COMPARISON OF SUBMILLIMETER AND CO BRIGHTNESS IN ORION AND MON R2

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Emission from interstellar dust in L 1641 and Mon R2 was mapped with three arcminute resolution at 400 microns wavelength from White Mountain, California at 3.9 km elevation. Dust brightness distributions and ^{13}CO antenna temperatures are shown below with equal linear scales, emphasizing that the core of Mon R2 is considerably larger and more massive than the core of the Orion region containing OMC-1 and OMC-2. Dust and ^{13}CO brightness distributions for each object are similar, but some of the differences may be real. The differences become accentuated when mass distributions are compared.

Optical depth is determined from 400 micron brightness using roughly estimated temperatures. Temperatures in Orion are estimated from submillimeter colors and temperatures in Mon R2 are estimated from luminosities of previously known sources of heating. Ratios of optical depth to ^{13}CO column density are calculated. The average of these ratios is about 8×10^{-20} square cm for OMC-2 and the eastern part of Mon R2, and is about 30×10^{-20} for the western part of Mon R2. The former is below what would be expected from the distribution over many objects found by Righini-Cohen and Simon (1977), and the latter is above that. This rough procedure for estimating dust optical depth leads to an apparent dust peak in Mon R2 five arcminutes west of the brightness peak, while the CO peak is at the same location as the submillimeter peak. This could be due to the reduction procedure, or it could be due to a real difference in locations of dust peaks and stars as well as a difference in dust and CO distributions. An undetected source of heating would account for the higher brightness of the dust to the west, although this is unlikely as it does not appear in the CO brightness.

These observations support the expectation of dust and CO being closely related, although some deviations in the dust to CO ratio may be visible. Improved measurements of dust color temperature will enable better analysis of these deviations.

REFERENCES

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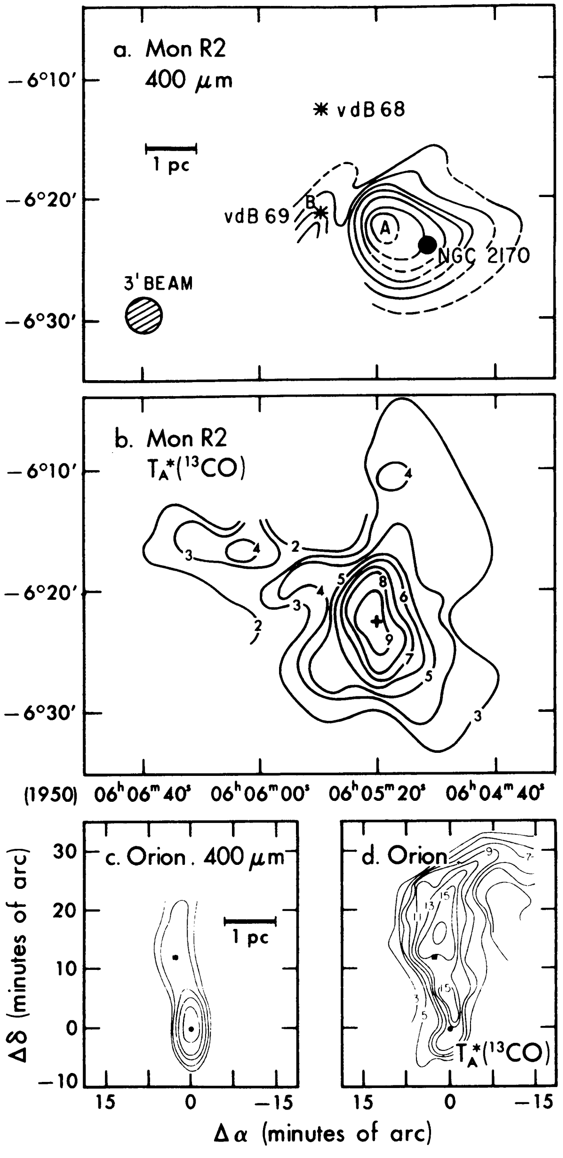

Mon R2, 400 micron contour intervals are 325 Jy in 3 arcminute beam, objects A and B are known sources of infrared heating. Cross (+) in CO map is at position of A. vdB 69 is assumed to be heated by B.

Orion, L 1641, 400 micron contour intervals are logarithmic at 200, 400, 800, 1600 and 3200 Jy in 3 arcminute beam. Solid circle and square are at locations of centers of OMC-1 and OMC-2 respectively. Coordinates are relative to peak of OMC-1.

Figure 1. 400 micron dust brightness and ^{13}CO antenna temperatures. 400 micron observations do not cover entire area of CO observations. Dust and CO measurements were made with 3.0 and 2.6 arcminute beamwidths respectively. CO data are reproduced by permission of authors and The Astrophysical Journal. Orion CO is from Kutner, Evans, and Tucker (1976) and Mon R2 CO is from Loren (1977). CO temperatures are corrected for beam efficiency and atmospheric absorption.