours.

https://doi.org/10.1017/S0074180900048257 Published online by Cambridge University Press

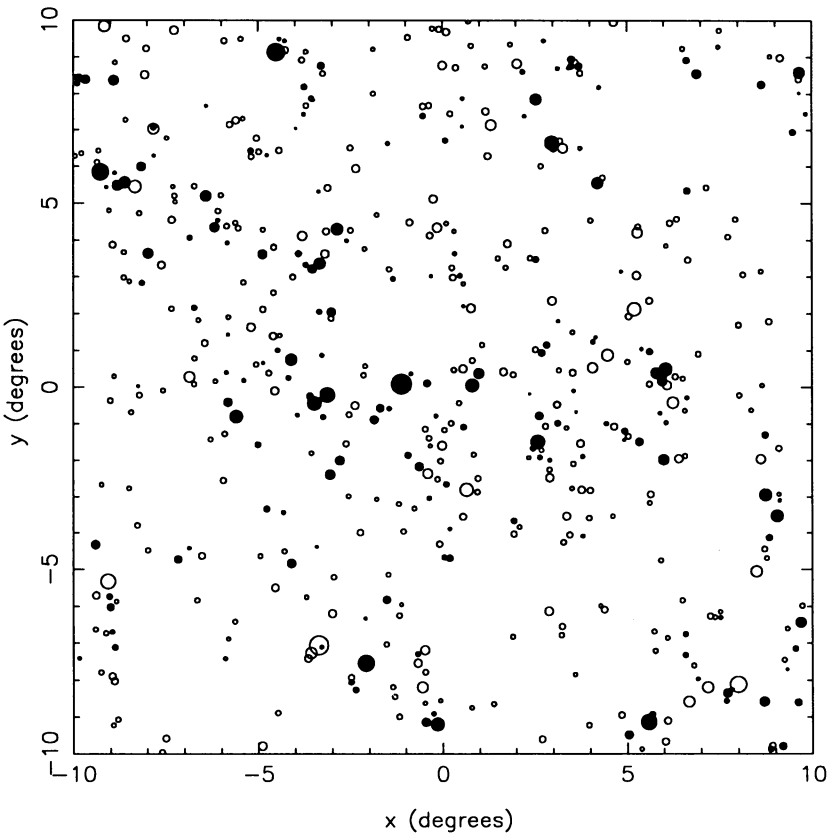

Figure 2. The clusters detected in the area of Fig. 1 using an automated cluster search technique (described in Yentis et al. 1992). Filled circles represent the rich 'Abell-type' clusters.

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