

STELLAR SOURCES IN A FIELD AT $l \simeq -45^\circ$, $B \simeq 0^\circ$ OF THE ISOGAL SURVEY (ISOCAM 7 AND 15 MICRONS OBSERVATIONS)

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1. What is ISOGAL ?

ISOGAL is a survey at 15 and 7 μm with ISOCAM of the inner Galactic disk. The survey covers $\sim 18 \text{ deg}^2$ in selected areas of the central $l = \pm 30$ deg of the Galactic plane, all complemented by 0.8-2.2 μm DENIS data. Combined with the near infrared IJK data of the DENIS survey, it is mainly aimed at the study of the cold stellar populations of the most obscured regions of the inner Galaxy and the corresponding Galactic structure.

2. The Data

The ISO field analysed here is at $(l, b) = (-45, 0)$ (see Perault et al. 1996). We have limited the analysis of the ISOGAL field to a total area of 0.144 deg^2 after dropping the edges of the 0.2 deg^2 7 by 24 raster field, where the quality of the data is dubious because of the lack of several observations of the same sky point. The total number of sources presently found in this field is 396 in LW3 (15 μm) and 1213 in LW2 (7 μm) bands in 0.144 deg^2 . The completeness limiting flux achieved is $\sim 8 \text{ mJy}$ ($m_{15} \sim 8.5$; $m_7 \sim 10$). This is two orders of magnitude more than IRAS, as expected with a sensitivity and a pixel surface ($6'' \times 6''$) almost 100 times better. The completeness limits in DENIS K, J and I bands are 12.5, 14.5 and 16.5 mag, respectively. The total number of extracted sources in 0.144 deg^2 are about 2560, 3091

and 4040 in K, J and I bands, respectively. Within a matching radius of 2 arcsec, we find 1875 JK and 1028 IJK cross-identified DENIS sources.

3. ISOGAL - DENIS cross-correlation

We have cross-correlated the ISOGAL sources with DENIS IJK sources. About 190 of 15 μm sources have a clear identification with a bright K sources ($K \leq 11$). Among them 170 have a J counterpart, and among the later 94 also have an I counterpart. 43 ISOGAL sources are also associated with a weak DENIS K sources ($11 < K \leq 12.5$), among them 24 have also a J counterpart and many of them have large K-15 values. About 482 of 7 μm sources also cross-matched with bright DENIS K sources ($K \leq 11$), among them 419 have a J counterpart and 230 have also an I counterpart. A total of 146 sources have been detected in LW3, LW2 and DENIS JK bands in $K \leq 11$ and 8 sources in $11 < K \leq 12.5$. We restricted our analysis to ISO sources considering the 154 sources ($K \leq 12.5$) detected in the LW3 & LW2 and DENIS JK bands.

4. Conclusion

We analysed the data of a field at $l \simeq -45^\circ$ from the ISOGAL survey. In combination with IJK data from DENIS, the ISOCAM data allow the first detailed study of infrared stellar populations in very obscured regions of the inner Galaxy. The analysis of the two-color diagrams (such as J-K *vs* K-15 and J-K *vs* K-7) allows to identify the main astrophysical classes of the ISO sources and their proportion. Of the ~ 3000 sources/deg² detected at 15 μm , about half are red giants seen through extinction of up to $A_V \sim 30$, with very few earlier-type foreground stars, while most of the remainder are probably AGB and dusty young stars. Red giants are better observed at 7 μm , they increase the sample of the detected giants by a factor of ~ 5 . The 7 μm data also help to confirm and characterise the many dusty YSOs detected at 15 μm but not in K. Most of the ISOGAL sources are associated with relatively bright DENIS sources ($K \leq 11$), although an important fraction ($\sim 30\%$) have no K association and are expected to be cold dusty young stars if they are real sources. The number of ISOGAL sources without K counterpart is also consistent with the expectation for dusty young stars inferred from the study of IRAS sources in Lynds 1641 dark cloud by Storm et al. (1989).

References

- Perault M., Omont A., Simon G., Séguin P., Ojha D., et al, 1996, A&A 315, 165L
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