The RMS Survey: Mid-Infrared Observations of Candidate Massive YSOs in the Southern Hemisphere

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Context: The Red MSX Source (RMS) survey is an ongoing effort to return a large, well-selected sample of massive young stellar objects (MYSOs) within our Galaxy. 2000 candidates have been colour-selected from the Mid-course Space Experiment (MSX) point source catalogue (PSC). A series of ground-based follow-up observations are being undertaken in order to remove contaminant objects (ultra-compact HII (UCHII) regions, planetary nebulae (PN), evolved stars), and to begin characterising these MYSOs.

Aims: As a part of these follow-up observations, high resolution (~1") mid-IR imaging aids the identification of contaminant objects which are resolved (UCHII regions, PN) as opposed to those which are unresolved (YSOs, evolved stars) as well as identifying YSOs near UCHII regions and other multiple sources.

Method: We present 10.4 micron imaging observations for 346 candidate MYSOs in the RMS survey in the Southern Hemisphere, primarily outside the region covered by the GLIMPSE Spitzer Legacy Survey. These were obtained using TIMMI2 on the ESO 3.6m telescope in La Silla, Chile. Our photometric accuracy is of order 0.05Jy, and our astrometric accuracy is 0.8", which is an improvement over the nominal 2" accuracy of the MSX PSC.

Results: Point sources are detected in 64% of our observations, which are expected to be either YSOs or evolved stars. 24% contain only sources of extended emission, which are likely to be either UCHII regions or, in a few cases, PN. This is confirmed by comparison with radio continuum observations. We find that, as expected for a dusty HII region, the strength of 10.4 micron and radio continuum emission is related. The remaining targets (12%) result in non-detections. While for 63% of our targets we detect only one mid-infrared source, 25% show multiple sources. In these cases, our observations will allow the apportioning of the flux from larger beam measurements between the different sources. Within these multiple source targets, we find some point sources on or near UCHII regions. Our improved astrometric information will allow more accurate targeting of spectroscopy, which will be used to identify unresolved sources in cases where it is not clear whether they are YSOs or evolved stars.

Reference: Accepted by Astronomy and Astrophysics
Status: Manuscript has been accepted

Weblink:

Comments: Preprint available at http://arxiv.org/abs/0709.2040

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