A Survey of Protostars and Disks in the Embedded Clusters GGD 12-15 and IRAS 20050+2720: New Results from *Spitzer*

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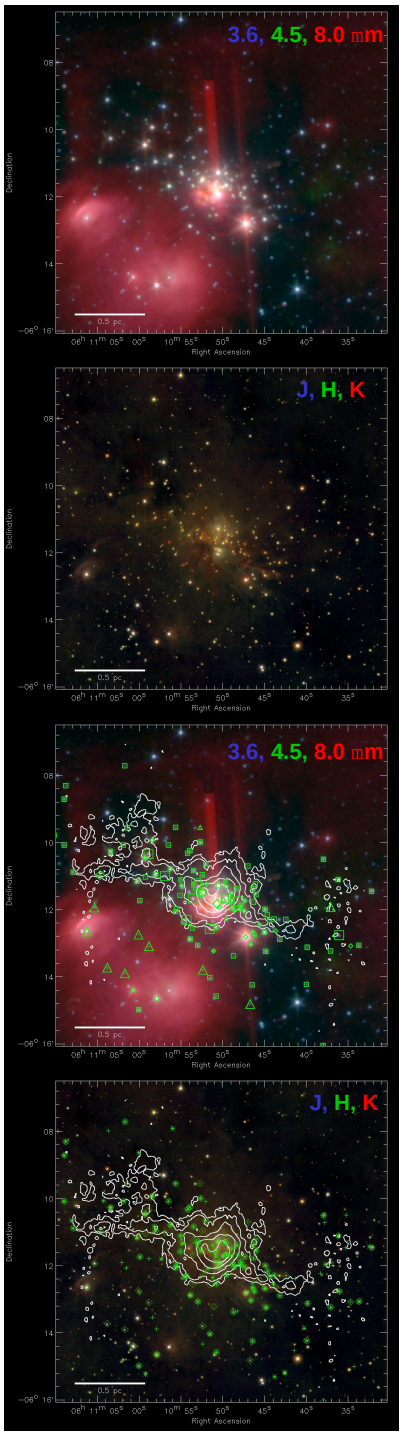
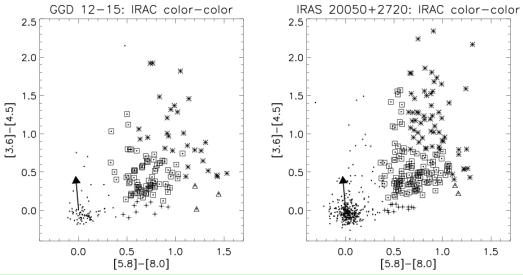
GGD 12-15



Abstract

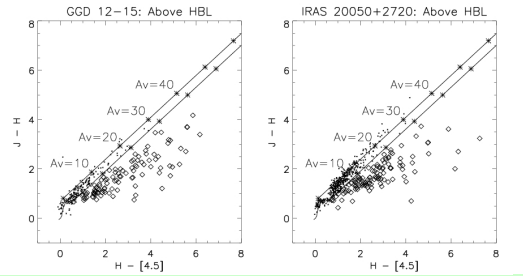
We present preliminary analysis of 1-8 μm photometry of the nearby (0.7-0.8 kpc) young (<1 Myr) stellar clusters GGD 12-15 and IRAS 20050+2720 from IRAC on *Spitzer*, FLAMINGOS on MMT, and 2MASS. Each cluster has on the order of 100 members in a high density asymmetric configuration as well as significant outflow activity. However, their far-infrared luminosities differ by more than an order of magnitude. Combined ground-based near-infrared and IRAC colors are used to identify stars with circumstellar disks. Class I (protostars) and Class II (stars with disks) objects are classified via IRAC 3-8 μm color analysis. The spatial distributions of all young stars with infrared excess emission detected are compared with published gas and dust distributions for these regions.



Above: ***IRAC Four Band Color-Color Diagrams***
Pre-main sequence (PMS) star identification method from Allen et al. (2004) and Megeath et al. (2004). Vector shows A_v = 30 from reddening law of Indebetouw et al. (2005).
Plot key: **Class 0/I = asterisks; Class II = squares; Class I/II = triangles; Circumstellar Disk Gap Candidates = pluses.**

Left and Right: ***Spatial Distributions of Pre-Main Sequence Stars I***
Contours**: SCUBA 850 mm dust emission (Gutermuth et al. 2005)**
Plot Key**: Class 0/I = diamonds; Class II = squares; Class I/II = triangles; Circumstellar Disk Gap Candidates = large triangles**

NOTE: Red vertical bands at left are instrumental artifacts caused by bright sources.



Above: ***J, H, (ground-based) and IRAC 4.5 mm Color-Color Diagrams***
Stars with excess 4.5 mm emission (diamonds) have warm inner disks, thus Class II (with a few Class I). This method is very sensitive, but less effective in high extinction. Reddening law adopted from Indebetouw et al. (2005).

Left and Right: ***Spatial Distributions of Pre-Main Sequence Stars II***
Contours**: SCUBA 850 mm dust emission (Gutermuth et al. 2005)**
Plot Key**: IRAC Four Band Method PMS identifications = diamonds**
JH[4.5] Method warm disk identifications = asterisks

REFERENCES

Allen, L. E., et al., 2004, ApJS, 154, 363; Gutermuth et al. 2005, submitted to ApJ; Indebetouw et al. 2005, in press; Megeath, S. T., et al., 2004, ApJS, 154, 367

IRAS 20050+2720