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Optical identification of equatorial infrared catalogue number 1 sources previously identified with only AFGL sources

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Abstract. We have identified, using Palomar Observatory Sky Survey (POSS) prints, the optical counterparts of six of the seven sources from the Equatorial Infrared Catalogue Number 1 (EIC-1) previously identified by Sweeney *et al.* (1978) with only AFGL infrared sources. We have estimated their P and R magnitudes from a measurement of the diameters of their images on the O and E POSS prints. The source EIC 725 does not appear to have an optical counterpart.

Key words : EIC-1 sources—POSS prints—optical identification

1. Introduction

The Equatorial Infrared Catalogue Number 1 (referred to hereafter as EIC-1) by Sweeney *et al.* (1978) contains 896 sources detected at 2.7 μm with U. S. Air Force satellite sensors. All of these sources lie in the declination range $\pm 10°$. Of these sources 808 were identified by Sweeney *et al.* (1978) with sources in (i) the SAO catalogue, (ii) the AGK3 catalogue, (iii) the Two Micron Sky Survey (TMSS) catalogue of Neugebauer & Leighton (1969) and (iv) the AFGL Infrared Sky Survey catalog of Price & Walker (1976). Among these 808, 7 were identified with only AFGL infrared sources and had no identification with sources in the SAO, AGK3 or TMSS. We therefore undertook optical identification of these sources using POSS prints and estimeted their P and R magnitudes.

2. Results

For identifying the optical counterparts we have used the method described by Ghosh *et al.* (1983). This method is expected to yield the positions of the optical counterparts to an accuracy of about four arcsec relative to EIC-1. A search was made for the seven EIC–1 sources which have their identifications only with AFGL sources. After identifying the stars, their magnitudes in the blue and the red were estimated, to an accuracy of $\sim$1 mag, by measuring their diameters on corresponding POSS prints.

In table 1 are listed columnwise : (i) the source number as in EIC-1; (ii) the right ascension and declination, for epoch 1950, of the source (a) as given in EIC-1 and (b) its optical candidate (present study); (iii) separation $\Delta\theta$ (arcsec) between the coordinates of EIC–1 and its optical counterpart; (iv) the AFGL number with which it had been identified by Sweeney *et al.* (1978); (v) *P*, the blue; and (vi) *R*, the red magnitudes estimated from the image sizes of the optical counterparts on the O and E POSS prints. The finding charts of these sources are presented in figure 1.

Table 1. Optical identifications of EIC-1 sources

EIC-1 No.	Coordinates R. A. (1950)	Dec (1950)	Δθ (arcsec)	AFGL No.	*P*	*R*
	h m S	° ′ ″				
153	06 44 22.75	+08 04 11.2 *	2.6	1010	13.0	8.5
	06 44 22.86	+08 04 13.3 †				
458	15 52 17.83	−03 47 36.2 *	6.8	1809	11.4	8.2
	15 52 18.20	−03 47 32.3 †				
652	18 23 01.82	+05 44 16.4 *	3.4	2150	20.0	13.1
	18 23 02.04	+05 44 17.1 †				
678	18 31 55.07	−08 37 12.7 *	5.6	2195	20.0	13.1
	18 31 55.42	−08 37 10.6 †				
679	18 32 07.84	−08 39 07.2 *	4.8	2195	12.4	8.5
	18 32 08.13	−08 39 05.0 †				
725	18 56 03.71 ‡	+06 38 47.7 * ‡	‡	2290	>21	>20
768	19 24 48.67	+06 58 03.0 *	2.9	2392	>21	15.4
	19 24 48.63	+06 58 05.9 †				

Notes : (*) Position of the EIC-1 source.
(†) Position of the optical candidate.
(‡) No optical candidate was found.

3. Discussion

It is seen from table 1 that the EIC-1 sources 153, 458 and 679 have reasonably bright optical counterparts. However, we could identify only the source 458 with the source −3° 3841 in the BD catalogue. The optical counterpart of source 768 is seen on the red print but is invisible on the blue print. This source was identified with AFGL 2392 by Sweeney *et al.* (1978). Cohen (1975) identified the optical counterpart of AFGL 2392 using POSS prints and estimated its *P* and *R* magnitudes. His identification of the optical counterpart of AFGL 2392 matches well with the optical counterpart of EIC 768. The *P* and *R* magnitudes obtained by Cohen also compare quite well with the *P* and *R* magnitudes estimated by us.

We did not find any optical counterpart for EIC 725 on either the blue or the red POSS prints. The nearest object in the field (indicated by an arrow in figure 1) has a magnitude of ~19 in *R* and is ~50 arcsec away from the position of EIC 725. EIC 725 has been identified with AFGL 2290 by Sweeney *et al.* (1978). Lebofsky & Kleinmann (1976) searched for the optical counterpart of AFGL 2290 but did not find any. Lebofsky *et al.* (1976) confirmed the AFGL sources 2290 and 2392 in the improved ground-based verification program they carried out. They determined the position of AFGL 2290 to an accuracy of 3 arcsec and AFGL 2392 to an accuracy of 15 arcsec, in both right ascension and declination. Lebofsky *et al.* (1976) give broad band fluxes of AFGL 2290 at 2.2, 3.6, 5.0 and 10.6 μm. It is seen

that the flux decreases sharply below 3.6 μm and is in conformity with the source being invisible to the limiting sensitivity of POSS prints.

No ground-based observations of the AFGL sources identified with EIC-1 sources 153, 458, 652, 678 and 679 appear to have been reported. Thus no positional data on them to an accuracy comparable to that of the EIC-1 sources is available. Also no optical searches for their counterparts appear to have been reported.

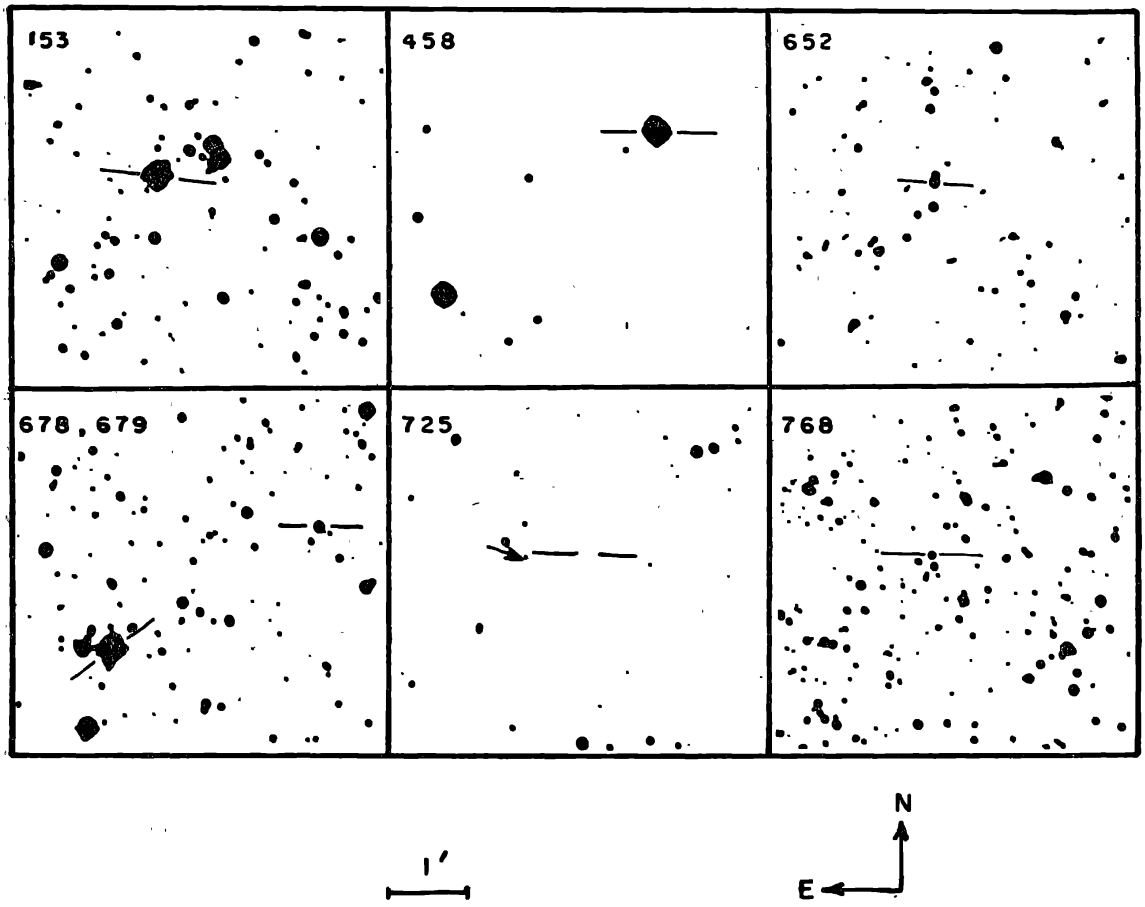

Figure 1. Copies of the red prints of the Palomar Sky Survey in the regions surrounding the EIC-1 sources. Source numbers are given in the upper left corner of each print. The identified optical candidates of these sources are enclosed by two lines. In the case of the sources 678 and 679 which are on the same frame, 678 is on the right and 679 on the left. For 725 no optical candidate was found. Note that the identified optical candidates are not always at the centre of the prints.

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